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IN THE MATTER OF AN ARBITRATION UNDER ANNEX 14-C OF THE CANADA-UNITED STATES-MEXICO AGREEMENT (CUSMA), CHAPTER ELEVEN OF THE NORTH AMERICAN FREE TRADE AGREEMENT AND THE 2013 UNCITRAL ARBITRATION RULES

BETWEEN:

WINDSTREAM ENERGY LLC

Claimant

and

GOVERNMENT OF CANADA

Respondent

CLAIMANT'S THIRD BOOK OF EXPERT REPORTS
VOLUME 1 OF 3

TAB NOS. 1 - 4

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TABLE OF CONTENTS

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TABLE OF CONTENTS

11.	CER-COWI (Opinion of Probable Cost)	Expert Report of COWI North America Inc. (Brent Cooper, Jørn Thomsen, Jørgen Bang Cramwikt, Carly Wilmott, Emma Chick)	Wolfe Island Shoals - Gravity Based Foundation Opinion of Probable Cost
12.	CER-4C Offshore-3	Third Expert Report of 4C Offshore Ltd.	Wolfe Island Shoals – Review of Capital Costs
13.	CER-Weeks-2	Expert Report of Weeks Marine	Wolf Island Shoals - Gravity Based Foundation and Wind Turbine Generator Installation Means and Methods

TAB 1

Secretariat

Windstream Energy LLC CLAIMANT

-and-

Government of Canada RESPONDENT

Independent Expert Report of Chris Milburn, Edward Tobis, and Pierre-Antoine Tetard

February 18, 2022

TABLE OF CONTENTS

LIST OF SCHEDULES

1 INTRODUCTION

A. Assignment

1.1 We have prepared this report at the request of Torys LLP ("**Counsel**"), on behalf of Windstream Energy LLC ("**Windstream"** or the "**Claimant**"), in connection with a claim advanced against the Government of Canada ("**Canada**" or "**Respondent**") under the North American Free Trade Agreement (the "**NAFTA**" or the "**Treaty**"). We refer to the Claimant and the Respondent collectively as the "**Parties**".

1.2 We are instructed that the dispute between the Parties relates to the Claimant's investment (the "**Investment**") in an offshore wind power generation facility located off the coast of Wolfe Island, near Kingston, Ontario (the "**Project**").

1.3 On May 4, 2010, Windstream Wolfe Island Shoals Inc. ("**WWIS**"), a subsidiary of the Claimant, entered a Feed-in-Tariff contract (the "**FIT Contract**") with the Ontario Power Authority ("**OPA**").[1] The FIT Contract required WWIS to develop, build and bring the Project into commercial operation.[2] In accordance with the FIT Contract, the OPA was required to purchase all the power produced by the Project, at an indexed fixed price, for a 20-year period beginning from the date that the Project reached "**Commercial Operations**".[3, 4]

1.4 On February 11, 2011, the Ontario Government issued a moratorium on offshore wind energy projects in Ontario (the "**Moratorium**").[5]

1.5 On January 28, 2013, Windstream filed a Notice of Arbitration against the Respondent under Chapter 11 of the NAFTA with respect to the actions of the Ontario Government and OPA relating to the Project to that point in time ("**NAFTA 1**").

1.6 On September 27, 2016, an arbitral tribunal issued an award (the "**First NAFTA Award**") that found that Respondent breached its obligation for fair and equitable treatment of Windstream's investments and found that the FIT Contract remained in force and that "… *it continues to remain open for the Parties to re-activate and as appropriate, renegotiate the FIT*

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1 NAFTA 1, Exhibit C-0251, Feed-in Tariff Contract (OPA) and WWIS (May 4, 2010), Cover Page.
2 NAFTA 1, Exhibit C-0245, Feed-in Tariff Contract, Schedule 1, Version 1.3.0. (May 4, 2010), section 2.1.
3 NAFTA 1, Exhibit C-0245, Feed-in Tariff Contract, Schedule 1, Version 1.3.0. (May 4, 2010), section 8.1(b).
4 Section 2.6 of the FIT Contract (NAFTA 1, Exhibit C-0245) states that commercial operations will be deemed to have been achieved when the following are met: 1) the OPA has issued a Notice to Proceed to WWIS; 2) if WWIS was required to submit a Metering Plan, the OPA has received and approved it; 3) the OPA has received an electrical drawing identifying the as-built Connection Point; 4) the OPA has received an IE Certificate stating the requirements per section 2.6(iv) of the FIT Contract; and 5) the OPA has received from WWIS a certificate in the form set out in Exhibit F of the FIT Contract with respect to the commercial operation of the facility.
5 Notice of Arbitration dated December 22, 2020 (the "**NOA**"), paragraph 20.

Contract to adjust its terms to the moratorium."[6] The Tribunal awarded Windstream approximately $25.2 million in damages for Canada's breaches of the NAFTA in relation to the Project using a comparable transactions methodology, and on the basis that "*…the Claimant had not lost the entire value of its investment.*"[7]

1.7 We understand that subsequent to the First NAFTA Award, the Claimant initiated another proceeding under the NAFTA alleging that the Respondent breached its obligations under the following articles of Chapter 11 of the NAFTA:[8]

i. Article 1110 (Expropriation);

ii. Article 1105(1) (Minimum Treatment); and,

iii. Article 1503(2) (State Enterprises).

1.8 We have been advised that the measures which the Claimant alleges constituted wrongful measures under the Treaty relating to the Project since the First NAFTA Award, include, but are not limited to:[9]

i. The failure of the Ontario Government to direct the Independent Electricity System Operator ("**IESO**")[10] not to terminate the FIT Contract following the First NAFTA Award;

ii. The failure of the Ontario Government to direct the IESO to amend the FIT Contract following the First NAFTA Award to ensure the Project would be "deferred", "frozen" and "on hold";

iii. The failure of the IESO to amend the FIT Contract to ensure the Project would be "deferred", "frozen" and "on hold", based on commitments that had been provided by the Ontario Government;

iv. The failure of the Ontario Government to complete the work it considered necessary in order to lift the Moratorium in a timely manner, following the First NAFTA Award;

v. The Ontario Government's continued application of the Moratorium to WWIS following the First NAFTA Award; and,

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6 **C-2040** - Windstream Energy LLC v. Canada, PCA Case No. 2013-22, Award (September 27, 2016) (Nancy Baines' Witness Statement) ("**First NAFTA Award**"), paragraph 290.

7 **C-2040** - First NAFTA Award, paragraphs 473, 476, 515 (e).

8 NOA, paragraph 54.

9 NOA, paragraph 56.

10 In January of 2015, the OPA merged with the IESO and the combined entity kept the name of the IESO. Source: **C-2011** - IESO Press Release entitled "The Independent Electricity System Operator and Ontario Power Authority Amalgamate" (January 2, 2015).

vi. The termination of the FIT Contract by the IESO on February 20, 2018, which took effect on February 18, 2020.

1.9 We refer to the above allegations collectively herein as the "**Alleged Breaches**".

1.10 We have been asked by Counsel to provide our independent opinion as to the quantum of damages sustained by the Claimant, if any, as a result of the Alleged Breaches. We have been asked to prepare our analysis using a valuation date of February 18, 2020 (the "**Valuation Date**"), the day the FIT Contract was officially terminated.

1.11 In preparing our opinion of damages, we have assumed that there will be a finding that the Claimant is entitled to an award of damages due to the Alleged Breaches of the Respondent. Comments contained herein are not intended to be opinions on the legal merits of the claim (which we are not qualified to provide) and should not be interpreted as such.

1.12 In preparing this report, we have been asked to rely upon the conclusions set out in the following expert reports:

i. The report of Mr. Richard Auckland of 4C Offshore dated February 18, 2022 (the "**4C Report**"). The 4C Report provides independent expert analysis concerning the capital costs of the Project, and the global offshore wind market during the relevant period;

ii. The report of Mr. Ian Irvine of Two Dogs Projects Ltd. dated February 18, 2022 (the "**Two Dogs Report**"). The Two Dogs Report provides independent expert analysis concerning certain technical aspects, and operating and capital cost assumptions of the Project;

iii. The report of Wood Group plc (formerly SgurrEnergy) dated February 18, 2022 (the "**Wood Report**"). The Wood Report provides independent expert analysis concerning technical aspects and capital cost assumptions of the Project; and,

iv. The report of Power Advisory dated February 18, 2022 (the "**Power Advisory Report**"). the Power Advisory Report addresses the IESO's decision to terminate the FIT Contract, Ontario's current electricity supply needs, and includes a forecast of the long-term Hourly Ontario Energy Price ("**HOEP**") that it had contemporaneously prepared in September of 2019.

B. Qualifications

1.13 This report has three authors, Chris Milburn, Edward Tobis (collectively referred to as "**Secretariat**"), and Pierre-Antoine Tetard. Our qualifications are set out briefly below and our CVs are attached in **Appendix 8**, **9** and **10,** respectively.

Chris Milburn

1.14 I am a professional accountant (CPA, CMA) and a Chartered Business Valuator (CBV). I am a Managing Director with Secretariat International and have been involved exclusively in business valuations, damage quantification, financial litigation, and corporate finance-related matters since 1997. I have acted as an advisor to private and public companies, regulatory bodies, and governments on a wide variety of industries. My work experience covers assignments throughout the world.

1.15 I have prepared expert opinion reports on valuation and economic damages issues in disputes before Canadian, US, UK and Australian domestic courts, commercial arbitrations and investor-state arbitrations under many forums including the International Centre for the Settlement of Investment Disputes (ICSID), Permanent Court of Arbitration (PCA), International Chamber of Commerce (ICC), and the London Court of International Arbitration (LCIA).

1.16 I have provided expert testimony relating to the quantification of economic damages on many occasions.

1.17 My curriculum vitae is attached in **Appendix 8**.

Edward Tobis

1.18 I am a professional accountant (CPA, CA) and a Chartered Business Valuator (CBV). I have been involved in business valuations, financial litigation, corporate finance, and financial accounting related matters since 2010. I have acted as a business valuator, auditor, financial consultant and tax advisor for private and public companies, regulatory bodies, and governments in a wide variety of industries, including the energy and infrastructure industries, and I have prepared dozens of valuations and economic damages reports filed in various courts and International Arbitration Hearings around the world.

1.19 I have provided expert testimony relating to the quantification of economic damages and business valuation issues on multiple occasions.

1.20 My curriculum vitae is attached hereto as **Appendix 9**.

Pierre-Antoine Tetard

1.21 I am a professional economist (MS in industrial economics and MS in Finance), with over 15 years' professional experience in the energy industry, with the past 14 years specializing in renewable energy, and the past 7 years specializing in the offshore wind industry. From 2006 to 2008, I worked in Investment Banking at Morgan Stanley (London & New York) in their energy practice offering advisory services to clients in mergers & acquisitions, strategy, equity/debt capital raising and strategic valuation. In 2008, I joined the largest energy-focused Private Equity fund, Riverstone, where I analyzed, structured, executed, and managed private investments ("portfolio companies"). There, I launched a newly formed portfolio company exclusively dedicated to onshore wind project investments (acquisitions, project developments, project finance funding, construction, and sale).

1.22 From 2014 onwards, I specialized in offshore wind, successively working with Green Giraffe (equity investments/fundraising), Ørsted (business development initiatives, including mergers & acquisitions, project financing, partnerships / joint ventures, globally) and my current firm, BlueFloat Energy (leading the company's international expansion into new markets, setting up partnerships with local partners and initiating offshore wind project development strategies). Blue Float Energy was founded in 2020, and has a presence in 4 continents (Europe, North America, South America, Asia-Pacific).

1.23 Since 2008, when I joined Riverstone, my role as investor and renewable energy project developer has largely focused on project and company valuations, including the investability and bankability of those projects. I have led or participated in the evaluation of several gigawatts ("**GWs**") of onshore and offshore wind projects, globally, including valuation, technical and legal due diligence, structuring, negotiation, and documentation to signing/closing.

1.24 My work experience covers assignments in Europe, Asia, North America, and South America.

1.25 My curriculum vitae is attached hereto as **Appendix 10**.

C. Report Structure and Contributions of Each Author

1.26 In the following section, we set out the areas of this report for which each author is primarily responsible, unless otherwise noted, along with the areas for which author is jointly responsible.

1.27 Our report is set out as follows:

i. In Section 2, we provide an executive summary of our damages analysis and conclusions (Secretariat and Mr. Tetard);

ii. In Section 3, we provide the reporting standards and restrictions applicable to this report (Secretariat);

iii. In Section 4, we provide an overview of the Investment, the Claimant, and the dispute (Secretariat and Mr. Tetard);

iv. In Section 5, we describe the approach we have taken to quantify the Claimant's damages in this matter (5A to 5D: Secretariat; 5E and 5F: Secretariat and Mr. Tetard);

v. In Section 6, we set out our valuation of the Project under an income approach to value using a discounted cash flow ("**DCF**") methodology (Secretariat and Mr. Tetard);

vi. In Section 7, we set out our valuation of the Project under a market-based approach (7A, 7B and 7C, Secretariat and Mr. Tetard, 7D, 7E and 7F, Secretariat);

vii. In Section 8, we provide a summary of Windstream's discussions with interested parties in 2017, which provide objective indicators of the value of the Project (Secretariat);

viii. In Section 9, we set out our calculation of pre-award interest (Secretariat);

ix. In Section 10, we provide our conclusions on the Claimant's damages due to the Alleged Breaches (Secretariat (all damages conclusions) and Mr. Tetard (valuation conclusions only);

x. In Section 11 we provide a list of the assumptions we have used in our damages analysis (Secretariat);

xi. In Section 12, we provide our declarations with respect to this report (Secretariat and Mr. Tetard);

xii. In **Appendix 1**, we provide an overview of the offshore wind generation industry, and in particular, describe the growth in this industry since the First NAFTA Award (Secretariat and Mr. Tetard);

xiii. In **Appendix 2**, we provide an overview of how offshore wind projects are developed and funded (Mr. Tetard);

xiv. In **Appendix 3**, we provide a discussion of the discount rate we use to discount the expected future cash flows of the Project in our DCF analysis (Secretariat);

xv. In **Appendix 4**, we provide a detailed description of the comparable transactions used in our market-based valuation (Secretariat and Mr. Tetard);

xvi. In **Appendix 5**, we provide a detailed description of the comparable company trading multiples used in our market-based valuation (Secretariat);

xvii. In **Appendix 6**, we set out the documents we have relied upon in the preparation of this report (Secretariat and Mr. Tetard); and,

xviii. In **Appendix 7**, we provide a glossary of the defined terms used throughout this report (Secretariat and Mr. Tetard).

1.28 Notwithstanding that Secretariat and Mr. Tetard are primarily responsible for certain portions of this report, to the extent that these portions are interdependent and overlapping, the authors have reviewed the entire analysis and believe the assumptions, methodology and conclusions herein are reasonable.

2 EXECUTIVE SUMMARY[11]

A. Introduction

2.1 The dispute between the Parties relates to the Alleged Breaches of Respondent's obligations under the NAFTA regarding the Claimant's Investment in the Project.

2.2 We have calculated damages to the Claimant under the assumption that there will be a finding that the Claimant is entitled to an award of damages due to the Alleged Breaches of the Respondent. Our calculations are based on the principle set out in the judgement in the *Factory at Chorzów* case that damages are to "*… as far as possible, wipe out all the consequences of the illegal act and re-establish the situation which would, in all probability, have existed if that act had not been committed.*" [12]

2.3 We have calculated the Claimant's damages as the fair market value (**"FMV"**)[13] of the Investment on the Valuation Date of February 18, 2020, absent or 'but-for' the Alleged Breaches, less the amount received by the Claimant as damages in the First NAFTA Award, plus pre-award interest to the expected date of the Tribunal's award.

2.4 We have used both an income approach and a market approach to determine the FMV of the Project as at the Valuation Date, absent the Alleged Breaches.

2.5 We have calculated pre-award interest on a compound basis to compensate the Claimant for not having had access to, or use of, the amount of damages calculated herein from the Valuation Date to the date of an expected award. We can update that calculation as to the date of any later report or presentation before the Tribunal, if requested.

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[11] The paragraphs included within this executive summary represent a summary of our analysis and conclusions and are not a substitution for the body of this report. Please refer to the relevant sections of our report for detailed discussions pertaining to the issues summarized in this executive summary.
All figures noted in $ herein are presented in Canadian dollars.

[12] NAFTA 1, Exhibit CL-034, Case Concerning the Factory at Chorzów (Germany v. Poland), 1928 P.C.I.J (ser. A) No. 17 (September 13, 1928).

[13] See definition of FMV at **Section 5C** below. We understand that in cases of unlawful expropriations, the definition of FMV should be subject to the overriding principle of full reparation, as discussed in **Section 5C** below.

B. Overview of the Project

2.6 The Project is an offshore renewable wind energy generation project that was to be located off the coast of Wolfe Island, near Kingston, Ontario,[14] on approximately 48,000 acres of shallow water shoals.[15]

2.7 WWIS entered into the FIT Contract with the OPA on May 4, 2010 which provided that WWIS was to design and build the Project facility and bring it to commercial production. The FIT Contract was a fixed-price contract that provided the terms and conditions applicable to the contract holders (suppliers) and the OPA/IESO including a 20-year fixed price of $0.19/kilowatt hour ("**kWh**") (subject to inflationary increases) to be paid by the OPA/IESO for offshore wind power. The FIT Contract provided a capacity for the Project of 300 megawatt ("**MW**"). [16]

2.8 Under the FIT Contract, a Milestone Date for Commercial Operation ("**MCOD**") was set at 5 years from the FIT Contract date, which resulted in a date of May 4, 2015 (the "**Original MCOD**").[17] However, if an event of Force Majeure[18] caused WWIS to be unable to achieve Commercial Operation by the Original MCOD, the milestone date was to be extended "*for such reasonable period of delay directly resulting from such Force Majeure event*,"[19] (the "**Revised MCOD**"). We have been instructed to assume that the Revised MCOD for purposes of this case is January 2025.

2.9 Subsequent to the First NAFTA Award, WWIS made efforts to move the Project forward, which included completing research studies to address the concerns raised in relation to the Moratorium.[20]

2.10 In May of 2017, Windstream engaged KeyBanc Capital Markets ("**KeyBanc**") to act as an exclusive financial advisor to negotiate a potential transaction for the sale of the Project, or a

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[14] NAFTA 1, Exhibit C-0551, Report (Ortech), Draft Project Description for Wolfe Island Shoals Offshore Wind Farm (September 26, 2011), Section 1.

[15] NAFTA 1, Exhibit C-0877, Garrad Hassan Technical Report (December 2, 2010), page 3.

[16] NAFTA 1, Exhibit C-0251, FIT Contract Cover Page dated May 4, 2010; and NAFTA 1, Exhibit C-0245, FIT Contract Schedule 1.

[17] NAFTA 1, Exhibit C-0243, FIT Contract Schedule 2, section 1.

[18] Defined under the FIT Contract as "*…any act, event, cause or condition that prevents a Party from performing its obligations…" and includes "an order, judgment, legislation, ruling or direction by Governmental Authorities restraining a Party…*". NAFTA 1, Exhibit C-0245, Schedule 1, section 10.3.

[19] NAFTA 1, Exhibit C-0245, FIT Contract Schedule 1, section 10.1(f).

[20] **C-2075** - ORTECH Status Report: Summary of Engineering and Environmental Studies in Support of the Wolfe Island Shoals Offshore Wind Farm (February 15, 2017), page 6; **C-2073** - Letter from Ian Baines (WWIS) to Ministry of Environment and Climate Change (MOECC) - "Re: Updated Project Description for the Wolfe Island Shoals Offshore Wind Farm FIT Contract F-000681-WIN-130-602" (February 15, 2017) (Memorial) (Ian Baines Report - FN#34-37), page 2.

portion thereof, to prospective investors, and/or the arrangement of a private placement transaction to raise funds for the development of the Project. Throughout 2017, Windstream engaged with various parties who were interested in either purchasing the Project from Windstream or partnering with Windstream to develop the Project once the Moratorium was lifted.[21]

2.11 Offshore wind projects follow a consistent series of sequential stages of development from development stage projects to production stage projects as follows:[22]

i. **Development Stage Projects:** In this stage, project operators conduct technical studies, design the project layout, and identify the necessary capital equipment, conduct economic feasibility studies in which capital and operating costs estimates are prepared, obtain a revenue (e.g., FIT) contract, apply for and obtain the necessary permits and approvals to proceed with the project including grid access, and site control. The conclusion of the development phase is called Final Investment Decision (**"FID"**), or Financial Close ("**FC**"). At that point, the project is fully contracted and fully funded, allowing the construction phase to start;

ii. **Construction Stage Projects:** In this stage, a project has received all the necessary permits and secured financing to construct the project, entered into contracts with equipment and service suppliers, and commences and completes the construction of the project; and,

iii. **Production Stage Projects:** At this stage, a project is operational and generates cash flows over its useful life.

2.12 As of the Valuation Date, absent the Alleged Breaches, the Project would have been a development stage project as it had the FIT Contract, had grid access,[23] and had an exclusive and priority position secured on the site the Project would be built on, but still required

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[21] Third Witness Statement of David Mars, Section A. Also see **Section 8** of this report.

[22] See **Appendix 2** for details.

[23] First Witness Statement of Ian Baines, paragraph 93: *"After the FIT Contract had been executed…we had taken the steps required with the Independent Electricity System Operator and Hydro One to confirm that we would be able to connect the WWIS project to the electrical grid at the Lennox location…"*
Footnote 49: *"Our grid connection was further confirmed when WWIS received a Notification of Conditional Approval for Connection from the IESO on November 8, 2010 (NAFTA 1, Exhibit C-0381, System Impact Assessment Report (IESO), Wolfe Island Shoals Wind Generation Station, Connection Assessment & Approval Process (Final Report) (November 8, 2010)), and Hydro One on the same day issued its CIA for WWIS, which provided that WWIS was not expected to adversely impact transmission customers in the area of Lennox Country (NAFTA 1, Exhibit C-0383, Report (Hydro One), Customer Impact Assessment, Wolfe Island Shoals GS 300 MW Wind Turbine Generator Generation Connection (November 8, 2010)).*

complete site control,[24] and also required the following approvals from the Government of Ontario and the Government of Canada to advance to a Construction Stage Project:

i. Renewable Energy Approval ("**REA**") from Ontario's Ministry of Environment and Climate Change ("**MOECC**"; formerly Ministry of Environment or "**MOE**" and now named Ministry of the Environment, Conservation and Parks or "**MECP**");

ii. Authorization under the Navigable Waters Act ("**NWA**");

iii. Confirmation Letter from Ontario's Ministry of Natural Resources and Forestry ("**MNRF**"); formerly Ministry of Natural Resources or "**MNR**" until 2014); and,

iv. Authorization from the Fisheries Act ("**FA**") and other federal and provincial bodies may have also been required.

2.13 According to the Wood Report, absent the Alleged Breaches, based on a start date of February 18, 2020, it would have taken approximately 58 months to complete the remaining planning, development, and construction of the Project, whereby the Project would have become operational by December 20, 2024.[25]

2.14 Based on the energy yield assessment and turbine assessment analyses carried out by Wood and Mr. Irvine, but for the Alleged Breaches, as at the Valuation Date, the Project would consist of 66 Siemens Gamesa SG 4.5 - 145 wind turbine generators ("**WTGs**") operating at 100 m hub height with a total installed capacity of 297.0 MW.[26]

C. Approach to Damages and the Counterfactual or "But-for" Case

2.15 We have been asked to provide our independent opinion of the economic damages sustained by the Claimant resulting from the Alleged Breaches on the basis that the Alleged Breaches amounted to an unlawful expropriation of the Claimant's Investment in breach of Canada's

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[24] First Witness Statement of Ian Baines, paragraph 56-57: "*On September 24, 2009, Minister Cansfield wrote to us, confirming our Crown land applications, including for the WWIS project. In a subsequent letter to us dated November 24, 2009, the Ministry of Natural Resources stated that Crown land applicants that applied to the FIT Program and were awarded a FIT Contract*

> *'… will be given the highest priority to the Crown land sites applied for.* ***This means that these applications will take precedence over all others for this site, and will receive priority attention from MNR.'***

MNR's representations were confirmed by the Ontario Power Authority's statements, in the FIT Rules published at that time, ***that an applicant for a FIT contract would be deemed to have access rights to the project site required for a FIT contract*** *so long as the applicant had submitted a request for Applicant of Record status to the MNR*". (emphasis added).

[25] CER-Wood, page 5.

[26] CER-Wood, Table 1-1 (page 15); and Two Dogs Wind Turbine Selection Report, Section 6 and Section 8.

obligations as of the Valuation Date of February 18, 2020 (i.e., the date that the FIT Contract was terminated by the IESO).[27]

2.16 We have determined the Claimant's damages due to the Alleged Breaches as the amount that provides 'full-reparations' for the damage caused, being the amount that will restore it to the financial position it would have occupied absent or 'but-for' the Alleged Breaches.

2.17 We apply the following framework in our calculation of the Claimant's damages due to the Alleged Breaches:

i. The FMV[28] of the Claimant's Investment as of the Valuation Date, absent the Alleged Breaches. We have determined the FMV of the Project absent the Alleged Breaches at the Valuation Date under both an income approach and a market approach;

ii. Less: Any cash flow received, or residual value retained by the claimant(s) from the affected asset(s) subsequent to the Alleged Breaches. Although in the 'but-for' case (see discussion below), the Claimant would have operated the Project over its expected useful life and would have received the full FMV of the Project absent the Alleged Breaches, since the Claimant received an award of $25.2 million in the First NAFTA Award for a portion of the value of the Project, we have been instructed to deduct this amount in our damages calculation to avoid double recovery by the Claimant on the Investment through its NAFTA cases. We also deduct the $6 million letter of credit that was returned to the Claimant in February 2020 upon the termination of the FIT Contract, which would have been returned to Windstream upon reaching COD in 2025 in the "but for" scenario; and,

iii. Plus: Pre-award interest from the Valuation Date to the expected date of the award. For the purposes of our calculations, we have used December 31, 2023, as the estimated date of the award and have calculated pre-award interest at a rate of the Canadian Three-Month Interbank Rate ("**CIDOR**") plus 2%, on a compounded basis.

2.18 The "but-for" or counterfactual case (i.e., the case that would have prevailed absent the Alleged Breaches) that we have been instructed to assume is that the IESO would not have terminated the FIT contract on February 18, 2020, the Moratorium which had prevented Windstream from proceeding through its approvals process for the Project would have been lifted, and that the following would have occurred by February 18, 2020:

i. The MECP would have confirmed its proposed regulatory amendment to include a five-kilometer setback or confirmed that it would not proceed with any regulatory amendment

27 **C-2289** - Letter from Michael Lyle (IESO) to Nancy Baines re Feed-in Tariff Contract F-000681-WIN-130-602 between IESO and the Supplier dated May 4, 2010 - Notice of Termination pursuant to Section 10.1(g) (February 18, 2020), and NOA, paragraph 51.

28 See paragraph 5.8 below for the definition of FMV.

(such that setbacks for offshore wind projects would continue to be assessed on a site-specific basis);

ii. The MNRF would have fulfilled its commitment to discuss the reconfiguration of Windstream's applications for Crown land for the Project (if a five-kilometer setback was confirmed) and would have thereafter fulfilled its commitment to *"move as quickly as possible through the remainder of the application review process so that the Project may obtain Applicant of Record status in a timely manner";*

iii. The MECP and MNRF would have fulfilled their commitment to process the Project's application for a Renewable Energy Approval (REA) within the six-month service guarantee;

iv. The MNRF would have permitted Windstream to proceed through MNRF's Crown land application process and granted Windstream site release; and,

v. The Ontario Government would have dealt with Windstream in good faith and would not have subjected the Project to unreasonable regulatory delays.

2.19 In addition to the above noted events that would have occurred by February 2020, the following additional events would have occurred from February 2020 onwards:

i. Windstream and WWIS would have obtained environmental and other permits and approvals for the Project by February 20, 2023;[29]

ii. Windstream and WWIS would have reached the FC stage by February 20, 2023;[30] and,

iii. The Project would have completed construction and reached Commercial Operation by December 20, 2024 (the "**Commercial Operation Date"** or "**COD**").[31] Thus, under the counterfactual case we have been asked to assume, absent the Alleged Breaches, the Project would have reached COD prior to the Revised MCOD due to the Force Majeure of January 2025.

2.20 The counterfactual timeline upon which our damages analysis is based is detailed out in the "Wolfe Island Shoals Development Programme" attached to the Wood Report, and is summarized in the figures below:[32]

29 CER-Wood, Section 10.3.
30 CER-Wood, Section 10.3.
31 CER-Wood, Section 10.2.
32 CER-Wood, Appendix B - Development Programme.

Figure 2-1: Key Milestone Dates per Wood Report Development Programme

Milestone	Date
Finalise Layout – Number and Location	Aug 27, 2020
Permits to Operate Wind Farm	May 2, 2022
Permits to Build Substation / Onshore Cabling	Dec 2, 2022
Permits to Build Fabrication Facility	Oct 24, 2022
Permits to Build Offshore Facilities	Feb 15, 2023
Financial Close (FC)	Feb 20, 2023
Commercial Operations Date (COD)	Dec 20, 2024

Figure 2-2: Summary of Tasks per Wood Report Development Programme

Task	Start Date	End Date
Renewable Energy Approval	Feb 18, 2020	Feb 20, 2023
Impact Assessment Act (Federal)	Feb 18, 2020	Jan 1, 2022
Other Permits and Approvals	Feb 18, 2020	Aug 7, 2023
Connection Studies and Agreements	Jan 14, 2021	Feb 28, 2023
Operational Approvals	May 3, 2022	Mar 4, 2024
Legal/Land	Feb 18, 2020	Feb 20, 2023
Design, Procurement and Construction	Feb 18, 2020	Aug 6, 2024
Installation	Dec 25, 2022	Mar 31, 2025
Commissioning	Jan 9, 2024	Dec 20, 2024
Commercial Operations Date (COD)	Dec 20, 2024	Dec 20, 2024

D. FMV of the Project under an Income Approach to Value

2.21 We have valued the Project, absent the Alleged Breaches, on a going concern basis using an income approach and employing a discounted cash flow (DCF) methodology.

2.22 It is our view that the DCF method is an appropriate and necessary valuation methodology for the Project at the Valuation Date due to the following:

i. The Project's expected future cash flows can be reliably forecast given the revenue clarity provided by the FIT Contract over a 20-year period, onsite wind measurements, and available actual capital and operating cost data for wind power generation projects located across the world that use similar equipment and technologies. The Project's risks of advancing to the commercial operation stage and executing on its operating plan over its expected operating life can be appropriately reflected in the cash flows themselves, in the risk-adjusted discount rate applied to discount future expected project cash flows to a present value as of the Valuation Date, and/or through a project stage risk adjustment factor; and,

ii. In order to meet the definition of FMV, which contemplates the price that would be negotiated by prudent and informed arm's length notional buyers and sellers, it is necessary to use the same methodology (or methodologies) that market participants would use to value the Project given its stage of development at the Valuation Date (i.e., absent the Alleged breaches). Based on Mr. Tetard's experience with transactions for similar staged projects in the wind power sector, market participants would use a DCF methodology as the primary methodology to value the Project at the Valuation Date and would use comparable market transaction benchmarks to assess the reasonableness of their DCF conclusion.

2.23 We constructed a DCF model over the expected operating life of the Project based on the 20-year FIT Contract and an additional 10 years of economic life after the expiry of the FIT contract,[33] on-site studies including the measurement of wind conditions, as well as technical inputs provided in the 4C Report, the Wood Report, and the Two Dogs Report.

2.24 Our DCF cash flow model for the Project includes all cash inflows and outflows to/from the Project and the appropriate discount rate and risk adjustments to obtain the FMV on a net present value basis at the Valuation Date. The elements of our DCF model are as follows:

i. Project schedule;

ii. Revenue;

iii. Capital costs;

iv. Operating costs;

v. Decommissioning costs;

vi. Taxes;

vii. Working capital;

viii. Financing costs;

ix. Discount rate; and,

x. Project stage risk adjustment factor (if applicable).

2.25 In Mr. Tetard's experience, since the Project had a number of remaining steps to complete before reaching FC, including obtaining certain permitting and environmental approvals, and

[33] In our DCF valuation, we assumed that the Project's operating life would be 30 years (See CER-Wood, page 57 and 115) which would include 20 years of the PPA, and an additional 10 years after the expiry of the PPA. Based on Mr. Tetard's experience, a 30-year lifetime for an offshore wind project would be an appropriate and possibly conservative assumption. Some investors assume longer lifetimes for offshore wind projects (e.g., 35 years). Investors do not assume project lifetimes of shorter than 30 years. See paragraph 6.16 below for a discussion of how this relates to the consideration of the decommissioning costs for the Project.

financing, a notional purchaser would typically structure a transaction for a project at the Project's stage of development at the Valuation Date into two payments: i) an upfront payment on the Valuation Date based on a multiple of the costs incurred to date, and ii) a contingent payment that would be due on the date of FC, based on the amount that would enable the buyer to earn a return, commensurate with the risk of the Project at the Valuation Date.

2.26 The FMV of the Project at the Valuation Date must be expressed as a single amount, on a net present value basis on that date, reflective of all of the Project's risks including the likelihood that it would have successfully advanced to FC absent the Alleged Breaches. Thus, we must determine the single cash amount that a notional buyer would be indifferent between paying at the Valuation Date (incorporating the risk of reaching FC), and the two payments structured as set out above (with the second payment being contingent on the Project reaching FC).

2.27 In Mr. Tetard's experience, in the market conditions prevailing as of the Valuation Date (early 2020), market participants would have expected a levered equity Internal Rate of Return ("**IRR**") [34] in the range of 14% to 16% for projects similar to Windstream, as a development stage project. This expected IRR takes into account the additional risks given the Project's stage of development at the Valuation Date.

2.28 We calibrated our DCF model to calculate the amount of contingent consideration that would be paid by a hypothetical buyer at FC, providing them an IRR of 15% (i.e., the midpoint of 14% to 16%). We then discounted the contingent consideration to the Valuation Date using the same required IRR to calculate the FMV of the Project as of the Valuation Date.

2.29 We summarize the results of this valuation approach below:

[34] IRR is the discount rate at which a series of cash flows (outflows and inflows) result in a Net Present Value ("**NPV**") of zero. In above context, the amount of the contingent consideration would be determined such that when it is deducted from the forecasted cash flows of the Project, it results in a NPV of zero when discounted by the IRR required by the hypothetical buyer of the Project.

Figure 2-3: Valuation of the Project using a Transaction Structuring Analysis ($ Millions)

			FIT-Contract	Post FIT-Contract	Total
Equity IRR required by a hypothetical buyer	15.0%				
Upfront cash consideration	***[A]***		**$ 46.1**		**$ 46.1**
Contingent consideration	*[B]*		$ 364.0	$ 12.4	$ 376.4
Expected payout date of contingent consideration (at Financial Close)			20-Feb-23	20-Feb-23	20-Feb-23
PV factor for Contingent Consideration	*[C]*	15.0%	*0.66*	*0.66*	*0.66*
Value of Contingent Consideration	***[E = B * C]***		**$ 239.0**	**$ 8.2**	**$ 247.2**
FMV of the Project at February 18, 2020	***[F = A + E]***		**$ 285.2**	**$ 8.2**	**$ 293.4**

2.30 Alternatively, we valued the Project under a DCF methodology at the Valuation Date using a nominal cost of equity ("**CoE**") discount rate of 10% that we independently derived using the Capital Asset Pricing Model ("**CAPM**"), and we then applied a risk adjustment factor to the resulting net present value conclusion to reflect the probability that the Project would have reached FC absent the Alleged Breaches.

2.31 As of the Valuation Date, we identified 14 offshore wind projects that had reached a similar stage of development as the Project between 2010 and 2017 (i.e., had achieved revenue clarity but did not have all necessary permits, and had not yet reached FC). Of those 14 projects, 8 (or 57% of these projects) successfully reached FC by the Valuation Date, 1 had been cancelled, and 5 were still in the process of obtaining the permits necessary to reach FC. Thus, we have estimated the probability adjustment factor for the Project reaching FC by 2023, absent the Alleged Breaches to be in the range of 55% to 60% and applied this to the NPV calculated in our DCF analysis to obtain the FMV (based on the expected NPV) of the Project as of the Valuation Date.

2.32 Our conclusion of the FMV of the Project on the Valuation Date based on our DCF analysis with a project stage risk adjustment factor, is summarized as follows:

i. The NPV of the Project at the Valuation prior to any adjustment for the risk of advancing to FC is approximately $575.2 million; and,

ii. The expected value (i.e., probability-adjusted) FMV of the Project as at the Valuation Date, reflecting the risk of the Project advancing to FC, is in a range from $316.4 million to $345.1 million.

2.33 In other words, under this approach, as at the Valuation Date, a notional purchaser would pay approximately $316.4 million to $345.1 million to Windstream upfront, whereby they would be taking on the risk of the Project advancing to FC. Such that, once the Project had achieved

FC it would be worth $575.2 million to the notional purchaser, with the difference representing the return for the additional risks associated with investing in the Project at its current stage at the Valuation Date. We summarize the results of this approach below:

Figure 2-4: Valuation of the Project using the Project Stage Risk Adjustment Factor *Approach* ($ Millions)

		FIT-Contract	Post FIT-Contract	Total
DCF equity value as of the Valuation Date, assuming the Project reaches Financial Close	*[A]*	$ 556.2	$ 19.0	$ 575.2
Probability of Financial Close	*[B]*	*55%*	*55%*	*55%*
FMV of the Project at February 18, 2020: Low	***C = A * B***	**$ 305.9**	**$ 10.5**	**$ 316.4**
Probability of Financial Close	*[D]*	*60%*	*60%*	*60%*
FMV of the Project at February 18, 2020: High	***E = A * D***	**$ 333.7**	**$ 11.4**	**$ 345.1**
FMV of the Project at February 18, 2020: Mid	**[(C+E)/2]**	**$ 319.8**	**$ 10.9**	**$ 330.7**

E. FMV of the Project under a Market Approach to Value

2.34 In addition to our DCF valuation, we have also valued the Project using a market approach under a comparable transactions methodology.

2.35 Our comparable transactions valuation analysis consisted of a review of completed offshore wind farm transactions from a proprietary database compiled by 4C Offshore.[35] We filtered the completed wind farm transactions in the 4C Offshore database according to 6 criteria (date, development stage, revenue clarity, availability of information regarding MW capacity and consideration paid, and location) and identified 10 suitably comparable transactions to use in our comparable transactions valuation analysis. We then calculated the price paid per MW acquired as a proxy for the value/MW of the Project.

2.36 Based on the transactions that met our filtering criteria, we have calculated the range of values for the Project to be from $0.96 million/MW to $1.01 million/MW. Our conclusion of the FMV of the Project based on the comparable transaction methodology is summarized below:

Figure 2-5: Comparable Transactions Method Conclusion

Description	Low	High
Project planned capacity (MW)	297	297
Transaction value per MW (Median and Average)	$ 0.96	$ 1.01
Implied Value, millions	**$ 284.7**	**$ 299.1**

35 **C-1913** - 4C Comparables (Excel).

2.37 We note that nearly all the comparable transactions identified had a Power Purchase Agreement ("**PPA**") price that was significantly below the inflation adjusted PPA price that Windstream would have obtained from the Project but for the Alleged Breaches (per the FIT Contract). All else equal, we would expect that an offshore windfarm with a higher PPA price (such as Windstream) would command a higher transaction value per MW than a project with a lower PPA price. Thus, since the comparable transactions we identified were largely projects with lower PPA prices than the Project would have received absent the Alleged Breaches, the valuation range noted above may understate the FMV of the Project at the Valuation Date.

2.38 Further, nearly all the transactions identified related to the sale of a non-controlling interest (i.e., 50% or less) in an offshore windfarm. All else equal, transactions for a controlling interest (i.e., greater than 50% of the subject company or project) typically command a higher value to reflect the additional consideration that an investor would pay in order to own a controlling interest in the company or project. In other words, a 20% interest in a project would be worth less than 20% of the entire company, given that this 20% ownership interest might be limited in terms of the scope of control it could exercise over critical aspects of the business operations. Therefore, since many of the comparable transactions we identified to value a 100% interest in the Project involved transactions for non-controlling interests in offshore wind projects, the valuation range noted above may understate the FMV of the Project as at the Valuation Date.

2.39 Lastly, nearly all the comparable transactions identified were carried out one to three years before the Valuation Date. In the period leading up to the Valuation Date, the offshore wind industry continued to grow and expand around the world, with increasing appetite from international investors for the North American offshore wind industry in particular. Capital and operating costs also continued to decrease significantly over this period, and there was increased public pressure to reduce dependence on fossil fuels globally due to the acceleration of the impacts of climate change. Therefore, given the growth in the industry in the period leading up to the Valuation Date, based on transactions that pre-date the Valuation Date by one to three years, the valuation range noted above would also tend to understate the FMV of the Project at the Valuation Date.

F. Damages Conclusion

2.40 Based on the scope of our review as well as the procedures, analyses, assumptions, and restrictions noted herein, our conclusions as to the Claimant's damages, on the premise that the Alleged Breaches of the Respondent are proven, are as follows:

Figure 2-6: Summary of Damages Conclusion – Income Approach ($ Millions)

	Income Approach	
	Transaction Structuring	*Risk Adjustment*
FMV of the Project at February 18, 2020, but for the Alleged Breaches (Equity Value)	**$ 293.4**	**$ 330.7**
Less: NAFTA 1 Award	(25.2)	(25.2)
Less: Return of Letter of Credit	(6.0)	(6.0)
Claimants' damages before pre-award interest	**262.2**	**299.6**
Add: Pre-Award Interest	29.2	33.4
Claimants' damages including pre-award interest	**$ 291.4**	**$ 333.0**

Figure 2-7: Summary of Damages Conclusion – Market Approach ($ Millions)

	Market Approach	
	Low	*High*
FMV of the Project at February 18, 2020, but for the Alleged Breaches (Equity Value)	**$ 284.7**	**$ 299.1**
Less: NAFTA 1 Award	(25.2)	(25.2)
Less: Return of Letter of Credit	(6.0)	(6.0)
Claimants' damages before pre-award interest	**253.5**	**267.9**
Add: Pre-Award Interest	28.3	29.9
Claimants' damages including pre-award interest	**$ 281.8**	**$ 297.7**

3 REPORTING STANDARDS AND RESTRICTIONS

3.1 In preparing this report, we have been assisted by Secretariat staff working under our direction, supervision, and review. We have discussed issues relevant to the matter with Counsel. However, the opinions expressed in this report are our own.

3.2 The professionals engaged on this assignment have acted independently and objectively in the preparation of this report and do not have any financial interest whatsoever in the outcome of this matter.

3.3 This report was prepared in conformity with the Practice Standards of the CICBV of which Mr. Milburn and Mr. Tobis are members in good standing. The relevant Practice Standards of the CBV Institute include those governing the preparation of Expert Reports (CICBV Practice Standards 310, 320, and 330) and Valuation Reports (CICBV Practice Standards 110, 120, and 130).[36]

3.4 Under CBV Institute Practice Standard 110, there are three types of Valuation Reports: Comprehensive, Estimate, and Calculation. These reports are not only distinguished by the valuator's scope of review and the amount of disclosure provided, but also by the level of assurance being provided in the conclusion, with a Comprehensive Valuation Report providing the highest assurance and the Calculation Valuation Report providing the lowest.

3.5 A Comprehensive Valuation Report "*…contains a conclusion as to the value of shares, assets or an interest in a business that is based on a comprehensive review and analysis of the business, its industry and all other relevant factors, adequately corroborated and generally set out in a detailed Valuation Report.*" An Estimate Valuation Report "*…contains a conclusion as to the value of shares, assets or an interest in a business that is based on limited review, analysis and corroboration of relevant information, and generally set out in a less detailed Valuation Report.*" A Calculation Valuation Report "*…contains a conclusion as to the value of shares, assets or an interest in a business that is based on minimal review and analysis and*

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36 With respect to our reliance on other technical experts, CBV Standards 320 Clause 5E states: "*The Expert shall consider the necessity of relying upon the work of a specialist (e.g., real estate appraiser, engineer, actuary, etc.) (Recommendations: If it is deemed appropriate to request the assistance of a specialist, the Expert should obtain reasonable assurance concerning the specialist's reputation for competence and degree of independence.) (Explanatory comment: The appropriateness and reasonableness of the assumptions and methods used by the specialist are the responsibility of the specialist. Ordinarily, the Expert may accept the specialist's judgement and work in this regard unless the report of the specialist, the Expert's communication with the specialist or the Expert's knowledge of the nature of the dispute and the events giving rise to the claim lead the Expert to believe that the specialist's assumptions or methods are unreasonable in the circumstances.)*"

little or no corroboration of relevant information, and generally set out in a brief Valuation Report."[37]

3.6 The valuation analysis in this report was prepared to be at the level of a Comprehensive Valuation Report under the CBV Institute Practice Standards. CBV Institute standards are generally consistent with International Valuation Standards Council ("**IVSC**") standards.

3.7 This report has been prepared solely for the purpose described in this introduction. In all other respects, this report is confidential. It should not be used by any other party for any purpose or reproduced or circulated, in whole or in part, by any party without our prior written consent and that of Secretariat.

3.8 We accept no liability or duty of care to any person other than the Claimant for the content of the report and disclaims all responsibility for the consequences of any person other than the Claimant acting or refraining to act in reliance on the report or for any decisions made or not made which are based upon the report.

3.9 We have provided our opinion of the damages to the Claimant based on the documents listed in **Appendix 6** and our assessment of various key parameters that impact the value of the Claimant's assets over time and the appropriate methodologies that should be applied thereto.

3.10 In the event that the Tribunal's findings differ with respect to the parameters or methodologies derived or applied herein, we can update our calculations of the damages to reflect its findings.

[37] **C-1944** - CBV Institute Practice Standard No. 110 (June 17, 2009), pages 1-2.

4 OVERVIEW OF THE CLAIMANT, THE PROJECT, AND THE DISPUTE

A. Introduction

4.1 In this section we summarize the background to this matter, to the extent relevant to the issues we have been asked to consider.

B. The Claimant

4.2 Windstream is a limited liability company that was incorporated in Delaware, USA on October 15, 2007.[38] Windstream is owned by White Owl Capital Partners LLC,[39] a New York based investment group with many years of experience in the energy and technology sectors.[40]

4.3 Windstream owns 100% of WWIS which was incorporated in Ontario, Canada on October 18, 2007.[41] WWIS is based in Kingston, Ontario, Canada. The principals of and consultants to WWIS have many decades of experience in developing renewable energy projects in Ontario.[42]

4.4 We provide an organization chart of the Claimant's investment in the Project in the figure below:

38 NAFTA 1, Exhibit C-0179, Second Amended Restated Limited Liability Company Agreement of Windstream Energy LLC (January 14, 2010).

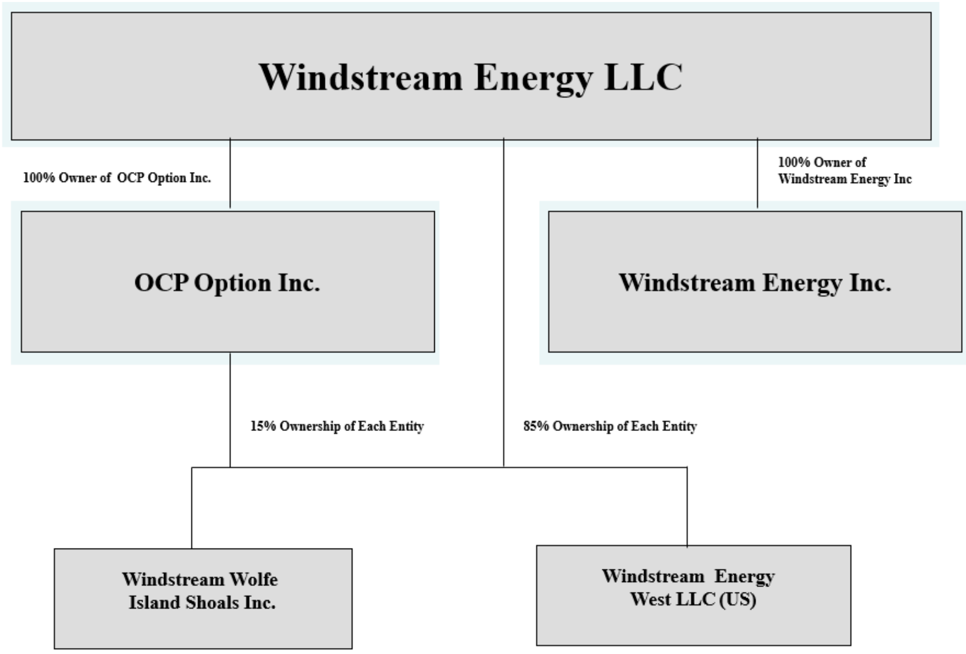
39 NAFTA 1, Exhibit C-0179, Second Amended Restated Limited Liability Company Agreement of Windstream Energy LLC (January 14, 2010).

40 **C-2374** - whiteowlcap.com website: "White Owl Capital - Welcome - Early Stage Tech and Energy Investment - About Us" (June 15, 2021).

41 NAFTA 1, Exhibit C-0037, Windstream Wolfe Island Shoals Inc. (WWIS) Corporation Summary (October 18, 2007).

42 NOA, paragraph 14.

Figure 4-1: Organization Chart of the Claimant and the Project

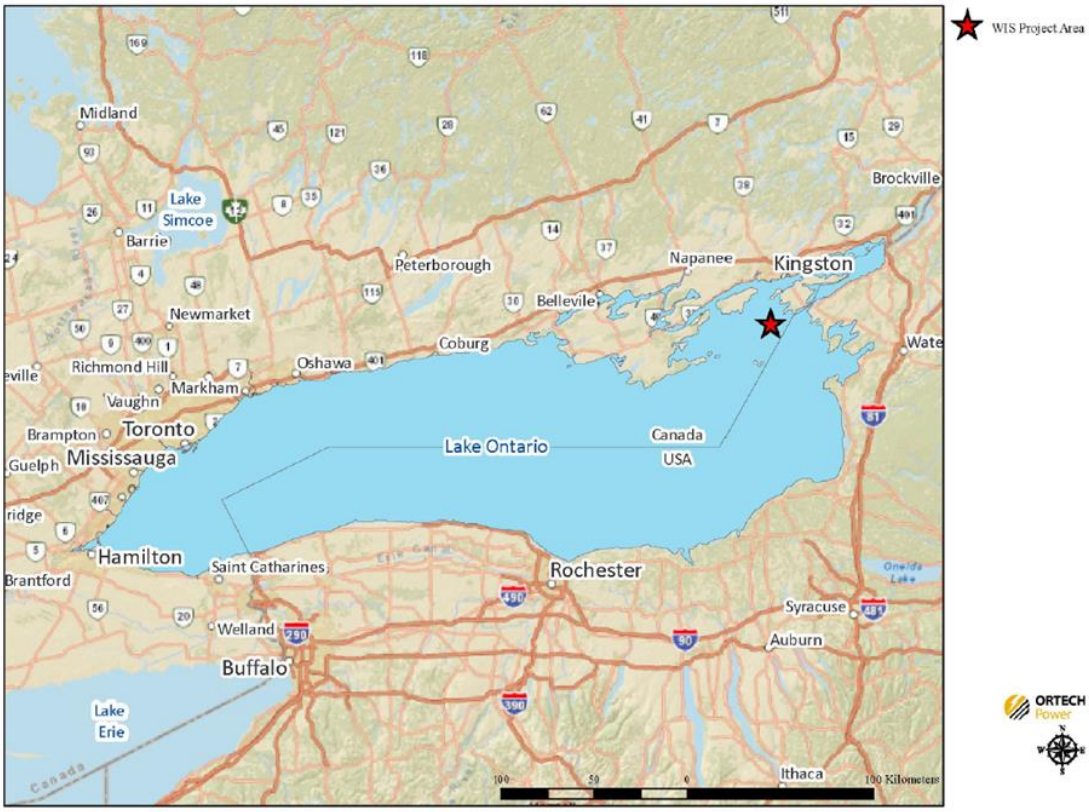


C. The Project

4.5 The Project is an offshore renewable energy generation project that was to be located off the coast of Wolfe Island, near Kingston, Ontario,[43] on approximately 48,000 acres of shallow water shoals.[44] The original plans consisted of up to 130 wind turbines with capacity ranging from 2.3 MW to 3.6 MW per turbine.[45] Based on the energy yield and turbine assessment analyses carried out by Wood and Mr. Irvine, but for the Alleged Breaches, as at the Valuation Date, the Project would consist of 66 Siemens Gamesa SG 4.5 - 145 WTGs operating at 100 m hub height with a total installed capacity of 297.0 MW.[46] The depth of Lake Ontario in the immediate turbine area had water depths ranging between 1 meter to 30 meters.[47]

[43] NAFTA 1, Exhibit C-0551, Report (Ortech), Draft Project Description for Wolfe Island Shoals Offshore Wind Farm (September 26, 2011), Section 1.
[44] NAFTA 1, Exhibit C-0877, Garrad Hassan Technical Report (December 2, 2010), page 3.
[45] NAFTA 1, Exhibit C-0551, Report (Ortech), Draft Project Description for Wolfe Island Shoals Offshore Wind Farm (September 26, 2011), Section 5.2.
[46] CER-Wood, Table1-1 (page 15); and Two Dogs Wind Turbine Selection Report, Section 6 and Section 8.
[47] NAFTA 1, Exhibit C-0551, Report (Ortech), Draft Project Description for Wolfe Island Shoals Offshore Wind Farm (September 26, 2011), Section 7.4.

Figure 4-2: Map of the Project Location[48]



4.6 In 2008, after two years of research and study, the Ontario the MNR determined that it would begin accepting applications for exploration proposals for offshore wind projects.[49] On June 30, 2008, the Minister of Natural Resources, Ms. Donna Cansfield was quoted saying "*that Ontario was 'open for business' when it comes to offshore wind*."[50]

4.7 In May of 2009, the Government of Ontario enacted the Green Energy and Green Economic Act of 2009[51] and subsequently created a FIT program for the development of renewable energy projects in Ontario, including offshore wind.[52]

4.8 On October 1, 2009, the OPA began taking applications under the FIT program.[53]

48 NAFTA 1, Exhibit C-0744, Map (Ortech) Lake Ontario (July 21, 2014).
49 NAFTA 1, Exhibit C-0761, Remarks by Natural Resources Minister Donna Cansfield to the Energy 2100: Making The Great Lakes Conference (April 23, 2008), pages 16-17.
50 NAFTA 1, Exhibit C-0081, Toronto Star Article "Wind power a dilemma for Ontario", dated June 30, 2008.
51 NAFTA 1, Exhibit C-0123, The Green Energy Act and Green Economy Act (2009).
52 NAFTA 1, Exhibit C-0806, Information Note: Green Energy Act and Renewable Energy Approvals for Off-Shore Wind Facilities (April 6, 2010).
53 NAFTA 1, Exhibit C-0774, OPA (2009), Ontario's Feed-in Tariff Program Backgrounder.

4.9 WWIS entered into the FIT Contract with the OPA on May 4, 2010, which provided that WWIS was to design and build the Project facility and bring it to commercial production.[54]

4.10 The FIT Contract was a fixed-price contract that provided the terms and conditions applicable to the contract holders (suppliers) and the OPA/IESO including a 20-year fixed price (subject to inflationary increases) to be paid by the OPA/IESO for offshore wind power to provide greater investor certainty and to ensure that the FIT Contract would be "*…financeable by way of long-term limited recourse debt financing to fund the project*."[55]

4.11 The FIT Contract cover page included the following key terms:[56]

i. Contract Effective Date: May 4, 2010;

ii. Renewable fuel: Wind (Off-shore);

iii. Contract capacity/Gross Nameplate Capacity: 300,000 kilowatts ("**kW**") or 300 MW.

iv. Contract Price (before indexation): $0.19/kWh, ("**FIT Contract Price**");[57]

v. Base date (used for contract price indexation purposes): September 30, 2009;

vi. Indexation: The FIT Contract provided for full indexation of the FIT Contract Price by inflation prior to reaching the commercial operation date and partial indexation for inflation during operation based on the formula provided in Exhibit B of the FIT Contract, based on a "percentage escalated" of 20%;[58]

vii. Minimum required domestic content level for capital costs: 50%;[59] and,

viii. Connection point: IESO-Controlled Grid.

4.12 Schedule 1 of the FIT Contract included the following key terms:

i. Term: From the COD until the 20th anniversary of earlier of the Milestone Date (defined below) or the COD;[60]

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54 NAFTA 1, Exhibit C-0251, FIT Contract Cover Page dated May 4, 2010; and NAFTA 1, Exhibit C-0245, FIT Contract Schedule 1.

55 NAFTA 1, CER-Powell, Expert Report of Sarah Powell dated August 19, 2014, paragraph 18-19.

56 NAFTA 1, Exhibit C-0251, FIT Contract Cover Page dated May 4, 2010.

57 Revenue for the Project each year is calculated as the total kWh generated (Project capacity * the wind generation factor * the number of hours per year) * the indexed contract price in the relevant year.

58 NAFTA 1, Exhibit C-0197, Exhibit B, section 1.3; and NAFTA 1, Exhibit C-0251, FIT Contract Cover Page dated May 4, 2010, item 13.

59 We have been instructed that the domestic content requirement was ultimately eliminated in December of 2013. We note that this is consistent with NAFTA 1, CER-Deloitte (Taylor and Low) dated August 19, 2014, pp. 1, paragraph 1.5(e), footnote 5.

60 NAFTA 1, Exhibit C-0245, FIT Contract Schedule 1, section 8.1(b).

ii. Windstream was required to post a $6 million letter of credit with the OPA in 2010 that was to be returned to Windstream after the COD;[61] and,

iii. The Original MCOD (Milestone Date for Commercial Operation) was set at 5 years following the date of the FIT Contract, i.e., May 4, 2015.[62] However, if an event of Force Majeure[63] caused WWIS to be unable to achieve Commercial Operation by the Milestone Date, the Milestone Date was to be extended "*for such reasonable period of delay directly resulting from such Force Majeure event*"[64] (the Revised Milestone Date). We have been instructed to assume that the Revised MCOD for purposes of this case is January 2025.

4.13 The facility would be deemed to have achieved Commercial Operation when confirmed in writing by the OPA/IESO following the receipt of certain documents including a certificate from the independent engineer stating that the facility "*has been constructed, connected, commissioned and synchronized to the IESO-Controlled Grid, a Distribution System or a Host Facility such that at least 90% of the Contract Capacity is available to Deliver Electricity...*"[65]

4.14 Subsequent to the First NAFTA Award, WWIS made efforts to move the Project forward, which included completing research studies to address the concerns raised in relation to the Moratorium[66] and attempted to arrange discussions with the Ministry of Energy ("**MEI**") and the IESO to discuss the path forward for the Project, including renegotiating the FIT Contract to adjust it to the terms of the Moratorium.[67] In February 2017, WWIS submitted a package of information to the MOECC, which included technical and environmental studies that concluded that the Project could meet the sound level requirements, would not pose a threat to drinking water, and had low likelihood of disrupting "species at risk" habitats, among other things.[68] Windstream followed up on this application several times throughout 2017 and eventually received a reply in August of 2017 that the MOECC was not able "*to confirm whether or when Ontario will be revisiting the February 2011 decision* [i.e., the Moratorium]".[69]

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61 NAFTA 1, Exhibit C-0245, FIT Contract Schedule 1, section 5.1(c); C-0197 Exhibit A, section 1.2. Calculated as $20/kWh of Contract Capacity ($20 x 300,000 kWh = $6,000,000).

62 NAFTA 1, Exhibit C-0243, FIT Contract Schedule 2, section 1.

63 Defined under the FIT Contract as "*...any act, event, cause or condition that prevents a Party from performing its obligations...*" *and includes "an order, judgment, legislation, ruling or direction by Governmental Authorities restraining a Party...*". NAFTA 1, Exhibit C-0245, Schedule 1, section 10.3.

64 NAFTA 1, Exhibit C-0245, FIT Contract Schedule 1, section 10.1(f).

65 NAFTA 1, Exhibit C-0245, FIT Contract Schedule 1, paragraph 2.6(a)(iv)(C).

66 **C-2075** - ORTECH Status Report: Summary of Engineering and Environmental Studies in Support of the Wolfe Island Shoals Offshore Wind Farm (February 15, 2017), page 6; **C-2073** - Letter from Ian Baines (WWIS) to Ministry of Environment and Climate Change (MOECC) - "Re: Updated Project Description for the Wolfe Island Shoals Offshore Wind Farm FIT Contract F-000681-WIN-130-602" (February 15, 2017) (Memorial) (Ian Baines Report - FN#34-37), page 2.

67 Witness Statement of Nancy Baines, paragraph 27.

68 Windstream Letter MOECC February 15, 2017, page 3.

69 Third Witness Statement of Ian Baines, paragraphs 36 to 39.

4.15 In May of 2017, Windstream engaged KeyBanc to act as an exclusive financial advisor to negotiate a potential transaction for the sale of the Project, or a portion thereof, to prospective investors, and/or the arrangement of a private placement transaction to raise funds for the development of the Project.[70]

4.16 Throughout 2017, Windstream engaged with various parties who were interested in either purchasing the FIT Contract from Windstream or in partnering with Windstream to develop the Project once the Moratorium was lifted.[71] Several of these parties continued to reach out to Windstream to express in and seek updates on the status of the Project into 2018.[72]

4.17 In 2017, Windstream sought to take advantage of improved technology to re-examine the data from the lake bottom. They retained Canadian Seabed Research ("**CSR**") in 2017 to process the geophysical data that had been collected over the offshore windfarm site in 2010, and to compile a geological assessment of the area. This assessment was to include the updated turbine locations as at that date.[73]

4.18 In February of 2018, WWIS submitted an Expression of Interest Application for the Emerging Renewable Power Program Application ("**ERPP**") issued by Canada's Minister of Natural Resources to expand renewable energy sources available to the provinces, and in April of 2018, WWIS submitted an application under the ERPP. In July 2018, Windstream was informed that its Project was not recommended to be funded under Phase 1 of the ERPP. On July 16, 2018, Windstream responded and agreed to be added to the Phase 2 list of projects for consideration for future funding under the ERPP.[74]

4.19 Between June of 2015 and February 2020, the Claimant incurred approximately $10 million of additional costs in relation to its attempts to continue to advance the Project.[75]

4.20 The following approvals from the Government of Ontario and the Government of Canada were still required at the Valuation Date:[76]

i. REA from Ontario's Ministry of Environment and Climate Change;

ii. Authorization under the Navigable Waters Act;

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70 **C-2085** - KeyBanc Capital Markets Engagement Letter ("KBCM - Windstream I EL - Fully Executed) (May 1, 2017).

71 Third Witness Statement of David Mars, Section A. Also see **Section 8** of this report.

72 Third Witness Statement of David Mars, paragraph 16.

73 Third Witness Statement of Ian Baines, paragraphs 41 to 43.

74 Third Witness Statement of Ian Baines, paragraphs 44 to 49.

75 See **Schedule 3**.

76 **C-2074** - ORTECH Report: Project Description - Wolfe Island Shoals Offshore Wind Farm (February 15, 2017) (February 15, 2017), section 2.3.

iii. Confirmation Letter from Ontario's Ministry of Natural Resources and Forestry; and,

iv. Authorization from the Fisheries Act and other federal and provincial bodies may be required (will be based on investigation completed by Windstream).

D. Overview of the Dispute

4.21 On September 9, 2010, WWIS was notified by the MNR that its Crown land application was on hold until additional research could be conducted on the impact of offshore wind projects.[77]

4.22 On December 10, 2010, WWIS filed a force majeure notice to the OPA due the MNR's notification that it could not conduct additional research at the Project site, as it was unable to advance the Project without carrying out further wind testing and additional studies.[78]

4.23 On February 11, 2011, the Ontario Government imposed a moratorium of indefinite term on offshore wind energy generation facilities in Ontario.[79] The Moratorium provided that no environmental approvals would be granted, and Crown land rights processes would not continue for offshore wind projects in Ontario over the indefinite term of the Moratorium.[80]

4.24 Windstream was assured by the Ontario Government at the time that the Project would not be cancelled and could proceed once the Moratorium was lifted and accordingly that the FIT Contract would be "deferred", "frozen" or put "on hold". However, Windstream alleges that in breach of its commitments, the OPA refused to amend the FIT Contract to ensure it was "deferred", "frozen" or put "on hold" for the duration of the Moratorium.[81]

4.25 In January 2013, Windstream brought an arbitration claim against the Respondent under Chapter 11 of the NAFTA alleging that Respondent's actions breached its obligations to afford fair and equitable treatment and that is breaches resulted in the expropriation of the Investment (NAFTA 1). At this time, the FIT Contract remained in effect.[82]

4.26 In September of 2016, the Tribunal in NAFTA 1 rendered the First NAFTA Award granting the Claimant's claim that "*the Respondent had failed to accord the Claimant's investments*

[77] NAFTA 1, Exhibit C-0357, Meeting Minutes (MNR), Wolfe Island Shoals MNR Kick Off Meeting (September 9, 2010).

[78] NAFTA 1, Exhibit C-0408 Form of Notice of Force Majeure, OPA and WWIS (December 10, 2010) FIT Contract, OPA and WWIS (December 10, 2010).

[79] NAFTA 1, Exhibit C-0497, Article (Canadian Press) Ont. Declares moratorium on off-shore wind farms (February 11, 2011).

[80] **C-1969** - News Release entitled "Ontario Rules out Offshore Wind Projects" - Ontario Newsroom (February 11, 2011).

[81] NOA, paragraphs 23-24.

[82] NOA, paragraph 25.

treatment fair and equitable treatment in accordance with international law, contrary to Article 1105 of NAFTA…"[83] and awarded the Claimant approximately $25.2 million in damages.[84]

4.27 The Tribunal stated that the:

> "*…purpose of the compensation to be awarded is to make the Claimant "whole," keeping in mind the Tribunal's determination* *__that the Claimant has not lost the entire value of its investment as the FIT Contract is still formally in force (albeit under an extended force majeure)__* *and, accordingly, as the CAD 6 million letter of credit is still available to the Claimant and has not been lost or taken by the Government. The compensation to be awarded to the Claimant must therefore reflect the Claimant's loss (damage to the investment) rather than the full value of the investment. This latter would be relevant only if the Claimant has lost the entirety of its investment as a result of an expropriation, which is not the case here."*[85] *(emphasis added)*

4.28 The Tribunal in NAFTA 1 arrived at its damages figure of $25.2 million based on the value of the loss as at the date of the award (September 27, 2016).[86] This figure was derived from the implied transaction multiples from seven "early stage" transactions for offshore windfarms in the UK, Germany and the Netherlands that were carried out between 2009 and 2013 but, as noted, the Tribunal recognized that this did not represent the "*full value of the investment*".[87,88]

4.29 As noted in Section 4C above, following the First NAFTA Award, although the Moratorium remained in place and prevented the Claimant from conducting work on the Project site, we understand that the Claimant attempted to advance the Project through various actions.

4.30 We understand that a termination right became available under the FIT Contract on May 4, 2017. In the months leading up to when the termination right becoming available, WWIS

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83 **C-2040** - First NAFTA Award, paragraph 515 (b).

84 **C-2040** - First NAFTA Award, paragraph 515 (e). The Tribunal dismissed the Claimant's other claims, including that Respondent unlawfully expropriated the Claimant's investments in WWIS, that Respondent failed to accord the Claimant's investments treatment no less favourable than that accorded, in like circumstances, to its own investors or investors of any other party or non-party, and its claim for post-award interest. See **C-2040** - First NAFTA Award, paragraph 515.

85 **C-2040** - First NAFTA Award, paragraph 473.

86 **C-2040** - First NAFTA Award, paragraph 484.

87 **C-2040** - First NAFTA Award, paragraph 439, and NAFTA 1 RER-BRG 2, page 87; NAFTA 1, RER Green Giraffe, paragraph 94.

88 As noted in **Section 5E** and **Appendix 1**, since 2010, the offshore wind industry experienced significant growth and expansion around the world, and in North America in particular. Considering this growth, the improvement in the technology used to construct and operate offshore windfarms, and the general trend towards renewable energy in Canada and around the world, in our view, in the absence of the Alleged Breaches, all else equal, the value of the Project would have been higher as at February 2020 than it would have been as at the time of NAFTA 1.

applied to the Ontario Superior Court of Justice for orders restraining the IESO from exercising its termination right under section 10.1(g) of the FIT Contract.[89]

4.31 On February 20, 2018, while the Ontario court application was still pending, the IESO exercised its termination right under section 10.1(g) of the FIT Contract. WWIS and IESO agreed that the termination was not to take effect until 30 days after the Ontario court ruling.[90]

4.32 On January 15, 2020, WWIS withdrew its court application.[91]

4.33 On February 18, 2020, the IESO confirmed its decision to terminate the FIT Contract, and on February 20, 2020, the IESO directed Windstream's bank to cancel the $6 million letter of credit that Windstream had posted in 2010 as required under the FIT Contract.[92]

4.34 As noted, the Claimant considers that the Alleged Breaches by Respondent since the First NAFTA Award have resulted in the unlawful expropriation of the Project as at February 18, 2020.

89 NOA, paragraph 41.

90 NOA, paragraph 42.

91 **C-2289** - Letter from Michael Lyle (IESO) to Nancy Baines re Feed-in Tariff Contract F-000681-WIN-130-602 between IESO and the Supplier dated May 4, 2010 - Notice of Termination pursuant to Section 10.1(g) (February 18, 2020).

92 **C-2289** - Letter from Michael Lyle (IESO) to Nancy Baines re Feed-in Tariff Contract F-000681-WIN-130-602 between IESO and the Supplier dated May 4, 2010 - Notice of Termination pursuant to Section 10.1(g) (February 18, 2020), and NOA, paragraph 51.

5 APPROACH TO DAMAGES

A. Introduction

5.1 In this section we explain the damages framework and valuation approaches we have followed to quantify the damages to the Claimant, under the assumption that the Claimant is entitled to an award of damages. This includes the theory of damages, the standard of value, the appropriate valuation date, the counterfactual case, valuation approaches, and methodologies considered and applied herein.

B. Theory of Valuation and Damages

5.2 We have been asked to provide our opinion of the economic damages sustained by the Claimant resulting from the Alleged Breaches on the basis that the Alleged Breaches amounted to an unlawful expropriation of the Claimant's Investment in breach of Canada's obligations.

5.3 We have determined the Claimant's damages due the Alleged Breaches as the amount that provides 'full-reparations', being the amount that will restore it to the financial position it would have occupied absent or 'but-for' the Alleged Breaches.

5.4 We apply the following framework in our calculation of the Claimant's damages due to the Alleged Breaches:

i. The FMV[93] of the Claimant's Investment as of the Valuation Date, absent the Alleged Breaches. As noted, we have determined the FMV of the Project absent the Alleged Breaches at the Valuation Date under both an income approach and a market approach;

ii. Less: Any cash flow received, or residual value retained by the claimant(s) from the affected asset(s) subsequent to the Alleged Breaches. Although in the 'but-for' case (see discussion below), the Claimant would have operated the Project over its expected useful life and would have received the full FMV of the Project absent the Alleged Breaches, since it received an award of $25.2 million in the First NAFTA Award, we have been instructed to deduct this amount in our damages calculation to avoid double recovery by the Claimant on the Investment. We have also deducted the $6 million letter of credit that was returned to the Claimant in February 2020, upon the termination of the FIT Contract, and which would have been returned to Windstream upon reaching COD in the "but for" scenario; and,

93 See definition in **Section 5C** below.

iii. Plus: Pre-award interest from the Valuation Date to the expected date of the award. For the purposes of our calculations, we have used December 31, 2023, as the estimated date of the award and have calculated pre-award interest at a rate of CIDOR plus 2%, on a compounded basis.[94]

5.5 The "but-for" or counterfactual case (i.e., the case that would have prevailed absent the Alleged Breaches) that we have been instructed to assume is that the IESO would not have terminated the FIT contract on February 18, 2020, the Moratorium which had prevented Windstream from proceeding through its approvals process for the Project would have been lifted, and that the following would have occurred by February 18, 2020:

i. The MECP would have confirmed its proposed regulatory amendment to include a five-kilometer setback or confirmed that it would not proceed with any regulatory amendment (such that setbacks for offshore wind projects would continue to be assessed on a site-specific basis);

ii. The MNRF would have fulfilled its commitment to discuss the reconfiguration of Windstream's applications for Crown land for the Project (if a five-kilometer setback was confirmed) and would have thereafter fulfilled its commitment to *"move as quickly as possible through the remainder of the application review process so that the Project may obtain Applicant of Record status in a timely manner."*;

iii. The MECP and MNRF would have fulfilled their commitment to process the Project's application for a REA within the six-month service guarantee;

iv. The MNRF would have permitted Windstream to proceed through MNR's Crown land application process and granted Windstream site release; and,

v. The Ontario Government would have dealt with Windstream in good faith and not have subjected the Project to unreasonable regulatory delays.

5.6 In addition to the above noted events that would have occurred by February 2020, the following would have occurred from February 2020 onwards:

i. Windstream and WWIS would have obtained environmental and other permits and approvals for the Project by February 20, 2023;[95]

ii. Windstream and WWIS would have reached the FC stage by February 20, 2023;[96] and,

[94] See **Section 9** below for our discussion of Pre-award interest.
[95] CER-Wood, Section 10.3.
[96] CER-Wood, Section 10.3.

iii. The Project would have completed construction and reached Commercial Operations (i.e., COD) by December 20, 2024 (which is prior to the Revised MCOD of January 2025).[97]

5.7 The counterfactual timeline upon which our damages analysis is based is detailed in the "Wolfe Island Shoals Development Programme" (Appendix B of the Wood Report), and is summarized in the figures below:

Figure 5-1: Key Milestone Dates per Wood Report Development Programme

Milestone	Date
Finalise Layout – Number and Location	Aug 27, 2020
Permits to Operate Wind Farm	May 2, 2022
Permits to Build Substation / Onshore Cabling	Dec 2, 2022
Permits to Build Fabrication Facility	Oct 24, 2022
Permits to Build Offshore Facilities	Feb 15, 2023
Financial Close (FC)	Feb 20, 2023
Commercial Operations Date (COD)	Dec 20, 2024

Figure 5-2: Summary of Tasks per Wood Report Development Programme

Task	Start Date	End Date
Renewable Energy Approval	Feb 18, 2020	Feb 20, 2023
Impact Assessment Act (Federal)	Feb 18, 2020	Jan 1, 2022
Other Permits and Approvals	Feb 18, 2020	Aug 7, 2023
Connection Studies and Agreements	Jan 14, 2021	Feb 28, 2023
Operational Approvals	May 3, 2022	Mar 4, 2024
Legal/Land	Feb 18, 2020	Feb 20, 2023
Design, Procurement and Construction	Feb 18, 2020	Aug 6, 2024
Installation	Dec 25, 2022	Mar 31, 2025
Commissioning	Jan 9, 2024	Dec 20, 2024
Commercial Operations Date (COD)	Dec 20, 2024	Dec 20, 2024

C. Definition of Value

5.8 We have defined FMV as follows:[98]

> *"[T]he price, expressed in terms of cash equivalents, at which property would change hands between a hypothetical willing and able buyer and a hypothetical willing and able seller, acting at arms-length in an open and unrestricted market, when neither is under compulsion to buy or sell and when both have reasonable knowledge of the relevant facts."*

5.9 In an unlawful taking, economic damages should represent full reparation to the Claimant. Therefore, in applying the concept of FMV outlined above, we consider the specific

[97] CER-Wood, Section 10.2.
[98] **C-2402** - CBV Institute Practice Bulletin No. 2 (November 2021), page 4.

circumstances that would have existed for the Claimant 'but-for' the Alleged Breaches and the value of the Investment to the Claimant specifically. As such, the amount that would fairly compensate the Claimant may be higher than the price that would be obtainable by the Claimant for the Project on the open market as at the Valuation Date under the above definition of FMV.

5.10 For example, as at the Valuation Date, a potential purchaser of the Project may have considered the risk that the Government of Ontario would not have dealt with Windstream in good faith and would have subjected the Project to unreasonable regulatory delays. However, since this issue is one of the actions being complained of by the Claimant in these proceedings, these risks are properly excluded in 'but for' valuation analysis under a full reparation standard of compensation.

D. Valuation Date

5.11 One of the fundamental principles of the valuation of business interests is that the value of an asset or business interest is time specific. That is, it is a function of the conditions prevailing, facts known, and expectations held at a given point in time. Information that was not known at the valuation date, or hindsight information, should not be considered in the determination of FMV since market participants at that time would not have had the benefit of this information and would have transacted based only on the information available.

5.12 Therefore, the date that the FMV of the Claimant's Investment, 'but-for' the Alleged Breaches, is assessed, is a key consideration in our analysis. Ultimately, the appropriate valuation date is a legal question that is decided by the Tribunal and as such we do not express an opinion thereon.

5.13 We have been instructed by Counsel to value the Claimant's Investment, 'but-for' the Alleged Breaches, as at the Valuation Date of February 18, 2020, the day that the IESO terminated the FIT Contract.

5.14 Further, in cases of unlawful expropriations, we understand that Claimants are entitled to any increase in the value of the asset from the date of expropriation and the date of an award.

E. Growth of the North American Offshore Wind Industry Since NAFTA 1

5.15 From the date of the NAFTA 1 Award to the Valuation Date, the offshore wind industry has continued to grow and expand around the world, and in North America in particular. For example, the first offshore windfarm in North America, the Block Island Wind Farm in Rhode Island, became operational in December of 2016. Furthermore, capital and operating costs have decreased significantly due to increases in wind turbine sizes, technological advancements, and there has been increased public pressure to reduce dependence on fossil fuels globally due to the acceleration of the impacts of climate change.[99]

5.16 Consequently, since the date of NAFTA 1, large industry players have committed significant amounts of capital towards the acquisition and development of development stage[100] offshore windfarm assets in North America.

5.17 For example:

i. In December of 2016, Statoil, now called Equinor, paid USD 42.5 million to acquire leasing rights for approximately 79,350 acres of the shore of New York (approximately $717/acre, based on a $56.9 million purchase price).[101] This transaction allowed Statoil to explore the potential development of an offshore wind farm. At the time of this transaction, the lease area acquired by Statoil did not have revenue clarity or a PPA agreement, had not completed the permitting process, had not completed studies to evaluate the seabed conditions, did not have security on grid connection options, and did not have on-site wind resources measured in the lease site;[102]

ii. In October of 2018, Ørsted, one of the largest renewable energy companies in the world, paid USD 510 million to acquire a 100% equity interest in Deepwater Wind, which was a leading US offshore wind developer. At the time of the transaction, Deepwater held:

   a. The Block Island windfarm, which was a 30 MW operational offshore wind farm;

   b. Three offshore windfarm development projects with 810 MW of capacity: Revolution Wind (600 MW), Skipjack (120 MW) and Southfork (90 MW) in Northeastern United States. These projects had long term revenue contracts in place or pending finalization, but did not have all of their permits or a grid agreement in place at the transaction date); and,

   c. 2.5 GW of offshore wind development potential in lease areas in Massachusetts and Delaware;[103]

iii. In December 2018, the US Bureau of Ocean Energy Management (BOEM) held an auction for the leasing rights to develop offshore wind farms off the coast of Massachusetts. Three leases for approximately 130,000 acres each were sold to Mayflower Wind Energy LLC, Vineyard Wind Energy LLC, and Equinor Wind US LLC, respectively, for

99 **C-2255** - CNBC article entitled "US has only one offshore wind energy farm but a 70 billion market is on the way" (December 13, 2019).
100 I.e., projects in a similar or earlier stage as the Windstream Project, in the absence of the Alleged Breaches.
101 Translated using CAD:USD exchange rate of 1.3530 on Dec 23, 2016 per Capital IQ.
102 **C-2056** - Equinor Press Release entitled "Statoil wins offshore wind lease in New York" (December 16, 2016).
103 **C-2182** - Ørsted News Release entitled "Ørsted acquires Deepwater Wind and creates leading US offshore wind platform" (October 8, 2018).

approximately USD 135 million each (approximately $1,388/acre, based on a $180 million purchase price).[104] As at the transaction date, these lease areas did not have any revenue contracts, permits or grid agreements for the prospective offshore windfarms;[105]

iv. In December 2018, EDF Renewables, a wholly owned subsidiary of EDF, a French multinational firm that is one of the largest power companies in the world, paid USD 215 million plus a deferred variable payment to US Wind Inc. to acquire a lease area of 183,353 acres (approximately $1,585/acre, based on $291 million)[106] with the potential to produce approximately 2,500 MW of offshore wind energy. As at the transaction date, this lease area did not have any revenue contracts, permits or grid agreements for the prospective offshore windfarms;[107]

v. In February 2019, Ørsted and Eversource Energy (New England's largest energy company) announced a 50-50 partnership to develop key offshore wind farm assets in the Northeastern United States. Eversource paid approximately USD 225 million for a 50% interest in Ørsted's Revolution Wind and South Fork (development stage) wind farm projects, as well as a 164,480 acre[108] tract off the coasts of Massachusetts and Rhode Island. As at the transaction date, the Revolution Wind project was still subject to permitting, finalized power purchase agreement and final investment decisions, and the South Fork project was subject to permitting, further development and final investment decisions.[109] This transaction related to 50% of the New England portion of the Deepwater portfolio acquired by Ørsted in October 2018 as described above. The transaction built upon Ørsted and Eversource Energy's 50-50 partnership that began in 2016 to develop the Bay State Wind project in New England;[110] and,

vi. In September 2020, Equinor entered into an agreement to sell a 50% interest in the Empire Wind and Beacon Wind development stage offshore wind farms located off the coast of Massachusetts to BP plc, one of the largest oil and gas companies in the world for total consideration before adjustments of USD 1.1 billion (approximately $657,995/MW, based on a $1.4 billion purchase price[111] for 2,200 MW of potential capacity, or $13,919/acre for 104,000 acres). This transaction had an effective date of January 1, 2020. As at the transaction date, only Phase 1 of Empire Wind had a revenue

104 Translated using CAD:USD exchange rate of 1.3361 on Dec 13, 2018 per Capital IQ.

105 **C-2446** - BOEM State Activities: "Commercial Leases OCS-A 0520 0521 and 0522 (February 2022)

106 Translated using CAD:USD exchange rate of 1.3519 on Dec 20, 2018 per Capital IQ.

107 **C-2188** - PR Newswire article entitled "US Wind Inc Agrees to Sell its New Jersey Offshore Lease to EDF Renewables North America" (December 20, 2018).

108 Translated from 257 square miles.

109 **C-2208** - Eversource News Release entitled "Orsted and Eversource Enter 50-50 Partnership Agreement on Key Offshore Wind Assets in the Northeast" (February 8, 2019).

110 **C-2054 -** Ørsted News Release "DONG Energy Wind Power US Inc and Eversource Announce Partnership to Make Large-Scale Offshore Wind a Reality in the United States" (December 14, 2016).

111 Translated using CAD:USD exchange rate of 1.4476 on September 10, 2020 per Capital IQ.

mechanism in place[112] and neither wind farm had its permits or a grid agreement in place.[113]

5.18 Considering the growth in the North American offshore wind industry since the date of NAFTA 1, the improvement in the technology used to construct and operate offshore windfarms since NAFTA 1,[114] and the general trend towards renewable energy in Canada and around the world, in our view, in the absence of the Alleged Breaches, all else equal, the value of the Project would have been higher as at February 2020 than it would have been as at the time of NAFTA 1.

5.19 Please refer to **Appendix 1** for our detailed analysis of the growth offshore industry between NAFTA 1 and at the Valuation Date.

F. Valuation Approaches

5.20 There are three main valuation approaches to value a business interest on a going concern basis:[115]

i. **Income-based approaches:** Value is determined by discounting future cash flow to a single value as of a given valuation date.[116] Generally, in the valuation of a business interest, the expected future cash flow is of primary importance. When applying a going-concern approach, methodologies such as the DCF or capitalized cash flow are preferred;[117]

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112 Empire Wind Phase 1 with capacity of 816 MW was announced as a winner in New York's first offshore wind solicitation on July 18, 2019. The purchase and sale agreement for an OREC Strike Price of USD83.36 per MWh (in 2018 dollars) was executed on October 23, 2019. Source: **C-2204** - Equinor News Releases entitled "Equinor offshore wind bid wins in New York State" (2019), and **C-2238** - NYSERDA Report entitled "Launching New York's Offshore Wind Industry - Phase 1 Report" (October 2019), Table 1: ORECRFP18-1 Contracting Summary, page 22.
Empire Wind Phase 2 (1,260 MW) and Beacon Wind Phase 1 (1,230 MW) were also announced as winners in another of New York's offshore wind solicitations on January 13, 2021. The OREC purchase and sale agreement for these wind farms are still under negotiation. Source: **C-2341** - Equinor News Release entitled "Equinor selected for largest-ever US offshore wind award" (January 2021), and **C-1922** - NYSERDA - Offshore Wind Projects.

113 **C-1913** - 4C Comparables (Excel) and **C-2318** - Equinor Press Release entitled "Equinor partners with BP in US offshore wind to capture value and create platform for growth" (September 10, 2020).

114 CER-4C Offshore-3, Section 2, and CER-Wood, Section 2.1.

115 For the purposes of our analysis, we have valued the Project on a going concern basis (i.e., at its highest and best use), consistent with the definition of FMV.

116 **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 40.1.

117 **C-2281** - Johnson, Dr. Howard E, CPA Canada "Business Valuation in Canada" (2020), pages 24 to 25 and 333.

ii. **Market-based approaches:** Value is determined by comparing the asset with sufficiently comparable (i.e., similar) assets for which price information is publicly available;[118] and,

iii. **Cost-based approaches:** Cost-based approaches are based on the principles that the costs to construct or develop an asset contribute to future value, and that a prospective buyer will not pay more for an asset than it could pay to construct a similar asset for itself.[119]

5.21 The objective in selecting valuation approaches and methods is to find the most appropriate method(s) under the particular circumstances. According to the IVSC, the selection process of valuation approaches and methods should consider (at a minimum):[120]

i. "The appropriate basis(es) of value and premise(s) of value, determined by the terms and purpose of the valuation assignment;

ii. The respective strengths and weaknesses of the possible valuation approaches and methods;

iii. The appropriateness of each method in view of the nature of the asset and the approaches of methods used by participants in the relevant market; and,

iv. The availability of reliable information needed to apply the method(s)."

5.22 Although the use of multiple methods is not required, multiple approaches and methods should be considered, "… *particularly when there are insufficient factual or observable inputs for a single method to produce a reliable conclusion*."[121] Ultimately, it is the valuation professional's responsibility to choose the appropriate method for a given asset or business interest.[122]

5.23 Income approaches such as the DCF methodology can be used when there is sufficient information known about a given project upon which a reliable forecast of future expected cash flows can be prepared. According to the IVSC, an income approach "*should be applied and afforded significant weight*" for assets where i) "*the income-producing ability of the asset is the critical element affective value from a participant perspective*" and/or ii) "*reasonable projections of the amount and timing of future income are available for the subject asset, but there are few, if any, relevant market comparables*."[123]

[118] **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 20.1.
[119] **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 60.1.
[120] **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 10.3.
[121] **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 10.4.
[122] **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 10.5.
[123] **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 40.2.

5.24 The IVSC further notes that additional circumstances may indicate that the income approach *"may be applied and afforded significant weight"* including where *"…there is significant uncertainty regarding the amount and timing of future income-related to the subject asset"* and/or where "*the subject asset has not yet begun generating income, but is projected to do so.*"[124]

Income Approach

5.25 In our experience, a DCF methodology is used in a FMV opinion when there is sufficient commercial, technical and market information on a project to prepare a reliable forecast of the future expected cash flows over the life of the project.

5.26 Each offshore wind project is unique. Accordingly, in Mr. Tetard's experience, market participants favour the use of a DCF methodology for offshore wind projects where a reliable forecast can be made (as opposed to a comparable transaction approach) since it is the only approach that is able to capture the specificities of each project, including the following (among other variables):

i. The price at which every unit of power produced is sold in the market;

ii. The amount of power units generated for a given period, i.e., the number of MWh produced in a year, which is calculated as the combination of the wind speed at the project specific location, and the power curve of the wind turbine generator that is specifically assumed for the project;

iii. The project schedule;

iv. The distance to the grid connection point;

v. The project design suitable for its specific geographic location;

vi. The project's logistics;

vii. The specific technologies used; and,

viii. The construction and operation strategies.

5.27 Thus, whereas a DCF methodology reflects the unique characteristics of a given offshore wind project, a comparable transaction approach (and other market approaches) can only provide an approximation of the value of an offshore wind project based on value benchmarks from sufficiently similar projects, if available.

5.28 In Mr. Tetard's experience, in practice, the only situation when an offshore wind project would not be valued using a DCF methodology is when no information is available to evaluate the

[124] **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 40.3.

potential cash flow generated by a project, such as in situations where a project has not yet achieved revenue clarity through a PPA or similar type of arrangement. This does not apply to the Project, particularly since the Project had revenue clarity through the FIT Contract.

5.29 Moreover, in a real-world market transaction, a qualified investor, (i.e., a specialist investor in infrastructure investments including offshore power generation, such as utility companies, infrastructure investors or private equity investors) will prepare a financial model of the project's future cash flows. Project specific risks or uncertainties with respect to future expected cash flows are reflected in the cash flow estimates themselves (estimated revenues and costs) and in the discount rate (or target investment return) applied to convert the future cash flows into a present value as of the Valuation Date.

5.30 In infrastructure projects investments, including offshore wind power generation projects, investors[125] generally value projects based on a targeted investment return. This target investment return is effectively the return on investment which the investor is aiming to achieve when deciding to execute on the acquisition of a project.

5.31 Since the Claimant had obtained the FIT Contract which provided for a fixed revenue stream over a 20 year period, had performed onsite wind measurements, had grid access, and had an exclusive and priority position secured on the site the Project would be built on,[126] and the Project's capital and operating expenses can be estimated with a reasonable degree of certainty based on similar projects around the world,[127] in our view, the Project's cash flows, and the risk of transitioning the Project from a development stage into an operational stage could be reliably forecast as of the Valuation Date. Accordingly, based on established industry practice, hypothetical buyers and sellers for the Project at the Valuation Date would perform a valuation based on a DCF methodology.

5.32 Thus, consistent with the definition of FMV, which contemplates a notional transaction between arm's length parties and the valuation processes market participants would consider and apply, it is our view that a DCF methodology is a required valuation methodology. As

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125 Investors in wind generation project are typically either energy companies (such as utilities or IPPs – Independent Power Producers) or financial investors (such as infrastructure funds, private equity funds, etc.).

126 See Footnotes 23 and 24 above.

127 According to CER-Two Dogs (Capex Opex Sensitivity Report) ("**CER-Two Dogs**") (Section 5.3) "*The range of Capex and Opex costs for WWIS is considered to be a reasonable starting point for use in financial modelling and, as with all large capital-intensive projects, can be refined using more site-specific information as the design of the Project advances*".

such, we have applied a DCF valuation methodology as of the Valuation Date, as part of our damages calculation (see Section 6 below).[128]

Market Approach:

5.33 Market-based methods are generally appropriate for projects at all stages of development, provided that sufficient, reliable market-based information is available as of a given valuation date that relates to suitably similar assets.

5.34 As noted above, a market approach to value the Project on the Valuation Date cannot reflect the Project's specific characteristics and therefore it would not, in our view, be the primary or only method that market participants would use to value the Project in a real world transaction at the Valuation Date (absent the Alleged Breaches). However, in our view, a market approach can provide an additional analysis that would be considered in a valuation of the Project and can also be used to assess the reasonableness of the conclusions derived from the income approach. Accordingly, we have also applied a market approach to value in our damages assessment based on objective market data relating to sufficiently similar projects and companies proximate to the Valuation Date (see Section 7 below).

Costs Approach

5.35 With respect to the cost approach to value, according to IVS, "*[t]he cost approach cannot normally be applied in a valuation of businesses or business interests as these assets seldom meet the criteria in IVS 105…*"[129] Cost approaches to value are appropriate in cases where the fundamental basis of value is based on replacement cost, where the asset is not an income generating asset and thus income or market based approaches are unfeasible for the asset.[130]

5.36 In a transaction based on replacement or reproduction costs, the amount paid would generally reflect the owner's costs plus a return on its investment, and thus under a cost approach to value, it may be appropriate to include an estimated profit margin on the costs incurred to date.[131] Since the Project was expected to become an income generating asset in future, absent the Alleged Breaches, and since the income and market approaches can be relied upon, we consider that a cost approach to value is not appropriate for the Project at the Valuation Date absent the Alleged Breaches.

[128] We provide further discussion on the reason for adopting a DCF approach in our valuation analysis in **Section 6** below.
[129] **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 70.1.
[130] **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 60.2.
[131] **C-2278** - International Value Standards (IVS) 2020, section 105, paragraph 70.12.

5.37 Thus, we have not included a cost approach to value in our damages analysis for the Claimants since, in our view, it will not restore the Claimant to the economic position it would have occupied absent the Alleged Breaches. However, we do present the amounts invested by the Claimant to date for informational purposes, and in our consideration of the structuring and timing of the consideration that would be paid in transaction for the Project as at the Valuation Date. See Section 6K and **Schedule 3** for details.

6 INCOME APPROACH

A. Introduction

6.1 In this section, we describe our valuation of the Project at the Valuation Date under the income approach using a DCF methodology.

B. Discounted Cash Flow (DCF) Methodology and Inputs

6.2 We have constructed a DCF model over the operating life of the Project based on existing contracts, including the FIT Contract, on-site studies including the measurement of wind conditions, as well as the inputs received from qualified consultants, as traditionally performed by investors in offshore wind projects. We present our valuation of the Project by using two components i) the component that relates to the 20-year term of the FIT Contract, and ii) an additional 10 years (net of decommissioning costs), that would also be considered by an investor when valuing the Project.[132]

6.3 Our DCF model for the Project includes all cash inflows and outflows to/from the Project and the appropriate discount rate and risk adjustments to obtain the FMV on a net present value basis. The key elements of our DCF analysis are as follows:

i. Project schedule;

ii. Revenue;

iii. Capital costs;

iv. Operating costs;

v. Decommissioning costs;

vi. Taxes;

vii. Working capital;

viii. Financing costs;

ix. Discount rate; and,

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[132] According to CER-Wood (page 57): "*It is assumed that the Project will continue operation, perhaps with upgraded wind turbines (repowering) beyond the original twenty-year period specified in the FiT Contract. In the European market, offshore wind projects assume a typical useful life or operational life of 30 years*".
In our DCF valuation, we assumed that the Project's operating life would be 30 years, which would include 20 years of the PPA, and an additional 10 years after the expiry of the PPA. Based on Mr. Tetard's experience, a 30-year lifetime for an offshore wind project would be an appropriate and possibly conservative assumption. Some investors assume longer lifetimes for offshore wind projects (e.g., 35 years). Investors do not assume project lifetimes of shorter than 30 years. See paragraph 6.16 below for a discussion of how this relates to the consideration of the decommissioning costs for the Project.

x. Project stage probability/risk adjustment.

6.4 We discuss each of the above noted elements of the DCF as they relate to the Project.

C. Project Schedule

6.5 Wood developed a detailed project schedule which outlined the key activities required for the Project to be successfully implemented. Wood concluded that, absent the Alleged Breaches, the Project would have re-commenced its development on February 18, 2020. The first 36 months of the implementation schedule would have included obtaining the required permits, and thus, absent the Alleged Breaches, the Project would have reached FC on February 20, 2023.[133]

6.6 According to Wood's analysis, after FC, the Project would have progressed to the construction stage. During the construction stage, 66 WTGs, their foundations, inter-array cables, and other components would have been procured, manufactured, and installed. Wood concluded that it would have taken 22 months from FC to fully implement the Project, which reflected the time required to complete all required processes in the construction stage and making an allowance for the winter months wherein some of the construction activities may not be possible.[134]

6.7 Wood also concluded that it would have taken 58 months from a re-commencement date of February 18, 2020, until the Project would have reached Commercial Operation, at a Commercial Operation Date (COD) of December 20, 2024.[135] We have incorporated the Project Schedule set out in the Wood Report into our analysis.

D. Revenue

6.8 Revenue for the Project is calculated as the volume of electricity the Project would generate multiplied by the FIT Contract price, subject to inflationary increases in accordance with the terms of the FIT Contract, or the open market price in the final 10 years of the Project's life, when no FIT contract would be in place.

[133] CER-Wood, Section 10.3.
[134] Wood's analysis takes into account that certain construction activities could not be performed for a certain period of time in the winter months due to low temperature and/or ice formation in Lake Ontario. See CER-Wood, Section 10.4.
[135] CER-Wood, Section 10.2.

Annual Wind Power Generation

6.9 A key input in driving the cash flows of the Project is the amount of energy that would have been generated by the wind farm to be sold under the FIT Contract for the first 20 years of the operating life and to the open market for the last 10 years of the Project's life.[136]

6.10 Wood conducted an energy yield assessment of the Project using a statistical model based on the historical measurements of wind data in the region. Based on its statistical model, Wood calculated that a long-term wind speed of 8.47 m/s would be available to the Project at the height of the planned WTGs.[137] Wood concluded that, accounting for the generation capabilities of the turbines, corrections and losses, absent the Alleged Breaches, the Project would have generated 1,159.9 GWh/annum[138] based on a "P50" factor,[139] implying a P50 capacity estimate of 44.6%.[140]

6.11 In our DCF Model, we have relied upon the conclusions set out in the Wood Report for the energy that would have been generated by the Project on an annual basis over the Project's estimated life.

Energy Price During the FIT Contract Term

6.12 We multiplied the wind energy generation with the tariff that would be applicable to each MWh generated during the operation during the term of the FIT Contract to calculate the Project's (nominal) revenues in each year, absent the Alleged Breaches. As discussed below, we relied on the forecasts of energy prices to estimate the tariff that would be available to the Project after the expiry of its FIT Contract, and until the end of its operational life (i.e., 30 years).

6.13 Under the FIT Contract, the Project was entitled to receive the FIT Contract Price of $0.19 per kWh (as at a base date of September 30, 2009),[141] which is equivalent to $190.00 per MWh with inflation indexing to the MCOD, and partial inflation indexation (on 20% of the indexed

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136 See footnote 1322 above.
137 CER-Wood, Section 5, page 40.
138 CER-Wood, Table 5-1.
139 A "P50" assumption represents the net energy yield achieved by the project with a 50% probability of occurrence i.e., 50% of the times the energy yield would be higher and for the rest 50% of the times the yield would be lower, with an average over the long term of P50 yield value (see CER-Wood, Section 5, page 40). P50 is the probabilistic scenario used by investors in offshore wind energy.
140 The capacity factor of 44.6% implies that a project comprising of 66 turbines of capacity 4.5 MW each, would generate 132.3 MW per hour on average in the long term (calculated as: 66 x 4.5 x 44.6% = 132.3 MW, rounded). The capacity factor expresses the portion of time during the year when the Project is producing at full rated capacity (297 MW).
141 NAFTA 1, Exhibit C-0251, FIT Contract cover page.

price) after MCOD.[142] We have been instructed by Counsel to assume that the Revised MCOD of January 2025 is relevant for indexation of the FIT Contract Price, rather than the Original MCOD of May 4, 2015 set out in the FIT Contract. The use of the Revised MCOD for the indexation is necessary to ensure that IESO's promise to "freeze" the FIT Contract for the duration of the Moratorium and "insulate" Windstream from its effects is realized. Otherwise, the value of the FIT Contract Price would be progressively eroded over time due a lack of indexation to inflation up until the Revised MCOD.

6.14 Therefore, in our analysis, we have applied inflation on the entire amount of the Contract Price from September 30, 2009, to the anticipated COD of December 20, 2024. We applied the actual changes in the Consumer Price Index ("**CPI**") for Ontario published by Statistics Canada from September 30, 2009[143] to January 31, 2020[144], and the estimated inflation rate from February 1, 2020, to the COD in December of 2024 of 2% per year[145] to calculate the applicable indexed-price that the Project would have received at COD, absent the Alleged Breaches, of $253.8 per MWh.[146]

6.15 Further, as per the terms of the FIT Contract, 20% of the indexed price at COD (i.e., $51.0 per MWh) was to be adjusted by inflation on an annual basis in accordance with the CPI figures for Ontario. The remaining 80% of the indexed-price at COD (i.e., $203.9 per MWh) would remain fixed over the 20-year term of the FIT Contract. We summarize the applicable tariff during the term of the FIT Contract, accounting for the inflation in the figure below:

142 NAFTA 1, Exhibit C-0197, Exhibit B, section 1.3; and NAFTA 1, Exhibit C-0251, FIT Contract Cover Page dated May 4, 2010, item 13.

143 September 30, 2009 is the 'Base Date' per NAFTA 1, Exhibit C-0251, FIT Contract Cover Page, item 15.

144 CPI data is published monthly by Statistics Canada. January 31, 2020 represents the most recent date for which the actual CPI data was available as of the Valuation Date.

145 Long term inflation expectation as per **C-2191 -** Bank of Canada Annual Report 2019, page 13.

146 Calculated as [Contract Price x CPI at Jan-20 x Estimated Inflation from Feb-20 to Dec-24 / CPI at Sep-09] i.e., $190 x 138.00% x 110.16% / 113.8% = $253.8 (rounded).
Refer to **C-1945** - Statistics Canada: Ontario CPI (September 2009-January 2020) for Monthly CPI Data (Table 18-10-0004-01 Consumer Price Index, monthly, not seasonally adjusted); and **C-2191 -** Bank of Canada Annual Report 2019 for the estimated inflation as at the Valuation Date.

Figure 6-1: Summary of Price during the period of the FIT-Contract Absent the Alleged Breaches ($/MWh)

Year	Fixed Price	Indexed Price	Tariff
2025	$ 203.0	$ 50.8	$ 253.8
2026	203.0	51.8	254.8
2027	203.0	52.8	255.9
2028	203.0	53.9	256.9
2029	203.0	54.9	258.0
2030	203.0	56.0	259.1
2031	203.0	57.2	260.2
2032	203.0	58.3	261.4
2033	203.0	59.5	262.5
2034	203.0	60.7	263.7
2035	203.0	61.9	264.9
2036	203.0	63.1	266.2
2037	203.0	64.4	267.4
2038	203.0	65.7	268.7
2039	203.0	67.0	270.0
2040	203.0	68.3	271.4
2041	203.0	69.7	272.7
2042	203.0	71.1	274.1
2043	203.0	72.5	275.5
2044	203.0	73.9	277.0

Energy Price After the FIT Contract Term

6.16 As noted above, we have assumed that the Project would have an operating life of 30 years, which includes 20 years of the PPA and an additional 10 years after the expiry of the PPA.[147] It is important to consider the value of the remaining economic life of the Project beyond the expiration of the FIT Contract in order to properly net this amount against the Project's estimated decommissioning costs, which we discuss in Section 6G below. In other words, failing to take into account the additional economic life of the Project beyond the expiry of the PPA while still incorporating the decommissioning costs would understate the value of the Project.

6.17 Therefore, we have assumed that after the FIT Contract of 20 years (i.e., as of 2045), the Project would still have operated for at least another 10 years, absent the Alleged Breaches. During these last 10 years (i.e., from 2045 to 2054), the Project would have generated similar amounts of electricity per year on average as it would have generated during each year (on

[147] See footnote 1322 above.

average) of the initial 20 years, assuming that the Project would have been adequately maintained. Based on Mr. Tetard's experience, the electricity generated during the Project's last 10 years would have been sold to the market, either through a contract (with a utility or a large consumer or a pool of medium consumers), or directly to the electricity market of Ontario.

6.18 Investors typically use a power price forecast as the basis for determining the economic value of a MWh many years in the future. A power price forecast is typically sourced from a power market consultant who has knowledge of the local electricity market including how the power price is formed in this market. For the Project, such a forecast provides the power price (in $ per MWh) that the Project is expected to sell each MWh produced by the Project after the term of the FIT Contract. In Mr. Tetard's experience, a discount of 4% to 6% is typically deducted from the forecasted market power price to allow for the costs associated with the sale of the electricity on the market, in effect using a licensed power market participant with the operational capabilities to sell the Project's power on the Ontario electricity market.

6.19 For the purposes of our DCF analysis over the years 2045 to 2054, we have relied upon the HOEP forecast prepared by Power Advisory as at September 2019.[148] We understand that this was the most recent contemporaneously prepared forecast by Power Advisory in the ordinary course prior to the Valuation Date.[149] According to this forecast, the weighted average HOEP in nominal Canadian dollars would range from $74.7/MW to $100.5/MW from 2045 to 2054. We have deducted a discount of 5% (midpoint of 4% to 6%) from the prices forecasted by Power Advisory to reflect the cost associated with the sale of the electricity on the market, based on the typical range of rates observed in Mr. Tetard's experience as noted above.

6.20 The projected realizable tariffs that would be received by the Project over the years 2045 to 2054 are summarized as follows:

[148] CER-Power Advisory-2, Section 5 and Appendix B: September 2019 Ontario Wholesale Price Forecast. According to the IESO: "The IESO calculates the hourly Ontario energy price (HOEP), which is charged to large consumers that participate in the market, as well as local distribution companies (LDCs) who recover it from the subset of customers that pay the market price. The HOEP is the average of the twelve market clearing prices (MCP) set in each hour. A new MCP is set every five minutes. Averages are weighted by the amount of electricity used throughout the province within each hour." Source: **C-2438** - IESO - Hourly Ontario Energy Price (HOEP) (February 2022).
In other words, the HOEP represents the price that an electricity producer in Ontario would receive on the sale of its energy in the absence of a FIT contract.

[149] Power Advisory regularly prepares HOEP forecasts, and these forecasts are used by the Ontario Energy Board (OEB) to use as one of a number of inputs to set the regulated price plan (RPP) prices. (Source: **C-2375** - "Ontario Energy Board Regulated Price Plan – Price Report November 1, 2019 to October 31, 2020 (October 22, 2019), page 6.).

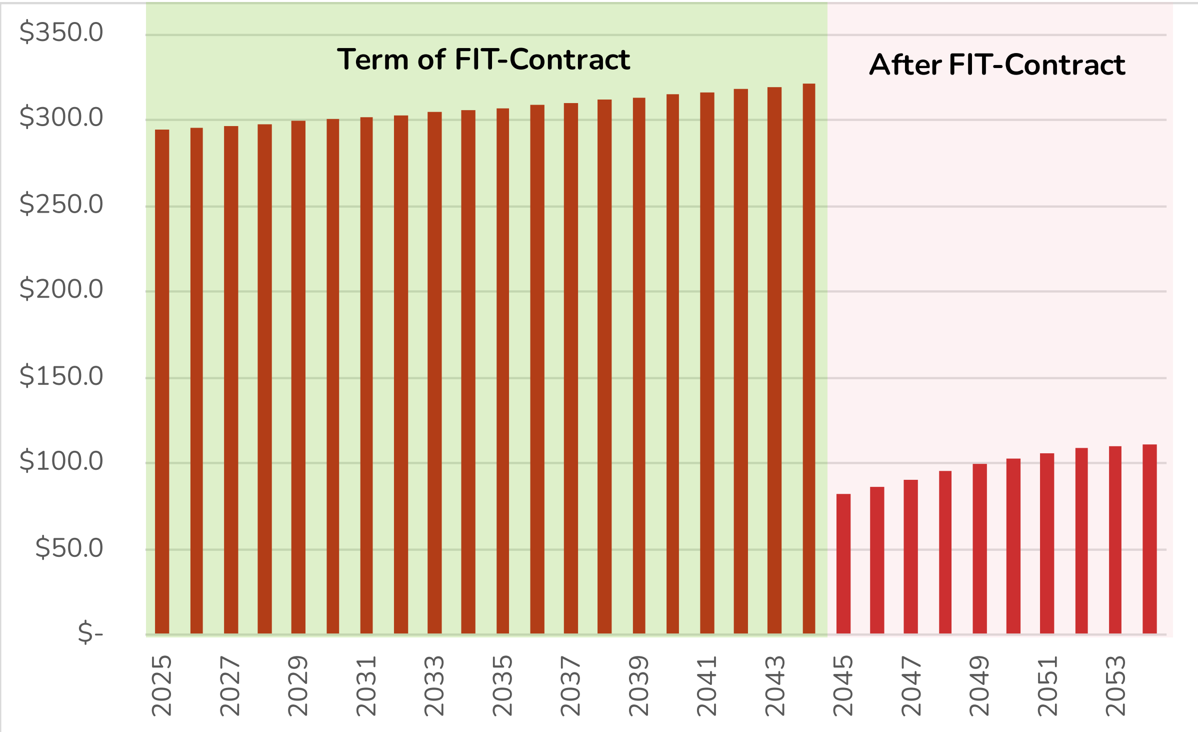
Figure 6-2: Summary of Price after the FIT-Contract period ($/MWh, nominal)

Year	Tariff Forecast	Discount	Realizable Tariff
	[A]	[B = A * 5%]	[A - B]
2045	$ 74.7	-$ 3.7	$ 70.9
2046	78.5	-3.9	74.5
2047	82.5	-4.1	78.4
2048	86.9	-4.3	82.6
2049	90.3	-4.5	85.8
2050	93.7	-4.7	89.0
2051	96.3	-4.8	91.5
2052	98.5	-4.9	93.6
2053	99.6	-5.0	94.6
2054	100.5	-5.0	95.5

Total Revenues

6.21 In the below figure, we summarize the total revenue of the Project in nominal terms (i.e., accounting for inflation) over the 30-year operating life of the Project:

Figure 6-3: Summary of Project Revenue ($ Millions)



E. Capital Costs

6.22 There are two major categories of capital expenditures applicable to the Project:

i. Planning and Development Expenditure ("**DEVEX**"): This includes costs relating to studies, stakeholder engagement, site investigation, technical advisory, legal fees, and other advisory fees to obtain the data and information required, as well as to secure the procurement and funding for the Project to reach FC; and,

ii. Construction Expenditure ("**CAPEX**"): This includes costs related to the procurement, delivery, installation, and commissioning of all components required for the Project (wind turbines, foundations, electric cables, project management and others) to reach COD.

Planning and Development Expenditure (DEVEX)

6.23 The 4C Report and the Two Dogs Report estimated that the DEVEX would be required for following items:[150]

i. Preliminary desktop studies including a preliminary environmental impact assessment and preliminary designs and associated infrastructure;

ii. Site Investigation including geophysical surveys, geotechnical surveys and assessment of the wind resource;

iii. Technical advisory costs associated with engineering design studies and contractor procurement;

iv. Permitting and environmental studies; and,

v. Legal expenses.

6.24 Mr. Irvine reviewed the capital cost benchmarking analysis performed by 4C, which detailed the DEVEX incurred by comparable projects.

6.25 Based on the adjustments to 4C's DEVEX benchmarking analysis discussed above, the Two Dogs Report estimated the DEVEX for the Project to be in the range of $45.0 to $52.5 million (in real 2020 dollars), with a central estimate of $48.5 million.[151] In our DCF analysis we have applied the central estimate of $48.5 million for DEVEX.

6.26 The DEVEX amount presented in the Two Dogs Report is reflected in real 2020 dollars. Given that we have prepared our model in nominal terms, we have applied inflation to these costs

[150] CER-Two Dogs, Section 3.2, and CER-4C Offshore-3 page 5, and Section 3.

[151] CER-Two Dogs, Section 3.2; and Table 2.

to adjust these amounts into nominal dollars in the subsequent years over which these costs would have been incurred absent the Alleged Breaches.

6.27 Based on the Project schedule set out in the Wood Report, Mr. Irvine estimated the timing of the DEVEX spending over the development period. The schedule of DEVEX for the Project, including expected inflation, is summarized as follows:

Figure 6-4: Summary of DEVEX Schedule (Nominal, $ Millions)[152]

DEVEX	2020	2021	2022	2023	2024	Total
Planning and Development Expenditure (DEVEX)	**$ 14.4**	**$ 15.9**	**$ 16.2**	**$ 2.8**	**$ -**	**$ 49.2**

Construction Expenditure (CAPEX)

6.28 In the Two Dogs Report, Mr. Irvine provides his estimates of the CAPEX that would be required for the Project, including the following items:[153]

i. Gravity Based Foundation (**"GBF"**);

ii. Wind Turbine Generators (WTG);

iii. Offshore high voltage substation (**"OVHS"**);

iv. Array and export cables;

v. Installation costs;

vi. Onshore interconnection;

vii. Insurance;

viii. Management costs; and,

ix. Contingency.

6.29 Mr. Irvine analyzed the 4C's cost estimates for CAPEX which were based on the benchmarking of costs spent by other projects and industry studies. Mr. Irvine made certain adjustments to the 4C cost estimates and concluded that the CAPEX for the Project would be in a range from $1,011.6 million to $1,150.5 million, with a central estimate of $1,088.2 million (in real 2020 dollars) which includes a 10% contingency factor.[154]

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152 Refer to **Appendix 11**, Excel Model, tab 'Control Sheet', cells H89 to L89.

153 CER-Two Dogs, Sections 3.3 to 3.20.

154 Capital costs as per CER-Two Dogs, Sections 3.3 to 3.20. Also see CER-Two Dogs, Table 25. CAPEX calculated as total Project capital costs, less DEVEX (as discussed above), as follows:

- Low Estimate: $1,057.0 million - $45.0 million = $1,011.6 million (rounded).
- Central Estimate: $1,136.6 million - $48.5 million = $1,088.2 million (rounded).
- High Estimate: $1,202.9 million - $52.5 million = $1,150.5 million (rounded).

6.30 The CAPEX amount presented in the Two Dogs Report is reflected in real 2020 dollars. Given that we have prepared our model in nominal terms, we have applied inflation to these costs to adjust these amounts into nominal dollars in the subsequent years over which these costs would have been incurred, absent the Alleged Breaches.

6.31 Based on the Project schedule set out in the Wood Report, Mr. Irvine estimated the timing of the CAPEX spending over the construction period. The schedule of CAPEX spending for the Project, including expected inflation, is summarized as follows:[155]

Figure 6-5: Summary of CAPEX Schedule (Nominal, $ Millions) [156]

CAPEX	2020	2021	2022	2023	2024	Total
Foundation or Gravity Based Foundation (GBF)	$ 6.6	$ 11.7	$ 63.0	$ 160.7	$ 101.3	$ 343.2
Wind Turbine (WTG)	-	-	-	98.3	196.8	295.1
Offshore high voltage substation (OVHS)	-	1.2	1.3	26.5	23.2	52.2
Array and export cables	-	1.0	0.6	40.2	26.6	68.4
Installation costs	-	-	-	38.7	158.6	197.3
Onshore interconnection	-	1.1	1.2	22.4	25.5	50.2
Insurance	-	-	-	12.3	15.0	27.3
Management costs	-	-	-	6.5	7.9	14.4
Contingency (10%)	-	-	-	47.3	57.8	105.1
Total CAPEX	**$ 6.6**	**$ 14.9**	**$ 66.2**	**$ 452.7**	**$ 612.8**	**$ 1,153.2**

F. Operating Costs

6.32 The operating costs for the Project are comprised of the following:

i. Annual wind land rental charges;

ii. Operating and maintenance expenses relating to mechanical operation); and,

iii. Other fixed expenses.

Annual Wind Land Rental Charges

6.33 We understand that absent the Alleged Breaches, the Project would have been required to pay annual wind rental charges for the use of Crown Land to the MNRF during the operation

[155] CER-Two Dogs, Section 3.3 to 3.20, and Section 6.
[156] Refer to **Appendix 11**, Excel Model, tab 'Control Sheet', cells H90 to L99.

phase of the Project. Based on the guidelines from the MNR, these charges are based on the following formula:[157]

$$\textbf{Total installed capacity (MW)} \times \textbf{8,760 hours per year} \times \textbf{30.0\% capacity factor} \times \textbf{3.0\% rate of return} \times \textbf{Price per MWh}$$

6.34 Accordingly, we have incorporated the annual wind rental charges based on the applicable tariff for each year of the operations based upon the inflation adjusted FIT Contract price for each year, as discussed in Section 6C above.[158]

Base land rent fees

6.35 We have also deducted base land rent fees during the construction of the Project. According to the MNR document titled "Onshore Windpower Development on Crown Land – Non-Competitive Application" – issued on May 9, 2013, the base land rent rate is applicable *"for the area occupied by the Wind Turbines"*. The formula for the base land rent per this document is Zonal rate per hectare/acre * Area * 10% + CPI. The applicable zonal rate for the Southeast zone (where the Project is located) Is $399 per acre.[159]

6.36 We understand that the Project would require 208 Wind Power Allocation Blocks based on the design of the Project incorporated into the Wood Report. This would result in a total area of 31,778 acres.[160] We then calculated the annual base land fee during construction as: 31,778 * $399 * 10% = $1.27 million per year. We then applied CPI to this amount, from May 2013 to the years in which the base land rent fees is paid, in accordance with the terms of the MNR document.

6.37 We understand from Windstream that the base land rent fees would only commence after the Renewable Energy Approval would be received and would continue throughout the construction period until COD, at which point Windstream would begin paying the Annual Wind Land Rental Charges described above. As noted in Figure 5-2 above, according to the Wood Report, the Renewable Energy Approval would be received on February 20, 2023, and COD would occur on December 20, 2024. Therefore, for purposes of our analysis, we have incorporated the base land rent fees for the period between February 20, 2023, and December

[157] As per Ontario wind power on Crown Land procedure, Appendix B – Windpower activities, authorizations, fees and rents. Source: **C-1987** - Government of Ontario website "Onshore wind power development on Crown land procedure" (May 9, 2013).

[158] See **Schedule 1** for details and **Appendix 11**, Excel model, tab 'Control Sheet', cell F130.

[159] NAFTA 1, Exhibit R-0123, Onshore Windpower Development on Crown Land – Non-Competitive Application (May 9, 2013), page 19 and 20.

[160] **C-2337** - ORTECH Memorandum to Ian Baines (WEI) Re: Required Wind Power Allocation Blocks (January 7, 2022).

20, 2024. After including inflation, this results in total fees of $1.3 million for calendar 2023, and $1.5 million for calendar 2024.[161]

Administrative land rent fee

6.38 We deducted the $1,000 per year administrative land rent fee applicable to the Project once in operation, according to the MNR document titled "Onshore Windpower Development on Crown Land – Non-Competitive Application" – issued on May 9, 2013.[162]

Operating and Maintenance Expenses

6.39 We understand that absent the Alleged Breaches, the Project would have incurred certain operating and maintenance ("***O&M***") expenses for the upkeep of the mechanical equipment (such as turbines, cables, etc.). We have relied upon the operating costs estimates contained in the Two Dogs Report.

6.40 Mr. Irvine calculated the annual O&M costs to be in the range of $25.8 million to $32.2 million with a central estimate of $28.8 million (in real 2020 dollars). We note that Mr. Irvine's calculation of the O&M expenses includes a $3 million per annum premium to the range of O&M costs observed for other offshore wind projects, given that "*WIS is remote from the locus of offshore wind development activities in the USA*".[163]

6.41 We understand that the annual operating and maintenance cost estimates presented in the Two Dogs Report are in real 2020-dollar terms. Given that we have prepared our model in nominal terms, we applied inflation factors to the mid-point estimate of $28.8 million to adjust this amount into nominal dollars in the subsequent years over which these costs would have been incurred absent the Alleged Breaches.

Other Fixed Expenses

6.42 In addition to the wind land rental charges and operating costs, the Project would also incur annual insurance costs. We relied on the insurance cost estimates (in real 2020 dollar terms) provided to Mr. Tetard by reputable offshore wind insurance brokers for the first 20 years of operations for a project value of $1.0 billion. We adjusted the insurance costs for a project value of $1.04 billion[164] and for inflation, the annual insurance expense for the first 20 years

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161 See **Schedule 1**.

162 NAFTA 1, Exhibit R-0123, Onshore Windpower Development on Crown Land – Non-Competitive Application (May 9, 2013

163 CER-Two Dogs, Section 4.4.

164 CER-Two Dogs, Section 3.18.

ranged between $4.3 million and $8.7 million (in nominal terms).[165] The insurance premium in the last 10 years would decline in real terms due to the declining useful life of the Project, but would continue to increase due to inflation. Accordingly, we assumed that the annual insurance cost would remain stable in nominal terms at $4.5 million per annum for the last 10 years.

6.43 The Project would also incur certain other fixed administrative costs during the operational period. We have relied upon the other fixed expenses set out in the original Ortech model for the Project,[166] and applied inflation factors to bring these amounts forward to each year that the costs would be incurred over the life of the Project. Consistent with the Ortech model, we assumed that the legal support, engineering support and post-construction environmental monitoring costs would have a 100% contingency factor for the first year of operations. We summarize the other fixed expenses incorporated into our model below:

Figure 6-6: Summary of Other Fixed Expenses (in Real 2020 dollars)

Cost Category	Amount Per Year, First Year of Operations	Amount Per Year, Second Year of Operations Onwards
Owner's administration and operation	$ 122,697	$ 122,697
Legal support	51,124	25,562
Engineering support	184,045	92,023
Post-construction environmental monitoring	61,348	30,674
Owner's operator	76,686	76,686
Owner's maintenance crew	122,697	122,697
Contingency (10%)	61,860	47,034
Total	**$ 680,457**	**$ 517,372**

G. Decommissioning Costs

6.44 At the end of the operating life of the Project absent the Alleged Breaches, it would have been necessary to decommission the Project site. This would have involved the removal of all Project components and the restoration of the site to its pre-existing conditions.[167] In this section we describe the methodology we have applied to estimate the decommissioning costs for the Project, to net against the value of the Project in the post FIT Contract period.

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[165] **C-1928 and C-2352** Insurance premium quotes, average of P40 and P60 Indications provided by quotes provided to Mr. Tetard by reputable offshore insurance brokers, based on recent offshore wind insurance market appraisals. Refer to **Appendix 11**, Excel Model, tab 'Control Sheet', cells H158 to AK162.

[166] NAFTA 1, Exhibit C-1903, Ortech Financial Model (October 16, 2012), PDF page 5. According to the Ortech model, these cost estimates were reflected in 2018 dollar terms.

[167] CER-Wood, Section 12, page 57.

6.45 As noted above, it is important to consider the value of remaining economic life of the Project beyond the expiration of the FIT Contract in order to properly net this amount against the Project's estimated decommissioning costs at the end of the Project's operating life.

6.46 We have not considered a renewal of the FIT Contract or a re-powering of the Project site after the 30-year estimated operating life. Accordingly, we have incorporated the estimated decommissioning costs that would have been incurred after the 30-year period elapsed, in our DCF analysis.

6.47 At the time of decommissioning, projects typically have little to no revenues. As a result, in Mr. Tetard's experience, even though these costs are required to be spent at the end of the life, in order to ensure the necessary funds are available for decommissioning, regulations in the global industry generally require the operators to either i) provide advanced security (such as a letter of credit) to cover the estimated decommissioning costs, or ii) deposit the estimated amount of decommissioning costs in an escrow-like account during the operational years to be utilized at the time of decommissioning. In Mr. Tetard's experience, the former approach is more common than the latter.

6.48 From an economic and financial perspective, a project would therefore start making deposits towards the known future decommissioning obligations, at a point in its operating cycles when the cash flows are stable.

6.49 Accordingly, we have assumed that Windstream would have provided a letter of credit to cover the estimated decommissioning costs once it reached COD, and that Windstream would have placed the cash amounts to fund the decommissioning liability in escrow in the last three years of the FIT contract, at which point the entire amount of debt financing would have been repaid, leaving the Project with stable cash flows for the remainder of the FIT Contract to fund the decommissioning costs escrow account.

6.50 According to the report prepared by Aecom Canada Ltd / URS dated November 6, 2015, on behalf of Canada in NAFTA 1 (the "**2015 URS Report**"), the resale value of the scrap equipment at the end of the Project's life "*will be adequate to cover all decommissioning costs including labour, vessel hire, processing and storage of materials, with the exception of the specialised vessel to remove the WTGs, towers and GBF*". URS estimated that Windstream would need to rent a specialised vessel for 260 days, at a rate of $271,500 per day (in October 2014 prices), to complete the decommissioning of the Project at the end of its useful life. This amounted to an estimate of $71.0 million (in October 2014 prices).[168] URS then inflated these

[168] I.e., $271,500 * 260 = $71 million. This estimate amounts to approximately $0.24 per MW in 2014 prices (i.e., $71 million / 297 MW = $0.239)

costs to the end of the FIT contract, to reflect the value of this cost in nominal dollars in the year that the costs would be incurred.

6.51 In our model, we adopted the URS estimate of decommissioning cost of $271,500 per day for 260 days (in October 2014 prices), and inflated this amount into 2054 dollars, which is when the decommissioning costs would be incurred after the 30-year economic life of the Project. This results in total decommissioning costs of $141.1 million when reflected in 2054 dollars.

6.52 We note that the URS estimate of decommissioning costs related to the decommissioning of 130 2.3MW turbines. In the revised project design model, the Project would have 66 4.5MW turbines. We have assumed that the additional time associated with decommissioning the larger 4.5MW turbines in the revised Project design would be offset by the time savings associated with the fact that there would be approximately half as many turbines to remove at the end of the Project's life.

6.53 As noted above, we have assumed that absent the Alleged Breaches, Windstream would have funded the decommissioning costs in equal amounts over the last 3 years of the FIT contract (i.e., 2042 to 2044), at which point the Project would have been generating sufficient and stable cash flows to provide for the decommissioning costs.

H. Taxes

6.54 We have prepared our DCF analysis on an after-tax basis. As a result, we have deducted the corporate income taxes that the Project would have been required to pay in Canada from its cash flows.

6.55 The tax laws in Canada allow for a deduction towards the Capital Cost Allowance ("**CCA**") which represents depreciation for tax purposes. The law allows for CCA to be claimed up to a maximum amount in a given year that is calculated as a prescribed percentage applied to the Undepreciated Capital Cost ("**UCC**") balance for each asset class, in each year.[169]

6.56 Under Canadian tax laws, the CCA rate for wind power projects is prescribed at 50%.[170] This means that in any given year of operations, any amount up to 50% of the UCC can be claimed as CCA for tax purposes. However, from a financial perspective, a business would claim CCA only up to the amount of its taxable income for a year (before deduction of CCA). This would

[169] **C-2343** - Government of Canada "Capital cost allowance CCA" (Modified January 18, 2021).

[170] **C-1982** - Natural Resources Canada, Canmet Energy: Leadership in ecoInnovation: Technical Guide to Class 43.1 and 43.2, 2013.

optimize the tax deductions and would enable the business to claim the remaining amount of CCA in subsequent years.[171]

6.57 Based on the above, we make an allowance for the CCA that would have been claimed each year to calculate the income subject to income tax each year. We then calculate the tax expense by multiplying the taxable income by the applicable corporate tax rate, as discussed below.

6.58 As at the Valuation Date, the corporate income tax rate applicable to the Project was comprised of: Federal tax of 15.0%; and a Provincial (Ontario) tax of 11.5%, thereby representing a combined corporate income tax rate of 26.5%.[172] We assumed that this tax rate would remain consistent in the future and deducted income taxes from the cash flows of the Project.

I. Working Capital

6.59 Working capital refers to the difference between non-cash current assets (i.e., accounts receivable) and non-debt current liabilities (i.e., accounts payable). An increase (or investment) in the working capital ties up cash and thus any changes in the working capital must be considered in a DCF analysis.

6.60 We have estimated the change in net working capital on an annual basis by estimating the lag in receivables and payables over the life of the Project.

6.61 As per the FIT Contract, the OPA was required to prepare monthly settlement statements for the amounts payable to Windstream. Further, the FIT Contract required the payments to be made by the last day of the following month.[173] Accordingly, we assumed that the revenues would be collected with a lag of one month.

6.62 We assumed that the expenses of the Project would also be paid in the following month. Accordingly, we have incorporated a payables lag of one month in our DCF analysis.

[171] **C-1916 -** Government of Canada "Amount of capital cost allowance CCA you can claim".
[172] **C-2273** - Deloitte 2020 Corporate Income Tax Rates.
[173] NAFTA 1, Exhibit C-0245, FIT Contract Schedule 1, Clause 4.2(b); and 4.2(c).

6.63 As discussed in Section 4 above, Windstream was required to post a $6 million letter of credit with the OPA in 2010 that was to be returned to Windstream after the COD.[174] Accordingly, we incorporated a refund of $6 million in 2025 at the time of COD.[175]

6.64 In Mr. Tetard's experience, the Project would have also required an 'O&M Reserve Account' equal to three-months of expected O&M costs. This account would have needed to have been fully funded at the time of COD and thus we adjusted the cash flows to account for changes in the balance of the fund.

J. *Financing Costs*

6.65 It was anticipated that the Project would have been financed through a combination of debt and equity, with debt financing being available based on the capacity of the Project's cash flows to sustain debt repayments and interest costs (see below). We have prepared our DCF on an equity value basis.[176] Therefore, in our DCF model we have accounted for the Project's financing costs, debt disbursements and repayments, and have calculated the resulting after-tax cash flows available to the equity holders of the Project.

6.66 Based on Mr. Tetard's experience and discussions with lenders active in project financing of offshore wind projects, lenders typically require at least 15% to 20% of the total project construction and development cost to be funded by the equity. In addition, we understand that the lenders use the metric of Debt Service Coverage Ratio ("**DSCR**")[177] to calculate the maximum amount of financing made available through debt.

6.67 Under the DSCR criteria, the maximum amount of debt financing available is calculated using an iterative calculation. The lenders first determine the minimum DSCR acceptable to them over the term of the financing, then the amount of equity is iteratively calculated (with the balance of the project cost being funded though debt) to a point where the minimum DSCR over the term is equal to the minimum required DSCR.

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[174] NAFTA 1, Exhibit C-0245, FIT Contract Schedule 1, section 5.1(c); C-0197 Exhibit A, section 1.2. Calculated as $20/kWh of Contract Capacity ($20 x 300,000 kWh = $6,000,000).

[175] We understand that this amount has been refunded to Windstream subsequent to the termination of the FIT Contract (**C-2289** - Letter from Michael Lyle (IESO) to Nancy Baines re Feed-in Tariff Contract F-000681-WIN-130-602 between IESO and the Supplier dated May 4, 2010 - Notice of Termination pursuant to Section 10.1(g) (February 18, 2020), and NOA, paragraph 51). Accordingly, we deducted this amount from the FMV of the Project to calculate the damages to Windstream. Refer to **Section 11**.

[176] A company's enterprise value ("**EV**"), or firm value, is made up of equity and debt components. Alternatively, we could have valued the project on an EV basis (i.e. without deducting debt and applying a weighted average cost of capital discount rate), and would have reached the same result. We selected an equity basis since the treatment of debt is set out in detail.

[177] DSCR is calculated as: Cash available for Debt servicing (i.e., EBITDA – tax) *divided by* amount of debt servicing (i.e., Interest + Principal Repayment).

6.68 Further, in cases of renewable energy projects such as a wind project, the lenders typically look at different wind energy yield assumptions (such as P50, P90, and P99) to determine their minimum DSCR requirements. At higher probability, or 'P', values, the level of certainty from the statistical modeling increases while the energy yield (and projected revenue) decreases. Accordingly, lenders typically have lower DCSR requirements for higher 'P' value assumptions and vice-versa.

6.69 Based on Mr. Tetard's experience and discussions with lenders in the sector that, around the Valuation Date, lenders for offshore wind energy projects would have been very comfortable with a term of 17 years for a project with 20-years of contracted revenues, with minimum DSCR requirements of 1.50x at P50 assumptions, 1.25x at P90 assumptions, and 1.05x at P99 assumptions. Based on Mr. Tetard's discussions with lenders, some lenders would have been comfortable with a term of over 20 years, with up to an additional 3 years after the end of the FIT-Contract term. For the purposes of our calculations, we have assumed a term of 17 years which we consider appropriate, if somewhat conservative.

6.70 Using the results of energy yield assumption carried out in the Wood Report and the cash flow modeling in our analysis, we carried out an iterative calculation of the minimum equity requirement that would satisfy the minimum DSCR requirements of the lenders. Based on our calculations, due to the level of the FIT-Contract price, the Project could have comfortably satisfied the minimum DSCR requirements at any level of equity and thus the debt sizing limiting factor for the Project is the leverage cap of 80% of the total project construction and development costs, which is based upon the assumption that lenders would require at least 20% of the project's construction and development costs to be funded by equity, regardless of the results of the DSCR calculations.[178]

6.71 Accordingly, we incorporated the minimum equity requirement as 20% of the total Project construction and development cost. This is based on Mr. Tetard's experience and from his discussions with lenders that a contribution of a minimum of 15% and the more generally agreed upon contribution of 20% of the total Project's construction and development costs is typically required from equity holders, irrespective of the DSCR requirements. We calculated the amount of equity funding as $263.7 million[179] with $1,054.9 million funded through debt for a total project construction and development cost of $1,318.6 million.[180]

178 The iterative calculation in our DCF model resulted in negative values for equity requirement to satisfy the minimum DSCR requirement. A negative value of equity requirement signifies that the project can meet the DSCR requirements at any level of debt funding. Refer to **Appendix 11**, tab 'Control Sheet', cells F31 to F33.

179 We understand that Windstream's investors were "prepared to invest in the Project as needed to move it to financial close". Source: Third Witness Statement of Mr. David Mars, paragraph 6.

180 Refer to **Schedule 2**.

6.72 Further, according to Mr. Tetard's discussions with lenders, the interest chargeable on the debt financing would have been determined based on a spread or margin on the 3-month Canadian Dollar Offer Rate ("**CDOR**"). Further, the spread would have been 1.75% at the initiation of the lending arrangement, with an increase of 0.20% for every five years of operations. We accounted for the interest cost on debt based on the forecast of 3-month CDOR obtained from the Bloomberg database,[181] and the expected margin on CDOR during the term of the debt financing. Based on the above, this implies an interest rate that ranges from 3.3% to 4.4% over the term of the debt financing.[182]

6.73 In addition to the interest costs on financing, according to Mr. Tetard's experience and discussions with lenders, that lenders would have charged other financing costs as follows:

i. An upfront fee (also known as structuring fee) of 1.25% on the total amount of debt raised;

ii. A commitment fee of 0.70% annually on the undrawn portion of the debt during the construction phase; and,

iii. Letter of credit costs of 1.75% annually on the amount of unspent capex[183] during the construction period.

6.74 Further, as is typical in financing for offshore wind projects the lenders would have required the Project to maintain a Debt Service Reserve Account ("**DSRA**") for the entire duration of the debt term. We have accounted for a DSRA in our DCF analysis equal to six-months of the expected debt servicing (debt servicing being equal to debt repayments plus interest costs).

6.75 Lastly, we note that the financing may have been made available to Windstream on a "mini-perm" structuring basis. This means that, after approximately 7 years of operations, the Project would have been required to refinance the entire remaining debt balance. Upon refinancing of the debt balance, the equity holders would have the option to re-lever their investment and obtain a one-time dividend payment from the refinancing, which would thereby increase the equity value of the Project. We have not incorporated an adjustment for a mini-perm structuring and the corresponding dividend payment in our analysis, although we note that since this option would be available to a potential buyer of the Project, this would serve as a positive contingency in negotiations with a potential buyer as at the Valuation Date.

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181 Bloomberg database provided forecasted yield curve of 3-month CDOR rates over next 50 years, from which we determined annual interest rates using interpolation. Refer to **Appendix 11**, Excel Model, tab 'CDOR Forecasts'.

182 Refer to **Appendix 11**, Excel Model, tab 'Financing', row 41.

183 Letter of credit costs would be on the unspent amount of 'Foundation or Gravity Based Foundations', 'Wind Turbines', 'Offshore high voltage substation', 'Array and export capex', 'Installation Costs', and 'Onshore interconnection'.

Contemporaneous Financing Assumptions

6.76 As noted, Windstream engaged Keybanc in May of 2017 to act as an exclusive financial advisor to negotiate a potential transaction for the sale of the Project, or a portion thereof, to prospective investors, and/or the arrangement of a private placement transaction to raise funds for the development of the Project (absent the Alleged Breaches). As part of this engagement, Keybanc provided its view on the terms of the debt financing that would be available to the Project (absent the Alleged Breaches). We summarize the debt financing terms prepared by Keybanc below:[184]

i. Percentage of equity requirement: Minimum equity requirement of 15% (85% debt);

ii. Indicative loan size: $1.4 billion;

iii. Debt sizing criteria: Lesser of 1.40x contracted P50 cash flows; and 1.05x contracted 1-year P99 cash flows;

iv. Term of 18 years;

v. Interest rate of CDOR plus margin of 2.0% with a 0.25% step up to the margin every four years; and,

vi. Reserve requirements: DSRA equal to six-months and O&M reserve of 6 months.

6.77 We conclude that the financing assumptions incorporated in our DCF analysis are reasonable as they are generally supported by Keybanc's contemporaneous assessment. In the following table, we summarize the key debt financing inputs into our analysis, compared to the debt financing terms set out in the KeyBanc presentation:

[184] KeyBanc Capital Markets, Presentation to Windstream Energy on 'Utilities, Power & Renewable Energy', Corporate & Investment Banking, dated November 2017. This presentation was included in an email sent by Windstream to the ERPP Program Manager with the Project's EOI Application on February 11, 2018 (see **C-2141**).

Figure 6-7: Comparison of Debt Financing Assumptions

Term	Secretariat/PAT	KeyBanc 2017
Percentage of equity requirement	20%	15%
Loan size[185]	$1.05 billion	$1.4 billion
Term of loan	17 years	18 years
Interest rate on loan	CDOR + 1.75%, increased by 0.2% every 5 years	CDOR + 2.0%, increased by 0.25% every 4 years
Reserve requirements	DSRA of 6 months; O&M reserve of 3 months	DSRA of 6 months; O&M reserve of 6 months

K. Valuation of the Project using the Transaction Structuring Approach

6.78 Based on Mr. Tetard's experience with buying and selling offshore wind projects, a purchaser of a development stage project like the Windstream Project would likely enter into an agreement as at the Valuation Date to structure the consideration it would pay into two parts:

i. **Upfront Consideration**: An upfront payment linked to the historical cost spent on the Project; and,

ii. **Contingent Consideration:** A future payment conditional on the Project reaching certain pre-identified milestones. It is market standard that the key milestone is identified as FC, at which point the contingent consideration would become due.

6.79 Further, in Mr. Tetard's experience, when market participants price an asset, they are most concerned with the return that they expect from the asset, which depends on its stage. Accordingly, market participants typically estimate the contingent consideration as the amount which would enable them to earn a return commensurate with the risk of the investment. Thus, the contingent consideration would include the risk associated with a development stage project successfully overcoming the necessary hurdles to transition into an operating stage project.

Upfront Consideration

6.80 In Mr. Tetard's experience, for a project like Windstream, a market participant would typically pay 1x to 2x the amount of historically incurred costs relating to the Project as upfront consideration at the time of entering into the transaction (i.e., as at the Valuation Date) with the remaining value being paid as contingent consideration, as discussed below. In Mr. Tetard's experience, the costs which have been incurred but not yet paid would attract a

[185] The loan size in our analysis is smaller primarily due to the lower capital costs as at the Valuation Date compared to 2017, due in part to the reduction in the number of turbines required at the Project and the general improvements in technology. See CER-Wood and CER-4C Offshore-3 for further details.

multiple of 1x, the amount of letter of credit extended by the Project would also attract a multiple of 1x, while all other costs that had already been paid would attract a multiple of 2x.

6.81 We reviewed Windstream's financial statements and general ledger information, and other supporting documents[186] to quantify the historical costs incurred on the Project. We then analyzed each of the cost items to identify the multiple that would be applicable for the calculation of the upfront consideration. We summarize the total costs incurred on the Project as at the Valuation Date in the figure below:

Figure 6-8: Summary of Costs Incurred ($ Millions)

Cost Item	Costs Incurred Before NAFTA 1	Costs Incurred After NAFTA 1	Total as of Valuation Date
Project costs capitalized by WWIS	$ 4.34	$ 0.45	$ 4.78
Management fees, White Owl Capital	0.90	1.08	1.98
Management fees, 905085 Ontario Inc.	1.77	1.82	3.59
Letter of credit, with bank fees	6.00	0.12	6.12
Interest paid, net of interest earned	5.27	3.92	9.18
Legal fees incurred between NAFTA 1 and NAFTA 2 to advance the Project	N/A	0.75	0.75
Public relations fees to Navigator Ltd	N/A	0.08	0.08
Data room services costs to Donelly Financial Solutions	N/A	0.04	0.04
Government relations fees to Rubicon Strategy	N/A	0.27	0.27
IESO costs reimbursement relating to 2018/2019 proceedings	N/A	0.75	0.75
Accounting fees to Andersen Tax	N/A	0.18	0.18
Equityholder expenses reimbursed by Windstream	N/A	0.04	0.04
Total Costs Incurred as of Valuation Date	**$ 18.27**	**$ 9.48**	**$ 27.75**

6.82 In the following figure, we summarize the multiples applied to the historical costs incurred to derive the amount of upfront consideration as at the Valuation Date:

[186] See **Schedule 3** for details.

Figure 6-9: Calculation of Upfront Consideration ($ Millions)

Cost Item	Cost	Multiple	Upfront Consideration
Capitalized costs	$ 4.78	2	$ 9.57
Management fees, White Owl Capital, paid	1.03	2	2.06
Management fees, White Owl Capital, unpaid	0.95	1	0.95
Management fees, 905085 Ontario Inc., paid	2.00	2	4.00
Management fees, 905085 Ontario Inc., unpaid	1.59	1	1.59
Letter of credit	6.00	1	6.00
Letter of credit fees, paid	0.12	1	0.12
Interest earned	(0.05)	1	(0.05)
Interest paid	9.23	2	18.46
Legal fees incurred between NAFTA 1 and NAFTA 2 to advance the Project, paid	0.75	2	1.49
Public relations fees to Navigator Ltd, paid	0.08	2	0.16
Data room services costs to Donelly Financial Solutions, paid	0.04	2	0.08
Government relations fees to Rubicon Strategy, paid	0.27	2	0.54
IESO costs reimbursement relating to 2018/2019 proceedings	0.75	1	0.75
Accounting fees to Andersen Tax, paid	0.18	2	0.35
Equityholder expenses reimbursed by Windstream, paid	0.04	2	0.07
Total Costs Incurred as of Valuation Date	**$ 27.75**		**$ 46.15**

6.83 Based on the foregoing, we have calculated that a transaction involving the Project as of the Valuation Date would include an upfront payment of approximately $46.1 million.[187]

Contingent Consideration

6.84 In Mr. Tetard's experience, as at the Valuation Date, a market participant (i.e., a hypothetical buyer of the Project) would estimate the amount of the contingent consideration as the amount which would enable the buyer to earn a return, commensurate with the risk of the Project at the Valuation Date. In this regard, IRR[188] is the most common metric of return used by the market participants.

6.85 Based on Mr. Tetard's experience, in market conditions as of the Valuation Date (early 2020), market participants would have expected a levered equity IRR in the range of 14% to 16% for

[187] See **Schedule 3**.

[188] IRR is the discount rate at which a series of cash flows (outflows and inflows) result in a NPV of zero. In above context, the amount of the Contingent Consideration would be determined such that when it is deducted from the forecasted cash flows of the Project, results in a NPV of zero when discounted by the IRR required by the hypothetical buyer of the Project.

projects similar to Windstream as a development stage project. This expected IRR is higher than the CoE for a project at FC (**Appendix 3**) due to the Project's stage of development.

6.86 We note that in the NAFTA 1 Green Giraffe Report, Green Giraffe opined that as at 2011-2012, the blended IRR requirement for all equity in the Project (pre-and post FC) would be in excess of 18-20%.[189] We further note that in a Green Giraffe presentation given by Mr. Jerome Guillet in April 2019, Mr. Guillet opined that there has been a decreasing trend in the cost of capital in the relatively liquid renewable energy and offshore wind market, and as a result, that the levered IRR expected by equity investors in offshore wind decreased by 3% to 4% between 2010 and 2016. This decrease was due to several factors, including that:

i. "*Renewable energy assets are trading at high prices as investors competitively chase yield, pushing down IRRs*

ii. *Continued high transaction volume in OW (Offshore Wind)…*

iii. *Transactions for assets under development, at FC…or operating…*

iv. *Emergence of Chinese buyers…and continued active presence of Japanese and Canadian investors, in addition to traditional European players….*

v. *Decent, if regularly shrinking, premium for construction risk and early development (permitting) risk.*

vi. *Prices are relatively insensitive to technology or tariff and regulatory regime*". [190]

6.87 Green Giraffe further notes in this presentation that: "*There are buyers for almost every profile of risk*" including development stage projects; "*Recent new auction results (Massachusetts, Taiwan) suggest there will be a minimal premium for "new market" risk*", and that "*Major European contractors [are] expected to follow investors in new markets and build the local supply chain*". [191]

6.88 As explained in further detail in **Appendix 1**, the offshore wind industry continued to grow around the world in the years leading up to the Valuation Date since NAFTA 1, with increasing appetite from international investors for North American offshore assets in particular and the industry becoming more mature. Capital and operating costs also continued to decrease significantly, and there was increased public pressure to reduce dependence on fossil fuels globally due to the acceleration of the impacts of climate change. These factors further contributed to the decline in the levered equity IRR that would be expected by investors in the

[189] NAFTA 1 - RER-Green Giraffe, para. 148

[190] **C-2216** - Green Giraffe Presentation entitled "Recent trends in offshore wind finance" (April 4, 2019), slide 13.

[191] **C-2216** - Green Giraffe Presentation entitled "Recent trends in offshore wind finance" (April 4, 2019), slide 16.

Project between 2016 and the Valuation Date, which in Mr. Tetard's experience, would have been in the range of 14% to 16% as of the Valuation Date.

6.89 We calibrated our DCF model to calculate the amount of contingent consideration that would be paid by a hypothetical buyer at FC, providing them a total blended levered equity IRR of 15% (i.e., the midpoint of 14% to 16%). We then discounted the contingent consideration to the Valuation Date using the same required IRR to calculate the FMV of the Project as of the Valuation Date.[192]

6.90 We then combined the contingent consideration with the upfront consideration discussed above in order to calculate the FMV of the Project at the Valuation Date, as shown in the figure below:

Figure 6-10: Valuation of the Project using a Transaction Structuring Analysis ($ Millions)

			FIT-Contract	Post FIT-Contract	Total
Equity IRR required by a hypothetical buyer	15.0%				
Upfront cash consideration	***[A]***		**$ 46.1**		**$ 46.1**
Contingent consideration	*[B]*		$ 364.0	$ 12.4	$ 376.4
Expected payout date of contingent consideration (at Financial Close)			20-Feb-23	20-Feb-23	20-Feb-23
PV factor for Contingent Consideration	*[C]*	15.0%	*0.66*	*0.66*	*0.66*
Value of Contingent Consideration	***[E = B * C]***		**$ 239.0**	**$ 8.2**	**$ 247.2**
FMV of the Project at February 18, 2020	***[F = A + E]***		**$ 285.2**	**$ 8.2**	**$ 293.4**

6.91 In other words, under this approach, as at the Valuation Date, a notional purchaser would be indifferent between paying $293.4 million upfront (whereby they would be taking on the risk of the Project advancing to FC); or entering into a contingent arrangement that would require them to pay approximately $46.1 million upfront, and $376.4 million three years later at FC.

L. Valuation of the Project using the Project Stage Risk Adjustment Factor Approach

6.92 We have also calculated the FMV of the Project under the income approach by deriving a CoE discount rate using the principals of valuation and finance for a project that has reached FC, and then applying an adjustment for the additional risks associated with the Project advancing from a development stage project to FC, based on observable market data.

[192] See **Schedule 1**.

Discount Rate

6.93 In this approach, the resulting annual after-tax cash flows to equity over the life of the Project are discounted to a single NPV as of the Valuation Date using a discount rate that reflects i) the time value of money and ii) the risk of realizing the forecasted cash flows (assuming the project will reach FC).

6.94 We first calculated the FMV of the Project assuming that it would reach FC for which we estimated the appropriate risk-adjusted discount rate to convert the projected cash flows into a NPV as of the valuation date. We derived a CoE discount rate using the CAPM approach of 10% for an equity investment in the Project as of the Valuation Date.

6.95 A detailed discussion of the discount rate we have derived is provided in **Appendix 3**.

6.96 We estimate the equity value of the Project as of the Valuation Date, assuming that there is no risk associated with the Project reaching FC, to be $575.2 million.[193]

Project Stage Risk-adjustment Factor

6.97 As noted, the above equity value assumes that the Project would have achieved FC stage as per the Project Schedule discussed in **Section 6C** above. However, the Project had several steps to complete in order to reach FC as of the Valuation Date. Thus, to determine the FMV at the Valuation Date given its actual stage of development at that time, it is necessary to account for the risk associated with the Project advancing to FC absent the Alleged Breaches.

6.98 As of the Valuation Date, the remaining steps that the Project needed to complete before achieving FC (i.e., absent the Alleged Breaches) included:

i. Permitting risk and Environmental approvals: The risk that the Project would not have obtained the permits and environmental approvals required to operate, within the timeframe provided for under the FIT contract;

ii. Financing risk: The risk that the Claimant would not be able to obtain sufficient debt financing to complete the construction of the Project. As noted above, while the Claimant had several discussions with interest parties and banks regarding the financing of the Project since NAFTA 1, no third-party debt financing agreement had been reached for the Project by the Valuation Date, which we understand was due to the Moratorium and the other Alleged Breaches. Although we note that the financing conditions in the

193 See **Schedule 1**.

offshore wind industry had significantly improved between NAFTA 1 and the Valuation Date;[194] and,

iii. Construction execution risk: The risk that the Claimant would be unable to complete the construction of the Project consistent with the estimated project schedule and costs due to cost overruns, design issues, supplier/contractor issues, delays, etc.

6.99 The risks and uncertainty summarized above can be reflected through the discount rate, or through the application of a project stage risk adjustment factor to the FMV of the Project, to reflect the risk that the Project may not have reached FC. From a FMV perspective, the probability factor would be based on the available information and expectations of the market participants as at the Valuation Date that the Project would reach FC.

6.100 This project stage risk adjustment factor would not relate to any macroeconomic or industry level risks, given that these risks would already be accounted for through the CoE discount rate, which is derived from an industry beta factor, as discussed in **Appendix 3** below. However, as we also note in **Appendix 3** below, it would not be appropriate to include project stage risk adjustment factor, as well as an additional Project Specific Risk Premium in the discount rate, since doing so would double count these risks and lead to an understatement of the FMV of the Project.

6.101 Furthermore, we have been instructed by Counsel that the project stage risk factor should not include any of the risks relating to the Alleged Breaches, which include the risks that:

i. The MECP would not have confirmed its proposed regulatory amendment to include a five-kilometer setback, or confirmed that it would not proceed with any regulatory amendment (such that setbacks for offshore wind projects would continue to be assessed on a site-specific basis);

ii. The MNRF would not have fulfilled its commitment to discuss the reconfiguration of Windstream's applications for Crown land for the Project (if a five-kilometer setback was confirmed) and or would not have thereafter fulfilled its commitment to "*move as quickly as possible through the remainder of the application review process so that the Project may obtain Applicant of Record status in a timely manner;*"

iii. The MECP and MNRF would not have fulfilled their commitment to process the Project's application for a REA within the six-month service guarantee;

[194] For example, a presentation by Green Giraffe from April 2019, notes the recent trend that "*the debt market has shown it was ready to take construction risk on attractive terms (leverage, pricing, covenants)*" that the overall size of greenfield debt transactions in the offshore wind industry had increased substantially since 2011/2012, and that offshore wind debt financing has now become mainstream (**C-2216** - Green Giraffe Presentation entitled "Recent trends in offshore wind finance" (April 4, 2019), slides 15, 23 and 24).

iv. The MNRF would not have permitted Windstream to proceed through MNR's Crown land application process and granted Windstream site release; or,

v. The Ontario Government would not have dealt with Windstream in good faith and would not have subjected the Project to unreasonable regulatory delays.

6.102 In our view, an objective and reliable way to account for the risks and uncertainty associated with the Project reaching FC is through the application of a probability factor based on available information and expectations of market participants as at the Valuation Date.

6.103 To estimate the probability of Windstream reaching FC, we analyzed other offshore wind energy projects worldwide which we considered to be sufficiently comparable to Windstream for purposes of assessing this probability factor. We compared the number of projects that had obtained revenue clarity around the time of the Windstream Project, which were able to reach FC by the Valuation Date, against the ones which did not. We relied on the 4C database to filter the wind energy projects based on the following criteria:

i. **Geography**: We selected projects located in Asia, Europe, and North America;

ii. **Revenue Clarity**: We selected projects which obtained revenue clarity during the period between January 1, 2010, to February 18, 2017 (i.e., had a PPA or other revenue mechanism in place); and,

iii. **Permits**: We selected projects which did not have permits at the time that the PPA was obtained.

6.104 Based on the above analysis, we note that out of 14 projects considered sufficiently comparable to Windstream for this purpose, 8 reached FC by the Valuation Date, 1 had been cancelled, and 5 were still in the process of obtaining the permits necessary to reach FC as at the Valuation Date.[195] This implies a probability of 57% (i.e., 8 out 14) that, as of the Valuation Date, Windstream would have successfully reached FC with sufficient time to achieve commercial operations by the Revised MCOD.[196]

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[195] According to Mr. Tetard, all 5 projects that were still in the process of obtaining permits necessary to reach FC as at the Valuation Date were subject to the unique circumstances of the French legal system which allows project's opponents (local communities, fishermen, national anti-wind associations) to delay the project permitting process based generally on technicalities (rather than on substance). None of these projects have been cancelled to date (nor are they expected to be cancelled). We understand that the extent of the legal delays experienced by these French projects would not be relevant to the Project in Ontario, but for the Alleged Breaches.

[196] See **Schedule 4** for details.

Figure 6-11: Comparable Projects Reaching Financial Close by the Valuation Date

Name	Country	Capacity (MW)	PPA Date	FC Date	Commissioning Date (Actual / Expected)	FC as of the Valuation Date
Projet de parc éolien en mer de Saint-Nazaire	France	480.0	6-Apr-12	19-Sep-19	31-Dec-22	Yes
Block Island	United States	30.0	11-Aug-10	2-Mar-15	7-Feb-17	Yes
Hornsea Project One	United Kingdom	1,218.0	23-Apr-14	3-Feb-16	31-Dec-19	Yes
Walney Extension	United Kingdom	659.0	23-Apr-14	28-Oct-15	6-Sep-18	Yes
Eneco Luchterduinen	Netherlands	129.0	5-Nov-11	1-Apr-13	21-Sep-15	Yes
Tahkoluoto Offshore Wind Power Project	Finland	42.0	19-Nov-14	27-Jan-16	31-Aug-17	Yes
Burbo Bank Extension	United Kingdom	254.2	23-Apr-14	19-Dec-14	1-Apr-17	Yes
Nissum Bredning Vind	Denmark	28.0	10-Feb-16	20-Sep-16	26-Mar-18	Yes
Cape Wind	United States	468.0	11-May-10	NA	NA	No, cancelled
Eoliennes Offshore du Calvados project	France	450.0	6-Apr-12	22-Feb-21	1-Jan-24	No
Parc éolien en mer de Fécamp	France	498.0	6-Apr-12	2-Jun-20	31-Dec-23	No
Projet éolien en mer de la Baie de Saint-Brieuc	France	496.0	6-Apr-12	9-Mar-20	31-Dec-23	No
Parc éolien en mer de Dieppe - Le Tréport	France	496.0	7-May-14	N/A	N/A	No
Parc des Iles d'Yeu et de Noirmoutier	France	496.0	7-May-14	N/A	N/A	No
					Total Project Count	**14**
					Count of 'Yes'	**8**
					Count of 'No'	**6**

6.105 Accordingly, we used a risk adjustment factor of 55% to 60% to account for the risk factors present as of the Valuation Date. In other words, we assume that as at the Valuation Date, a hypothetical purchaser would consider that there would be a 55% to 60% chance that the Project would reach FC by February of 2023, which would allow it to reach COD before the Revised MCOD of January of 2025. Therefore, we assume that notional purchaser would adjust the valuation of the Project accordingly to reflect this risk.[197]

[197] We note that 3 of the 5 of the projects in the dataset of comparators that were not cancelled but had not reached FC by the Valuation Date, ultimately achieved FC after the Valuation date and the other 2 are still

6.106 Based on a probability of reaching FC as of the Valuation Date (absent the Alleged Breaches) of 55% to 60%, we calculated the risk adjusted FMV of the Project as at the Valuation Date as follows:

Figure 6-12: Valuation of the Project using the Project Stage Risk Adjustment Factor Approach ($ Millions)

		FIT-Contract	Post FIT-Contract	Total
DCF equity value as of the Valuation Date, assuming the Project reaches Financial Close	*[A]*	$ 556.2	$ 19.0	$ 575.2
Probability of Financial Close	*[B]*	*55%*	*55%*	*55%*
FMV of the Project at February 18, 2020: Low	***C = A * B***	**$ 305.9**	**$ 10.5**	**$ 316.4**
Probability of Financial Close	*[D]*	*60%*	*60%*	*60%*
FMV of the Project at February 18, 2020: High	***E = A * D***	**$ 333.7**	**$ 11.4**	**$ 345.1**
FMV of the Project at February 18, 2020: Mid	**[(C+E)/2]**	**$ 319.8**	**$ 10.9**	**$ 330.7**

6.107 In other words, under this approach, as at the Valuation Date, a notional purchaser would be willing to pay approximately $316.4 million to $345.1 million for the Project as at the Valuation Date, whereby they would be taking on the risk of the Project advancing to FC. Once the Project had achieved FC, it would be worth $575.2 million to the notional purchaser, with the difference representing the return for the additional risks associated with investing in the Project at its current development stage as at the Valuation Date.

pursuing FC. Thus, 12 of 15 of the projects (80%) in our dataset ultimately did reach FC. We further note that the one project in the dataset above that was cancelled (Cape Wind) was largely due to its location, whereby it "*would have been visible to wealthy waterfront property owners like the Kennedys, Mr. Koch…*". While critics of the project also cited the high cost of offshore wind, alleged navigational hazards and threats to the environment, it was ultimately the location that upset the critics of the Cape Wind Project. (Source: **C-2127** - New York Times article entitled "After 16 Years, Hopes for Cape Cod Wind Farm Float Away" (December 19, 2017).

7 MARKET APPROACH

A. Introduction

7.1 As noted in **Section 5** above, we have conducted a valuation of the Project under a market approach as of the Valuation Date under a comparable transactions methodology. Under the comparable transactions methodology, value relationship metrics (i.e., Enterprise Value or EV per MW of production/capacity) are obtained by reference to transactions proximate to the Valuation Date for suitably comparable projects. The value relationships observed in the market are then applied as a proxy to the same metrics for the Project (i.e., total MW of production/capacity) to obtain the FMV of the Project as at the Valuation Date.

7.2 We have also conducted an analysis of public company trading multiples, whereby value relationship metrics (i.e., EV/MW of production or capacity) were obtained by reference to publicly traded share prices of companies with suitably similar assets to the Project proximate to the Valuation Date. However, given the fact that most public companies that hold similar assets to the Project also hold operating windfarms and other non-wind related renewable energy projects, we are not able to find sufficiently comparable companies to the Project. We have therefore used the public company trading multiple approach to derive a high-level reasonability check on our valuation conclusions, from an order of magnitude perspective.

7.3 In conducting a market valuation under the above methodologies, it is important to understand and assess the characteristics of each potentially comparable transaction or public company identified to determine the level of comparability with the Project. All wind projects are unique, and thus the wind projects used as comparables to value the Project do not need to be 'perfectly' comparable or match up along all key project attributes to provide meaningful valuation benchmark information. However, the level of comparability and the variance in the range of values observed will dictate the level of reliance that can be placed on the results of a comparable transactions or public company trading multiples methodology in the wind power generation sector.

7.4 We describe the two methodologies noted above in turn below.

B. Comparable Transactions Methodology

7.5 Our comparable transactions valuation analysis consists of a review of completed offshore wind farm transactions from a proprietary database compiled by 4C Offshore.[198] We used this database to identify transactions involving projects we deemed suitably comparable to the

[198] 4C Offshore is a "leading market intelligence organization targeting global offshore renewable energy markets". Source: **C-1914** – 4COffshore.com - About Us.

Project. In order to derive the comparable transactions, we applied the following filtering criteria to the information provided from 4C Offshore's offshore wind project transaction database:

i. **Date of Transaction:** Transactions that were completed in the three-year period prior to the Valuation Date;

ii. **Development Stage:** Transactions involving projects at the development stage, where the project had not yet reached FID / FC;

iii. **Revenue Clarity:** Transactions that had 'revenue clarity' at the date of transaction (i.e., they had a PPA or other revenue agreement or mechanism in place);

iv. **Availability of reliable information:** Transactions where we were able to reasonably determine the amount of consideration paid, and the amount of MW acquired, based on information available in the public domain; and,

v. **Geographical location:** Transactions for projects located in North America, Europe, and Taiwan.[199]

7.6 After filtering the completed wind farm transactions in the 4C Offshore database according to the criteria outlined above, we identified 10 suitably comparable transactions for purposes of our valuation analysis. We then calculated the price paid per MW acquired as a proxy for the value/MW of the Project.

7.7 We provide the detailed results of our analysis in **Schedule 5** and summarize the results of our analysis below:

[199] We have selected North America as that is where the Project is located. We have also selected Europe given the number of transactions that have taken place in Europe over the relevant time period, and the general size of the European offshore wind industry (see **Appendix A**, Section B). Lastly, we also considered Taiwan given that Taiwan's offshore wind market is very similar to Canada in that it is a relatively early-stage offshore wind market with only 128 MW of installed capacity as at or around the Valuation Date. Source: **C-2275** – GWEC Global Offshore Wind Report (2020) published on August 5, 2020, page 18.

Figure 7-1: Comparable Transactions Summary[200]

Project Acquired	Buyer	Seller	Project Country	Transaction Announcement Date	Transaction Value ($ millions)	% Acquired	Project MWs	MW Acquired	Value / MW ($ millions)
					A	*B*	*C*	*D = B x C*	*E = A / D*
Deutsche Bucht	Northland Power	Highland	Germany	3-Mar-17	$ 310.2	100.0%	252	252	$ 1.23
Borssele III & IV	Partners Group	Blauwwind Consortium	Netherlands	8-Jan-18	446.4	45.0%	732	329	1.36
Moray East	Diamond Generation Europe Limited	EDPR	United Kingdom	23-Mar-18	65.1	20.0%	950	190	0.34
Neart na Gaoithe	EDF	Mainstream	United Kingdom	3-May-18	770.2	100.0%	450	450	1.71
Triton Knoll	J Power, Kansai Electric Power	Innogy SE	United Kingdom	13-Aug-18	706.9	41.0%	860	353	2.00
Moray East	Diamond Generation Europe Limited	EDPR	United Kingdom	16-Nov-18	91.2	13.4%	950	127	0.72
Dieppe-Le Treport & Yeu-Noirmoutier	Sumitomo	EDPR	France	18-Dec-18	121.3	13.5%	992	134	0.91
Revolution Wind & South Fork	Eversource	Orsted	United States	8-Feb-19	183.0	50.0%	834	417	0.44
Formosa 1	Orsted, Macquarie	Swancor Renewable	Taiwan	25-Jan-17	38.2	85.0%	128	109	0.35
Formosa 2	Stonepeak	Swancor	Taiwan	31-Jul-19	90.4	23.8%	376	89	1.01
								Average	**$ 1.01**
								Median	**$ 0.96**

7.8 While each of the transactions summarized above identified met our screening criteria, as noted, each project is unique and has attributes that may be more or less favourable than the Project (i.e., different PPA values, different environmental and locational attributes such as wind speeds, distance to grid connection point, bathymetry etc., different levels of country risk, different tax and royalty rates etc.). We summarize major comparable attributes in the figure below. As noted in **Appendix 1**, there have been no offshore wind farms constructed in Canada to date.

200 We have provided a detailed discussion of each of the comparables selected in **Appendix 4**.

Figure 7-2: Comparable Transactions Major Attributes[201]

Project	Grid Access	Permits	PPA Price at COD ($/MWh)	Length of PPA Contract (years)	Max # of Turbines	Max Turbine Capacity (MW)	Max Development Depth (m)	Wind Speed (m/s)
Deutsche Bucht	Y	Y	$ 264	13	31	8.4	41	10.04
Borssele III & IV	Y	Y	77	16	77	9.5	37	10.21
Moray East	Y	Y	92	15	100	9.5	54	10.13
Neart na Gaoithe	Y	Y	220	15	54	8	55	9.57
Triton Knoll	Y	Y	120	15	90	9.5	18	9.16
Moray East	Y	Y	92	15	100	9.5	54	10.13
Dieppe-Le Treport & Yeu-Noirmoutier	1/2	1/2	231	N/A	62	8	25, 35	9.59, 8.73
Revolution Wind & South Fork	N	N	152	20	88, 15	8	46, N/A	8.73
Formosa 1	Y	N	256	20	20	6	30	11.81
Formosa 2	Y	N	253	20	47	9.5	55	11.81
Windstream	**Y**	**N**	**$ 254**	**20**	**66**	**4.5**	**30**	**8.47**

7.9 We note that many of the comparable transactions identified above had permits in place at the transaction date, while the Project did not. We also note that the size of the turbines used by the windfarms in these comparable transactions were larger than the turbines that would have been used by the Project as at the Valuation Date and that the winds speeds at these windfarms were higher than the windspeed at the Project. All else equal, a windfarm with permits in place would command a higher transaction value per MW than a project without permits in place due to the additional risk associated with obtaining the remaining permits. Further, all else equal, a windfarm with larger turbines and higher windspeed would command a higher transaction value than a windfarm with smaller turbines.

7.10 However, we also note that most of the comparable transactions identified above had a PPA price that was significantly lower than the PPA price that Windstream would have obtained from the Project but for the Alleged Breaches per the FIT Contract. This is consistent with the general downward trend in offshore wind PPA prices since 2010, as we discuss in **Appendix 1**, Section B. We also note that most of the comparable transactions had a PPA that was for a shorter duration than Windstream. In this regard, all else equal, we would expect that an offshore windfarm with a higher PPA price, or a longer PPA term (such as Windstream) would

[201] See **Schedule 5A** and **Appendix 4** for details and sources of information.

command a higher transaction value per MW than a project with a lower PPA price or a shorter PPA term.

7.11 Further, nearly all of the transactions identified above related to the sale of a non-controlling interest (i.e., 50% or less) in an offshore windfarm.[202] All else equal, transactions for a controlling interest (i.e., greater than 50% of the subject company or project) typically command a higher value, to reflect the additional consideration that an investor would pay in order to own a controlling interest in the company or Project. In other words, a 20% interest in a project would be worth less than 20% of the value of 100% of the company, given that this 20% ownership interest might be limited in terms of the scope of control it could exercise over critical aspects of the business operations. Therefore, all else equal, using transactions involving the sale of non controlling interests in offshore wind projects as a basis to derive the value of a 100% interest in the Project would understate the value of the Project as at the Valuation Date.

7.12 Lastly, nearly all the comparable transactions identified were carried out one to three years before the Valuation Date. In the period leading up to the Valuation Date, the offshore wind industry continued to grow and expand around the world, with increasing appetite from international investors for North American offshore wind assets in particular. Capital and operating costs also continued to decrease significantly, and there was increased public pressure to reduce dependence on fossil fuels globally due to the acceleration of the impacts of climate change. Therefore, given the growth in the industry in the period leading up to the Valuation Date, the valuation range based on transactions that pre-date the Valuation Date by one to three years will also tend to understate the FMV of the Project at the Valuation Date.

7.13 Despite the differences between offshore wind projects, market participants often consider value benchmarks obtained from comparable transactions, such as these, in order to inform their decisions in an arm's length negotiation for the purchase or sale of an offshore wind project. Therefore, while none of these transactions are 'perfectly' comparable to the Project in all respects, in our view, after the application of the criteria filters noted above, as a group, these transactions provide a relevant benchmark range of values that market participants would consider in the negotiation of a transaction involving the Project as at the Valuation Date, absent the Alleged Breaches.

[202] According to data compiled by FactSet Mergerstat, the premiums paid to acquire companies engaged in the generation, transmission and/or distribution of electric energy for the trailing 12 months incorporated into the Q1 2020 Mergerstat Study ranged from 7.5% to 60.6%. The average of all premiums in the dataset was 29.6%. Source: **C-2270** – CPS Quarterly 2020 Q1.

7.14 In order to obtain a benchmark range of value for the Project as at the Valuation Date, we multiplied this planned capacity of the Project of 297 MW by the range of transaction multiples derived from the comparable transactions identified above.

7.15 We have summarized our conclusions under the comparable transaction method as follows:

Figure 7-3: Comparable Transactions Method Conclusion

Description		Low		High
Project planned capacity (MW)		297		297
Transaction value per MW (Median and Average)	$	0.96	$	1.01
Implied Value, millions	**$**	**284.7**	**$**	**299.1**

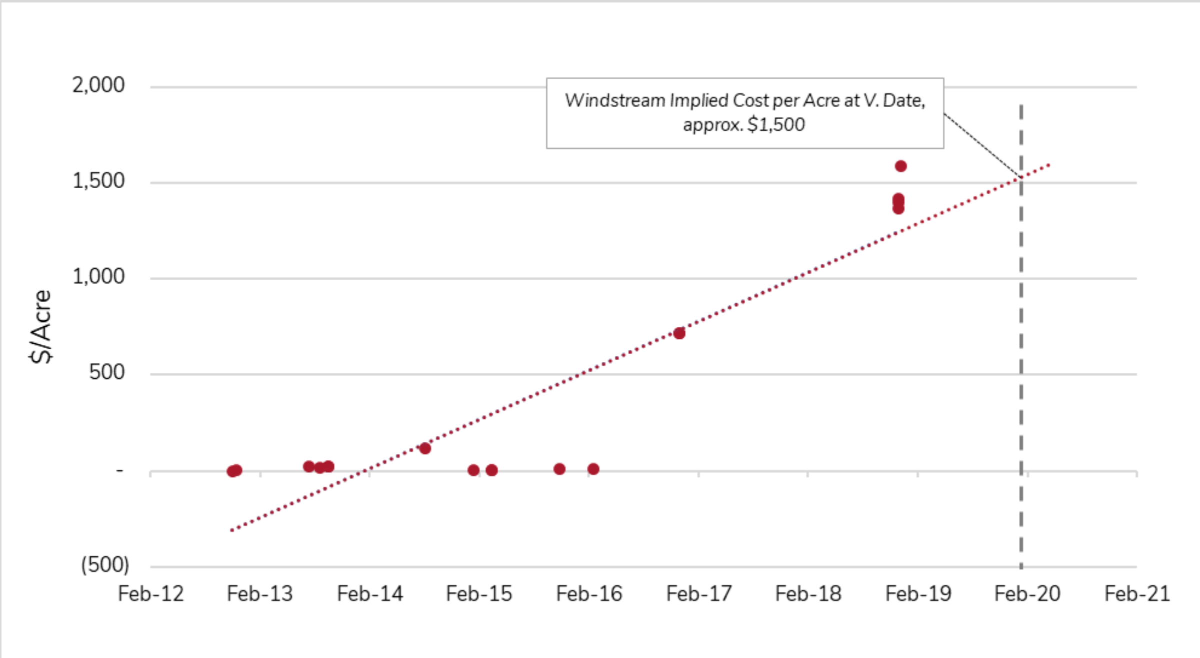
C. Offshore Wind Lease Transactions

7.16 In addition to transactions for offshore wind projects at a similar stage of development as the Project, we have also considered several transactions within North America from 2012 to 2018 for much earlier stage projects (i.e., offshore wind area leases). As discussed in **Section 5E**, large industry players committed significant amounts of capital towards offshore windfarm assets in North America between the dates of NAFTA 1 and the Valuation Date. This includes acquisitions of leasing areas and rights. These transactions involved leasing offshore areas that had potential to develop an offshore wind project thereon but had not completed any other project development activities. Accordingly, these transactions involved <u>much earlier stage wind projects than the Project</u> since the Project already had revenue clarity through the FIT Contract, had conducted site work, had grid access, and had an exclusive and priority position secured on the site the Project would be built on.[203]

7.17 In the following figure, we summarize the trend in the price paid per acre in offshore wind leasing transactions in the US from February 2012 to the Valuation Date, and we have included a trendline to demonstrate the implied $/acre as at the Valuation Date, based on the trend of the amounts paid in the years leading up to the Valuation Date.

[203] See Footnotes 23 and 24 above.

Figure 7-4: Summary of Leasing Costs per Acre ($)[204]



7.18 In the figure below, we summarize the price paid per acre in offshore wind lease transactions carried out in North America over the three-year period prior to the Valuation Date:

Figure 7-5: Lease Transactions Summary[205]

Buyer	Project	Transaction Date	Transaction Value ($ millions)	Acres Leased	Value / Acre
Equinor Wind US LLC	Beacon Wind	13-Dec-18	$ 180.38	128,811	$ 1,400.33
Mayflower Wind Energy, LLC	Mayflower Wind	13-Dec-18	180.38	127,388	1,415.97
Vineyard Wind LLC	Liberty Wind	13-Dec-18	180.51	132,370	1,363.69
EDF Renewables	Atlantic Shores	20-Dec-18	290.65	183,353	1,585.19
				Average	**$ 1,441.29**
				Median	**$ 1,408.15**

7.19 In our view, the Project would have commanded a higher value than the assets acquired in these lease transactions given it was significantly more advanced, primarily since the Project already had a FIT Contract in place which provided it with revenue clarity at a relatively high price compared to the prices that were obtained on other offshore wind projects proximate to the Valuation Date. **At a minimum, the Claimant would have in all likelihood been able to**

[204] **C-2410** - Orennia "Offshore Wind-lytics Sea you there" (November 15, 2021), page 10.

[205] See **Schedule 6** for details. Source: **C-2410** - Orennia "Offshore Wind-lytics Sea you there" (November 15, 2021), page 10 and **C-2188** - PR Newswire article entitled "US Wind Inc Agrees to Sell its New Jersey Offshore Lease to EDF Renewables North America" (December 20, 2018).

sell the Project for an amount greater than the values implied in the lease transactions noted above.

7.20 Further, the power offtake agreements subsequently signed by the above leasing transactions were ultimately significantly lower than the Project's "**Indexed FIT Contract Price**" of $253.8/MWh in its first year of operations, further supporting the notion that the value of the above leasing transactions would be lower than the value of the Project. In our view, it is reasonable to assume that as at the transaction date, the buyers in these 2018 lease transactions were not expecting to receive PPA prices in the same range as the prices that the Project would have received, but for the Alleged Breaches. This is because the PPA's signed by other US offshore wind developers in the period leading up to these transactions included prices that were significantly lower than the indexed PPA price that the Project would have received, but for the Alleged Breaches. For example:

i. In May 2017, Maryland awarded the US Wind and Skipjack projects PPAs at a levelized price of $181 / MWh, for two offshore windfarms expected to commence operations in 2021 and 2023 respectively;[206]

ii. In July 2018, Vineyard Wind signed two PPAs at rates of $96 / MWh, and $85 / MWh, for offshore windfarms expected to commence operations in 2022 and 2023 respectively, escalating at 2.5% per year;[207] and,

iii. In December 2018, Ørsted signed a PPA for its Revolution Wind farm in Connecticut at a levelized PPA price of approximately $126 / MWh for a project expected to commence operations in 2023.[208]

7.21 As noted in **Section 4C** above, the Project was to be located on approximately 48,000 acres of shallow water shoals.[209] Therefore, in order to obtain a benchmark value for the Project as at the Valuation Date based on the US lease transactions carried out in the three-year period prior to the Valuation Date, we multiplied the total acreage available for the Project by the implied average cost per acre for the Project of $1,408 per Figure 7-5. This would imply a minimum value of approximately $68 million for the Project.

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206 USD 131.93/MWh converted using CAD:USD exchange rate of 1.37 on May 11, 2017. **C-2091** - Maryland Public Service Commission Press Release entitled "Maryland PSC Awards ORECS to Two Offshore Wind Developers Projects to Create Jobs, Economic Development in New Industry" (May 11, 2017).

207 USD 74/MWh and USD 65/MWh converted using CAD:USD exchange rate of 1.30 on July 31, 2018. Source: **C-2165** – Green Tech Media "First Large US Offshore Wind Project Sets Record-Low Price Starting at $74 per MWh" (August 1, 2018).

208 USD 94/MWh converted using CAD:USD exchange rate of 1.34 as at December, 2018. Source: **C-2136 -** Report (US DOE), 2018 Offshore Wind Technologies Market Report (2018), page 17.

209 NAFTA 1, Exhibit C-0877, Garrad Hassan Technical Report (December 2, 2010), page 3.

7.22 Another key transaction that demonstrates the continued growth and significant capital spent in the industry shortly after the Valuation Date is BP plc's acquisition of a 50% interest in the Empire Wind and Beacon Wind development stage offshore wind farms located off the coast of Massachusetts from Equinor, which was entered into on September 10, 2020.[210] At that time, only Phase 1 of Empire Wind had a revenue mechanism in place.[211] The wind farms also did not have permits or grid agreements at the time.[212]

7.23 This transaction had a value of $1.4 billion,[213] which translates to approximately $0.66 million/MW, based on 2,200 MW of potential.[214] This would imply a value of approximately $196 million for the Project.[215]

7.24 While this transaction represents hindsight information as at the Valuation Date and as such, we have not used it in our FMV conclusion, it demonstrates the continued trend towards increasing valuations and the increasing appetite from international investors for the North American offshore wind industry as at and around the Valuation Date.[216]

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210 **C-2318** - Equinor Press Release entitled "Equinor partners with BP in US offshore wind to capture value and create platform for growth" (September 10, 2020).

211 Empire Wind Phase 1 with capacity of 816 MW was announced as a winner in New York's first offshore wind solicitation on July 18, 2019. The purchase and sale agreement for an OREC Strike Price of USD83.36 per MWh (in 2018 dollars) was executed on October 23, 2019. Source: **C-2204** - Equinor News Releases entitled "Equinor offshore wind bid wins in New York State" (2019) and **C-2238** - NYSERDA Report entitled "Launching New York's Offshore Wind Industry - Phase 1 Report" (October 2019), Table 1: ORECRFP18-1 Contracting Summary, page 22.
Empire Wind Phase 2 (1,260 MW) and Beacon Wind Phase 1 (1,230 MW) were also announced as winners in another of New York's offshore wind solicitations on January 13, 2021. The OREC purchase and sale agreement for these wind farms were still under negotiation. Source: **C-2341** - Equinor News Release entitled "Equinor selected for largest-ever US offshore wind award" (January 2021), and **C-1922** - NYSERDA - Offshore Wind Projects.

212 **C-1913** - 4C Comparables (Excel) and **C-2318** - Equinor Press Release entitled "Equinor partners with BP in US offshore wind to capture value and create platform for growth" (September 10, 2020).

213 USD1.1 billion translated using CAD:USD exchange rate of 1.4476 on the transaction date of September 10, 2020 per Capital IQ.

214 Potential capacity calculated as: (2 GW for Empire Wind + 2.4 GW for Beacon Wind) x 50% interest acquired. Source: **C-2318** - Equinor Press Release entitled "Equinor partners with BP in US offshore wind to capture value and create platform for growth" (September 10, 2020).
Multiple calculated as $1.447 billion / 2,200 MW = $0.66 million per MW.

215 Calculated as 297 MW * $0.66 million per MW = $196 million.

216 In a notional market valuation, hindsight information can be used as one factor of post-valuation date evidence, to assess whether subsequent events were generally consistent with the conclusions reached using information available as at the Valuation Date, but not in the actual determination of FMV. Source: **C-1933** – I. Campbell & H. Johnson, "The Valuation of Business Interests" (2001), page 61.

D. Onshore Wind Transactions in Ontario, Canada

7.25 We were not able to identify any transactions involving offshore wind projects in Canada prior to the Valuation Date.[217] Therefore, in addition to the above, we have also considered transactions in Ontario involving onshore wind energy projects under the FIT Program of the Ontario Government. Although the Ontario onshore wind energy projects provide relevant proxies for the value of Ontario wind generation projects, they differ from the offshore wind energy projects in certain respects, including the different technologies involved in construction of onshore wind projects compared to offshore wind projects,[218] generally lower capital costs with onshore projects, generally lower wind speeds associated with onshore wind projects compared to offshore wind projects, and the lower PPA prices generally available for onshore wind compared to offshore wind under the Ontario FIT program. Accordingly, we have used the valuation multiples from this analysis to assess the order of magnitude for the value ascribed by the market participants to the onshore wind energy projects in Ontario prior to the Valuation Date.

7.26 We identified three transaction that took place in 2019 involving wind energy projects located in Ontario, Canada, summarized as follows:

Figure 7-6: Summary of Transactions in Onshore Wind Projects in Ontario, Canada[219]

Transaction Date	Project	Buyers	Sellers	Stage	Turbines	Capacity (MW)	FIT Contract Date	FIT Contract Price	Remaning FIT Contract Period
11-Oct-19	Henvey Inlet	Pattern Energy Group Inc.	Pattern Energy Group LP.	Comissioned September 2019	Vestas 3.4 MW	300	25-Feb-11	150	19.9 years
2-Aug-19	North Kent Wind Facility	Pattern Energy Group Inc.	Pattern Energy Group LP.	Comissioned February 2018	Siemens 3.2 MW	100	1-Apr-15	128	18.5 years
2-Aug-19	Belle River Wind Facility	Pattern Energy Group Inc.	Pattern Energy Group LP.	Comissioned September 2017	Siemens 3.2 MW	100	22-Sep-14	115	18.1 years

[217] As noted in **Appendix 1**, Section E, as at the Valuation Date, no offshore windfarms were under construction in Canada as at the Valuation Date. There was one offshore windfarm in development (Naikun Wind), which was located in British Columbia, although this project was at a very early stage at the Valuation Date, as it did not have a PPA, or any revenue mechanism, and did not have permits in place as at the Valuation Date.

[218] CER-Wood, page 4.

[219] Refer to **Schedule 7**.
Pattern Energy Group LP is a legacy entity that was involved in the original formation of Pattern Energy Group Inc. It was also the sponsor at the time of initial public offering and owned an equity interest in Pattern Energy Group Inc. till 2018. Although the two companies were partially related, as at the transaction dates, they had different set of shareholders due to the listed status of Pattern Energy Group Inc., accordingly, it is reasonable

7.27 Comparing the above projects with Windstream we note the following:

i. Location: Similar to Windstream, the above projects are located in Ontario and therefore are subject to similar market factors as the Project. However, the above projects are onshore, while Windstream was approximately 10 km southwest of Wolfe Island offshore in Lake Ontario;[220]

ii. FIT-Contract: Similar to Windstream, the above projects have an Ontario FIT-Contract of 20 years with the IESO, however due to the lower prices offered on onshore wind vs. offshore wind under the Ontario FIT program, the price on these onshore wind projects is 21%[221] to 39%[222] lower than the price under the Windstream FIT contract;

iii. Turbine Size: The above projects used a smaller turbine of 3.2 MW compared to the 4.5 MW turbine that Windstream would have used but-for the Alleged Breaches. All else being equal, with larger turbine size Windstream would require fewer turbines to achieve its capacity; and,

iv. Stage: The above projects were all at more advanced stages to Windstream at the time of the transactions. They were already commissioned at the time of their transactions and were all within the first two years of their operations.

7.28 We summarize the EV/MW multiple for these transactions in the figure below:

Figure 7-7: Valuation Multiples of Transactions involving Onshore Wind Energy Projects in Ontario ($ Millions)[223]

Transaction Date	Project	Purchase Consideration	Stake Acquired	Equity Value	Debt	Enterprise Value	Capacity (MW)	EV/ MW
11-Oct-19	Henvey Inlet	$ 242.4	50.0%	$ 484.8	$1,448.0	$ 1,932.8	300	6.44
2-Aug-19	North Kent Wind Facility	$ 31.2	35.0%	$ 89.1	$ 223.2	$ 312.3	100	3.12
2-Aug-19	Belle River Wind Facility	$ 20.8	21.7%	$ 95.8	$ 227.1	$ 322.9	100	3.23

7.29 As shown above, commissioned onshore wind energy projects in Ontario were attracting an EV/MW multiple of 3.23x to 6.44x. This would imply an enterprise value in the range of $1.0 billion to $1.9 billion for a 297 MW project once commissioned with:

to assume that the transactions between the two parties were at an arm's length relationship, at a fair market value.

220 CER-Wood, Section 1.

221 Calculated as: [1 – (150/190)] = 21% (rounded).

222 Calculated as: [1 – (115/190)] = 39% (rounded).

223 Refer to **Schedule 7**.

i. 18.1 to 19.9 years remaining in the FIT-Contract;

ii. FIT-Contract price in the range of $115/MW to $150/MW (before inflation adjustments); and,

iii. 3.2MW to 3.4 MW onshore turbines.

7.30 In contrast, Windstream had 20 years remaining on its FIT Contract, at a higher price of $190/MW (before inflation adjustment) and would have used larger 4.5 MW offshore turbines (i.e., fewer turbines). Accordingly, in our opinion, the appropriate value indictor for the Project, once commissioned, would be at the higher end of the implied range of the multiples shown above.

7.31 As a result, the market indicators from the onshore transactions in Ontario would imply a value closer to $1.9 billion[224] (in 2019 dollar terms) for the Project once it is commissioned. However as of the Valuation Date, the Windstream Project still needed to overcome the risks associated with transitioning to the Financial Close, and fund future capex.[225] Therefore, we do not consider that our conclusions under this analysis provides an estimate of the FMV of the Project at the Valuation Date, but rather we consider that this analysis demonstrates that our FMV conclusions under a DCF (from $293.4 million to $330.7 million)[226] and the comparable transactions approach (from $284.7 million to $299.1 million)[227] are lower than the implied value of the Project based on more advanced onshore windfarms in Ontario. This provides us with additional comfort that our FMV conclusions are reasonable and are not overstated.

E. Public Company Trading Multiples Methodology

7.32 Under the public company trading multiples method, valuation metrics are derived from the share prices of publicly traded companies that hold similar assets to the Project.

7.33 In order to identify public companies that we consider to be suitably similar or comparable to the Project, we have conducted an analysis of the S&P Capital IQ proprietary database and filtered for the following criteria:

i. **Company Type:** We selected companies that were publicly traded on an exchange at the Valuation Date;

[224] Calculated as: 6.44 * 297 MW = $1.9 billion.

[225] The total project cost to fund (for the enterprise i.e., debt plus equity) over 2020 to 2024 before achieving the commissioning for Windstream is estimated to be $1.3 billion (in dollar terms nominal terms). Refer to **Section 6.J** above.

[226] Refer to **Section 6** above.

[227] Refer to **Section 7B** above.

ii. **Industry Classification:** We selected companies which S&P Capital IQ categorized in the "Electric power by wind energy" industry;

iii. **Location:** We selected companies located in the United States, Canada, and Europe;

iv. **Company Status:** We selected companies that were listed as Operating or Operating subsidiaries in Capital IQ;

v. **Energy Source:** We selected companies that primarily operate wind as an energy source (i.e., at least 80% of development and operating capacity (**"Total Capacity"**) is wind-generated);

vi. **Availability of reliable information:** We selected companies where we were able to reasonably determine the MW capacity held, based on information available in the public domain; and,

vii. **Project Stage:** We excluded companies which only held projects without revenue clarity.[228]

7.34 We have also included one additional renewable energy company in our analysis, Ørsted A/S, which was not captured in the Capital IQ results based on the filtering criteria summarized above, but which we considered sufficiently comparable for purposes of this analysis. This is because 87% of its total energy capacity is wind-generated, and given its significant activity in the North America offshore wind market in the period leading up to the Valuation Date, as described in **Section 5E** above.

7.35 Based on our analysis, we identified 7 public companies and we then calculated value metrics for Enterprise Value per MW for each.

7.36 We note that results obtained under this methodology are less reliable than using completed transactions since this methodology assumes that the public trading prices of the shares of these comparable companies trade in an 'efficient market' and provides a reasonable indication of the FMV of the underlying projects held by these companies. As outlined in greater detail below, the efficient market assumption may not apply to the shares of these companies due to the following:

i. The prices of shares that are thinly or sporadically traded may not be indicative of FMV;

[228] We note that Oceanic Wind Energy Inc. (previously NaiKun Wind Energy Group Inc.) was the only offshore wind project in development in Canada at the Valuation Date; however, we have excluded it from our comparable public companies as the project it held was at a very early stage (it did not have a PPA or other revenue mechanism in place, which did not meet our filtering criteria, and also did not have permits in place as at the Valuation Date). Source: **C-1923** - Oceanic Wind Project Timeline.

ii. The publicly traded shares of a company represent a minority interest in the company and will thus generally reflect a "minority discount" due to the inability of minority shareholders to exercise control over the investment;

iii. The share price may reflect factors such as investor sentiment, asymmetric knowledge about the Project(s) or the wind energy sector in general on the part of investors, and thus the share price may not provide a reliable indication of the FMV of the underlying assets at a given point in time; and,

iv. The share price / market capitalization of a company would only reflect the equity value of the underlying projects, while a proper analysis of the value of the underlying value of the projects should be based on the Enterprise Value. Enterprise value represents the total value of a business including both its equity and interest-bearing debt components (net of redundant cash). Therefore, in a public company trading multiples analysis, it is important to convert the market capitalization into an Enterprise Value by adding the interest-bearing debt held by the company, net of redundant cash.

7.37 In addition, in calculating Enterprise Value per MW, we have used Total Capacity as a denominator. This assumes that Enterprise Value is distributed evenly across the MW, regardless of energy source and status (operating, in construction, or in development), which results in a multiple that may not be comparable to the Project which was in the development stage as at the Valuation Date.

7.38 Acquisition premiums paid in recent transactions are identified and published quarterly by FactSet Mergerstat ("**Mergerstat**"). Mergerstat defines this premium as "*…the additional consideration that an investor would pay over a marketable minority equity value (i.e., current, publicly traded stock prices) in order to own a controlling interest in the common shares of a company.*" The premium is calculated by Mergerstat by comparing the "*…price just prior to the point of change in the representative normal pricing of a given security…*" to the purchase price per share.

7.39 The premiums pertaining to companies engaged in the generation, transmission and/or distribution of electric energy for the trailing 12 months incorporated into the Q1 2020 Mergerstat Study ranged from 7.5% to 60.6%. The average of all premiums in the dataset was 29.6%.[229]

7.40 Based on the above, we have applied an acquisition premium to the market capitalizations of the comparable companies of 30% in our analysis.

[229] **C-2270** - CPS Quarterly 2020 Q1, page 36; transactions in SIC code 4911.

7.41 A summary of the selected public companies is provided in the figure below:

Figure 7-8: Summary of Public Company Trading Multiples Method Analysis[230]

Entity Name	Ticker	Total Capacity (MW)	Wind Capacity (MW)	Wind Capacity as % of Total Capacity	Development Capacity as % of Total Capacity	EV ($ million)	EV / MW ($ million)	EV with Premium ($ million)	EV / MW with Premium ($ million)
Arise AB (publ)	OM:ARISE	967	967	100%	86%	$ 318	$ 0.33	390	$ 0.40
Boralex Inc.	TSX:BLX	4,958	4,161	84%	59%	6,406	1.29	7,321	1.48
EDP Renováveis, S.A.	ENXTLS:EDPR	12,356	12,072	98%	8%	23,501	1.90	28,358	2.30
Fintel Energija a.d.	BELEX:FINT	901	901	100%	95%	352	0.39	416	0.46
Ørsted A/S	CPSE:ORSTED	13,307	10,824	81%	53%	65,963	4.96	84,455	6.35
Polenergia S.A.	WSE:PEP	2,065	1,948	94%	88%	629	0.30	778	0.38
Terna Energy S.A.	ATSE:TENERGY	1,935	1,904	98%	28%	2,492	1.29	2,913	1.51
						Average	**$ 1.49**		**$ 1.84**
						Median	**$ 1.29**		**$ 1.48**

7.42 While certain of the companies included in our analysis also held operating projects, which, all else equal, would result in a higher value per MW when compared to the Windstream Project, we note that several of the development projects held by the companies above did not yet have revenue clarity, which, all else equal, would result in a lower value per MW when compared to the Windstream Project. Further, we note that for the projects that did have revenue clarity at the assessment date, many of them were subject to a PPA price that was significantly below the PPA price that the Windstream Project would have achieved but for the Alleged Breaches.[231]

7.43 A more detailed discussion of each of the comparable public companies we selected in our analysis is provided in **Appendix 5**.

7.44 Our analysis results in an average price multiple of $1.29 to $1.49 per MW or $1.48 to $1.84 with the 30% acquisition premium. We have summarized the implied value of the Project under the public company trading multiples method as follows:

230 We have provided additional details in **Schedule 8** and a detailed discussion of each of the comparables selected in **Appendix 5**.

231 For example, we note that according to an equity research report prepared for Polenergia, the estimated 15-year forecasted electricity price for the company as at December 2019 was approximately $76/MWh (PLN 243/MWh converted to CAD). This price was based on the average price announced by the Polish regulator resulting from their December 2019 auction. Source: **C-2257** - Santander Report entitled "[+] 187MW on-shore windfarms won 15-year support in auctions" (December 20, 2019). Further, the majority of Polenergia's development capacity related to the Baltyk I, II and III development stage offshore windfarms in the Baltic Sea, whereby as at the Valuation Date, there was no regulatory framework in place, they did not have any revenue clarity, were not anticipating receiving a building permit until 2023, and operations were not expected to start until 2026. **C-1913** - 4C Comparables (Excel), "Database" tab and **C-2284** - Polenergia Equinor Facts and Figures - Baltyk (2020).

Figure 7-9: Public Company Trading Multiples Method Conclusion ($ Millions)

Description	Low	High
Enterprise value per MW (Median and Average)	$ 1.29	$ 1.49
Enterprise value per MW with acquisition premium	$ 1.48	$ 1.84
Project planned capacity (MW)	297	297
Implied Value, millions	**$ 438.5**	**$ 545.9**

7.45 Since this valuation is derived from the trading multiples of companies that also own operating windfarms, while the Project had not yet reached FC as at the Valuation Date, we expect that the value per MW of these public companies would be higher than the FMV of the Project on the Valuation Date. Thus, we do not consider that our conclusions under this analysis provides an estimate of the FMV of the Project at the Valuation Date, but rather we consider that this analysis demonstrates that our FMV conclusions under a DCF ($293.4 million to $330.7 million) and the comparable transactions approach (from $284.7 million to $299.1 million) are lower than the value of similar public companies with more advanced wind power generation projects. This provides us with additional comfort that our FMV conclusions are reasonable and are not overstated.

F. Conclusion - Valuation Approaches for the Project under the Market Approach

7.46 As noted, we conducted valuations for the Project under a comparable transaction methodology. First, we identified 10 comparable transactions to the Project based on our screening criteria and the 127 transactions in the 4C Offshore database including transaction date, location, development stage, revenue clarity and sufficient publicly available information with respect to key elements of each transaction. Based on our comparable transactions analysis, we conclude that the FMV of the Project as of the Valuation Date is in a range of $284.7 million to $299.1 million.

7.47 As a secondary calculation, we also reviewed a number of actual transactions in the US from 2012 to 2018 for offshore wind leases and demonstrated that the value/acre of these transactions increased significantly from 2012 to 2016 compared to 2017 and 2018. Since these offshore land leases involved projects at much earlier stages of development than the Project, and since they involved much lower energy prices (albeit after the lease transaction dates) than the Project was to receive under the FIT Contract**, the implied value based on these offshore wind leasing transactions understates the value of the Project.** We calculated the average value/acre of 4 offshore wind leases that occurred within three years of the Valuation Date to be approximately $1,408/acre which implies a value for the Project of $68 million, and accordingly we consider that the FMV of the Project at the Valuation Date must be greater than $68 million. In other words, **at a minimum, the Claimant would have in**

all likelihood been able to sell the Project for an amount greater than that implied by the leasing transactions noted above.

7.48 We also calculated a range of values for the Project based on the public company trading multiples methodology where we calculated the EV/MW from certain public companies that operate in the wind power generation sector. Based on our analysis the public companies we identified include a mix of development stage projects, similar to the Project, but also include projects at a more advanced stage of development, including operating assets. The median and average EV/MW values of these public companies is $1.48/MW and $1.84/MW, respectively. We consider that the implied values for the Project of $438.5 million to $545.9 million based on the median and average EV/MW values for this set of public companies would tend to overstate the value of the Project given that these values include projects at more advanced stages of development. Therefore, we only considered the public company trading multiple approach to provide a high-level order of magnitude check on the reasonability of our overall conclusions.

7.49 Based on the foregoing, we conclude that the FMV of the Project under a market-based approach to value to be from **$284.7 million to $299.1 million**, based on the comparable transaction methodology. Although we find that the leasing transactions and comparable public company data are not sufficiently comparable to provide a FMV conclusion, we conclude that they are both supportive that our comparable transaction FMV conclusions and our DCF conclusions are reasonable from an order of magnitude.

8 WINDSTREAM'S DISCUSSIONS WITH INTERESTED PARTIES IN 2017

A. *Introduction*

8.1 In this section we summarize our review of the contemporaneous correspondence in 2017 and note that since NAFTA 1, many market participants in the North American renewable and wind power sector were interested in investing in or acquiring the Project. This generally supports our conclusions that, absent the Alleged Breaches, the Project: i) would likely have obtained financing and proceeded to construction, and ii) would have had a positive valuation as at the Valuation Date.

8.2 As outlined above, in May of 2017, Windstream engaged KeyBanc to act as an exclusive financial advisor to negotiate a potential transaction for the sale of the Project, or a portion thereof, to prospective investors, and/or the arrangement of a private placement transaction to raise funds for the development of the Project. Throughout 2017 and 2018, Windstream engaged with various parties who were interested in either purchasing the Project from Windstream or partnering with Windstream to develop the Project once the Moratorium was lifted.[232]

8.3 The discussions held by Windstream with these interested parties provide objective and contemporaneous evidence as to the viability and positive valuation of the Project, absent the Alleged Breaches, in the period following NAFTA 1. In this section, we provide a summary of these discussions, and the implication on the FMV of the Project as at the Valuation Date.

B. *Analysis*

8.4 In February of 2017, Windstream (through Ortech Consulting) prepared a data room with 2.7 GB of files and data that would allow it to easily share information about the Project with potentially interested parties. The information in the data room was organized into 5 categories: Technical, Environmental, Financial, Legal, and Project Management and Other General.[233]

8.5 In May of 2017, prior to commencing the formal engagement with KeyBanc, Windstream was contacted by [redacted] whereby [redacted] indicated that they were [redacted]"[234]

[232] Third Witness Statement of David Mars, Section A.
[233] **C-2071** - Email from David Mars (WEI) to Daniel Brown (WEI) re 2017 WIS Data Room (February 7, 2017).
[234] Third Witness Statement of David Mars, footnote 12.

8.6 In June of 2017, KeyBanc began to reach out to companies that would potentially invest in or acquire the Project, with a presentation about the Project, and a non-disclosure agreement to allow the parties who expressed interest to have an opportunity to review more detailed information. By July of 2017, Windstream had reached out to, held initial meetings with, and shared preliminary documents about the Project with the following parties:[235]

Figure 8-1: WWIS Marketing Update per KeyBanc – July 2017

Buyer	Contact	Teaser & NDA Sent	NDA In Process	NDA Fully Executed	Initial Meeting Completed	Preliminary Docs Sent
[redacted]		✓	✓			✓
		✓	✓	✓	✓	✓
		✓	✓	✓	✓	✓
		✓	✓	✓	✓	✓
		✓				
		✓	✓	✓	✓	✓
		✓	✓	✓	✓	✓
		✓	✓		✓	✓
		✓	✓			

8.7 As a result, in mid-July 2017, Windstream/KeyBanc opened the data room to allow the interested parties to access the more detailed documents.[236]

8.8 Throughout July, August and September of 2017 as these parties looked through the Windstream data room, Windstream fielded questions from several potentially interested parties about the Project, such as [redacted][237] [redacted] etc. For example, in September 2017, [redacted][238]

8.9 At the end of September 2017, KeyBanc prepared the following summary of the potentially interested parties, who had been granted access to the Windstream data room:[239]

235 **C-2104** - Email from Tyler Nielsen (KeyBanc) to David Mars (WEI) re Windstream Buyers (July 6, 2017).
236 Third Witness Statement of David Mars, paragraph 12m.
237 Third Witness Statement of David Mars, paragraph 12n.
238 Third Witness Statement of David Mars, paragraph 12o.
239 **C-2122** – WWIS Marketing Update (KeyBank capital Markets) Presentation (September 28, 2017) (Confidential).

Figure 8-2: WWIS Marketing Update per KeyBanc – September 2017

WWIS Marketing Update

Buyer	Primary Contact	NDA Execution	Data Room Access	Commentary
[redacted]		July	✓	[redacted]
		June	✓	[redacted]
		June	✓	[redacted]
		June	✓	[redacted]
		June	✓	[redacted]
		June	✓	[redacted]
		July	✓	[redacted]

- The buyers have a combined total of more than 16.5 GW of operating and development offshore wind projects, and nearly 16 GW of operating renewable assets
- Since opening the data room in July, 17 users have logged in
- The marketing process has been paused to the delay in the force majeure hearing. As a result, other high-value buyers [redacted] have not been seriously engaged

8.10 As noted in the figure above, several serious investors in the offshore wind industry had shown significant interest in the Project. For example, [redacted] showed [redacted]. The document also notes that other high value buyers were not seriously engaged due to the force majeure hearing, i.e., due to the legal issues raised in this arbitration, and not due to Project specific factors.

8.11 Throughout October of 2017, Windstream engaged in discussions and meetings with members of [redacted] with respect to their interest in the Project. In an email sent by [redacted] to KeyBanc on October 9, 2017, [redacted] asked KeyBanc to ask Windstream:[240]

[redacted]

8.12 As noted in **Section 5** above, on February 20, 2018, the IESO exercised its termination right under section 10.1(g) of the FIT Contract. In this regard, we understand that Windstream and

[240] **C-2123** – Email from [redacted] to Daniel Brown of KeyBanc, dated October 9, 2017.

KeyBanc paused the process to seek out investors or purchasers of the Project, given that the potentially interested parties were unwilling to enter into any type of arrangement while the legal issues relating to the Moratorium that prevented the Project from moving forward remained outstanding.

8.13 As a result, Windstream decided to end its discussions with the interested parties given that it "*was not seeing any movement from the Government of Ontario with respect to advancing the research to lift the moratorium, or to renegotiate the terms of the FIT Contract to "freeze" us from the effects of the moratorium, as promised by the government officials*.".[241]

8.14 Despite this, we understand that certain potentially interested parties continued to follow up with Windstream on the status of the Project throughout 2018, whereby they expressed interest in, and continued to seek updates on the status of the Project into 2018.[242]

C. Conclusion

8.15 Based on our review of the contemporaneous correspondence in 2017 summarized above, many market participants in the North American renewable and wind power sector were interested in investing in or acquiring the Project which generally supports our conclusions that, absent the Alleged Breaches, the Project: i) would likely have obtained financing and proceeded to construction, and ii) would have had a positive valuation as at the Valuation Date.

[241] Third Witness Statement of David Mars, paragraph 16.
[242] Third Witness Statement of David Mars, paragraph 16.

9 PRE-AWARD INTEREST

A. Introduction

9.1 Pre-award interest compensates the Claimant for the deprivation of the use of the funds awarded from the date the damages were incurred to the date of an award of damages. In order to compensate the claimant, interest is calculated by applying an appropriate rate of return from the Valuation Date to the estimated award issuance date. We have been instructed to use December 31, 2023, as a proxy for the date of an award.

9.2 The two principal issues in the calculation of pre-award interest include the rate of interest applicable to the damages and whether the interest is calculated on a compound or simple basis.

B. Interest Rate

9.3 We have been instructed to calculate pre-award interest based on a rate of CIDOR plus 2% per annum to the expected award date which we have assumed for the purposes of our calculations. This approximates the cost of debt for the Project. See **Section 6J** for details.

C. Compound versus Simple Interest

9.4 Interest can be calculated on a simple basis (interest is calculated on principal only) or a compound basis (interest is calculated on both principal and interest from previous periods). All other inputs being equal, compound interest calculations will exceed simple interest calculations and the magnitude of the difference is a function of the holding term and the frequency of compounding (i.e., monthly, quarterly, or annually).

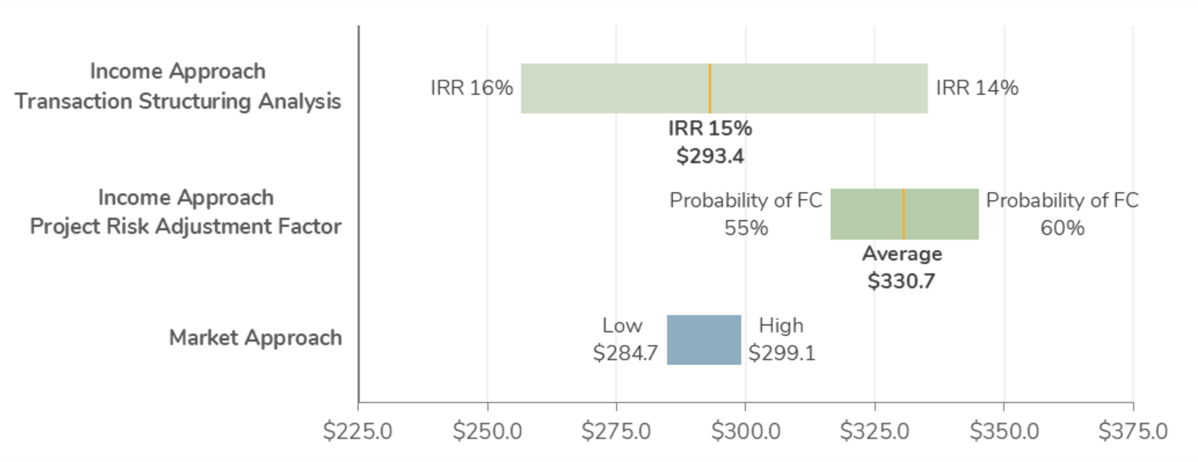
9.5 Considering the compensatory function of pre-award interest, in our view, compounding is the most appropriate method for the purposes of this calculation as almost all modern forms of commercial financing involve compound interest and the Alleged Breaches of the Respondent caused the Claimant to forego investment opportunities that would have included compounding effects. Simple interest would fail to compensate the Claimant.

9.6 Thus, we have calculated interest on a compound basis to the expected award date which, as noted, we have assumed to be for the purposes of our calculations.

10 CONCLUSION ON DAMAGES

10.1 The FMV of the Project using the Income Approach and the Market Approach is summarized as follows:

Figure 10-1: Summary of the Valuation of the Project ($ Millions)



10.2 Based on the scope of our review, as well as the procedures, analyses, assumptions, and restrictions noted herein, we have calculated the damages to the Claimant from the Alleged Breaches as follows:

Figure 10-2: Summary of Damages Conclusions – Income Approach ($ Millions)

	Income Approach	
	Transaction Structuring	*Risk Adjustment*
FMV of the Project at February 18, 2020, but for the Alleged Breaches (Equity Value)	**$ 293.4**	**$ 330.7**
Less: NAFTA 1 Award	(25.2)	(25.2)
Less: Return of Letter of Credit	(6.0)	(6.0)
Claimants' damages before pre-award interest	**262.2**	**299.6**
Add: Pre-Award Interest	29.2	33.4
Claimants' damages including pre-award interest	**$ 291.4**	**$ 333.0**

Figure 10-3: Summary of Damages Conclusions – Market Approach ($ Millions)

	Market Approach	
	Low	***High***
FMV of the Project at February 18, 2020, but for the Alleged Breaches (Equity Value)	**$ 284.7**	**$ 299.1**
Less: NAFTA 1 Award	(25.2)	(25.2)
Less: Return of Letter of Credit	(6.0)	(6.0)
Claimants' damages before pre-award interest	**253.5**	**267.9**
Add: Pre-Award Interest	28.3	29.9
Claimants' damages including pre-award interest	**$ 281.8**	**$ 297.7**

11 ASSUMPTIONS

11.1 The conclusions noted herein are based on the following key assumptions which we consider to be reasonable and appropriate:

i. The Claimant is entitled to an award of damages equal to the FMV of the Project as at the Valuation Date, 'but-for' the Alleged Breaches of the Respondent, less mitigation, plus pre-award interest;

ii. Absent the Alleged Breaches the Ontario Government would have removed the Moratorium on February 18, 2020, so that the WWIS could proceed through the approvals process for the Project;

iii. Absent the Alleged Breaches, the Government of Ontario would not have prevented the Project from obtaining in the ordinary course any approvals required to advance to a Construction Project, including the REA from the MOECC, the authorization under the NWA, the confirmation letter from the MNRF, and authorization from the FA and other federal and provincial bodies;

iv. The terms of the FIT Contract entitled the Project to inflation-indexation on the entire amount of the Contract Price from September 30, 2009, to the Revised MCOD of January of 2025 (which according to the FIT Contract, would be based on the CPI applicable in the month of December in the immediately preceding calendar year[243], i.e., December 2024);

v. The Claimant is entitled to pre-award simple interest calculated on a compound basis at a rate of CIDOR plus 2%;

vi. All financial information relied upon herein is reliable for the purposes of our damages analysis; and,

vii. Other assumptions as they relate to specific calculations are provided in **Section 2** to **Section 10** above.

[243] NAFTA 1, Exhibit C-0197, Exhibit B, section 1.3.

12 EXPERT DECLARATION

12.1 We, Chris Milburn, Edward Tobis, and Pierre-Antoine Tetard understand that our duty in giving evidence in this arbitration is to assist the arbitral tribunal decide the issues in respect of which expert evidence is adduced. We have complied with, and will continue to comply with, that duty.

12.2 We confirm that this is our own, impartial, objective, unbiased opinion.

12.3 We confirm that we have referred to all matters which we regard as relevant to the opinions we have expressed and have drawn to the attention of the Arbitral Tribunal all matters, of which we are aware, which might adversely affect our opinion.

12.4 Secretariat is currently retained by Torys LLP on another unrelated matter. This other retainer has no impact on Secretariat's ability to provide an independent, objective analysis of the damages in this case.

12.5 We confirm that we are independent of the Parties, their legal Advisors, and the Arbitral Tribunal

12.6 We confirm that, at the time of providing this written opinion, we consider it to be complete and accurate and constitute our true, professional opinion.

12.7 We confirm that if, subsequently, we consider this opinion requires any correction, modification or qualification we will notify the parties to this arbitration and the Arbitral Tribunal forthwith.

____

Chris Milburn, February 18, 2022

____

Edward Tobis, February 18, 2022

____

Pierre-Antoine Tetard, February 18, 2022

Appendix 1 Industry Overview

A1.1 In this appendix, we discuss the significant changes in the North American and global energy and wind energy markets between NAFTA 1 and the current date. Considering the significant amount of growth in the North American offshore wind industry since the date of NAFTA 1, the improvement in the technologies used to construct and operate offshore windfarms since NAFTA 1, and the general trend towards renewable energy in Canada and around the world, in our view, in the absence of the Alleged Breaches, all else equal, the value of the Project would have been higher as at February 2020 than it would have been as at the time of NAFTA 1.

A. Global Wind Energy Market

A1.2 In 2010, the year the FIT Contract was signed, global installed wind capacity increased by 24.1% to a total installed capacity of 197 GW.[244] However, there was a decrease in annual installations for the first time in two decades, mainly as a result of the 2008 financial crisis (see figure below).[245] Approximately 38.3 GW of wind power capacity was installed globally in 2010, largely in developing and emerging economies including China, India, and Latin America.[246] China's 2010 growth put its wind capacity at 22.7% of the global total.[247]

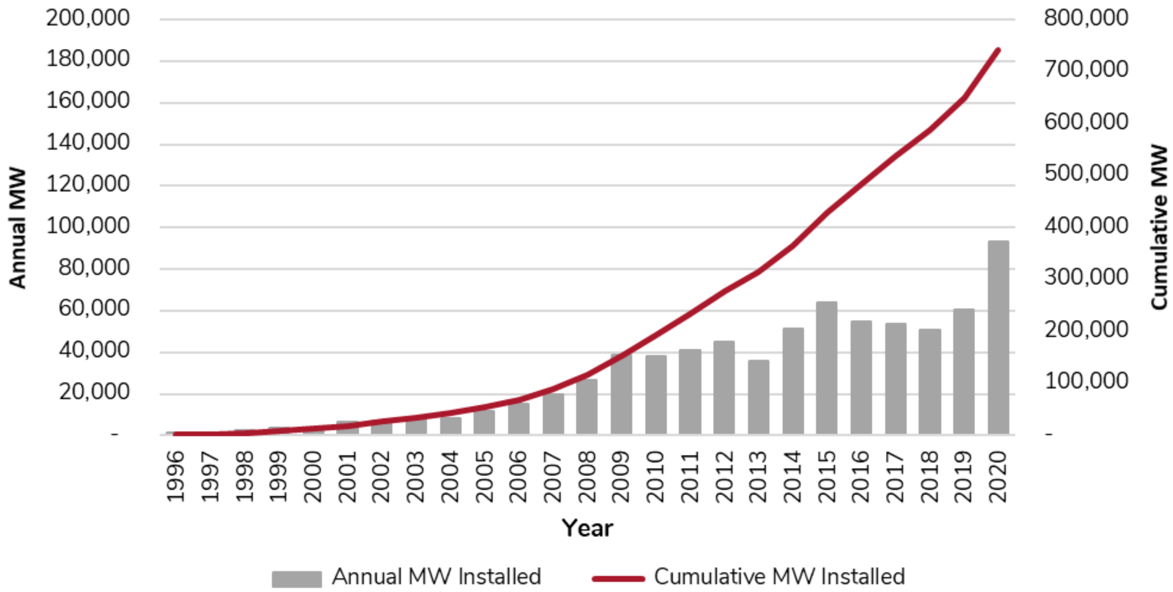
244 **C-1948** – GWEC Global Wind Report – Annual Market Update (2010), page 10. The Global Wind Energy Council ("**GWEC**") is a member-based organization representing the global wind energy sector. See **C-1921** - Global Wind Energy Council (GWEC) "What we do".

245 **C-1948** – GWEC Global Wind Report – Annual Market Update (2010), page 3.

246 **C-1948** – GWEC Global Wind Report – Annual Market Update (2010), page 3.

247 **C-1948** – GWEC Global Wind Report – Annual Market Update (2010), page 12.

Figure A1-1: Global Annual Installed Wind Capacity 1996-2020 [248]



A1.3 In December 2015, 196 parties (195 nations and the European Union (**"EU"**))[249] around the globe convened and adopted the Paris Agreement, which was entered into force on November 4, 2016. This was a legally binding international treaty on climate change with a goal focused on limiting global warming to 1.5 degrees Celsius. This was a critical event in the global energy generation industry as it was the first treaty of its kind that was "*a binding agreement [that] brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects*".[250]

A1.4 The Paris Agreement operates on a 5-year cycle, starting with countries submitting their plans for climate action by 2020. The agreement sparked global action, such as the development of low to zero-carbon solutions for energy generation and establishment of carbon neutrality targets. By 2030, these solutions were envisioned to become competitive in high-emission sectors.[251] 90% of the action plans that have been submitted by the parties mentioned renewables and 71% set quantified renewable energy generation targets. If all these targets were implemented, renewable energy capacity was forecasted in 2020 to grow 42% from 2,523 GW in 2019 to 3,564 GW in 2030.[252]

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[248] Installed capacity data obtained from annual GWEC Global Wind Reports. See **C-1948, C-1964, C-1974, C-1981, C-1992, C-2009, C-2022, C-2060, C-2134, C-2194,** and **C-2336**.

[249] **C-2024** – Report of the Conference of the Parties on its 21st session, held in Paris from 30 Nov to 13 Dec 2015 (January 29, 2016).

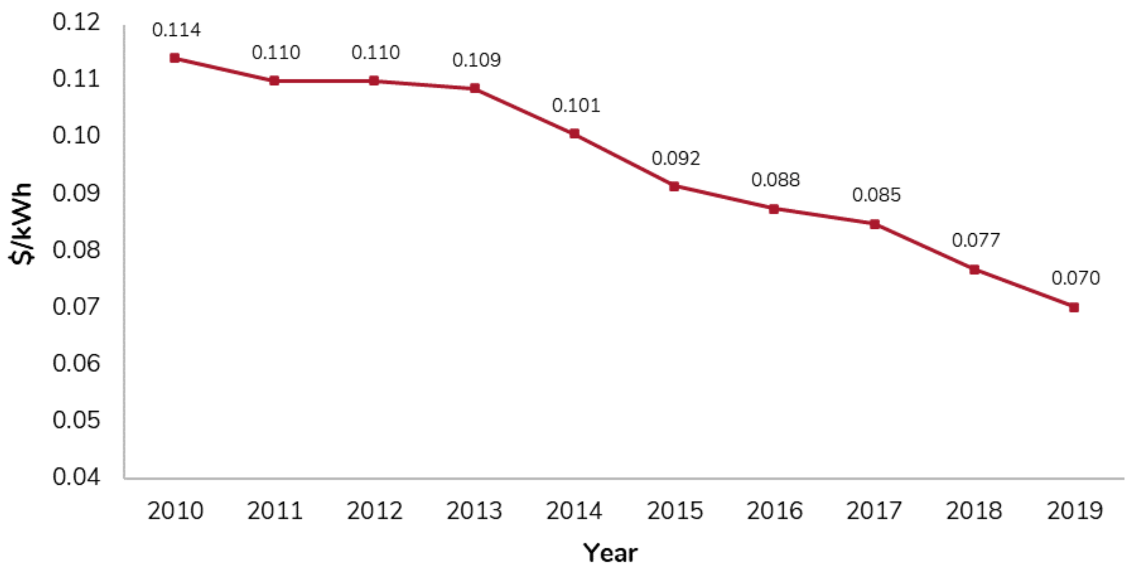
[250] **C-1925** – United Nations Framework Convention on Climate Change (UNFCCC) - Paris Agreement.

[251] **C-1925** – United Nations Framework Convention on Climate Change (UNFCCC) - Paris Agreement.

[252] **C-2277** – IRENA NDC Update 2020, page 2.

A1.5 By 2019, wind power had become cost-competitive with new-built coal or gas power projects in two-thirds of the world.[253] As shown in the figure below, the global weighted average levelized cost of electricity ("**LCOE**")[254] for new onshore wind farms decreased from $0.114/kWh in 2010 to $0.070/kWh in 2019, which results in a 38% decrease.[255] The LCOE was expected to continue to decrease to $0.058/kWh by 2030.[256]

Figure A1-2: Global Weighted Average LCOE for Onshore Wind Power, 2010-2019[257]



A1.6 In addition, over the period from 2010 to the present, there has been increasing global commitment to fight climate change as a result of young people taking action and policy makers realizing a closing window to address the climate emergency.[258] These factors helped drive the increased growth in wind energy, resulting in 60.4 GW installed in 2019. The

[253] **C-2194** – GWEC Global Wind Report - Annual Market Update (2019), page 8.

[254] LCOE measures the total costs of building and operating the power plant divided by the amount of energy produced over its life. This allows a comparison across different technologies and energy sources. See **C-1919 -** Corporate Finance Institute - Levelized Cost of Energy (LCOE).

[255] **C-2197** – IRENA Power Generation Costs 2019, Figure ES.2: Global weighted average LCOE and Auction/PPA prices for CSP, onshore and offshore wind, and solar PV, 2010 to 2023. Also see **C-2196** - IRENA Power Generation Costs 2019 Data File. The cost data referenced is in real 2019 USD terms, as stated on page 21 of the IRENA Power Generation Costs 2019 Report and translated using the average CAD:USD exchange rate of 1.3271 in 2019 per Capital IQ.

[256] **C-2276** – IRENA Global Renewables Outlook 2020, page 60. LCOE was expected to decrease 25% from 2018 to 2030 (calculated as: USD 0.058/kWh x 75% = USD 0.044/kWh, translated using the average CAD:USD exchange rate of 1.3271 in 2019 per Capital IQ).

[257] **C-2197** – IRENA Power Generation Costs 2019, Figure ES.2: Global weighted average LCOE and Auction/PPA prices for CSP, onshore and offshore wind, and solar PV, *2010 to 2023.* The cost data referenced is in real 2019 USD terms, as stated on page 21 of the IRENA Power Generation Costs 2019 Report and translated using the average CAD:USD exchange rate of 1.3271 in 2019 per Capital IQ.

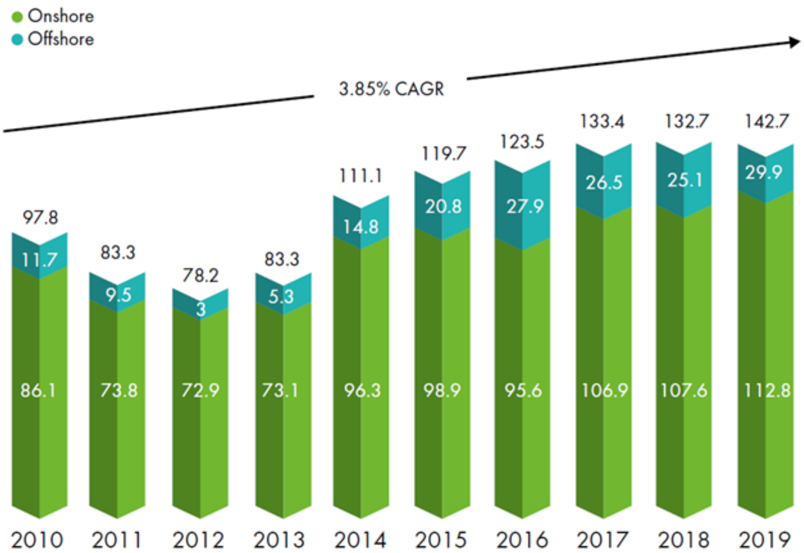
[258] **C-2194** – GWEC Global Wind Report - Annual Market Update (2019), page 10.

amount of wind power capacity installed in 2019 was the second largest year in history, after the 63.8 GW of new wind power that was installed in 2015.[259]

A1.7 Strong growth in the wind power generation industry was mainly driven by China and the US while limiting factors included institutional weaknesses (namely for India and Germany) and governments delaying scheduled tenders.[260] More specifically, the 60.4 GW of new capacity installed in 2019 came from Asia-Pacific (50.7%), Europe (25.5%), North America (16.1%), Latin America (6.1%), Africa & Middle East (1.6%).[261]

A1.8 The growth of wind energy is also demonstrated by the increase in annual investments over the past decade, which increased from USD97.8 billion in 2010 to USD142.7 billion in 2019.[262] Offshore wind investment more than doubled from USD 11.7 billion in 2010 to USD 29.9 billion in 2019.

Figure A1-3: Annual Investment in Wind Energy, 2009-2019[263]



A1.9 In 2013, the majority of the investments in onshore wind were being made in East Asia and the Pacific, followed by OECD Americas and Western Europe. By 2018, the majority of investments were being made in OECD Americas, followed by East Asia and the Pacific, and Western Europe, with other regions growing from 9% in 2013 to 19% in 2018.[264]

[259] **C-2194** – GWEC Global Wind Report - Annual Market Update (2019), page 10.
[260] **C-2194** – GWEC Global Wind Report - Annual Market Update (2019), page 10.
[261] **C-2194** – GWEC Global Wind Report - Annual Market Update (2019), page 36.
[262] **C-2194** – GWEC Global Wind Report - Annual Market Update (2019), page 26.
[263] **C-2194** – GWEC Global Wind Report - Annual Market Update (2019), page 26. Figures are in USD billion.
[264] **C-2274** – Global Landscape Renewable Energy Finance (2020), IRENA, Figure 10: Investment in onshore wind, by region of destination, 2013-2018.

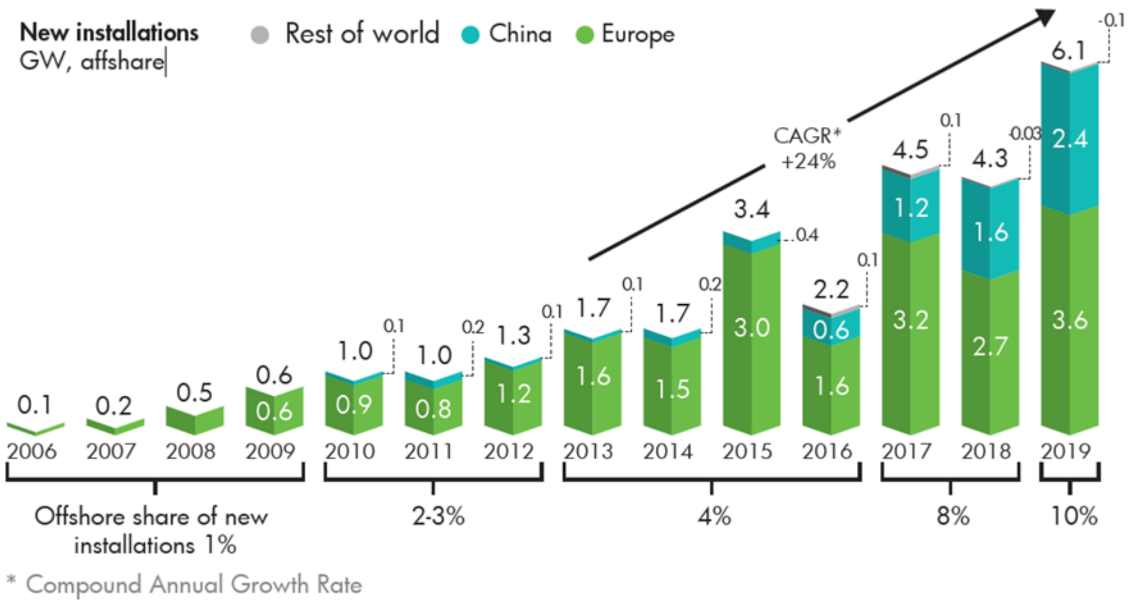
B. Offshore Wind in Global Markets

A1.10 In 2010, offshore wind was most prominent in Europe,[265] with 883 MW of installed capacity in the year, which was a 51% increase over 2009 and brought total capacity to 2,946 MW.[266] Within the EU, the UK was the leading offshore wind market[267] with 458 MW added in 2010 for a total installed capacity of 1,341 MW.[268]

A1.11 Outside of the EU, the first offshore wind project was built in China and began generating power in June 2010.[269]

A1.12 Over the decade commencing in 2010, the global offshore wind market has grown significantly from a total capacity of 3 GW in 2010[270] to 29.1 GW in 2019 (of which 33% is in the UK, 26% in Germany, 23% in China, 6% in Denmark, 4% in Belgium, and 8% in the rest of the world).[271] The figure below provides the annual offshore wind installations categorized between the two prominent offshore markets (China and Europe) and the rest of the world.

Figure A1-4: Global Annual Installed Offshore Wind Capacity 2010-2019[272]



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265 **C-1948** – GWEC Global Wind Report – Annual Market Update (2010), page 17.
266 **C-1948** – GWEC Global Wind Report – Annual Market Update (2010), page 38.
267 **C-1948** – GWEC Global Wind Report – Annual Market Update (2010), page 16.
268 **C-1948** – GWEC Global Wind Report – Annual Market Update (2010), page 38.
269 **C-1948** – GWEC Global Wind Report – Annual Market Update (2010), page 31.
270 **C-1963** – European Wind Energy Association (EWEA) Report entitled "Wind in our Sails (2011), page 11.
271 **C-2194** – GWEC Global Wind Report - Annual Market Update (2019), page 41.
272 **C-2275** – GWEC Global Offshore Wind Report (2020) published on August 5, 2020, page 11. The percentages illustrate the share of offshore wind installations relative to total wind installations (offshore and onshore) for the year.

A1.13 This increase in activity is also evidenced by the annual investment in offshore wind energy over the past 10 years increasing from USD11.7 billion in 2010 to USD 29.9 billion in 2019.[273]

A1.14 In 2019 alone, 6.1 GW of new offshore wind capacity was added, making it the largest year of additions in the sector's history.[274] Again, the key drivers of this growth are the EU and Asia Pacific, with 2.4 GW installed in China, 1.8 GW in the UK, and 1.1 GW in Germany.[275]

A1.15 Positive offshore developments in the Asian markets continued in 2019 with Taiwan connecting Formosa I, its first offshore project, to the grid and with an additional 5.6 GW of offshore wind to be installed by 2025 and a further 10 GW by 2035. Japan also had its first offshore wind auction in the summer of 2020.[276]

A1.16 By the end of 2020, the installed global capacity of offshore wind was about 35 GW. Only 42 MW were installed in the US (none in Canada). 70% of this was installed in Europe and the rest in Asian Pacific countries.[277]

A1.17 Similar to the lower cost for the overall wind industry as mentioned above, global offshore wind auction prices have also been lower than previous years, as offshore costs have decreased through technological innovation and economies of scale.[278] In 2019, the weighted-average cost of offshore wind was $0.153/kWh, a decrease of $0.090/kWh from the peak of $0.243/kWh in 2014.[279] According to IRENA, the LCOE for offshore wind is expected to continue to decrease to approximately $0.072/kWh by 2030.[280] We have provided a summary of the global weighted average LCOE for offshore wind power from 2010 to 2019 in the figure below.

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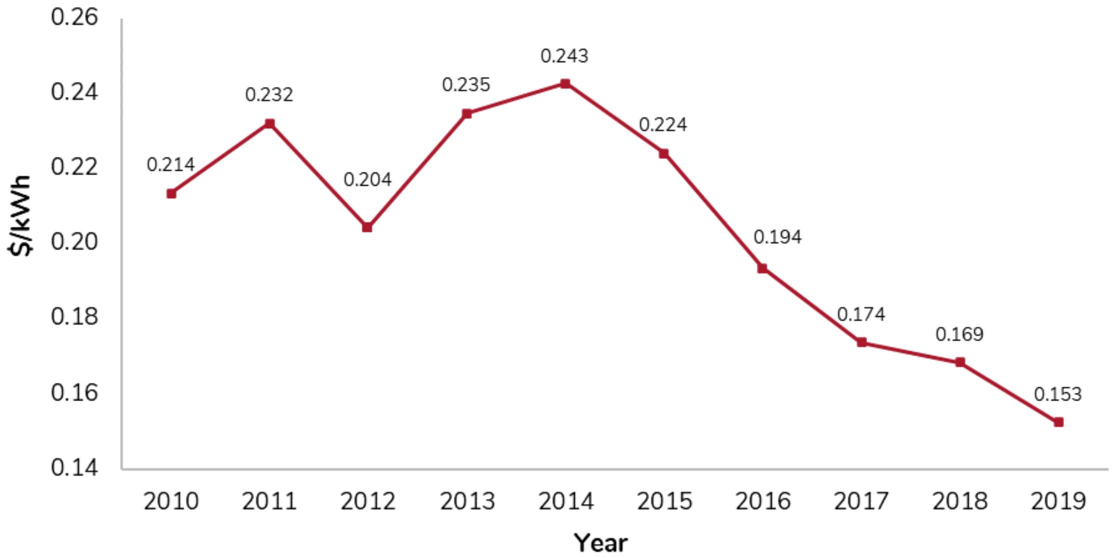
273 **C-2194** – GWEC Global Wind Report - Annual Market Update (2019), page 26.
274 **C-2275** – GWEC Global Offshore Wind Report (2020) published on August 5, 2020, page 11.
275 **C-2275** – GWEC Global Offshore Wind Report (2020) published on August 5, 2020, page 10.
276 **C-2275** – GWEC Global Offshore Wind Report (2020) published on August 5, 2020, page 11.
277 **C-2410** - Orennia "Offshore Wind-lytics Sea you there" (November 15, 2021).
278 **C-2275** – GWEC Global Offshore Wind Report (2020) published on August 5, 2020, page 10.
279 **C-2197** – IRENA Power Generation Costs 2019, Figure ES.2: Global weighted average LCOE and Auction/PPA prices for CSP, onshore and offshore wind, and solar PV, 2010 to 2023. The cost data referenced is in real 2019 USD terms, as stated on page 21 of the IRENA Power Generation Costs 2019 Report and translated using the average CAD:USD exchange rate of 1.3271 in 2019 per Capital IQ.
280 USD 0.054/kWh translated using the average CAD:USD exchange rate of 1.3271 in 2019 per Capital IQ. Source: **C-2276** – IRENA Global Renewables Outlook 2020, page 61.

Figure A1-5: Global Weighted Average LCOE for Offshore Wind Power, 2010-2019[281]



A1.18 PPA prices follow a similar downward trend. In the UK, the Department for Business, Energy and Industrial Strategy set up the Contracts for Difference ("**CfD**") scheme in 2014[282], which is the UK government's main mechanism to support low-carbon electricity generation.[283] To date, there have been three rounds of CfD allocations completed, with the following results. As shown, the average strike price has decreased over time.

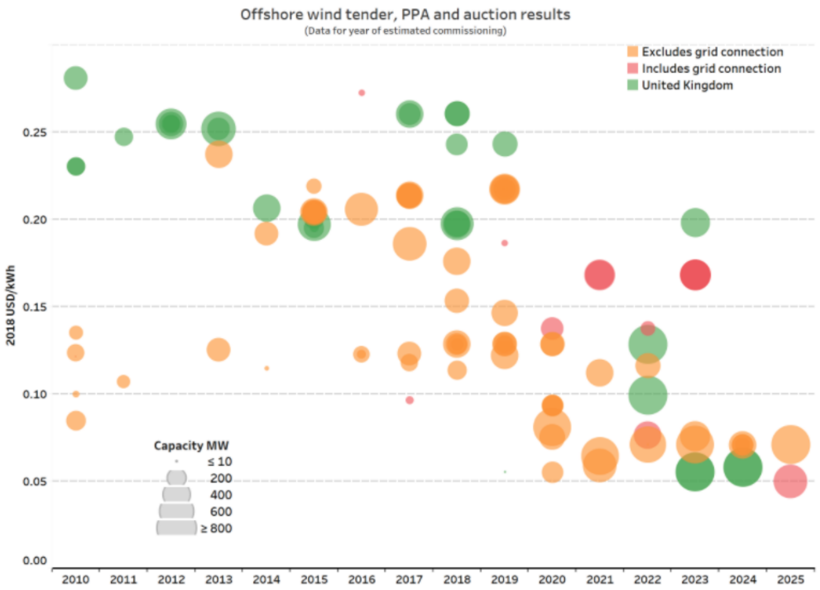
Figure A1-6: UK Contracts for Difference Allocation Results for Offshore Wind[284]

Allocation Round	Results Announcement Date	# of Offshore Wind Projects	Average Strike Price (£)	Average Strike Price ($)
1	26-Feb-15	2	117	186
2	11-Sep-17	3	63	100
3	20-Sep-19	6	41	64

[281] **C-2197** – IRENA Power Generation Costs 2019, Figure ES.2: Global weighted average LCOE and Auction/PPA prices for CSP, onshore and offshore wind, and solar PV, 2010 to 2023. The cost data referenced is in real 2019 USD terms, as stated on page 21 of the IRENA Power Generation Costs 2019 Report and translated using the average CAD:USD exchange rate of 1.3271 in 2019 per Capital IQ.
[282] **C-2339** - CFD Allocation Round portal -"Department for Business Energy and Industrial Strategy" (2021).
[283] **C-1920** - Government of United Kingdom Policy Paper "Contracts for Difference".
[284] Strike prices are in 2012 terms, translated using the average CAD:GBP exchange rate of 1.5841 in 2012 per Capital IQ. Source: **C-2013** – Government of United Kingdom CFD Allocation Round 1 Results (February 23, 2015); **C-2116** – Government of United Kingdom CFD Round 2 Results (September 11, 2017); and **C-2241** – Government of United Kingdom CFD Round 3 Results (October 11, 2019).

A1.19 The following chart demonstrates the general downward trend in offshore wind PPA prices since 2010:

Figure A1-7: Offshore Wind Tender, PPA and Auction Results [285]



Cost of electricity generation for offshore wind projects around the world (2018$/kWh) and starting to operate in years between 2010 and 2025. Each circle represents a single project, tender or auction round, with the size being proportional to its capacity. UK projects and auctions are shown in green, with results from other countries shown in red and orange depending on whether their costs include a connection to the electricity grid. PPAs are power purchase agreements signed between a developer and large electricity consumers. Source: IRENA renewable cost database.

C. North American Wind Energy Market

A1.20 In 2010, 5,805 MW of wind power was installed in North America the year (5,115 MW from the US and 690 MW from Canada), resulting in total capacity of 44 GW (40 GW in the US and 4 GW in Canada).[286] By 2019, the total capacity in North America had grown to 123.5 GW.[287] This is equivalent to 18% of the world's wind power (vs. China at 36%).[288]

A1.21 As of 2019, North America had 30 MW of offshore wind capacity installed, all of which is located in the US.[289] Canada does not currently have any offshore wind farms under construction or in operation.[290] This 30 MW capacity in the US is from the Block Island Wind

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[285] **C-2236** – Analysis: "Record-low price for UK offshore wind cheaper than existing gas plants by 2023" - CarbonBrief (September 20, 2019). The years shown in this chart is the actual and anticipated year that the projects would achieve COD.

[286] **C-1948** – GWEC Global Wind Report – Annual Market Update (2010), page 11.

[287] **C-2338** - IRENA Renewable Energy Capacity Statistics 2021, page 17.

[288] **C-2325** - Government of Canada: Renewable Energy Facts (October 6, 2020).

[289] **C-2275** – GWEC Global Offshore Wind Report (2020) published on August 5, 2020, page 11.

[290] **C-1924** – Offshore Wind farms in Canada per 4C Offshore. See further discussion on offshore wind in Canada in E below.

Farm, which started commercial operations in 2016 and is the first offshore wind farm in the US.[291]

A1.22 As outlined in **Section 5E** above, between 2016 and the Valuation Date, large industry players have committed significant amounts of capital towards the acquisition and development of development stage[292] offshore windfarm assets in North America. Several of these Projects had already achieved PPAs by the Valuation Date (such as US Wind, Skipjack, Vineyard Wind, Revolution Wind and South Fork Wind, see paragraph 7.20 above)

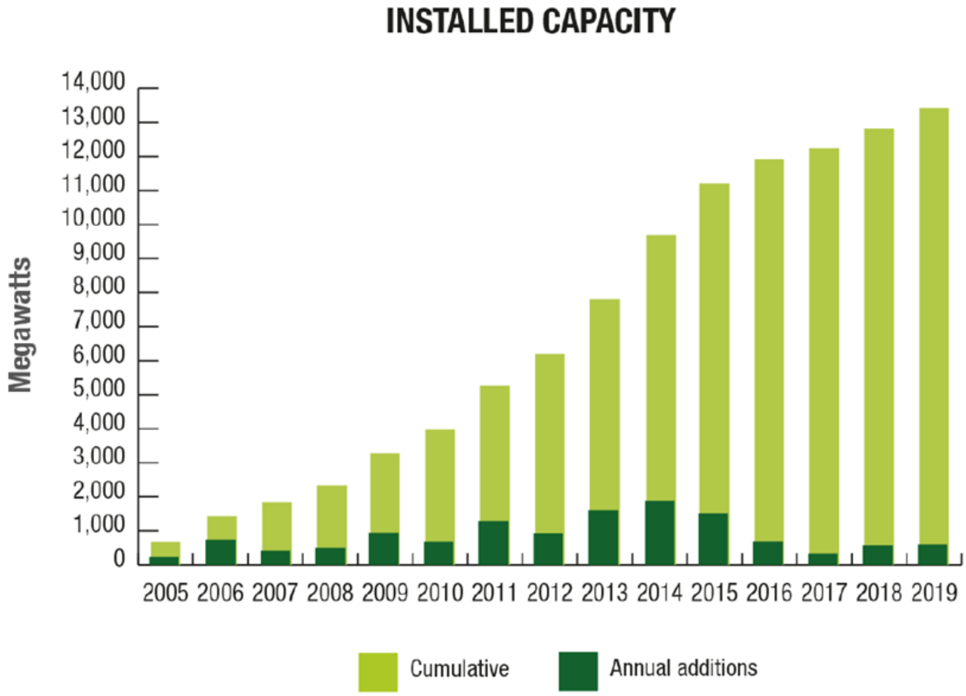
A1.23 Additionally, in 2016, Icebreaker Wind won a USD 40 million grant from the U.S. Department of Energy to construct a 20.7 MW offshore wind farm off the coast of Cleveland Ohio, on Lake Erie (i.e., a freshwater lake, similar to the Project). As at the Valuation Date, it had already secured a grid connection.[293] It also had revenue clarity, with a PPA signed with Cleveland Public Power for two-thirds of the project's output.[294] Offshore construction was expected to start in summer 2022 and the project was expected to be commissioned by the end of the year.[295]

D. Canadian Wind Energy Market

A1.24 Since 2010, Canada's installed wind capacity has grown from 3,969 MW to 13,413 MW at the end of 2019 and is made up of 301 wind farms with 6,771 turbines. [296] The annual and cumulative installed wind capacity in Canada from 2005 to 2019 is provided in the figure below.

[291] **C-2053** – CNBC article entitled "America's first offshore wind farm is up and running" (December 13, 2016)
[292] I.e., projects in a similar or earlier stage as the Windstream Project, in the absence of the Alleged Breaches.
[293] **C-2431** - Website (LEEDco), The Project: Ice Breaker Wind (February 2022).
[294] **C-2070** - Renewables Now article entitled "Lake Erie 20.7-MW wind project seeks Ohio approval" (February 3, 2017).
[295] **C-2431** - Website (LEEDco), The Project: Ice Breaker Wind (February 2022).
[296] **C-2251** – Canadian Wind Energy Association – Canada Installed Capacity (December 2019).

Figure A1-8: Annual and Cumulative Installed Wind Capacity, Canada, 2005-2019[297]



A1.25 Wind energy currently makes up 5.1% of Canada's electricity generation[298] (up from 1.5% in 2010)[299]. The increase in wind energy use can be partly attributed to the 70% decrease in wind energy costs since 2009. This significant cost reduction contributed to the 10-year average annual growth rate of 16% for wind energy.[300]

A1.26 Between 2015 and 2019, $9.3 billion was invested into renewable energy sources, with majority of it going to wind energy ($5.6 billion).[301]

A1.27 Looking forward, the Canada Energy Regulator's latest projection for Canada's energy markets shows a steady increase in electricity demand, from about 550TWh in 2020 to about 730TWh in 2050.[302] In order to meet the increase in demand, installed capacity is also expected to grow. More specifically, renewable and natural gas capacity will be added while

297 **C-2325** - Government of Canada: Renewable Energy Facts (October 6, 2020).
298 **C-2325** - Government of Canada: Renewable Energy Facts (October 6, 2020).
299 9 TWh wind energy generated out of total generation of 586 TWh in 2010. See **C-1951** – Global Electricity Generation - Global Change Data Lab (2010) and **C-1950** – Electricity Production by Source - Global Change Data Lab (2010).
300 **C-2251** – Canadian Wind Energy Association – Canada Installed Capacity (December 2019).
301 **C-2315** – Article published by Natural Resources Canada entitled "10 Key Facts on Canada's Energy Sector" (September 2020).
302 **C-2272** – Canada's Energy Future 2020, Figure R.17.

coal is phased out,[303] with wind capacity projected to increase from 13.5 GW in 2019 to 40.5 GW in 2050.[304]

A1.28 Additionally, with the signing of the Paris Agreement in 2015, Canada had committed to reducing its greenhouse gas emissions by 30% below 2005 levels by 2030 and 80% below 2005 levels by 2050. In order to meet these goals, Canada will have to transition to a largely non-emitting electricity grid, which means a significant expansion of its renewable energy production, including wind.[305]

E. Offshore Wind in Canada

A1.29 As at the Valuation Date, no offshore windfarms were under construction or in operation in Canada.[306] We note that Oceanic Wind Energy Inc. (previously NaiKun Wind Energy Group Inc.) owned the only offshore wind project in Canada that was in development at the Valuation Date, located in British Columbia. This project was at a very early stage at the Valuation Date as it did not have a PPA or other revenue mechanism, and did not have its permits or a grid connection in place as at the Valuation Date.[307]

F. Canada's Energy Generation Plan

A1.30 In 2017, Canada launched Generation Energy, a nation-wide program focused on initiating a dialogue with Canadians about what Canada could look like with a low-carbon energy future.[308]

A1.31 As part of this initiative, the Generation Energy Council (the "**Council**") was constituted. The Council is made up of 14 members whose mandate is to advise Canada on how to transition to a more affordable, reliable, and green energy generation.[309]

A1.32 In June 2018, the Council published a report outlining what Canada's energy future should look like, including goals to strive for, principles to follow, and pathways and milestones along the way.[310]

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[303] **C-2272** – Canada's Energy Future 2020, Figure R.19.
[304] **C-2272** – Canada's Energy Future 2020, Figure R.21.
[305] **C-1918** – Canadian Wind Energy Association – Vision.
[306] **C-1924** – Offshore Wind farms in Canada per 4C Offshore.
[307] **C-1923** – Oceanic Wind Project Timeline, and **C-1913** - 4C Comparables (Excel).
[308] **C-2133** – Generation Energy Council Report (2018), page 2.
[309] **C-2133** – Generation Energy Council Report (2018), page 2.
[310] **C-2133** – Generation Energy Council Report (2018), page 2.

A1.33 The report asserts that there are four pathways that must be followed in order for the country to achieve its low-carbon future. This consisted of the following:[311]

i. Waste less energy: this not only saves money, but it also cuts greenhouse gas emissions;

ii. Switch to clean power: this means producing electricity using renewable energy sources;

iii. Use more renewable fuels: this includes the use of biofuels and biogas from plants and waste to heat homes, power vehicles, and support manufacturing; and,

iv. Produce cleaner oil and gas: this can be done by shrinking the carbon footprint of the country's oil and gas industry through efficiency improvement, the use of clean power and cleaner fuels, and the introduction of new technologies.

A1.34 The Council also provided action plans for renewable energy. One action plan is the 'Smart Grid Program', which is a national program aimed at integrating renewable energy into Canada's electricity grid. This action plan contemplated up to $100 million being invested into the program, to allow higher market penetration by renewables and to foster the growth of renewable energy sources, including wind. This program was launched in 2018 and implementation/asset deployment will continue up to 2022.[312]

A1.35 As of October 2021, the Smart Grid Program has funded (in whole or in part) 21 projects, with announced investments totaling $86,223,640.[313]

A1.36 Another action plan put forward by the Council is the demonstration and deployment of clean energy for rural and remote communities. This program aims to support a number of projects across Canada, with a focus on reducing the use of diesel fuel in rural and remote communities. This increases the reach of and demand for clean energy sources, including wind.[314] As of May 2021, this program had invested $3.2 million into wind projects for two Aboriginal communities.[315]

A1.37 In 2020, Canada introduced a strengthened climate action plan entitled "A Healthy Environment and a Healthy Economy".[316] It aims to build a healthier economy and environment

[311] **C-2133** – Generation Energy Council Report (2018), page 10-11.
[312] **C-2400** - Smart Grid Program (nrcan.gc.ca) (October 28, 2021).
[313] Amount is the sum of total investments in each of the projects. Source: **C-2400** - Smart Grid Program (nrcan.gc.ca) (October 28, 2021).
[314] **C-2328** - Clean Energy for Rural and Remote Communities - BioHeat, Demonstration & Deployment Program Streams (October 18, 2020).
[315] **C-2369** - Clean Energy for Rural and Remote Communities funded projects Natural Resources Canada (May 13, 2021).
[316] **C-2283** – A Healthy Environment and a Healthy Economy Plan by Environment and Climate Change Canada (February 2020), page 1-2.

through the restoration of employment to pre-pandemic levels with a focus on climate action and clean growth.[317]

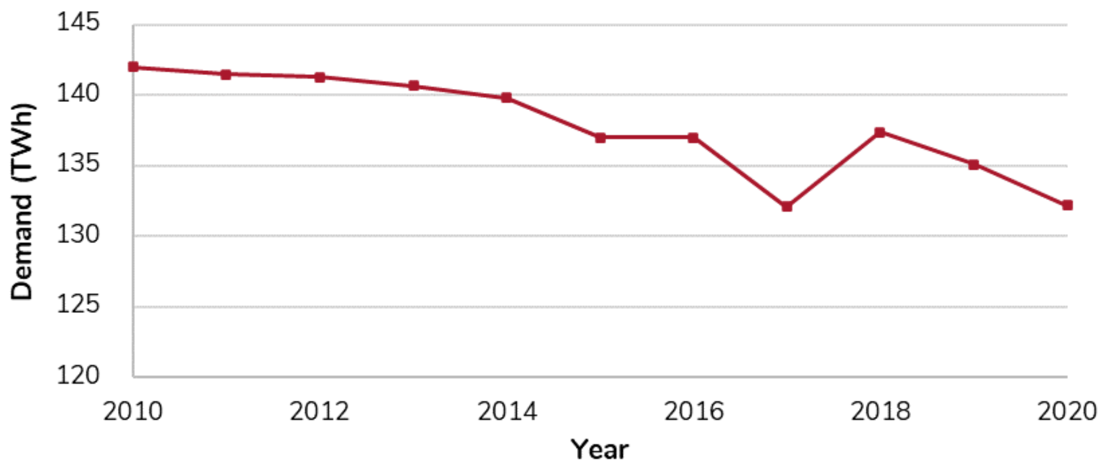
A1.38 One of the main goals of this action plan is to make clean, affordable transportation and power available in every community, which involves investing $964 million over four years in increasing renewable power generation capacity and grid modernization to enable storage of power generated through intermittent energy sources like wind.[318]

A1.39 The climate action plan also aims to invest $300 million over five years in transitioning rural, remote, and Indigenous communities from using diesel fuel to cleaner energy, in line with the 'Smart Grid' action plan noted above.

G. Ontario Wind Energy Market

A1.40 Ontario's electricity demand has been decreasing over the past decade, which can be primarily attributed to the province's conservation efforts as well as energy efficiency.[319] See the figure below for the province's electricity demand from 2010 to 2019.

Figure A1-9: Ontario Electricity Demand, 2010-2019[320]



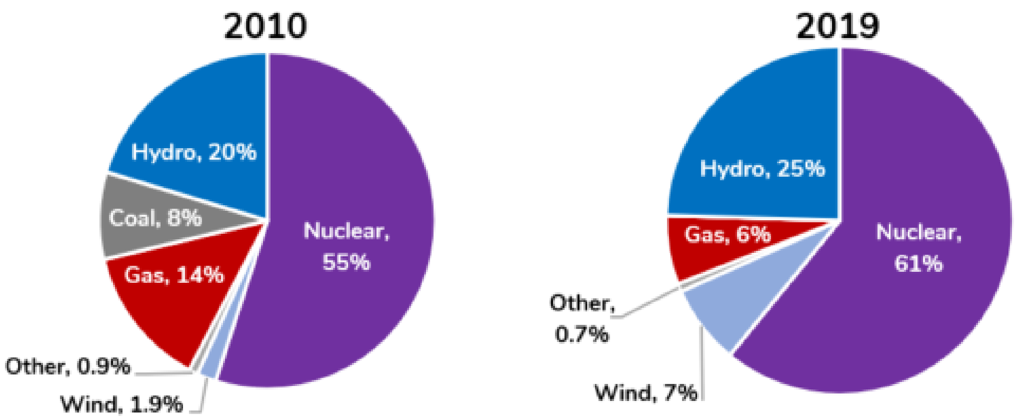
A1.41 Despite the decrease in Ontario electricity demand over the past decade, Ontario will require additional sources of electricity supply in the future. This is due to supply side risks of the current electricity generators in Ontario (such as gas-fired generators) that are expected to

[317] **C-2283** – A Healthy Environment and a Healthy Economy Plan by Environment and Climate Change Canada (February 2020), page 8.
[318] **C-2283** – A Healthy Environment and a Healthy Economy Plan by Environment and Climate Change Canada (February 2020), page 21.
[319] **C-2146** – Press Release by Canada Energy Regulator entitled "Market Snapshot: Why is Ontario's electricity demand declining?" (March 21, 2018).
[320] **C-1934** – IESO - Historical Demand (May 1, 2002-2020).

retire after their contracts expire, combined with the increasing demand for electricity in the future due to the potential for Ontario-wide electrification (i.e., electric vehicles, housing and commercial buildings etc.), which will result in a higher than forecasted electricity demand.[321]

A1.42 The fuel sources used by Ontario to meet its electricity demand has evolved over time. With annual generation of 151TWh in 2010, more than half of the electricity produced was from nuclear sources.[322] In 2019, total production was at 148TWh[323]. Nuclear power remained the most used fuel type. The main change was the transition out of coal (0% generated from coal in 2019) and a reduction of gas (14% to 6%). To offset this reduction, output from renewable energy sources increased from 23% in 2010 to 33% in 2019 and wind energy increased 3.7-fold from 1.9% to 7.0%. See the figure below for Ontario's electricity production by fuel type in 2010 versus 2019.

Figure A1-10: Ontario Total Electricity Production by Fuel Type, 2010 vs. 2019

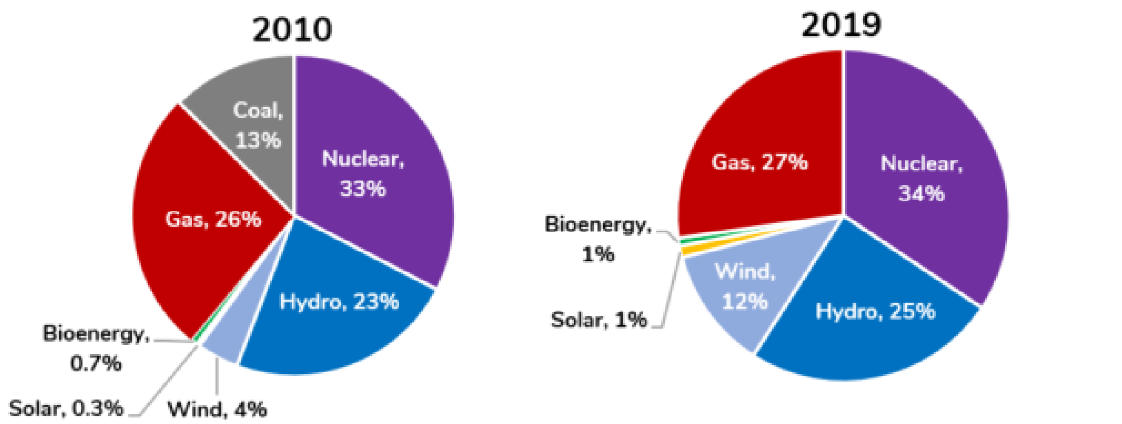


A1.43 In terms of installed capacity, the energy source mix has also changed over time. In 2010, Ontario had 35,138 MW of capacity,[324] which was largely made up of nuclear, gas, and hydro.[325] By 2019, Ontario's installed capacity was 37,856 MW and main sources remained the same (nuclear, gas, and hydro). However, as mentioned above, coal was transitioned out

[321] CER-Power Advisory-2, Section 1.3 and 4.
[322] **C-1947** – IESO Year-End Data (2010).
[323] **C-2195** – IESO Year-End Data (2019), Figure 5: Output by Fuel Type (TWh) and Percentage Contribution 2017-2019.
[324] **C-1949** – Ontario's Long-Term Energy Plan (2010) shows total capacity of 36,975 MW, with 1,837 MW attributed to energy conservation. This was excluded from our figures to provide a more accurate representation of fuel types.
[325] **C-1949** – Ontario's Long-Term Energy Plan (2010), Figure 4: Contract Between Generation and Installed Capacity and Appendix 3: Installed Capacity (MW).

and replaced with new renewable energy capacity including increased wind capacity of 12%.[326]

Figure A1-11: Ontario Total Installed Capacity by Energy Source, 2010 vs. 2019



A1.44 Below is a table summarizing the growth in Ontario's wind energy sector between 2010 and 2019 as outlined in previous paragraphs.

Figure A1-12: Ontario Wind Energy, 2010 vs. 2019

Item	2010	2019
Capacity as % of Total	4%	12%
Production as % of Total	1.9%	7%
Turbines	700[327]	2,681[328]
# Of Projects	35[329]	94[330]

A1.45 Similar to Canada's Paris Agreement targets, Ontario has committed to reduce its greenhouse gas emissions by 80% below 1990 levels by 2050. Mid-term targets include a reduction of 15% by 2020 and 37% by 2030. The previous 6% reduction target was met in 2014.[331] Due to a two-year lag in Canada's greenhouse gas reporting, the data for 2020 is not yet available; however, there was an increase in 2018 after almost a decade of declining emissions.[332]

[326] **C-2195** – IESO Year-End Data (2019), Figure 7: Transmission-connected Installed Capacity as of December 2019.
[327] **C-1949** – Ontario's Long-Term Energy Plan (2010), page 28.
[328] **C-1917** – Canadian Wind Energy Association – Ontario.
[329] **C-2132** – CANWEA Ontario Market Profile (2018) shows 35 projects installed by 2010.
[330] **C-1917** – Canadian Wind Energy Association – Ontario.
[331] **C-2010** – Ontario's Climate Change Strategy (2015), page 9.
[332] **C-2280** – Progress Report on Ontario's Climate Change Actions (2020), page 5.

H. Ontario Energy Generation Plan

A1.46 Ontario's energy generation strategy has evolved over the past decade. In 2009, Ontario introduced its FIT Program, which was the first in North America.[333] In the following year, Ontario launched its first Long-Term Energy Plan ("**2010 Plan**").[334] This plan was revised in 2013 and again in 2017. Below, we have outlined these plans, along with their commitments and the role of renewable energy.

2010 Long-Term Energy Plan

A1.47 The 2010 Plan focused on meeting the electricity needs of an evolving economy and shifting demands at affordable prices. In addition to affordability, the plan's goals also included shifting more of the supply mix to clean, renewable energy sources.[335] This includes eliminating coal-fired electricity generation and reducing annual gas emissions to be two-thirds lower than 2003 levels by 2014.[336] The eliminated coal capacity will be replaced by hydroelectric capacity (which is targeted to grow from 8,127 MW in 2010 to 9,000 MW by 2018)[337] and other renewable energy capacity (wind, solar, and bioenergy sources are targeted to grow to 10,700 MW by 2018)[338].

2013 Long-Term Energy Plan

A1.48 In 2013, Ontario released another Long-Term Energy Plan ("**2013 Plan**") that built on the 2010 Plan. The revisions focused on balancing five key principles: cost-effectiveness, reliability, clean energy, community engagement and an emphasis on conservation and demand management before building new generation.[339]

A1.49 The 2013 Plan focused on a "Conservation First" policy that prioritized reducing electricity demand instead of major investments in power generation and transmission.[340] With this, the renewable energy capacity target of 10,700 MW from the 2010 Plan remained but the target timeline was moved back from 2018 to 2021.[341] In addition, Ontario was to consider importing clean energy from other jurisdictions based on its system benefits and cost-effectiveness.[342]

[333] **C-1949** – Ontario's Long-Term Energy Plan (2010), page 28.
[334] **C-1949** – Ontario's Long-Term Energy Plan (2010).
[335] **C-1949** – Ontario's Long-Term Energy Plan (2010), page 9.
[336] **C-1949** – Ontario's Long-Term Energy Plan (2010), page 19-20.
[337] **C-1949** – Ontario's Long-Term Energy Plan (2010), page 26-27.
[338] **C-1949** – Ontario's Long-Term Energy Plan (2010), page 31.
[339] **C-1984** – Ontario's Long-Term Energy Plan (2013), page 4.
[340] **C-1984** – Ontario's Long-Term Energy Plan (2013), page 3.
[341] **C-1949** – Ontario's Long-Term Energy Plan (2010), pages 6, 31.
[342] **C-1984** – Ontario's Long-Term Energy Plan (2013), page 6.

2017 Long-Term Energy Plan

A1.50 In 2017, Ontario released a new Long-Term Energy Plan that focused on "delivering fairness and choice" ("**2017 Plan**"). This was intended to reduce electricity costs and introduce measures to fight climate change.[343]

A1.51 The key elements of the 2017 Plan included the following, among other things:

i. Ensuring affordable and accessible energy. This included reducing electricity bills and holding rate increases, sharing existing investment costs with future generations through refinancing, enhancing consumer protection, and expanding natural gas access to give consumers greater choice in their electricity supply;[344]

ii. Ensuring a flexible energy system that could meet any of the possible future energy demand mixes while working towards a cleaner energy supply mix;[345]

iii. Innovating to meet the future. This included providing consumers with greater choice in their electricity price plans, continuous investment in efficiency, reliability and cost-effectiveness, deployment of energy storage, and integration of electric vehicles into the province's grid. It also included funding demonstration projects, supporting the nuclear sector, and exploring the use of electricity to create hydrogen and innovative uses of the province's natural gas distribution system;[346]

iv. Continuing to put conservation first by integrating and expanding current conservation programs and empowering consumers with access to conservation data and tools;[347]

v. Responding to the challenge of climate change through the deployment of clean energy technologies. These technologies include renewable energy generation, net zero energy and carbon emission homes and buildings, expansion of net metering options, and renewable natural gas;[348]

vi. Continue to support First Nations and Métis access to clean, reliable and efficient energy. This included reviewing and expanding current Aboriginal programs regarding conservation, transmission connection, energy education, and financing as well as ensuring continuous collaboration;[349] and,

vii. Supporting regional solutions and infrastructure, with the province's "Conservation First."

[343] **C-2061** – Ontario's Long-Term Energy Plan (2017), page 10.
[344] **C-2061** – Ontario's Long-Term Energy Plan (2017), page 11.
[345] **C-2061** – Ontario's Long-Term Energy Plan (2017), page 11-12.
[346] **C-2061** – Ontario's Long-Term Energy Plan (2017), page 12-13.
[347] **C-2061** – Ontario's Long-Term Energy Plan (2017), page 14.
[348] **C-2061** – Ontario's Long-Term Energy Plan (2017), page 15.
[349] **C-2061** – Ontario's Long-Term Energy Plan (2017), page 15-16.

Appendix 2 Offshore Wind Project Development, Financing and Transaction Overview

A. Introduction

A2.1 In this appendix, Mr. Tetard sets out an overview of how offshore wind projects are developed, financed, and transacted in the industry based on his 13 years of experience in investing in renewable energy projects including the last 7 years in the offshore wind sector.

B. Offshore Wind Project Development Phases

A2.2 An offshore wind project follows the following three phases over its project life, which are the same as any other infrastructure project:

i. Development: The development phase starts with site identification and ends with FID or FC;

ii. Construction: The construction phase starts with pre-construction activities and ends when the project has been fully constructed and is ready for commissioning; and,

iii. Operation: The operating phase begins with project commissioning and ends when the project is decommissioned at the end of its operating life.

A2.3 We will focus on the Development phase below since that was the stage of development the Project would have been in as of the Valuation Date, absent the Alleged Breaches.

C. Development Phase 1 - from site identification to "shovel ready" status

A2.4 A developer starts a new offshore wind project by identifying a site where suitable physical characteristics are present: wind speeds, bathymetry, general constraints (environmental, military, civil aviation, etc.), area available at sea, grid connection route (offshore and onshore) and point of connection. During this phase, the developer will incur moderate amounts of spending, the primary spending categories being wind and other resources measurement equipment (e.g., a met mast or, when no suitable onshore location is available near the site, then a floating LIDAR is usually deployed). In parallel, the developer will incur costs to study the environmental conditions on and around the selected site, in order to compile a set of data and assessments of the potential impacts the project may have on its environment. This environmental assessment will be used during the licensing (or permitting) process where the developer will communicate closely with the governmental environmental authority in order to obtain the environmental license required for the project to proceed to construction and operations.

A2.5 Some pre-engineering works will be performed by the developer at this stage in order to define (and then refine) the project's technical parameters: turbine type and layout, type of foundations, grid connection route and grid connection, construction, and operation concepts. These engineering works initially represent low amounts of capital invested but increase significantly over time as the technical concepts are further refined.

A2.6 From early on during the development phase, the developer aims to secure the site where the project is being developed. Securing a site can take different forms, but in essence, the aim is to obtain some form of exclusivity to the site, such that no other developer would attempt to compete to develop the same site. A developer can secure a site in different ways and obtaining a lease from the government (sea areas are usually owned/controlled by governments) is the final step.

A2.7 The developer firms up site control by deploying resources and incurring costs, conducting environmental surveys, engaging with stakeholders (at the national, provincial, and local levels), running public consultations and generally communicating about the site, and working with the grid owner (to which the project will be connected). The more work a developer performs and the longer a developer works on a site, the lower the probability becomes that another developer will attempt to develop the same site. Indeed, a potential new developer would not start developing a site that another developer had already been developing for many months or years, since there would be no possibility for the new developer to "catch-up" with the original developer. Thus, site control is typically achieved prior to the signing of a lease between the land-owner (in this case, the government) and the project developer. In the case of the Project, the Project's sponsor had invested large amounts of capital over several years and had received a FIT, these elements combined to make it extremely unlikely that a competing developer would have initiated the development of a project on the same site as the chances of successfully "catching-up" for this new hypothetical developer would be particularly low.

A2.8 Furthermore, Windstream had already submitted applications for all project areas which was registered and accepted by the MNR. This meant that Windstream's applications took precedence over all others for this site and would receive priority attention from the MNR. This further means that Windstream would have access rights to the project site, that it required for its FIT Contract. As a result, Windstream had priority over all other applications to lease the crown lands that the Project would require. Therefore, Windstream had an exclusive and priority position secured on the site that the Project would be built on.[350]

[350] First Witness Statement of Ian Baines, paragraph 56-57. Also see footnote 24 above.

A2.9 Access to the grid is another workstream that is progressed from very early on. This starts with conversations with the grid owner or operator, which is typically a government-controlled entity. Based on the initial project designs and general project schedule, a grid operator is able to disclose whether or not the local grid will have sufficient availability to receive power from a project, including at which grid connection point, or whether the local grid connection point and/or grid will require upgrade works. Through these communications, the developer will receive extremely valuable information as to the feasibility of connecting the project to the grid. As noted above, Windstream had already confirmed that it had grid access for the Project prior to the Valuation Date.[351]

A2.10 Seeking a power offtake contract (or Power Purchase Agreement, or PPA) is another workstream that the developer will engage in early in the development phase. An offtake or PPA contract is a key contract that establishes the project's revenue value (a $/MWh figure), which allows the developer to assess the economic viability of its project. If the PPA contract is sufficiently attractive, then the developer will be incentivised to engage the necessary works (and associated capital) to further develop and construct the project.

A2.11 When a project has obtained its permits, site control, grid access and revenue clarity (with a PPA), the project is considered "shovel-ready", and can initiate its pre-construction phase.

A2.12 It is interesting to note that depending on the country, and the regulatory framework within each country, the above noted elements that compose a "shovel-ready" project are gathered in different orders. In some markets, site control comes first, in other markets, grid access comes first, and in other markets, the PPA comes first. It is also important to note that a project that has secured a PPA (and which is sufficiently attractive economically) typically completes the development phase and is financed and constructed.

A2.13 The main risks of the development phase include:

i. Not obtaining environmental licenses and permits, due to regulatory constraints;

ii. Not being able to connect the project to the grid due to a lack of available capacity in the system, or the unwillingness of the grid operator to cooperate;

iii. Being overtaken by another developer in securing control of the site, or not being able to secure a lease with the government that owns/controls the sea area when the project is to be located;

iv. Not securing an offtake contract with high enough economic incentives to ensure the economic viability of the project; and,

[351] First Witness Statement of Ian Baines, footnote 49 and paragraph 93. Also see footnote 23 above.

v. General changes in the regulatory framework.

D. Development Phase 2 - from “shovel-ready” status to FID/FC

A2.14 The pre-construction phase usually starts when the project reaches the “shovel-ready” status. In some cases, where the project timeline is compressed, the pre-construction phase can be performed in anticipation of the "shovel-ready" status to be reached. For example, Ørsted, the global market leader in offshore wind, is able to complete FID at the point of securing a PPA, allowing them to construct an offshore wind project faster than any of its peers. Ørsted has another advantage over many of its competitors in that it does not require bank financing (or project financing), as it funds the construction of its projects from its own funds.

A2.15 A well planned and managed pre-construction phase has little chance not to succeed. It is a series of smaller milestones that need to be achieved in sequence. The pre-construction process has been planned for and performed thousands of times in the infrastructure sector and hundreds of times in the offshore wind sector. Working with the right experts and implementing a detailed work programme, to be executed by experienced project managers, will generally ensure that the pre-construction phase is achieved according to plan.

A2.16 The key workstreams of this phase include i) completing the full and final project design, ii) procurement and contracting, and iii) financing. These three activities are generally run in parallel and can generally be achieved within a timeframe of approximately two to three years. Experts in the field of design, procurement/contracting and financing are readily available in the offshore wind industry. Companies such as Wood, DNV, and Mott Macdonald have vast amounts of experience in supporting projects through the design and procurement phase. Financial advisors such as BNP Paribas, SocGen, Santander and many others have vast amounts of experience to support the project through the financing phase. Together, these technical advisors and financial advisors have worked numerous times to successfully reach FID/FC on schedule.

A2.17 The conclusion of the development phase is the FID or FC. At that point, the project is fully contracted and fully funded, allowing the construction phase to start.

A2.18 The main risks of this phase are:

i. Working with inexperienced counterparties generally, but most importantly on the technical advisory and the financial advisory components;

ii. Working with inexperienced suppliers, contractors, and lenders (this risk would be largely mitigated by working with the right technical and financial advisors); and,

iii. General change in regulatory framework.

E. How offshore wind projects are transacted

A2.19 Transactions for offshore wind projects can occur at any point in their life from development to construction, to operation.

A2.20 A buyer with a higher appetite for risk (and return) will tend to acquire a project in its development phase, including at times prior to "shovel-ready" status when risks are perceived higher since it can then realize the upside if it can then successfully bring the project to operation. A motivated buyer with very low appetite for risk (and return) will tend to acquire projects that are already in the operational phase when perceived risks are lower.

A2.21 The appetite for risk of a buyer is usually expressed through the level of investment returns that this motivated buyer is willing to transact on. The level of investment return required by an investor is a function of its cost of capital.

A2.22 Invariably, in the pursuit of making the acquisition of an offshore wind project, a motivated buyer will conduct due diligence on the projects it wishes to acquire. Due diligence procedures cover technical, legal, tax, financial, and insurance issues. It will engage with a number of advisors who will perform this due diligence (unless the buyer performs these works in-house, which is becoming more common, particularly on the financial and technical sides). Through the due diligence process, a motivated buyer will evaluate the risks associated with the project, as well as the economic value the project represents to the buyer.

A2.23 For a project in its development phase (such as the Project), a buyer will focus on the various elements described in the previous section (environmental permits, site control, grid access and PPA), and will conduct an assessment as to the remaining steps that need to be taken in order to successfully reach FID/FC. It will also conduct an assessment of the construction and operation phases of the project. It will receive technical, economical, financial, legal, insurance and tax advice, to support its evaluation of the value and risks of the project.

A2.24 Buyers seek investment opportunities that have the potential to generate value for the buyers, or value that they can generate post-acquisition in accordance with the level of risk they are willing to bear.

A2.25 A buyer will value a project using a DCF approach, based on cash flows that the project is expected to generate. Although the exercise is more difficult when the project being evaluated does not yet have a PPA secured, a DCF analysis can and often still is undertaken. In the case where a project has a PPA secured, the buyer will generally run a DCF financial model. The reason being that a DCF approach is the only valuation approach that allows the buyer to assess the economic value of all individual aspects specific to the project being evaluated (wind speed, possible turbine model, estimated CAPEX for wind turbines, foundations and electrical infrastructures, operational expenditure ("**OPEX**") for the operational phases and, crucially: the revenue expected to be generated by the project).

A2.26 The PPA is the contract that, together with the volume of MWh being generated by the project (a value provided by a qualified technical advisor), will give the buyer clarity with respect to the future revenues of the project.

A2.27 Other economic aspects, such as remaining DEVEX (from Valuation Date to FID/FC), CAPEX for the construction phase, OPEX for the operational phase, tax and general project schedule, can all be evaluated with a sufficient level of certainty by the buyer and its advisors.

A2.28 With all inputs in hand, the buyer will run a DCF model and, at its cost of capital, and will be able to offer the project's owner a value at which the motivated buyer would be willing to pay the seller for the subject project.

A2.29 As of Valuation Date, the cost of capital of investors in offshore wind projects varied depending on the phase of the project being evaluated (development phase, construction or operation). The cost of capital applied in the industry for each phase have been quite consistent as the offshore wind sector has become increasingly crowded and competitive. Indeed, given the growth in the renewables sector generally and offshore wind specifically, the number of interested developers and investors have increased, on the back of strong political support by national governments, lower costs of offshore wind (becoming more and more competitive with other sources of power generation), proven technologies (millions of hours of track record of various technology platforms) and importantly with enormous amounts of capital being made available for this asset class. [352]

A2.30 Noting that cost of capital here is to be associated with the CoE of such motivated buyers, based on a project being levered (using project financing). We associate this cost of capital to a "levered CoE" or "Levered IRR".

A2.31 In summary, a buyer for a project in its development phase such as the Project, will run a DCF financial model based on its assessments of project economics as described above, using a discount rate equal to the levered equity IRR that the motivated buyer intends to generate for itself.

[352] See discussion in **Section 6K** above for how the cost of capital is incorporated into the DCF model for the Project.

Appendix 3 Discount Rate

A. Overview

A3.1 In this section, we provide a discussion of the inputs for the discount rate we have derived for the Project and applied in our DCF using the Project Stage Risk Adjustment Factor approach at the Valuation Date.

A3.2 The discount rate applied can be either a CoE, or a Weighted Average Cost of Capital ("**WACC**").[353] The decision on whether to apply a WACC or a CoE depends upon the type of cash flows that the discount rate is being applied to. A WACC is applied to free cash flows flowing to the enterprise, or in this case the Project itself, *before* distributions of cash to debtholders. Meanwhile, a CoE is applied to free cash flows to equity holders, *after* the distribution of cash to debtholders.

A3.3 In our valuation, we have calculated the free cash flows to Windstream after distributions of cash to debt holders. Therefore, the appropriate discount rate to apply to these future cash flows is a CoE.

B. Cost of Equity

A3.4 We derive the CoE using CAPM, which is a widely accepted approach to determine the required rate of return on an equity investment, and it consists of:

i. A risk-free rate of return;

ii. An equity risk premium ("**ERP**"), which is equivalent to the excess return that a notional investor expects from an investment in the stock market over a risk-free asset; and,

iii. A "beta" factor, which measures volatility of stock returns against returns of an overall market.

A3.5 The formula for the CoE using the CAPM is as follows:

Cost of Equity = Risk-free Rate + (Beta x ERP)

A3.6 We discuss each of these CAPM elements below.

C. Risk Free Rate

A3.7 The risk-free rate is the baseline rate of return for a "riskless" asset – one with no risk of financial loss. The yields on government bonds issued by countries with mature and stable

353 A WACC is an average cost of capital using the CoE as well as a Cost of Debt, weighted based on the optimal capital structure for the business or project being valued.

economies are generally used as a proxy for the risk-free rate. This long-term interest rate is a pre-tax rate of return.

A3.8 The risk-free rate used to come up with expected returns should be measured consistently with the cash flows that are measured. Thus, if cash flows are estimated in nominal Canadian dollar terms, the risk-free rate will be the Government of Canada bond rate.[354] Furthermore, it is necessary to match up the duration of the risk-free asset to the duration of the cash flows being analyzed.[355]

A3.9 We have used 1.45% as the risk-free rate, which is the Government of Canada long term bond yield at the Valuation Date of February 18, 2020.[356]

D. Equity Risk Premium

A3.10 The ERP represents the expected return from an equity market as a whole, in excess of the expected return on a risk-free asset. We have used an ERP of 5.5%, which was the median ERP for Canada 2020, based on a survey carried out by Professor Pablo Fernandez in February of 2020 (i.e. the month of the Valuation Date) of more than 20,000 finance and economics professors, analysts and managers in various countries on what equity risk premium they use to calculate the required return to equity in different countries.[357]

E. Beta

A3.11 Beta is an estimate of the volatility of an investment compared to the market as a whole. It generally comprises an analysis of a stock's returns against the Standard & Poor 500 Index returns. This regression analysis returns a beta coefficient that indicates the tendency of a security's return to move relative to the subject market. A beta of 1.0 indicates that a security moves perfectly with the market, while a beta of 2.0 means that the security is twice as volatile as the market. As a measure of volatility, the beta coefficient is often used as a measurement of a security's risk.

354 **C-1943** – What is the risk-free rate? A Search for the Basic Building Block, Aswath Damodaran (December 2008), page 13.
355 **C-1943** – What is the risk-free rate? A Search for the Basic Building Block, Aswath Damodaran (December 2008), page 31.
356 **C-1915** - Bank of Canada Selected Bond Yields.
357 **C-2271** - 2020 Valuation Handbook - International Guide to Cost of Capital, Chapter 3: International Equity Risk Premia, *Exhibit 3A.1: Dimson, Marsh, and Staunton Equity Risk Premia Relative to Bonds 1900-2019*. Pablo Fernandez is a professor in the Department of Financial Management at IESE, the graduate business school of the University of Navarra, Spain.

A3.12 Beta is used in the CAPM to add an investment-specific dimension to the selected ERP. In this case, we used an industry beta to account for the risk that an offshore wind project, such as the Windstream Project, would have relative to the market at large.

A3.13 Given that we have calculated our discount factor based upon Canadian data to apply to cash flows denominated in CAD, it is appropriate to only include companies traded in Canada in our analysis of the beta factor. In other words, a beta factor being applied to a Canadian risk-free rate and ERP must be calculated against a Canadian market index, and therefore the use of companies that are not traded in Canada to derive a beta factor would be inconsistent.

A3.14 We have considered the following Canadian companies to be sufficiently comparable in order to derive an objective measure of an appropriate industry beta factor to apply in our discount rate analysis:[358]

Figure A3-1: Companies Used to Derive the Beta Factor

Entity Name	Ticker	Net Debt ($ millions)[1]	Market Capitalization ($ millions)[1]	Statutory Tax Rate[2]	Debt/ Equity	Dept/ Capital	5 Year Beta[1]	5 Year Beta Unlevered
		A	B	C	D = A / B	A / (A+B)	E	E / (1+(1-C) * D)
Boralex Inc.	TSX:BLX	3,153	3,049	26.6%	103.4%	50.8%	1.23	0.70
Brookfield Renewable Partners L.P.	TSX:BEP.UN	22,501	18,603	29.0%	121.0%	54.7%	0.70	0.38
Innergex Renewable Energy Inc.	TSX:INE	4,655	3,787	26.6%	122.9%	55.1%	0.79	0.42
Northland Power Inc.	TSX:NPI	7,519	6,230	26.5%	120.7%	54.7%	0.71	0.38
TransAlta Renewables Inc.	TSX:RNW	898	4,722	26.0%	19.0%	16.0%	1.25	1.10
Average		**7,745**	**7,278**	**26.9%**	**97.4%**	**46.3%**	**0.94**	**0.59**
Median		**4,655**	**4,722**	**26.6%**	**120.7%**	**54.7%**	**0.79**	**0.42**

[1] *Data obtained from Capital IQ.*

[2] *Data obtained from the following exhibits: **C-2192** - Boralex Inc. 2019 Annual Report, page 117; **C-2243** - Brookfield Renewable Partners LP 2019 Annual Consolidated Financial Statements (February 28, 2020), page 52 (calculated as: $94 statutory tax / ($51 effective tax / 15.74% effective rate); **C-2121** - Innergex 2019 Annual Report (December 31, 2019), page 130; **C-2092** - Northland Power 2019 Annual Report (2019), page 87; and **C-2368** - TransAlta Renewables 2019 Annual Report (February 28, 2020), page M36.*

A3.15 The shares of all of the above companies were relatively liquid as at the Valuation Date, and therefore, their beta factors are sufficiently reliable to derive a beta estimate for Windstream.

[358] We note that while none of the companies included in our beta analysis are directly comparable to Windstream (given that none of these companies are pure-play offshore wind companies), the macroeconomic risks faced by the companies in these industries are similar to the risks faced by Windstream. Therefore, we have selected these companies to approximate the risks that Windstream would face, which is what an investor in the Project would examine, given a lack of directly comparable pure-play offshore wind companies in Canada.

A3.16 Using the below formula, we have un-levered the beta of each comparable company from the table above. This results in an average unlevered beta of 0.59.

Unlevered Beta = Levered Beta / [1 + (1 – Tax Rate) x Debt/Equity]

A3.17 The unlevered beta above is then levered with the following formula in order to account for the optimal capital structure of an investment:

Levered Beta = Unlevered Beta x [1 + (1 – Tax Rate) x Debt/Equity]

A3.18 We used a debt/equity ratio of 233% (70% debt and 30% equity) based on our assumption of for the optimal leverage for the Project (discussed below) and a combined federal and provincial tax rate of 26.5%.[359] This results in a levered beta of 1.60.

A3.19 We considered the following factors in selecting the 70% debt to capital ratio to use in our discount rate analysis:

i. The median debt to capital ratio in the three onshore wind transactions carried out in Ontario in 2019 was 71%;[360]

ii. The debt to capital ratio adopted by both experts in NAFTA 1 was 70%;[361] and,

iii. The median debt to capital ratio of the proxy group of companies used to derive the beta factor as shown above was 55%.

F. Project Specific Risk Premium (PSRP)

A3.20 The project-specific risk premium, or PSRP, refers to any project-specific risks not otherwise previously captured that differentiate the subject project from other somewhat comparable projects or companies in the industry. It is important that such considerations be reflected either in the discount rate or the cash flows.

A3.21 The beta factor we used to derive our discount rate was based upon larger diversified companies which also had many operating projects. Therefore, there are additional idiosyncratic risks and uncertainties in respect of the Project, given that construction of the Project has not yet commenced as at the date of this report. These idiosyncratic risks would not be reflected in my discount rate, and thus warrant additional consideration.

A3.22 As outlined in **Section 6L**, one way to address this risk would be to apply a probability risk factor directly to the cash flows from the Project to account for the risk that the Project may

[359] **C-2273** - Deloitte 2020 Corporate Income Tax Rates.
[360] See **Schedule 7.**
[361] See NAFTA 1, RER BRG-2, Figure 17.

not achieve FC, even in the absence of the Alleged Breaches. The inclusion of a probability risk factor in the cash flows of the Project, as well as a PSRP in the discount rate on account of such risks would be a "double count" and lead to an understatement of value.

A3.23 Given that we have already accounted for the execution risk of the Project through a probability risk factor as described in **Section 6L**, we have not included any additional PRSP in our calculation of the CoE applicable to the Project. Therefore, the discount rate calculated herein does not include any incremental risk associated with bringing the Project to the FC stage.

G. Cost of Equity Conclusion

A3.24 We have rounded our discount rate for the purpose of this report to the nearest percentage point as to not imply that an estimated discount rate is determined with perfect precision. The CAPM-based approach employed in this report is informed by multiple public financial and non-financial factors that are synthesized based on our professional judgement.

A3.25 Using the discussed inputs above, we arrive at a nominal CoE of 10%.

A3.26 As a reasonability check, we note that in an investor presentation issued by Equinor (a significant investor in North American offshore wind markets as at and around the Valuation Date) on February 6, 2020, Equinor noted that its nominal expected CoE (in USD) was in the range of 8% to 12%.[362]

A3.27 We have summarized our calculation of the CoE applicable to Windstream (absent any adjustment associated with bring the Project to the FC Stage) in the figure below:

Figure A3-2: Cost of Equity as at the Valuation Date

Cost of Equity		
Risk Free Rate (Rf)	[A]	1.45%
Equity Risk Premium (ERP)	[B]	5.50%
Industry Beta, Unlevered	[C]	0.59
Assumed Tax Rate	[D]	26.50%
Assumed Debt / Equity Ratio	[E]	233.33%
Selected Beta, Levered	[F] = [C] * (1 + (1-[D])*[E])	1.60
Adjusted Equity Risk Premium	[G] = [B]*[F]	8.83%
Cost of Equity	[H] = [A] +[G]	10.28%
Cost of Equity, rounded		**10.00%**

362 **C-2287** - Equinor - Capital Markets Update (February 6, 2020), Slide 13.

Appendix 4 Comparable Transactions Analysis

A. Overview

A4.1 In this appendix, we provide the details of the transactions we identified through filtering the 4C Offshore database that we consider are suitably comparable to the Project for the purposes of our comparable transactions valuation methodology.

A4.2 The ten transactions we have used in our comparable transactions approach to value the Project at the Valuation Date are summarized as follows:

Figure A4-1: Comparable Transactions Summary

Project Acquired	Buyer	Seller	Project Country	Transaction Announcement Date	Transaction Value ($ millions)	% Acquired	Project MWs	MW Acquired	Value / MW ($ millions)
					A	*B*	*C*	*D = B x C*	*E = A / D*
Deutsche Bucht	Northland Power	Highland	Germany	3-Mar-17	$ 310.2	100.0%	252	252	$ 1.23
Borssele III & IV	Partners Group	Blauwwind Consortium	Netherlands	8-Jan-18	446.4	45.0%	732	329	1.36
Moray East	Diamond Generation Europe Limited	EDPR	United Kingdom	23-Mar-18	65.1	20.0%	950	190	0.34
Neart na Gaoithe	EDF	Mainstream	United Kingdom	3-May-18	770.2	100.0%	450	450	1.71
Triton Knoll	J Power, Kansai Electric Power	Innogy SE	United Kingdom	13-Aug-18	706.9	41.0%	860	353	2.00
Moray East	Diamond Generation Europe Limited	EDPR	United Kingdom	16-Nov-18	91.2	13.4%	950	127	0.72
Dieppe-Le Treport & Yeu-Noirmoutier	Sumitomo	EDPR	France	18-Dec-18	121.3	13.5%	992	134	0.91
Revolution Wind & South Fork	Eversource	Orsted	United States	8-Feb-19	183.0	50.0%	834	417	0.44
Formosa 1	Orsted, Macquarie	Swancor Renewable	Taiwan	25-Jan-17	38.2	85.0%	128	109	0.35
Formosa 2	Stonepeak	Swancor	Taiwan	31-Jul-19	90.4	23.8%	376	89	1.01
								Average	**$ 1.01**
								Median	**$ 0.96**

A4.3 We discuss each of the above noted transactions in detail below.

B. Deutsche Bucht

A4.4 Toronto, Ontario-based Northland Power Inc. announced its acquisition of 100% of this Germany-based project from Highland Group Holdings Ltd. for $310 million on March 3, 2017. Deutsche Bucht is an offshore wind farm with a capacity of 252 MW.[363] At the time that the transaction was announced, the project had revenue clarity but had not yet reached FC. Additionally, the wind farm also had a grid agreement[364] and permits[365] in place.

A4.5 Under the German Renewable Energy Sources Act, the project is entitled to a FIT subsidy for approximately 13 years from its commissioning date. For the first 8 years of operations, Deutsche Bucht will earn $264/MWh,[366] and it will earn $214/MWh[367] for the remaining 5 years of the contract.[368] This contracted energy price at COD is comparable to the Indexed FIT Contract Price of $253.8/MWh that Windstream would have received at COD although the Deutsche Bucht Project has a shorter FIT contract than Windstream. Further, while the Windstream FIT Contract price would continue to increase with an inflation adjustment over the 20-year contract term, ultimately reaching $277/MWh by year 20,[369] the contract price of the Deutsche Bucht project decreases to $214/MWh for years 8 through 13, which would be considerably lower than the price that the Windstream Project would obtain in the latter part of the FIT Contract.

C. Borssele 3 & 4

A4.6 Switzerland-based Partners Group Holding AG announced their acquisition of 45% of this Netherlands-based project from the Blauwwind Consortium on January 8, 2018, which included Shell, Eneco Group, Diamond Generating Europe ("**DGE**"), and Van Oord. Borssele 3 & 4 is an offshore wind farm with a capacity of 731.5 MW. At the time that the transaction was announced, the project had revenue clarity but had not yet reached FC. Additionally, the wind farm also had a grid agreement[370] and permits[371] in place.

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363 **C-2077** - Northland Power Inc. Press Release entitled "Northland Power Agrees to Acquire 252 MW German Offshore Wind Farm" (March 3, 2017).

364 **C-1978** - Businesswire article entitled "Windreich and TenneT agree on interim connections for offshore wind farm Deutsche Bucht" (October 29, 2012).

365 **C-2126** - Green Giraffe publication entitled "The Green Giraffe Deutsche Bucht story" (December 1, 2017).

366 €184 translated using CAD:EUR exchange rate of 1.4344 on the Valuation Date per Capital IQ.

367 €149 translated using CAD:EUR exchange rate of 1.4344 on the Valuation Date per Capital IQ.

368 **C-2077** - Northland Power Inc. Press Release entitled "Northland Power Agrees to Acquire 252 MW German Offshore Wind Farm" (March 3, 2017).

369 See Figure 6-1 above.

370 **C-2137** - Partners Group Press Release entitled "Partners Group to become largest investor in 730MW Dutch offshore wind farm project" (January 8, 2018).

371 **C-2256** - Netherlands RVO publication entitled "Borssele Wind Farm Sites III & IV" (December 14, 2019).

A4.7 As the transaction is for less than 50% of the project, the multiple we have calculated represents a minority interest value, which would tend to understate the FMV of a 100% interest in the Project. In addition, the project is guaranteed $77/MWh[372] for its first 15 years of operation.[373] This electricity price is considerably lower than Windstream's Indexed FIT Contract Price, which, all else equal, would reduce the value of this project compared to Windstream.

D. Moray East

A4.8 In the first Moray East transaction in our analysis, UK-based DGE announced their acquisition of 20% of this UK-based project from Spain-based EDP Renováveis, S.A. ("**EDPR**") on March 23, 2018. Moray East is an offshore wind farm with a capacity of 950 MW.[374] At the time that the transaction was announced, the project had revenue clarity but had not yet reached FC. Additionally, the wind farm also had a grid agreement and permits in place.[375]

A4.9 As this transaction was for less than 50% of the project, the multiple we have calculated may not represent a controlling interest value, and thus may understate the FMV of a 100% interest in the Project. In addition, the project was awarded a 15-year CfD at $92/MWh[376] in September 2017, which is considerably lower than Windstream's Indexed FIT Contract Price and thus would likely be less valuable than the Project.[377]

A4.10 In a second transaction announced on November 16, 2018, DGE acquired an additional 13.4% interest in this UK-based project from the Spanish firm, EDPR.[378] The transaction multiple implied from the second Moray East Transaction was higher than the multiple implied by the first transaction. This increase in valuation likely related to the first milestone achieved by the Project under its CfD in October 2018,[379] and also due to the overall growing trend in the offshore wind industry in the period leading up to the Valuation Date, as discussed in **Appendix 1**. As this transaction took place close to the project's Financial Close of December

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[372] €54.49/MWh translated using CAD:EUR exchange rate of 1.4163 on the award date of December 1, 2016 per Capital IQ.

[373] **C-2159** - IJ Global article entitled "Borssele III/IV offshore wind Netherlands" (July 5, 2018).

[374] **C-2147** - EDPR Press Release: entitled "EDPR announces sale of 20% stake in UK wind offshore project" (March 23, 2018).

[375] **C-2115** - ENGIE Press Release entitled "EDPR Renováveis and ENGIE consortium is awarded long-term CfD for 950MW offshore wind project in UK" (September 11, 2017).

[376] £57.5/MWh translated using CAD:GBP exchange rate of 1.6002 on September 11, 2017 per Capital IQ.

[377] **C-2115** - ENGIE Press Release entitled "EDPR Renováveis and ENGIE consortium is awarded long-term CfD for 950MW offshore wind project in UK" (September 11, 2017).

[378] **C-2105** - EDPR press release dated November 16, 2018.

[379] **C-2329** - "Low Carbon Contracts Company congratulates generators passing their 12-month milestones (October 2019)".

6, 2018,[380] this project was somewhat more advanced than the Project at the Valuation Date. However, the lower CfD price of $92/MWh compared to Windstream's Indexed FIT Contract Price, and the shorter CfD period for Moray East compared to Windstream would, all else equal, indicate that this project was less valuable than the Project.[381]

E. Neart na Gaoithe (NNG)

A4.11 France-based EDF Energy Renewables announced their acquisition of 100% of this UK-based project from Ireland-based Mainstream Renewable Power Limited on May 3, 2018.[382] NNG is an offshore wind farm with a capacity of 450 MW.[383] At the time that the transaction was announced, the project had revenue clarity but had not yet reached FC,[384]. Additionally, the wind farm also had a grid agreement and permits in place.[385]

A4.12 The project was awarded a 15-year CfD at $220/MWh[386] in February 2015, which is comparable to Windstream's Indexed FIT Contract Price, but for a shorter time period.[387]

F. Triton Knoll

A4.13 Japan-based Electric Power Development Co., Ltd. (J-Power) and Kansai Electric Power Co., Inc. announced their acquisition of 41% (25% and 16% respectively) of this UK-based project from UK-based Innogy Renewables UK Limited on August 13, 2018. Triton Knoll is an offshore wind farm with a capacity of 857 MW.[388] At the time that the transaction was announced, the project had revenue clarity but had not yet reached FC. Additionally, the wind farm also had a grid agreement[389] and permits[390] in place.

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380 **C-2157** - Moray East Press Release entitled "Moray East Offshore Wind Farm confirms financial close" (Dec. 6, 2018).

381 **C-2115** - ENGIE Press Release entitled "EDPR Renováveis and ENGIE consortium is awarded long-term CfD for 950MW offshore wind project in UK" (September 11, 2017).

382 **C-2153** - Capital IQ Pro Deal Profile: "EDF Energy acquires Neart na Gaoithe from Mainstream Renewable Power" (May 3, 2018).

383 **C-2154** - Reuters.com article entitled "France's EDF buys Scottish offshore wind project" (May 3, 2018).

384 NNG ultimately reached FC on November 28, 2019, a year and a half after the transaction. Source: **C-2250** - EDF Renewables Press Release entitled "The EDF Group launches the construction of Neart na Gaoithe 450 MW offshore wind farm along with new Irish partner, ESB" (November 28, 2019).

385 **C-2152** - EDF Renewables Press Release entitled "EDF Group buys Mainstream Renewable Power offshore wind project" (May 3, 2018).

386 £114.39/MWh translated using CAD:GBP exchange rate of 1.9242 on February 26, 2015 per Capital IQ.

387 **C-2014** - Offshorewind.biz article entitled "Two UK Offshore Wind Projects Win CfDs" (February 26, 2015).

388 **C-2167** - Innogy Press Release entitled "Innogy finds new partners for its Triton Knoll Offshore Wind Farm" (August 13, 2018).

389 **C-2025** - Triton Knoll submission to the Secretary of State for Energy and Climate Change entitled "Triton Knoll Electrical System" (February 24, 2016), paragraphs 5.3 and 5.8.

390 **C-2036** - Triton Knoll Press Release entitled "Consent granted for Triton Knoll Offshore Wind Farm Electrical System" (September 6, 2016).

A4.14 As these transactions were both for less than 50% of the project, the multiple we have calculated represents a minority interest value, and thus may understate the FMV of a 100% interest in the Project. In addition, the project was awarded a 15-year CfD at $120/MWh[391] in September 2017, which is considerably lower than Windstream's Indexed FIT Contract Price and for a shorter amount of time.[392] On the other hand, this transaction took place close to this project's FC of August 31, 2018, which would make this project somewhat more advanced compared to the Project as at the Valuation Date.[393]

G. Le Treport & Noirmoutier

A4.15 Japan-based Sumitomo Corporation announced their acquisition of 13.5% of these France-based projects from Spain-based EDPR on December 18, 2018. Le Treport and Noirmoutier are offshore wind farms with capacity of 496 MW each.[394] At the time that the transaction was announced, the projects had revenue clarity but had not yet reached FC.[395] Additionally, Noirmoutier also had a grid agreement and permits in place.[396] Le Treport did not obtain its grid agreement and permits until February 26, 2019.[397]

A4.16 Since this transaction was for less than 50% of the project, the multiple we have calculated represents a minority interest value, and therefore may understate the FMV of a 100% interest in the Project. The projects were granted approval for FIT Contract prices of $231/MWh[398] in June 2018 for a period of 20 years,[399] which are comparable to Windstream's Indexed FIT Contract Price.

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[391] £74.75/MWh translated using CAD:GBP exchange rate of 1.6002 on September 11, 2017 per Capital IQ.

[392] **C-2115** - ENGIE Press Release entitled "EDPR Renováveis and ENGIE consortium is awarded long-term CfD for 950MW offshore wind project in UK" (September 11, 2017).

[393] **C-2170** - Triton Knoll Press Release entitled "Triton Knoll confirms Financial Close with major turbine deal and east coast port plans" (August 31, 2018).

[394] **C-2186** - EDPR Press Release entitled "EDPR sells 13.5% stake in French offshore wind projects" (December 18, 2018).

[395] **C-1913** – 4C Comparables (Excel) and **C-2158** - Offshorewind.biz article entitled "France Reduces Feed-In Tariffs for 6 Offshore Wind Projects" (June 20, 2018).

[396] **C-2187** - Prefect of the Vendee Press Release entitled "Le préfet de la Vendée accorde de nouvelles autorisations nécessaires à la réalisation du parc éolien en mer au large des îles d'Yeu et de Noirmoutier" (December 19, 2018).

[397] **C-2210** - Prefect of the Seine-Maritimen Press Release entitled "State services in Seine-Maritime: Construction of the offshore wind farm off Dieppe and Tréport and its connection (February 26, 2019).

[398] €150/MWh translated using CAD:EUR exchange rate of 1.5403 on June 20, 2018 per Capital IQ.

[399] **C-2158** - Offshorewind.biz article entitled "France Reduces Feed-In Tariffs for 6 Offshore Wind Projects" (June 20, 2018) and **C-2226** - Smart Energy article entitled "France EU Commission approves six new offshore wind plants" (July 30, 2019).

H. Revolution Wind & South Fork Wind

A4.17 Massachusetts, US-based Eversource Energy announced their acquisition of 50% of these US-based projects from Denmark-based Ørsted A/S on February 8, 2019. Revolution and South Fork Wind are offshore wind farms with capacity of 700 MW and 130 MW, respectively. At the time that the transaction was announced, South Fork had a finalized PPA, and Revolution Wind had signed a PPA agreement that was still subject to finalization. Neither had reached FC as at the transaction date, and wind farms also did not have a grid agreement or permits in place at the time of the transaction.[400]

A4.18 The projects have been awarded contracts for prices ranging from $114/MWh to $213/MWh[401], which are lower than Windstream's Indexed FIT Contract Price of $253.8/MWh.[402]

A4.19 Additionally, this transaction included a 257 square mile tract of land (164,480 acres). In order to arrive at a value for the Revolution Wind and South Fork wind farms only, we have reduced the transaction value by approximately $115.8 million, which we calculated as 164,480 acres x $1,408.15/acre leasing cost (see Figure 7-5 in **Section 7C** above) x 50% interest acquired.

I. Formosa 2

A4.20 New York, US-based Stonepeak Oceanview Holdings Co announced their acquisition of 23.8%[403] of this Taiwan-based project from Taiwan-based Swancor Holding Co., Ltd. on July 31, 2019.[404] Formosa 2 is an offshore wind farm with capacity of 376 MW. At the time that the transaction was announced, the project had revenue clarity but had not yet reached FC and did not have all its permits in place. Additionally, the wind farm also had a grid agreement[405] in place prior to the transaction date.

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[400] **C-2209** - Ørsted Press Release entitled "Orsted divests 50 of South Fork Revolution Wind and two New England offshore wind lease areas to Eversource" (February 8, 2019).

[401] USD 86.25/MWh and USD 160.33/MWh translated using CAD:USD exchange rate of 1.3260 on the Valuation Date per Capital IQ.

[402] **C-2193** - Eversource 2019 Annual Report, page 30.

[403] The transaction was for the acquisition of 95% of Swancor Renewable Energy Co., Ltd., which owned 25% of Formosa 2 and 100% of Taiwan Offshore O&M Service Co., Ltd. Therefore, the interest acquired in Formosa 2 is calculated as 95% * 25% = 23.75%. Source: **C-2199** - Swancor 2019 Annual Report, page 274.

[404] **C-2232** - Inframationgroup article entitled "Taiwan's Swancor sells offshore wind developer to Stonepeak" (August 12, 2019).

[405] **C-2185** - Offshorewind.biz-article entitled "Formosa 2 Power Purchase Agreement All Set" (December 12, 2018).

A4.21 It was announced that the transaction consideration would range from $34.2 million to $132.8 million[406] and would also involve three installments payable at the following milestone dates: share transfer, financing, and construction of the project. We have used a transaction value of $90.4 million calculated as the $34.2 million assumed initial payment at share transfer plus the contingent payment of $98.6 million (which is the difference between $132.8 million and $34.2 million) multiplied by a 57% probability factor that the project will reach FC and commence construction (i.e., 34.2 + (132.8 – 34.2) x 57%).[407]

A4.22 The project has a FIT price of $253/MWh[408] over a 20-year PPA, which is comparable with Windstream's Indexed FIT Contract Price.[409]

J. Formosa 1

A4.23 Denmark-based Ørsted A/S and Australia-based Macquarie announced their acquisition of 85% (35% and 50% respectively) of this Taiwan-based project from Taiwan-based Swancor Holding Co., Ltd. on January 25, 2017. Formosa 1 is an offshore wind farm with capacity of 128 MW.[410] At the time that the transaction was announced, the project had revenue clarity but did not have all its permits in place and had not yet reached FC.[411]

A4.24 The project has a FIT price of $256/MWh[412], which is comparable with Windstream's Indexed FIT Contract Price.[413]

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406 USD 25.98 million and USD 101 million translated using CAD:USD exchange rate of 1.3144 on July 31, 2019 per Capital IQ.

407 **C-2232** - Inframationgroup article entitled "Taiwan's Swancor sells offshore wind developer to Stonepeak" (August 12, 2019).
See discussion of this risk factor adjustment in **Section 6L** above.

408 TWD 5,850/MWh translated using CAD:TWD exchange rate of 0.0433 on December 12, 2018 per Capital IQ.

409 We understand that as of 2017, Taiwan has standardized FIT prices for offshore wind; therefore, we have assumed the FIT price for Formosa 2 to be equal to the FIT price in Taiwan for 2018 as their PPA was signed December 12, 2018. Source: **C-2139** - Jones Day paper entitled "Taiwan Offshore Wind Farm Projects: Guiding Investors through the Legal and Regulatory Framework (February 2018), page 12 and **C-2185** - Offshorewind.biz-article entitled "Formosa 2 Power Purchase Agreement All Set" (December 12, 2018).

410 **C-2069** - Macquarie Press Release entitled "Macquarie Capital and DONG Energy to invest into Swancor Renewable's 128MW Formosa 1 offshore wind farm in Taiwan" (January 25, 2017).

411 **C-2150** - Orsted.com article entitled "Ørsted commits to invest in the second phase of Taiwan's Formosa 1 offshore wind farm" (April 26, 2018).

412 TWD 6,044/MWh translated using CAD:TWD exchange rate of 0.0423 on December 1, 2017 per Capital IQ.

413 We understand that as of 2017, Taiwan has standardized FIT prices for offshore wind; therefore, we have assumed the FIT price for Formosa 1 to be equal to the FIT price in Taiwan for 2017 as their PPA was signed in December 2017. Source: **C-2081** - Flanders Investment & Trade Market Survey Report entitled The Offshore Wind Market in Taiwan (April 2017), page 9 and **C-2377** -Swancor-renewable.com article entitled "Milestones - Swancor Renewable Energy (July 2021).

Appendix 5 Public Company Trading Multiples Methodology

A. Overview

A5.1 In this appendix, we provide the details of the public companies we identified as being sufficiently comparable to Windstream for purposes of conducting a public company trading multiples analysis for the Project.

A5.2 The public companies we selected are provided below:

Figure A5-1: Public Company Trading Multiples Method Summary

Entity Name	Ticker	Total Capacity (MW)	Wind Capacity (MW)	Wind Capacity as % of Total Capacity	Development Capacity as % of Total Capacity	EV ($ million)	EV / MW ($ million)	EV with Premium ($ million)	EV / MW with Premium ($ million)
Arise AB (publ)	OM:ARISE	967	967	100%	86%	$ 318	$ 0.33	390	$ 0.40
Boralex Inc.	TSX:BLX	4,958	4,161	84%	59%	6,406	1.29	7,321	1.48
EDP Renováveis, S.A.	ENXTLS:EDPR	12,356	12,072	98%	8%	23,501	1.90	28,358	2.30
Fintel Energija a.d.	BELEX:FINT	901	901	100%	95%	352	0.39	416	0.46
Ørsted A/S	CPSE:ORSTED	13,307	10,824	81%	53%	65,963	4.96	84,455	6.35
Polenergia S.A.	WSE:PEP	2,065	1,948	94%	88%	629	0.30	778	0.38
Terna Energy S.A.	ATSE:TENERGY	1,935	1,904	98%	28%	2,492	1.29	2,913	1.51
						Average	$ 1.49		$ 1.84
						Median	$ 1.29		$ 1.48

B. Arise AB (publ)

A5.3 Based in Halmstad, Sweden, Arise AB operates onshore wind plants located in Sweden. While they operate and sell electricity through their own wind farms, they also develop and construct wind projects for sale.[414] At the Valuation Date, the majority of their capacity was under development.[415] In addition, the company's average selling price in 2019 was $61/MWh[416], which is significantly lower than Windstream's FIT Contract price.[417]

C. Boralex Inc.

A5.4 Based in in Kingsey Falls, Canada, Boralex Inc. engages in the development, construction, and operation of renewable energy power facilities in North America and Europe. While they primarily focus on onshore wind, they also operate in the hydro, solar and thermal energy sectors.[418] At the Valuation Date, more than half of their capacity was still in development.[419]

[414] **C-2363** - Arise AB (publ) Public Company - Company Profile - S&P Capital IQ (April 13, 2021).
[415] **C-2259** - Arise AB (publ) Annual Report (December 31, 2019), page 8.
[416] SEK 436 translated using CAD:PLN exchange rate of 0.1388 on December 31, 2019 per Capital IQ.
[417] **C-2259** - Arise AB (publ) Annual Report (December 31, 2019), page 19.
[418] **C-2192** - Boralex Inc. 2019 Annual Report, Note 1, page 92.
[419] **C-2192** - Boralex Inc. 2019 Annual Report, page 24, Segment and geographic breakdown, and page 32.

D. EDP Renováveis S.A.

A5.5 Based in Madrid, Spain, EDP Renováveis, S.A plans, constructs, operates, and maintains electricity generating power stations in North America, South America, and Europe. While they primarily focus on wind (both onshore and offshore), they also operate in the solar energy sector.[420] At the Valuation Date, only a small portion of their power stations were under development. [421]

E. Fintel Energija a.d.

A5.6 Based in Belgrade, Serbia, Fintel Energija a.d. installs and operates onshore wind farms in Serbia.[422] While they operate their own wind farms, they also operate wind farms not owned by the company. At the Valuation Date, the majority of their capacity was under development.[423]

F. Ørsted A/S

A5.7 Based in Fredericia, Denmark, Ørsted A/S develops, constructs, and operates renewable energy power plants located in North America, Europe, and Asia. While they primarily focus on wind (both offshore and onshore), they also operate in the solar and biomass sector.[424] At the Valuation Date, more than half of their capacity was under development.[425] In 2019, their average power price for offshore wind was $75/MWh[426], which is significantly lower than Windstream's.

G. Polenergia S.A.

A5.8 Based in Warsaw, Poland, Polenergia S.A. engages in the development, construction, and maintenance of renewable energy power plants located in Poland. While they primarily focus on wind (both onshore and offshore), they also operate in the solar energy sector.[427] At the Valuation Date, the majority of their capacity was under development. Most of this company's capacity related to the Baltyk I, II, and III development stage offshore wind farms in the Baltic Sea. As at the Valuation Date, there was no regulatory framework in place for these windfarms, the projects did not have any revenue clarity, and were not anticipating receiving

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[420] **C-2398** - EDP Renováveis Company Profile, Capital IQ Pro (October 13, 2021).
[421] **C-2285** - EDP Renovaveis, S.A. 2019 Volumes & Capacity Statement (January 21, 2020).
[422] **C-2263** - Fintel 2019-12-31 Annual Report Consolidated - English (December 31, 2019), Note 1, page 15.
[423] **C-2263** - Fintel 2019-12-31 Annual Report Consolidated - English (December 31, 2019), PDF page 118.
[424] **C-2406** - Ørsted A/S Company Profile, Capital IQ Pro (November 9, 2021).
[425] **C-2198** - Ørsted 2019 Annual Report, page 160.
[426] £43.6 translated using CAD:GBP exchange rate of 1.7178 on December 31, 2019 per Capital IQ.
[427] **C-2359** - Polenergia S.A. Company Profile, Capital IQ Pro (April 1, 2021).

a building permit until 2023, and operations were not expected to start until 2026.[428] In 2019, their average energy selling price was $80/MWh[429], which is significantly lower than Windstream's.[430]

H. Terna Energy S.A.

A5.9 Based in Athens, Greece, Terna Energy S.A. engages in the development, construction, and operation of renewable energy power plants located in North America and Europe. While they primarily focus on onshore wind, they also operate in the hydro, solar, and biomass energy sector.[431] At the Valuation Date, about a quarter of their capacity was under development.[432]

[428] **C-1913** - 4C Comparables (Excel), "Database" tab and **C-2284** - Polenergia Equinor Facts and Figures – Baltyk..

[429] PLN 235 translated using CAD:PLN exchange rate of 0.3424 on December 31, 2019 per Capital IQ.

[430] **C-2293** - Polenergia 2019 Investor Presentation (March 2020), slide 4.

[431] **C-2264** - Terna Energy 2019 Annual Financial Report (December 31, 2019), page 51.

[432] **C-2264** - Terna Energy 2019 Annual Financial Report (December 31, 2019), page 11; **C-2295** - Terna Energy FY 2019 Results Presentation (March 4, 2020).

Appendix 6 Scope of Review

A6.1 We have relied upon the following documents in arriving at our opinion of damages:

A. Documents from NAFTA 1

Exhibit #	File Name/Description
C-0037	Windstream Wolfe Island Shoals Inc. (WWIS) Corporation Summary (October 18, 2007)
C-0081	Toronto Star article dated June 30, 2008: "Wind power a dilemma for Ontario"
C-0123	The Green Energy Act and Green Economy Act (2009)
C-0179	Second Amended Restated Limited Liability Company Agreement of Windstream Energy LLC (January 14, 2010)
C-0197	FIT Contract, Exhibits A - H (March 10, 2010)
C-0243	FIT Contract Schedule 2
C-0245	Original FIT Contract Schedule 1
C-0251	Feed-in Tariff Contract (OPA) and WWIS (May 4, 2010), Cover Page
C-0357	Meeting Minutes (MNR), Wolfe Island Shoals MNR Kick Off Meeting (September 9, 2010)
C-0408	Form of Notice of Force Majeure
C-0497	Article (Canadian Press) Ont. Declares moratorium on off-shore wind farms (February 11, 2011)
C-0551	Report (Ortech), Draft Project Description for Wolfe Island Shoals Offshore Wind Farm (September 26, 2011)
C-0744	Map (Ortech) Lake Ontario (July 21, 2014)
C-0761	Remarks by Natural Resources Minister Donna Cansfield to the Energy 2100: Making The Great Lakes Conference (April 23, 2008)
C-0774	OPA (2009), Ontario's Feed-in Tariff Program Backgrounder
C-0806	Information Note: Green Energy Act and Renewable Energy Approvals for Off-Shore Wind Facilities (April 6, 2010)
C-0877	Technical Proposal for Commissioning Support and Wind Analysis for One Site in Wolfe Island (GL Garrad Hassan) (December 2, 2010)
C-1882	Memorandum from William Ziegler and David Mars to Francis Stafilopatis, et al (December 29, 2010)
C-1891	Windstream White Owl Capital Management Fee
C-1893	Estimate of Crown Land Costs Associated with Construction Phase
C-1903	Financial Model for Wolfe Island Shoals Base Case

Exhibit #	File Name/Description
CER-Deloitte (Taylor and Low)	Deloitte (Taylor and Low) Report dated August 19, 2014
CER-Deloitte (Taylor and Low)-2	Deloitte (Taylor and Low) Report dated June 19, 2015
CER-Powell	Expert Report of Sarah Powell dated August 19, 2014
CL-034	Case Concerning the Factory at Chorzów (Germany v. Poland), 1928 P.C.I.J (ser. A) No. 17 (September 13, 1928)
RER-BRG-2	Expert Rejoinder Report of Berkeley Research Group dated November 6, 2015
RER-URS-2	Expert Rejoinder Report of URS dated November 6, 2015
RER-Green Giraffe	Expert Report of Green Giraffe dated November 6, 2015
R-0123	Ministry of Natural Resources, Procedure PL 4.10.04 "Onshore Windpower Development on Crown Land"

B. Documents provided by Counsel

File Name/Description
Notice of Arbitration dated December 22, 2020
Third Witness Statement of David Mars dated February 18, 2022
First Witness Statement of Ian Baines dated August 18, 2014
Third Witness Statement of Ian Baines dated February 18, 2022
Witness Statement of Nancy Baines dated February 18, 2022
Report of Mr. Richard Auckland of 4C Offshore dated February 18, 2022 ("**CER-4C Offshore-3**")
Report of Mr. Ian Irvine of Two Dogs Projects Ltd. dated February 18, 2022 ("**CER-Two Dogs (Capex Opex Sensitivity Report)**")
Report of Wood Group plc (formerly SgurrEnergy) dated February 18, 2022 ("**CER-Wood**")
Report of Power Advisory dated February 18, 2022 ("**CER-Power Advisory-2**")

C. Other documents

Exhibit #	File Name/Description
C-1913	4C Comparables (Excel)
C-1914	4COffshore.com - About Us
C-1915	Bank of Canada Selected Bond Yields
C-1916	Government of Canada "Amount of capital cost allowance CCA you can claim"
C-1917	Canadian Wind Energy Association - Ontario

Exhibit #	File Name/Description
C-1918	Canadian Wind Energy Association - Vision
C-1919	Corporate Finance Institute - Levelized Cost of Energy (LCOE)
C-1920	Government of United Kingdom Policy Paper "Contracts for Difference"
C-1921	Global Wind Energy Council (GWEC) "What we do"
C-1922	NYSERDA - Offshore Wind Projects
C-1923	Oceanic Wind Project Timeline
C-1924	Offshore Wind farms in Canada per 4C Offshore
C-1925	United Nations Framework Convention on Climate Change (UNFCCC) - Paris Agreement
C-1928	Insurance Premium Quotes - P40 Indications Scenario A
C-1933	I. Campbell & H. Johnson, "The Valuation of Business Interests" (2001)
C-1934	IESO - Historical Demand (May 1, 2002-2020)
C-1943	What is the risk-free rate? A Search for the Basic Building Block, Aswath Damodaran (December 2008)
C-1944	CBV Institute Practice Standard No. 110 (June 17, 2009)
C-1945	Statistics Canada: Ontario CPI (September 2009-January 2020)
C-1947	IESO Year-End Data (2010)
C-1948	GWEC Global Wind Report - Annual Market Update (2010)
C-1949	Ontario's Long-Term Energy Plan (2010)
C-1950	Electricity Production by Source - Global Change Data Lab (2010)
C-1951	Global Electricity Generation - Global Change Data Lab (2010)
C-1955	Feed-In Tariff Prices for Renewable Energy Projects in Ontario (July 2, 2010)
C-1963	European Wind Energy Association (EWEA) Report entitled "Wind in our Sails (2011)
C-1964	GWEC Global Wind Report - Annual Market Update (2011)
C-1969	News Release entitled "Ontario Rules out Offshore Wind Projects" - Ontario Newsroom (February 11, 2011)
C-1974	GWEC Global Wind Report - Annual Market Update (2012)
C-1978	Businesswire article entitled "Windreich and TenneT agree on interim connections for offshore wind farm Deutsche Bucht" (October 29, 2012)
C-1981	GWEC Global Wind Report - Annual Market Update (2013)
C-1982	Natural Resources Canada, Canmet Energy: Leadership in ecoInnovation: Technical Guide to Class 43.1 and 43.2, 2013
C-1984	Ontario's Long-Term Energy Plan (2013)
C-1987	Government of Ontario website "Onshore wind power development on Crown land procedure" (May 9, 2013)

Exhibit #	File Name/Description
C-1988	FIT/microFIT Price Schedule (August 26, 2013)
C-1992	GWEC Global Wind Report - Annual Market Update (2014)
C-2007	FIT/microFIT Price Schedule (Effective September 30, 2014 for FIT and January 1, 2015 for microFIT) (September 30, 2014)
C-2009	GWEC Global Wind Report - Annual Market Update (2015)
C-2010	Ontario's Climate Change Strategy (2015)
C-2011	IESO Press Release entitled "The Independent Electricity System Operator and Ontario Power Authority Amalgamate" (January 2, 2015)
C-2013	Government of United Kingdom CFD Allocation Round 1 Results (February 26, 2015)
C-2014	Offshorewind.biz article entitled "Two UK Offshore Wind Projects Win CfDs" (February 26, 2015)
C-2019	Windstream Wolfe Island Shoals Inc. 2015 Financial Statements - Final (December 31, 2015)
C-2020	Wolfe Island Shoals Expenses 2016-2019
C-2022	GWEC Global Wind Report - Annual Market Update (2016)
C-2024	Report of the Conference of the Parties on its 21st session, held in Paris from 30 Nov to 13 Dec 2015 (January 29, 2016)
C-2025	Triton Knoll submission to the Secretary of State for Energy and Climate Change entitled "Triton Knoll Electrical System" (February 24, 2016)
C-2027	US Department of the Interior Bureau of Ocean Energy Management, Commercial Lease - Renewable Energy Lease No. OCS-A 0499 (March 1, 2016)
C-2036	Triton Knoll Press Release entitled "Consent granted for Triton Knoll Offshore Wind Farm Electrical System" (September 6, 2016)
C-2040	Windstream Energy LLC v. Canada, PCA Case No. 2013-22, Award (September 27, 2016)
C-2053	CNBC article entitled "America's first offshore wind farm is up and running" (December 13, 2016)
C-2054	Ørsted News Release "DONG Energy Wind Power US Inc and Eversource Announce Partnership to Make Large-Scale Offshore Wind a Reality in the United States" (December 14, 2016)
C-2056	Equinor Press Release entitled "Statoil wins offshore wind lease in New York" (December 16, 2016)
C-2060	GWEC Global Wind Report - Annual Market Update (2017)
C-2061	Ontario's Long-Term Energy Plan (2017)
C-2062	Northland Power Inc. 21st Annual Report (2017)

Exhibit #	File Name/Description
C-2069	Macquarie Press Release entitled "Macquarie Capital and DONG Energy to invest into Swancor Renewable's 128MW Formosa 1 offshore wind farm in Taiwan" (January 25, 2017)
C-2070	Renewables Now article entitled "Lake Erie 20.7-MW wind project seeks Ohio approval" (February 3, 2017)
C-2071	Email from David Mars (WEI) to Daniel Brown (WEI) re 2017 WIS Data Room (February 7, 2017)
C-2073	Letter from Ian Baines (WWIS) to Ministry of Environment and Climate Change (MOECC) - "Re: Updated Project Description for the Wolfe Island Shoals Offshore Wind Farm FIT Contract F-000681-WIN-130-602" (February 15, 2017)
C-2074	ORTECH Report: Project Description - Wolfe Island Shoals Offshore Wind Farm (February 15, 2017) (February 15, 2017)
C-2075	ORTECH Status Report: Summary of Engineering and Environmental Studies in Support of the Wolfe Island Shoals Offshore Wind Farm (February 15, 2017)
C-2077	Northland Power Inc. Press Release entitled "Northland Power Agrees to Acquire 252 MW German Offshore Wind Farm" (March 3, 2017)
C-2081	Flanders Investment & Trade Market Survey Report entitled The Offshore Wind Market in Taiwan (April 2017)
C-2082	Windstream Payouts (April 21, 2017-December 31, 2020)
C-2085	KeyBanc Capital Markets Engagement Letter ("KBCM - Windstream I EL - Fully Executed) (May 1, 2017)
C-2088	Letter from Torys LLP to Ontario Energy Board re Henvey Inlet Wind LP Application for Leave to Construct (EB-2016-0310) enclosing Applicant's Reply Submissions (May 4, 2017)
C-2091	Maryland Public Service Commission Press Release entitled "Maryland PSC Awards ORECS to Two Offshore Wind Developers Projects to Create Jobs, Economic Development in New Industry" (May 11, 2017)
C-2092	Northland Power 2019 Annual Report (2019)
C-2104	Email from Tyler Nielsen (KeyBanc) to David Mars (WEI) re Windstream Buyers (July 6, 2017)
C-2105	EDPR Press Release entitled “EDPR announces sale of additional 13.4% in UK wind offshore project” (November 16, 2018)”
C-2112	Northland Power Press Release entitled "Northland Power's Deutsche Bucht Offshore Wind Farm Reaches Financial Close" (August 18, 2017)
C-2115	ENGIE Press Release entitled "EDPR Renováveis and ENGIE consortium is awarded long-term CfD for 950MW offshore wind project in UK" (September 11, 2017)
C-2116	Government of United Kingdom CFD Round 2 Results (September 11, 2017)
C-2117	Offshorewind.biz article entitled "Three Offshore Wind Projects Secure Contracts for Difference as Strike Prices Go Down" (September 11, 2017)

Exhibit #	File Name/Description
C-2121	Innergex 2019 Annual Report (December 31, 2019)
C-2122	WWIS Marketing Update (KeyBank capital Markets) Presentation (September 28, 2017)
C-2123	Email from [redacted] to Daniel Brown (WEI) re Follow up questions/comments (October 9, 2017) with attached Management Discussion Analysis (MDA) 2016-2017 (Redacted)
C-2126	Green Giraffe publication entitled "The Green Giraffe Deutsche Bucht story" (December 1, 2017)
C-2127	New York Times article entitled "After 16 Years, Hopes for Cape Cod Wind Farm Float Away" (December 19, 2017)
C-2128	Swancor Holdings Company Limited and Subsidiaries Consolidated Financial Statements - December 31, 2017 and 2016
C-2132	CANWEA Ontario Market Profile (2018)
C-2133	Generation Energy Council Report (2018)
C-2134	GWEC Global Wind Report - Annual Market Update (2018)
C-2135	RWE 2018 Annual Report
C-2136	Report (US DOE), 2018 Offshore Wind Technologies Market Report (2018)
C-2137	Partners Group Press Release entitled "Partners Group to become largest investor in 730MW Dutch offshore wind farm project" (January 8, 2018)
C-2139	Jones Day paper entitled "Taiwan Offshore Wind Farm Projects: Guiding Investors through the Legal and Regulatory Framework (February 2018)
C-2141	Email from Nancy Baines (WWIS) to Emerging Renewable Power Program (ERPP) re Windstream Wolfe Island Shoals - ERPP EOI Application -#2 of 3 (February 11, 2018) with attached (a) WWIS ERPP EOI Form s.2.4 – General Map (February 11, 2018); (b) WWIS ERPP EOI Form s2.4 – Turbine Locations (February 11, 2018); (c) WWIS ERPP EOI Form s2.8 – Financing Strategy (February 11, 2018)
C-2146	Press Release by Canada Energy Regulator entitled "Market Snapshot: Why is Ontario's electricity demand declining?" (March 21, 2018)
C-2147	EDPR Press Release: entitled "EDPR announces sale of 20% stake in UK wind offshore project" (March 23, 2018)
C-2150	Orsted.com article entitled "Ørsted commits to invest in the second phase of Taiwan's Formosa 1 offshore wind farm" (April 26, 2018)
C-2152	EDF Renewables Press Release entitled "EDF Group buys Mainstream Renewable Power offshore wind project" (May 3, 2018)
C-2153	Capital IQ Pro Deal Profile: "EDF Energy acquires Neart na Gaoithe from Mainstream Renewable Power" (May 3, 2018)
C-2154	Reuters.com article entitled "France's EDF buys Scottish offshore wind project" (May 3, 2018)

Exhibit #	File Name/Description
C-2155	Orsted.tw article entitled "Financial close achieved for Taiwan's Formosa 1 offshore wind farm" (June 2018)
C-2157	Moray East Press Release entitled "Moray East Offshore Wind Farm confirms financial close" (December 6, 2018)
C-2158	Offshorewind.biz article entitled "France Reduces Feed-In Tariffs for 6 Offshore Wind Projects" (June 20, 2018)
C-2159	IJ Global article entitled "Borssele III/IV offshore wind Netherlands" (July 5, 2018)
C-2165	Green Tech Media "First Large US Offshore Wind Project Sets Record-Low Price Starting at $74 per MWh" (August 1, 2018)
C-2167	Innogy Press Release entitled "Innogy finds new partners for its Triton Knoll Offshore Wind Farm" (August 13, 2018)
C-2168	Tritonknoll.co.uk Press Release entitled "New Partners announced for Triton Knoll Offshore Wind Farm" (August 13, 2018)
C-2170	Triton Knoll Press Release entitled "Triton Knoll confirms Financial Close with major turbine deal and east coast port plans" (August 31, 2018)
C-2182	Ørsted News Release entitled "Ørsted acquires Deepwater Wind and creates leading US offshore wind platform" (October 8, 2018)
C-2185	Offshorewind.biz-article entitled "Formosa 2 Power Purchase Agreement All Set" (December 12, 2018)
C-2186	EDPR Press Release entitled "EDPR sells 13.5% stake in French offshore wind projects" (December 18, 2018)
C-2187	Prefect of the Vendee Press Release entitled "Le préfet de la Vendée accorde de nouvelles autorisations nécessaires à la réalisation du parc éolien en mer au large des îles d'Yeu et de Noirmoutier" (December 19, 2018)
C-2188	PR Newswire article entitled "US Wind Inc Agrees to Sell its New Jersey Offshore Lease to EDF Renewables North America" (December 20, 2018)
C-2189	EDPR Consolidated Annual Accounts and Consolidated Management Report 2018 (as at December 31, 2018)
C-2191	Bank of Canada Annual Report 2019
C-2192	Boralex Inc. 2019 Annual Report
C-2193	Eversource 2019 Annual Report
C-2194	GWEC Global Wind Report - Annual Market Update (2019)
C-2195	IESO Year-End Data (2019)
C-2196	IRENA Power Generation Costs 2019 Data File
C-2197	IRENA Power Generation Costs 2019
C-2198	Ørsted 2019 Annual Report
C-2199	Swancor 2019 Annual Report
C-2201	Pattern Energy Q2 2019 Financial Results

Exhibit #	File Name/Description
C-2204	Equinor News Releases entitled "Equinor offshore wind bid wins in New York State" (2019)
C-2208	Eversource News Release entitled "Orsted and Eversource Enter 50-50 Partnership Agreement on Key Offshore Wind Assets in the Northeast" (February 8, 2019)
C-2209	Ørsted Press Release entitled "Orsted divests 50 of South Fork Revolution Wind and two New England offshore wind lease areas to Eversource" (February 8, 2019)
C-2210	Prefect of the Seine-Maritimen Press Release entitled "State services in Seine-Maritime: Construction of the offshore wind farm off Dieppe and Tréport and its connection (February 26, 2019)
C-2216	Green Giraffe Presentation entitled "Recent trends in offshore wind finance" (April 4, 2019)
C-2226	Smart Energy article entitled "France EU Commission approves six new offshore wind plants" (July 30, 2019)
C-2229	SP Belle River Wind Purchase and Sale Agreement (August 2, 2019)
C-2230	North Kent Wind Purchase and Sale Agreement (August 2, 2019)
C-2232	Inframationgroup article entitled "Taiwan's Swancor sells offshore wind developer to Stonepeak" (August 12, 2019)
C-2236	Analysis: "Record-low price for UK offshore wind cheaper than existing gas plants by 2023" - CarbonBrief (September 20, 2019)
C-2238	NYSERDA Report entitled "Launching New York's Offshore Wind Industry - Phase 1 Report" (October 2019)
C-2240	Pattern Canada Finance Company and Pattern Energy Group LP Purchase and Sale Agreement (October 10, 2019)
C-2241	Government of United Kingdom CFD Round 3 Results (October 11, 2019)
C-2242	PR Newswire Press Release Archive entitled "Pattern Development and Henvey Inlet First Nation Complete Largest First Nation Wind Project in Canada (October 15, 2019)
C-2243	Brookfield Renewable Partners LP 2019 Annual Consolidated Financial Statements (February 28, 2020)
C-2244	Formosa2windpower.com article entitled "Financial close achieved for Taiwan's Formosa 2 offshore wind farm" (October 29, 2019)
C-2250	EDF Renewables Press Release entitled "The EDF Group launches the construction of Neart na Gaoithe 450 MW offshore wind farm along with new Irish partner, ESB" (November 28, 2019)
C-2251	Canadian Wind Energy Association - Canada Installed Capacity (December 2019)
C-2255	CNBC article entitled "US has only one offshore wind energy farm but a 70 billion market is on the way" (December 13, 2019)
C-2256	Netherlands RVO publication entitled "Borssele Wind Farm Sites III & IV" (December 14, 2019)

Exhibit #	File Name/Description
C-2257	Santander Report entitled "[+] 187MW on-shore windfarms won 15-year support in auctions" (December 20, 2019)
C-2259	Arise AB (publ) Annual Report (December 31, 2019)
C-2260	EDPR 2019 Independent Auditor's Report - Consolidated Annual Accounts and Consolidated Management Report (as at December 31, 2019)
C-2261	Windstream Wolfe Island Shoals Inc. Financial Statements (December 31, 2019)
C-2262	United States Securities and Exchange Commission Form 10K for Pattern Energy Group Inc. for fiscal year ended December 31, 2019 (December 31, 2019)
C-2263	Fintel 2019-12-31 Annual Report Consolidated - English (December 31, 2019)
C-2264	Terna Energy 2019 Annual Financial Report (December 31, 2019)
C-2265	Polenergia S.A. Group Directors' Report for the Year Ended December 31, 2019
C-2270	CPS Quarterly 2020 Q1
C-2271	2020 Valuation Handbook - International Guide to Cost of Capital, Chapter 3: International Equity Risk Premia
C-2272	Canada's Energy Future 2020
C-2273	Deloitte 2020 Corporate Income Tax Rates
C-2274	Global Landscape Renewable Energy Finance (2020), IRENA
C-2275	GWEC Global Offshore Wind Report (2020)
C-2276	IRENA Global Renewables Outlook 2020
C-2277	IRENA NDC Update 2020
C-2278	International Value Standards (IVS) 2020
C-2280	Progress Report on Ontario's Climate Change Actions (2020)
C-2281	Johnson, Dr. Howard E, CPA Canada "Business Valuation in Canada" (2020)
C-2283	A Healthy Environment and a Healthy Economy Plan by Environment and Climate Change Canada (February 2020)
C-2284	Polenergia Equinor Facts and Figures - Baltyk (2020)
C-2285	EDP Renovaveis, S.A. 2019 Volumes & Capacity Statement (January 21, 2020)
C-2286	Bloomberg forecasted yield curve of 3-month CDOR rates over next 50 years (February 3, 2020)
C-2287	Equinor - Capital Markets Update (February 6, 2020)
C-2289	Letter from Michael Lyle (IESO) to Nancy Baines re Feed-in Tariff Contract F-000681-WIN-130-602 between IESO and the Supplier dated May 4, 2010 - Notice of Termination pursuant to Section 10.1(g) (February 18, 2020).
C-2293	Polenergia 2019 Investor Presentation (March 2020)
C-2295	Terna Energy FY 2019 Results Presentation (March 4, 2020)
C-2303	Sumitomocorp.com article entitled "Participation in European offshore wind power projects" (June 2020)

Exhibit #	File Name/Description
C-2304	Letter from Goodmans to M. Seers re backup for Bill of Costs (June 3, 2020)
C-2315	Article published by Natural Resources Canada entitled "10 Key Facts on Canada's Energy Sector" (September 2020)
C-2318	Equinor Press Release entitled "Equinor partners with BP in US offshore wind to capture value and create platform for growth" (September 10, 2020)
C-2325	Government of Canada: Renewable Energy Facts (October 6, 2020)
C-2328	Clean Energy for Rural and Remote Communities - BioHeat, Demonstration & Deployment Program Streams (October 18, 2020)
C-2329	Low Carbon Contracts Company congratulates generators passing their 12-month milestones (October 2019)
C-2336	GWEC Global Wind Report - Annual Market Update (2021)
C-2337	ORTECH Memorandum to Ian Baines (WEI) Re: Required Wind Power Allocation Blocks (January 7, 2022)
C-2338	IRENA Renewable Energy Capacity Statistics 2021
C-2339	CFD Allocation Round portal -"Department for Business Energy and Industrial Strategy" (2021)
C-2341	Equinor News Release entitled "Equinor selected for largest-ever US offshore wind award" (January 2021)
C-2343	Government of Canada "Capital cost allowance CCA" (Modified January 18, 2021)
C-2352	Insurance Premium Quotes – P60 Indications Scenario A
C-2359	Polenergia S.A. Company Profile, Capital IQ Pro (April 1, 2021)
C-2363	Arise AB (publ) Public Company - Company Profile - S&P Capital IQ (April 13, 2021)
C-2368	TransAlta Renewables 2019 Annual Report (February 28, 2020)
C-2369	Clean Energy for Rural and Remote Communities funded projects Natural Resources Canada (May 13, 2021)
C-2374	whiteowlcap.com website: "White Owl Capital - Welcome - Early Stage Tech and Energy Investment - About Us" (June 15, 2021)
C-2375	Ontario Energy Board Regulated Price Plan – Price Report November 1, 2019 to October 31, 2020 (October 22, 2019)
C-2377	Swancor-renewable.com article entitled "Milestones - Swancor Renewable Energy (July 2021)
C-2398	EDP Renováveis Company Profile, Capital IQ Pro (October 13, 2021)
C-2400	Smart Grid Program (nrcan.gc.ca) (October 28, 2021)
C-2402	CBV Institute Practice Bulletin No. 2 (November 2021)
C-2406	Ørsted A/S Company Profile, Capital IQ Pro (November 9, 2021)
C-2409	905085 Ontario Inc. and WOCP Accruals to February 18, 2020 (February 15, 2022)
C-2410	Orennia "Offshore Wind-lytics Sea you there" (November 15, 2021)

Exhibit #	File Name/Description
C-2412	Windpowerengineering.com article entitled "New York's 1st offshore wind project is up for construction approval this January" (November 24, 2021)
C-2431	Website (LEEDco), The Project: Ice Breaker Wind (February 2022)
C-2438	IESO - Hourly Ontario Energy Price (HOEP) (February 2022)
C-2446	BOEM State Activities: "Commercial Leases OCS-A 0520 0521 and 0522 (February 2022)
C-2447	BOEM State Activities: "Atlantic Shores" (February 2022)
C-2448	BOEM State Activities: "Bay State Wind (OCS-A 0500)" (February 2022)
C-2449	BOEM State Activities: "Commercial Wind Leasing Offshore New Jersey" (February 2022)
C-2450	BOEM State Activities: "Commercial Wind Leasing Offshore Rhode Island and Massachusetts" (February 2022)
C-2451	BOEM State Activities: "CVOW-C" (February 2022)
C-2452	BOEM State Activities: "Delaware Activities" (February 2022)
C-2453	BOEM State Activities: "Empire Wind" (February 2022)
C-2454	BOEM State Activities: "Maryland Activities" (February 2022)
C-2455	BOEM State Activities: "Massachusetts Lease OCS-A 0500 (Bay State Wind) and OCS-A 0501 (Vineyard Wind)" (February 2022)
C-2456	BOEM State Activities: "Sunrise Wind Activities" (February 2022)
C-2457	BOEM State Activities: "Vineyard Wind South" (February 2022)
C-2492	Kinetic Blueprint LLC Invoice #Wind-13 (September 1, 2020)
C-2493	Taiwan Today news article "Taiwan Review – Fair Winds" (undated)
C-2494	News article "EDF Renewables, Enbridge and wpd launch construction of the Calvados offshore wind farm" (February 22, 2021)

Appendix 7 Glossary

Term	Definition
2010 Plan	Ontario's first Long-Term Energy Plan introduced in 2010
2013 Plan	Ontario's Long-Term Energy Plan introduced in 2013
2015 URS Report	Report prepared by Aecom Canada Ltd / URS dated November 6, 2015, on behalf of Canada in NAFTA 1; also RER-URS-2
2017 Plan	Ontario's Long-Term Energy Plan introduced in 2017
4C Report	Report of Mr. Richard Auckland of 4C Offshore dated February 18, 2022; also CER-4C Offshore-3
Alleged Breaches	Collective reference to the allegations stated in paragraph 1.8
Canada	Government of Canada; also Respondent
CAPEX	Construction Expenditure
CAPM	Capital Asset Pricing Model
CCA	Capital Cost Allowance
CDOR	Canadian Dollar Offer Rate
CER-4C Offshore-3	Report of Mr. Richard Auckland of 4C Offshore dated February 18, 2022; also 4C Report
CER-Power Advisory-2	Report of Power Advisory dated February 18, 2022; also Power Advisory Report
CER-Two Dogs	CER-Two Dogs (Capex Opex Sensitivity Report); report of Mr. Ian Irvine of Two Dogs Projects Ltd. dated February 18, 2022; also Two Dogs Report
CER-Wood	Report of Wood Group plc (formerly SgurrEnergy) dated February 18 2022; also Wood Report
CfD	Contracts for Difference
CIDOR	Canadian Three-Month Interbank Rate
Claimant	Windstream Energy LLC; also Windstream
COD	Commercial Operations Date; the date at which the Project would have completed construction and reached Commercial Operations
CoE	Cost of Equity
Council	Generation Energy Council
Counsel	Torys LLP
CPI	Consumer Price Index
CSR	Canadian Seabed Research
DCF	Discounted cash flow
DEVEX	Planning and Development Expenditure

Term	Definition
DGE	Diamond Generating Europe
DSCR	Debt Service Coverage Ratio
DSRA	Debt Service Reserve Account
EDPR	EDP Renováveis, S.A.
ERP	Equity risk premium
ERPP	Emerging Renewable Power Program Application
EV	Enterprise Value
FA	Fisheries Act
FC	Financial Close; also Final Investment Decision
FID	Final Investment Decision; also FC
First NAFTA Award	Award issued to Windstream by the arbitral tribunal on September 27, 2016
FIT Contract	Feed-in-Tariff contract entered into by WWIS with the OPA
FIT Contract Price	$0.19/kWh, which is the Contract Price before indexation
FMV	Fair Market Value
GBF	Gravity Based Foundation
GW	Gigawatt
GWEC	Global Wind Energy Council
HOEP	Hourly Ontario Energy Price
IESO	Independent Electricity System Operator
Indexed FIT Contract Price	$253.8/MWh (at COD)
Innogy	Innogy Renewables UK Limited
Investment	Claimant’s investment in the Project
IRR	Internal Rate of Return
IVSC	International Valuation Standards Council
KeyBanc	KeyBanc Capital Markets
kW	Kilowatt
kWh	Kilowatt hour, which is the amount of electricity used in an hour
LCOE	Levelized cost of electricity
MCOD	Milestone Date for Commercial Operation
MECP	Ontario’s Ministry of the Environment, Conservation and Parks; formerly MOE or MOECC
MEI	Ministry of Energy

Term	Definition
Mergerstat	FactSet Mergerstat
MNR	Ontario's Ministry of Natural Resources; now MNRF
MNRF	Ontario's Ministry of Natural Resources and Forestry; formerly MNR
MOE	Ontario's Ministry of Environment; now MECP
MOECC	Ontario's Ministry of Environment and Climate Change; formerly MOE and now MECP
Moratorium	Moratorium on offshore wind energy projects in Ontario issued by the Ontario Government on February 11, 2011
MW	Megawatt
NAFTA	North American Free Trade Agreement; also the Treaty
NAFTA 1	Arbitration proceedings that commenced with the Notice of Arbitration filed by Windstream against the Respondent under Chapter 11 of the NAFTA on January 28, 2013
NOA	Notice of Arbitration dated December 22, 2020
NPV	Net Present Value
NWA	Navigable Waters Act
O&M	Operating and maintenance
OPA	Ontario Power Authority
OPEX	Operational Expenditure
Original MCOD	May 4, 2015, which is 5 years from the FIT Contract date
OVHS	Offshore high voltage substation
Parties	The Claimant and Respondent collectively
Power Advisory Report	Report of Power Advisory dated February 18, 2022; also CER-Power Advisory-2
PPA	Power Purchase Agreement
Project	Windstream's planned offshore wind power generation facility located off the coast of Wolfe Island, near Kingston, Ontario
REA	Renewable Energy Approval
Respondent	Government of Canada
Revised MCOD	January 2025, which is the original MCOD extended "for such reasonable period of delay directly resulting from such Force Majeure event"
Secretariat	Chris Milburn and Edward Tobis
Total Capacity	Development and operating capacity
Treaty	North American Free Trade Agreement; also NAFTA
Two Dogs Report	Report of Mr. Ian Irvine of Two Dogs Projects Ltd. dated February 18, 2022; also CER-Two Dogs (Capex Opex Sensitivity Report)

Term	Definition
UCC	Undepreciated Capital Cost
Valuation Date	February 18, 2020; the day the FIT Contract was officially terminated
WACC	Weighted Average Cost of Capital
Windstream	Windstream Energy LLC; also Claimant
Wood Report	Report of Wood Group plc (formerly SgurrEnergy) dated February 18 2022; also CER-Wood
WTGs	Wind turbine generators
WWIS	Windstream Wolfe Island Shoals Inc.; a subsidiary of the Claimant

Appendix 8 CV of Chris Milburn

Chris Milburn

Managing Director

Contact Details

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cmilburn@secretariat-intl.com

Professional History

- Secretariat
- FTI Consulting
- LECG
- Low Rosen Taylor Soriano
- Arthur Andersen

Education

- Chartered Business Valuator (CBV), 2004
- Chartered Professional Accountant (CPA), Certified Management Accountant (CMA), 2000
- BA, Economics, University of Western Ontario, 1992

Professional Associations

- Canadian Institute of Chartered Business Valuators
- Chartered Professional Accountants Canada
- Toronto Commercial Arbitration Society
- Young Canadian Arbitration Practitioners
- Prospectors and Developers Association of Canada

Current Position

Mr. Milburn is a Managing Director at Secretariat Advisors (Canada) and is based in Toronto. He is a Chartered Professional Accountant, Certified Management Accountant (CPA/CMA), a Chartered Business Valuator (CBV) and is a Qualified Valuator under the Canadian Institute of Mining's Valuation Standards and Guidelines (CIMVAL).

Professional Experience

He has 24 years of experience in the quantification of economic damages and the valuation of business interests and forensic/financial investigations in the context of international arbitrations, commercial litigation, insurance litigation, personal injury litigation, tax litigation, and consulting for internal business purposes.

He has prepared expert opinion reports on valuation and economic damages issues in disputes before Canadian US, UK and Australian courts, commercial arbitrations and investor-state arbitrations under many forums including the International Centre for the Settlement of Investment Disputes (ICSID), Permanent Court of Arbitration (PCA), International Chamber of Commerce (ICC), and the London Court of International Arbitration (LCIA).

His work experience includes hundreds of matters relating to assets and business interests across the world, involving billions of dollars in dispute across many industries including energy, mining, oil and gas, financial services, asset management, manufacturing, textiles, software, and pharmaceuticals.

Mr. Milburn has extensive experience in the valuation and quantification of damages relating to energy and resource projects located all over the world. His work includes projects located in North America, South America, Central America, Australia, Asia Africa and Europe.

Mr. Milburn has provided expert testimony relating to valuation and economic damages issues numerous times including in international arbitration cases heard at the World Bank in

Washington D.C., the World Bank in Paris, the New York International Arbitration Centre, Maxwell Chambers in Singapore, and Arbitration Place in Toronto.

He has been recognized as a leading expert in the field of damages and valuation in the International Who's Who of Arbitration Expert Witnesses by Who's Who Legal since 2014. He has also been recognized as one of the leading arbitration expert witnesses in Canada in Who's Who Legal Canada since its inception in 2015 and has been named to the list of top mining experts since the mining list included experts in 2019. Comments on Mr. Milburn in the independent WWL publications include *"Chris is a top testifying expert and is simply excellent" and that he "has the ability to explain difficult concepts and to provide clear and convincing reasons for his conclusions."*

Mr. Milburn speaks regularly on damage quantification and valuation issues and has been involved in the education and training of professional valuators as well as advocacy training programs for lawyers for many years.

Representative Engagements

- Valuation and quantification of economic damages related to an International Center for the Settlement of Investment Disputes (ICSID) arbitration involving a number of hydro power generation and combined heat and power plants (CHPs) in Kazakhstan. Prepared expert reports including a damages analysis with respect to the impact of legislative changes by the Kazakh government to the tariff and regulatory regime on the claimant's operations, its rate of return, and value of its power generation assets in Kazakhstan. Matter resolved;
- Valuation and quantification of economic damages related in a NAFTA dispute related to the alleged expropriation of a natural gas concession located under the Saint-Lawrence River in Québec. Prepared damages reports quantifying damages to the claimants and testified at the hearing. Award pending;
- Valuation and quantification of economic damages related to a NAFTA dispute related to the alleged expropriation of a wind power generation project in Ontario. Matter ongoing;
- Valuation and quantification of economic damages in a Permanent Court of Arbitration (PCA) investment treaty arbitration relating to an eco-tourism site in Barbados. Prepared expert reports quantifying damages to the claimant due to the alleged environmental contamination and testified at the hearing. Matter resolved;
- Valuation of a holding company with numerous mining and petroleum assets in West Africa including an iron ore mine in Sierra Leone, a manganese project, and offshore oil and gas assets. Prepared expert reports on valuation and economic damages issues. Matter resolved;
- Valuation of mineral project and quantification of damages in a treaty case under UNCITRAL rules related to a production stage gold project in Asia. Prepared expert reports quantifying damages to the claimant and testified at the hearing. Award pending;
- Valuation of mineral project and quantification of damages in a treaty case under the ICSID rules related to a construction stage gold project in Central America. Prepared expert reports on valuation and economic damages and testified at the hearing; Matter resolved;

- Valuation of mineral project and quantification of damages in a treaty dispute under ICSID, regarding an iron ore project in Mauritania. Prepared expert reports including a valuation of the Claimant's investment, and testified at the hearing. Matter resolved;
- Valuation of mineral project and quantification of damages in a treaty case under UNCITRAL rules related to a silver, lead, and zinc project in South America. Prepared expert reports quantifying damages to the claimant and testified at the hearing. Matter resolved;
- Valuation of mineral projects and quantification of damages in a treaty case under UNCITRAL rules related to a silver, indium and gallium project in South America. Prepared expert reports and testified at the hearing. Matter resolved;
- Valuation of mineral project and quantification of damages in a treaty case under UNCITRAL rules related to a copper, silver, and molybdenum project in South America. Prepared expert report quantifying damages to the claimant and testified at the hearing. Matter resolved;
- Retained to provide independent opinions on mineral valuation issues in a litigation between the U.S. Securities and Exchange Commission and Rio Tinto plc relating to financial disclosure pertaining to a number of thermal and coking coal concessions in Mozambique, Africa. Prepared an expert report and rebuttal report on valuation issues. Matter ongoing;
- Valuation of mineral project and quantification of damages in a commercial arbitration related to a lithium, tin and coltan project in Africa. Prepared expert report quantifying damages to the claimant. Matter ongoing;
- Valuation of a previously producing iron ore mineral property in the US in a matter before the Bankruptcy Court of the State of Utah. Prepared expert reports. Matter resolved;
- Valuation of mineral project and quantification of damages in a treaty dispute under ICC, regarding an iron ore project and related rail and port infrastructure in Senegal. Prepared expert reports including a valuation of the Claimant's investment, and attended the hearing. Matter resolved;
- Valuation of mineral project and quantification of damages in a treaty dispute under ICSID, regarding a bituminous thermal coal project in Asia. Prepared expert report quantifying damages to the claimant. Matter resolved;
- Valuation of mineral project and quantification of damages in a treaty case under the ICSID rules related to an exploration stage copper project in Central America. Prepared expert reports on valuation and economic damages and attended the hearing. Decision pending;
- Assessment of economic damages in a commercial arbitration between two large international mining companies relating to an acquisition of a palladium group metals project in Africa. Matter ongoing;
- Quantification of lost profits and other economic damages due to business interruption following a fire at a zinc/lead mine in Australia. Matter ongoing;
- Valuation of mineral properties in the US relating to a producing palladium group metals project in a matter before the Delaware courts. Prepared expert reports. Decision pending;
- Valuation of mineral project and quantification of damages in a treaty case under UNCITRAL rules

regarding a gold project in Western Europe. Prepared expert reports and attended the hearing. Decision pending;

- Quantification of damages in treaty arbitration under ICSID relating to the alleged expropriation of a metallurgical processing facility in South America. Prepared reports quantifying damages to the Claimants and attended the hearing at the World Bank in Paris. Matter resolved;
- Assessment of damages claims in an International Chamber of Commerce (ICC) arbitration related to the contract mining costs of a zinc, lead and silver mine in South America. Prepared expert report and reply reports and attended hearing. Matter resolved;
- Valuation of mineral concessions and quantification of economic damages in a dispute before the Ontario Mining Commissioner relating to exploration stage gold mineral concessions in Northern Ontario. Matter resolved;
- Quantification of damages in an ICC case related to a lead and zinc mining project in Western Africa: Prepared expert reports and attended hearing. Matter resolved;
- Quantification of damages in a commercial dispute under the British Columbia International Commercial Arbitration Act involving a large copper and gold deposit in Asia: Prepared expert report calculating damages to the claimant and attended the hearing. Matter resolved;
- Consulting project analyzing the level of "government take" applicable to a potash and phosphate rock mining company in the Middle East relative to comparable companies and other countries in connection with a government review of mineral tax policies. Matter resolved.
- Quantification of damages in an ICC treaty dispute related to a copper/cobalt mining project in Africa: Managed project team in the preparation of a critique report of the claimant's expert report in an investor-state dispute under the ICC. Prepared expert report. Matter resolved; and,
- Valuation of gold mineral properties for two exploration and development companies with interests in South America prior to nationalization. Matters resolved.

Education/Professional Designations

- Chartered Business Valuator (CBV) – 2004
- Chartered Professional Accountant (CPA)/Certified Management Accountant (CMA) – 2000
- B.A. (Economics) at the University of Western Ontario – 1992

Positions Held

- Managing Director, Secretariat International – December 2018 to Present
- Managing Director, FTI Consulting Canada ULC – April 2009 to December 2018
- Senior Managing Consultant, LECG Canada Ltd. – March 2004 to March 2009
- Senior Consultant, Low Rosen Taylor Soriano – April 1998 to April 2004

- Consultant, Arthur Anderson – April 1997 to March 1998

Other

- Panelist at Energy & Resources Law Association webinar, "The Effect of U.S. Climate Change Policy on Natural Resource Sector in Asia-Pacific", August 2021;
- Webinar presentation to Bennett Jones, "Mining Trends and Valuation Issues", July 2021;
- Panelist at Debevoise & Plimpton webinar, "International Arbitration of Mining Disputes", June, 2021;
- Panelist at Canadian Council of International Law (CCIL) "NAFTA Chapter 11 Looking forward while glancing backward", October 2019.
- Panelist at Latin Lawyer – GAR Live's 3rd Annual Arbitration Summit, "Mining and metals: investment and the environment", April 2019.
- Speaker at event held during the Prospector's & Developers Association of Canada ("PDAC") Conference in March 2018 and 2019, "Trends in Mining Disputes".
- Speaker at event held during the PDAC Conference in March 2017, "Mining Disputes: Lessons and Best Practices".
- Speaker at the Expert Witness Forum, held in Toronto in March 2017, "The Use of Expert Evidence in International Arbitration".
- Speaker at event held during PDAC Conference in March 2016, "Technical and Economic Considerations for NI 43-101 Compliant Technical Reports".
- Speaker at event held during the PDAC Conference in March 2015, "Evidentiary Issues in Presenting a Mining Claim" and "Economic Damage and Technical Issues Faced in Mining Disputes".
- Speaker at event held during the PDAC Conference in March 2014, "Assessing Risks in New Mining Ventures" and "Use of Technical Reports to Assess Value".
- Speaker at CPA Conference on Financial Reporting Conference for the Mining Industry, "Disclosure of Financial and Economic Information under National Instrument 43-101", December 2013.
- Co-author, "Valuation of "Start-Up Oil and Gas and Mining Projects". Global Arbitration Review, the Arbitration Review of the Americas 2011.
- Developed course materials for and acted as an expert witness in mock hearings for the FIAA Expert Witness Trial Practice Programs held in Lausanne Switzerland in 2008-2009, Paris in 2011, New York in 2014 and Washington DC in 2015.
- Authored course materials for the Canadian Institute of Chartered Business Valuators.

Appendix 9 CV of Edward Tobis

Edward Tobis, CPA, CA, CBV

Director

Contact Details

Direct: +647.313.3328
etobis@secretariat-intl.com

Professional History

- Secretariat
- FTI Consulting
- Ap Valuations
- Ernst and Young LLP

Education

- Chartered Business Valuator (CBV), 2015
- Chartered Professional Accountant (CPA), Chartered Accountant (CA), 2012
- BBA, Accounting and Finance, Schulich School of Business, York University, 2009

Professional Associations

- Canadian Institute of Chartered Business Valuators
- Chartered Professional Accountants Canada
- Toronto Commercial Arbitration Society
- Young Canadian Arbitration Practitioners

Current Position

Mr. Tobis is a director at Secretariat International and is based in Toronto. He specializes in the preparation of business valuation and economic damages reports for commercial litigation and international trade and investment disputes. He is a Chartered Professional Accountant, Chartered Accountant (CPA, CA), a Chartered Business Valuator (CBV) and a Qualified Valuator under the Canadian Institute of Mining's Valuation Standards and Guidelines (CIMVAL).

Professional Experience

Mr. Tobis has acted as a business valuator, external auditor, financial consultant and tax advisor for private and public companies, regulatory bodies and governments.

His work experience covers assets and business interests on every continent, spanning multiple industry groups including, mining, oil and gas, energy and infrastructure projects, real estate and gaming. He has prepared numerous expert reports filed in various courts and International Arbitration Hearings around the world. He has provided expert testimony relating to valuation and economic damages issues at an international arbitration case heard at the World Bank in Washington D.C., as well as at the Ontario Superior Court of Justice.

He is recognized as a leading arbitration expert in the field of damages and valuation in the Canadian and international rankings published by the independent Who's Who Legal. Mr. Tobis was described as a *"phenomenal quantum expert"* with *"sweeping knowledge of international laws and damages principles"* who is *"excellent at explaining technical issues" and "crunches through data with incredible speed and alacrity"*.

Mr. Tobis is an instructor for one of the Canadian Institute of Chartered Business Valuators' mandatory courses entitled "Level IV – Special Topics in Business Valuation". This course covers topics such as the quantification of economic damages, the role of a valuation expert in the litigation process, and various tax issues faced in the context of business valuations.

Mr. Tobis graduated from the Bachelor of Business Administration Honours program at the Schulich School of Business at York University in 2009, where he specialized in Accounting and Finance.

Representative Engagements

- Preparation of an economic damages report in connection with a post transaction dispute relating to a cogeneration power plant in the United States. (Supreme Court of the State of New York)
- Preparation of valuation and economic damage reports on behalf of an American oil and gas producer pursuing an investment expropriation claim against the Government of Canada relating to the alleged expropriation of a natural gas concession located under the Saint-Lawrence River in Québec. (NAFTA)
- Preparation of economic damages reports in connection with a grain terminal in Eastern Europe, pursuant to a commercial arbitration between two parties in a joint venture agreement. (ICC)
- Preparation of a valuation and economic damages report on behalf of an Asian state-owned oil and gas company in connection with a failed transaction with a South American oil and gas producer. (ICC)
- Preparation of expert reports in a matter requiring an economic analysis of the financial performance of several real estate holding companies based in Toronto, Ontario in connection with a shareholders' dispute. Testified at the trial in the Ontario Superior Court of Justice.
- Preparation of valuation and economic damages reports on behalf of a Canadian company pursuing an investment expropriation claim against a Central American government relating to the alleged expropriation of a construction stage gold project. Testified at the hearing. (ICSID)
- Preparation of an expert report on behalf of a European gaming company in connection with a breach of contract dispute with a European government. (LCIA)
- Preparation of an economic advisory expert report in connection with a commercial arbitration between two multinational companies in the consumer electronics industry. (ICC)
- Preparation of economic damages analyses due to business interruption following a fire at a zinc/lead mine in Australia. (Supreme Court of Queensland)
- Acted as an advisor to shareholders of a Canadian biopharmaceutical company in connection with a shareholder dispute.
- Preparation of valuation and economic damages reports on behalf of a European gaming company pursuing an investment expropriation claim against a South American government. (ICSID)
- Preparation of a valuation and economic damages report on behalf of an Australian company pursuing an investment expropriation claim against an Asian government relating to a production stage gold project. (UNCITRAL)
- Preparation of valuation and economic damages reports on behalf of a Panamanian company pursuing an investment expropriation claim against a Western European government relating to a development stage gold project. (UNCITRAL)
- Preparation of economic damages reports on behalf of an Asian oil and gas producer in connection with a natural gas supply contract dispute. (ICC)
- Preparation of valuation and economic damages analyses on behalf of an Asian oil and gas producer pursuing a shareholder oppression claim against an Eastern European gas distribution company. (High Court of Justice Business and Property Courts of England and Wales)

- Preparation of valuation and economic damages reports on behalf of a Canadian oil and gas producer in connection with a post transaction dispute relating to certain oil and gas assets in Alberta. (Court of Queen's Bench of Alberta)
- Preparation of a purchase price allocation for a Canadian based electronic gaming company for financial reporting purposes in connection with a planned initial public offering.
- Acted as an advisor to a European uranium miner in connection with a post transaction dispute.
- Preparation of a valuation report on behalf of a Swiss metals trading company in connection with a dispute regarding numerous mining and petroleum assets in West Africa including a manganese project, an iron ore mine, and offshore oil and gas assets. (High Court of Justice Chancery Division)
- Assisted in the preparation of a valuation report on behalf of an investment fund in connection with a post transaction dispute relating to a producing palladium group metals project in the U.S. (Delaware Chancery Court)
- Preparation of economic damages and valuation analyses on behalf of an investment fund pursuing a dissent remedy claim against a Canadian oil and gas producer. (Court of Queen's Bench of Alberta)
- Preparation of valuation reports of several real estate holding companies based in Ontario, Canada in connection with tax compliance, matrimonial matters, and to support a potential transaction.
- Assisted in the preparation of an economic damages report involving several multi-residential real estate properties based in Toronto, Canada. (Ontario Superior Court of Justice)
- Preparation of an economic damages report on behalf of an IT service delivery company in connection with a dispute with Her Majesty the Queen in Right of Ontario.
- Preparation of financial advisory reports for the Competition Bureau of Canada to assist with its assessment of a proposed transaction in the Canadian propane industry.
- Preparation of economic damages reports on behalf of a Canadian pharmaceutical company in connection with a supply contract dispute. (Ontario Superior Court of Justice)
- Preparation of an economic damages report on behalf of a Canadian pharmaceutical company in connection with a patent infringement dispute. (Federal Court of Canada)
- Testifying expert for a valuation report prepared in connection with a matrimonial dispute involving the valuation of a dental practice. (Ontario Superior Court of Justice)
- Acted as a financial advisor to an insurance company in connection with its due diligence assessment of several merger and acquisition transactions in various industries.
- Preparation of an economic damages report on behalf of an Asian natural gas distribution company pursuing an investment expropriation claim against an Eastern European government. (UNCITRAL)
- Preparation of economic damages report on behalf of an American toy company in connection with a patent infringement dispute. (United States District Court Central District of California, Western Division)
- Preparation of financial advisory reports for the Competition Bureau of Canada to assist with its assessment of a proposed transaction in the Canadian telecommunications industry.
- Quantification of economic damages on behalf of an international mining and petroleum company relating to alleged defects in the construction of a Potash mine in Canada.

- Preparation of a valuation and economic damages report on behalf of a Canadian investor in a Permanent Court of Arbitration (PCA) investment treaty arbitration relating to an eco-tourism site in Barbados.
- Preparation of an interest rate reasonability report on behalf of a Canadian based charity in connection with a dispute with the Canada Revenue Agency.
- Preparation of a valuation and income analysis report for an Ontario based taxi company in connection with an estate dispute.
- Acted as a financial advisor to a Canadian auto parts manufacturer in connection with a post transaction dispute.
- Preparation of an economic damages report in connection with a wrongful termination dispute in the Ontario trucking industry.
- Preparation of a valuation report on behalf of the Canadian Department of Justice in connection with a tax dispute with a Canadian based charity program.
- Preparation of dozens of valuation and income analysis reports required for family law matters based in Ontario, Canada.

Other

- Course Instructor for the Canadian Institute of Chartered Business Valuators: “Level IV Special Topics in Business Valuation”, November 2019 to present.
- Presentation to Wildeboer Dellelce LLP, “Introduction to Business Valuation”, November 2021.
- Co-author, “The Role of Experts in Mining Arbitrations”, Global Arbitration Review’s “Guide to Mining Arbitrations”, June 2021.
- Presentation to Bennett Jones, “Mining Trends and Valuation Issues”, July 2021.
- Co-author, “Holding Foreign Companies Accountable Act & The Potential for Delisting of Chinese Companies”, June 2020.
- Co-author, “COVID-19: What is the Impact on Commercial Damages and Business Valuations?”, April 2020.
- Author, “The Relevance of Audited Financial Statements in a Valuation Analysis”, Global Arbitration Review, July 2019.
- Presenter at the Young Canadian Arbitration Society Spring Symposium on the cross examination of expert witnesses held in Calgary, Alberta, May 2018.
- Author, “Avoiding Double Taxation on International Arbitration Awards”, Journal of Damages in International Arbitration, Fall 2017.
- Completion of “Mineral Property Valuation” course presented by EduMine in collaboration with the Mining Studies Institute and the University of British Columbia, Spring 2017.
- Acted as an expert witness for the FIAA Expert Witness Trial Practice Program held in Washington DC, June 2015.

Appendix 10 CV of Pierre Antoine Tetard

Pierre-Antoine Tetard
+44 750 008 0218 / patetard@gmail.com

16+ years in global renewables, energy and infrastructures
Principal investments, financings, advisory, asset management, board member

As Vice President of Business Development at BlueFloat Energy, Pierre-Antoine is responsible for initiating, executing and delivering market entry and project development strategies internationally. In addition, he establishes and maintains BlueFloat's relationships with local development teams and strategic partners, as well as with key local stakeholders.

Prior to joining BlueFloat Energy, Pierre-Antoine worked at Ørsted, the global offshore wind major, where he held responsibilities in business development, market entry, M&A and project financing activities. Notably, he led the Ørsted team in the first-ever offshore wind non-recourse financing in Asia – the Formosa 1 project in Taiwan – as part of the joint-venture with Swancor and Macquarie. In Europe, he was instrumental in the financing and "farm-down" (sale of equity stake) of Hornsea 1, a 1.2 GW offshore wind project in the North Sea 100 km away from English shore. He also successfully implemented market entry strategies and managed the evaluation and execution of M&A opportunities in international markets such as Europe, the United States and Latin America.

Pierre-Antoine has worked in the energy sector for over 16 years. He started his career as an investment banking analyst at Morgan Stanley. He then joined Riverstone, an energy-focused private equity firm, which eventually resulted in a 3-year tenure as VP of Velocita Energy Developments (Riverstone's European onshore wind development platform), the company he co-launched and where he was responsible for group business development, M&A and project financing activities as well as for overseeing the French market. After Velocita, he worked with Green Giraffe in an effort with various parties to explore investment opportunities in offshore wind projects in late stage development.

Pierre-Antoine holds a Master's in Corporate Finance from Sciences Po in Paris and a Master's in Industrial Economics from Université Paris Dauphine.

Pierre-Antoine Tetard

WORK	
2020- today 1.5 years	**BlueFloat Energy –** *Global offshore wind developer* Renewable power / infrastructures **- London** *Vice President business development* ▪ 547 Energy/Quantum Energy Partners' sole portfolio company dedicated to investing in and developing offshore wind projects globally, investing from a USD5+ Bn global energy-dedicated private equity fund. BlueFloat identifies and selects offshore wind project locations and develops these projects from initial stages until Financial Close and beyond ▪ Responsible for initiating, executing and delivering market entry and project development strategies internationally ▪ Evaluate global markets (EU, Americas, APAC) with announced market entries in 6 countries since late 2020 and unannounced market entries in 6 additional countries. In each country, projects are actively being developed ▪ Evaluate and transact on project development opportunities via acquisition (M&A / JV) and/or project development partnerships with local project developers ▪ Establish and maintain BlueFloat's relationships with local development teams, strategic partners, as well as with key local stakeholders ▪ Actively involved in BlueFloat Energy's strategy at company's board of director level, effectively acting as "number two" to BlueFloat's CEO
2016/2020 4 years	**Orsted A/S (ex-DONG Energy)** *Global renewables IPP (US$60bn Mkt Cap)* Renewable power / infrastructures **- London** *Global business development, M&A and project financings in renewables* ▪ Explored on & offshore wind and solar PV market entries, tenders, M&A and JVs in the EU, US, Latam and Asia ▪ Closed JVs in the US with Eversource (50% disposal) and Taiwan with Macquarie/Swancor (35% acquisition) ▪ PFI award for Formosa 1: first ever Asian non-recourse project financing in Taiwan (128MW / US$600m debt) ▪ PFI award for Hornsea 1: 50% equity sale and holdco financing for the largest ever RE project (1.2GW/GBP4.5bn EV) ▪ Market entry evaluation (offshore and/or onshore): Poland (successful), Mexico (IC approval), India, Brazil ▪ 750 MW offshore wind tender in the Netherlands (April 2020): finished second behind Shell/Eneco
2014/2016 2 years	**Advisory mandates with renewable's investors and developers** Renewable power / infrastructures **- London** *a) 18-month advisor to Green Giraffe, a reputable offshore wind financial advisory boutique* ▪ Structuring/fundraising to invest in or acquire late development stage offshore wind projects globally ▪ Explored various structures e.g. GP/LPs/fund, portfolio company, managed accounts. Approached 40+ investors *b) 5-month advisor to OX2, a Swedish developer. French onshore wind market entry*

Pierre-Antoine Tetard

2011/2014 3 years	**Velocita Energy** *European onshore wind IPP (US$100m line of equity)* Renewable power / infrastructures **- London** *Vice President/acting CFO, board of Velocita Holdings, director of 20+ subsidiaries* ▪ Riverstone's European onshore wind platform designed and launched while working at Riverstone ▪ Structured, launched and managed the company. In charge of group business development / M&A and financing o Joined the appointed CEO as VP, being the first employee, then promoted to group acting CFO and CEO of France o Full cycle: acquisition, contracting/financing, construction, and post COD sale of a 24 MW UK project (2.0x MOI) o M&A: closed acquisition of 2 portfolios (800MW in France and 500MW in the UK) o Structured and negotiated 2 development consultancy agreements, maintaining original developers in Velocita o Other M&A: explored Italy, Turkey, Poland, Ireland, Spain, Germany o Non-recourse financings: closed 2 projects in the UK, 3 projects in France o Managed the French development portfolio including team of 20+ developers o Obtained 300MW+ of permits in France now financed, constructed and sold to Envision and Innergex o Designed and implemented Velocita group multijurisdictional legal and tax structure o Structured and grew the business from 2 to 40 employees implementing the reporting and finance o Developed company's footprint among regulators, politicians, turbine manufacturers, lobbyists, lawyers/consultants
2008/2011 3 years	**Riverstone Holdings LLC** Private Equity (*$38bn AuM, growth capital and buy-out*) Energy / real assets **– London** *Associate (Riverstone / Carlyle Global Energy & Power Fund IV and the R/C Renewable Energy Fund II)* ▪ Origination, evaluation and execution of investments o Focus on European renewables (wind, solar thermal and biomass) and conventional energy (E&P, midstream, OFS) o Led origination, business/financial due diligence, valuation, transaction and tax structuring, management incentives structuring and transaction documentation, from first meeting with management teams to transaction closing o Closed investments: $800m preferred equity investment in Pattern Energy (onshore wind US), $118m preferred equity investment in Cuadrilla Resources (European shale gas exploration), restructuring of Ensus (UK wheat-based bioethanol), design and launch of Velocita including $100m "line of equity" (see above)

	▪ Portfolio company management and reporting to LPs (Pattern Energy, Cuadrilla, Ensus) o Performance assessment through independent analysis, valuation and frequent dialogue with management o Board observer: strategic reviews, annual budget and evaluation of business development/financing opportunities
2006/2008 2.5 years	**Morgan Stanley** Investment Banking Energy / Utilities and Consumers **- London & New York** *Analyst - 1st and 2nd year in London. 3rd year in New York* ▪ Notable transactions: GDF-Suez merger now ENGIE (Suez defence – €70bn), Urals Energy (Private placement – $190m), MOL financing (Perpetual bond – €610m), Bunge acquisition of CPO (Buy-side – $4.8bn) ▪ Other: Mubadala E&P acquisition in North Africa, ENI E&P acquisition in UK off-shore and Canada oil sands
2005 1 year	**Rothschild & Cie** Investment Banking Banking and Telecoms **- Paris** *Analyst Internship. Focus on Eastern Europe and North Africa M&A and privatisations* ▪ Banking: Turkey, advisor to GE in its acquisition of 25% of Garanti Bankasi for $1.8bn. Romania, advisor to Erste Bank in its acquisition of BCR for €3.8bn. Algeria, advisor to the Government on CPA privatisation ▪ Telecoms: Tunisia, advisor to Vivendi Universal on the privatisation of Tunisie Telecom
EDUCATION	
2003/2004	**Sciences-po** MS in Corporate Finance and Capital Markets, with honours **Paris**
1999/2003	**Université Dauphine** MA in Economics and Corporate Strategy, with honours **Paris**
Languages	French (native), English (fluent), Portuguese (basics), German (basics)

Appendix 11 Discounted Cash Flows Excel Model

Refer to the native Excel file titled "Appendix 11_Windstream v. Canada_Secretariat & PAT DCF Analysis.xlsm"

Windstream v. Canada
Schedule 1
Discounted Cash Flows analysis

Years ended December 31st		unit	Total	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
No. of development months				10	12	12	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of construction months				0	0	0	10	12	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of operational months				0	0	0	0	0	12	12	12	12	12	12	12	12	12	12	12	12	12
PPA months				0	0	0	0	0	12	12	12	12	12	12	12	12	12	12	12	12	12
Non- PPA Months				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Project capacity		MW		-	-	-	-	-	297	297	297	297	297	297	297	297	297	297	297	297	297
Generation factor (P50)		%		-	-	-	-	-	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%
Generation period (24 hours for 365.25 days in a year)		hours		-	-	-	-	-	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766
Annual wind power generation		GWh	34,796	-	-	-	-	-	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160
Generation under the FIT-Contract	**[A]**	**GWh**	**23,197**	**-**	**-**	**-**	**-**	**-**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**
Generation after the FIT-Contract	**[B]**	**GWh**	**11,599**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Fixed price component		$ / MWh		$ -	$ -	$ -	$ -	$ -	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0
Indexed price component		$ / MWh		-	-	-	-	-	50.8	51.8	52.8	53.9	54.9	56.0	57.2	58.3	59.5	60.7	61.9	63.1	64.4
Tariff as per the FIT-Contract	**[C]**	**$ / MWh**		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 253.8**	**$ 254.8**	**$ 255.9**	**$ 256.9**	**$ 258.0**	**$ 259.1**	**$ 260.2**	**$ 261.4**	**$ 262.5**	**$ 263.7**	**$ 264.9**	**$ 266.2**	**$ 267.4**
Wholesale power price after the FIT-Contract term		$ / MWh		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Less: discount for costs associated with sale of power		%		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Realizable tariff after the term of the FIT-Contract	**[D]**	**$ / MWh**		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Gross revenue	[A*C + B*D]	$ m	$ 7,133.9	$ -	$ -	$ -	$ -	$ -	$ 294.4	$ 295.6	$ 296.8	$ 298.0	$ 299.2	$ 300.5	$ 301.8	$ 303.1	$ 304.5	$ 305.9	$ 307.3	$ 308.7	$ 310.2
Less: Annual wind land rental charges		$ m	(145.5)	-	-	-	-	-	(6.0)	(6.0)	(6.1)	(6.1)	(6.1)	(6.1)	(6.2)	(6.2)	(6.2)	(6.2)	(6.3)	(6.3)	(6.3)
Less: Administrative land rent		$ m	(0.0)	-	-	-	-	-	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Less: Base land rent fees		$ m	(2.8)	-	-	-	(1.3)	(1.5)	-	-	-	-	-	-	-	-	-	-	-	-	-
Net revenue		**$ m**	**6,985.6**	**-**	**-**	**-**	**(1.3)**	**(1.5)**	**288.4**	**289.5**	**290.7**	**291.9**	**293.1**	**294.4**	**295.7**	**297.0**	**298.3**	**299.6**	**301.0**	**302.4**	**303.8**
Less: Operating and maintenance expenses		$ m	(1,299.5)	-	-	-	-	-	(32.0)	(32.7)	(33.3)	(34.0)	(34.7)	(35.4)	(36.1)	(36.8)	(37.5)	(38.3)	(39.0)	(39.8)	(40.6)
Less: insurance costs		$ m	(176.8)	-	-	-	-	-	(7.4)	(7.4)	(7.4)	(7.4)	(7.4)	(8.7)	(8.7)	(8.7)	(8.2)	(8.2)	(8.2)	(5.5)	(5.5)
Less: Other fixed expenses		$ m	(23.5)	-	-	-	-	-	(0.8)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)	(0.7)
EBITDA		**$ m**	**5,485.8**	**-**	**-**	**-**	**(1.3)**	**(1.5)**	**248.2**	**248.8**	**249.4**	**249.9**	**250.4**	**249.7**	**250.2**	**250.8**	**251.9**	**252.4**	**253.0**	**256.4**	**257.0**
Less: debt related costs																					
Interest		$ m	(403.0)	-	-	-	-	-	(34.9)	(34.0)	(32.6)	(31.5)	(30.5)	(31.6)	(30.4)	(28.7)	(26.9)	(24.9)	(23.4)	(19.8)	(17.1)
Agency cost on debt		$ m	(1.9)	-	-	-	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Debt structuring costs		$ m	(13.2)	-	-	-	(13.2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commitment Fees		$ m	(7.7)	-	-	-	(5.3)	(2.4)	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: LC costs on unspent capex		$ m	(15.5)	-	-	-	(11.0)	(4.5)	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: LC Costs on unfunded decommissioning liability		$ m	(45.7)	-	-	-	-	-	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)
Less: Depreciation for tax purposes		$ m	(1,230.5)	-	-	-	-	-	(171.4)	(212.3)	(214.1)	(215.8)	(208.4)	(104.2)	(52.1)	(26.1)	(13.0)	(6.5)	(3.3)	(1.6)	(0.8)
Earnings before tax		**$ m**	**3,768.4**	**-**	**-**	**-**	**(30.9)**	**(8.5)**	**39.4**	**-**	**-**	**-**	**8.9**	**111.3**	**165.1**	**193.5**	**209.4**	**218.4**	**223.8**	**232.4**	**236.5**
Less: Tax		$ m	(998.6)	-	-	-	-	-	-	-	-	-	(2.4)	(29.5)	(43.8)	(51.3)	(55.5)	(57.9)	(59.3)	(61.6)	(62.7)
Earnings after tax		**$ m**	**2,769.8**	**-**	**-**	**-**	**(30.9)**	**(8.5)**	**39.4**	**-**	**-**	**-**	**6.6**	**81.8**	**121.4**	**142.2**	**153.9**	**160.6**	**164.5**	**170.8**	**173.8**
Add: Depreciation for tax purposes		$ m	1,230.5	-	-	-	-	-	171.4	212.3	214.1	215.8	208.4	104.2	52.1	26.1	13.0	6.5	3.3	1.6	0.8
Less: Planning and development expenditure (devex)		$ m	(49.2)	(14.4)	(15.9)	(16.2)	(2.8)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: Capital expenditure (capex)		$ m	(1,153.2)	(6.6)	(14.9)	(66.2)	(452.7)	(612.8)	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: Interest during construction		$ m	(28.0)	-	-	-	(5.2)	(22.8)	-	-	-	-	-	-	-	-	-	-	-	-	-
Add: refund of letter of credit at commissioning		$ m	6.0	-	-	-	-	-	6.0	-	-	-	-	-	-	-	-	-	-	-	-
Add / (Less): Working capital changes		$ m	-	-	-	-	-	-	(20.7)	(0.1)	(0.0)	(0.0)	(0.0)	0.1	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.3)	(0.0)
Add / (Less): O&M reserve account		$ m	-	-	-	-	-	(8.0)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)
Less: Decommissioning costs		$ m	(141.1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Add: tax benefit on decommissioning costs		$ m	37.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net cash flows before changes in debt balance		**$ m**	**2,672.1**	**(21.0)**	**(30.8)**	**(82.4)**	**(491.6)**	**(652.1)**	**195.9**	**212.1**	**213.9**	**215.6**	**214.8**	**185.9**	**173.3**	**168.0**	**166.6**	**166.8**	**167.5**	**172.0**	**174.4**
Add / Less: Debt																					
Debt raised		$ m	1,054.9	-	-	-	362.0	692.9	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt repayment		$ m	(1,054.9)	-	-	-	-	-	(46.8)	(48.1)	(49.6)	(51.2)	(52.7)	(53.6)	(55.5)	(57.6)	(59.8)	(62.2)	(64.6)	(67.7)	(70.6)
Debt Service Reserve Account (DSRA)		$ m	-	-	-	-	-	(40.8)	(0.2)	(0.1)	(0.2)	(0.3)	(1.0)	(0.3)	(0.2)	(0.2)	(0.2)	(0.4)	0.3	(0.1)	(0.1)
Free cash flows to equity	**[E]**	**$ m**	**$ 2,672.1**	**$ (21.0)**	**$ (30.8)**	**$ (82.4)**	**$ (129.6)**	**$ -**	**$ 148.9**	**$ 163.9**	**$ 164.1**	**$ 164.2**	**$ 161.0**	**$ 131.9**	**$ 117.6**	**$ 110.2**	**$ 106.6**	**$ 104.2**	**$ 103.2**	**$ 104.2**	**$ 103.7**
Cost of Equity discount rate, nominal	[F]	%		10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Mid-period	[G]	years		*0.4*	*1.4*	*2.4*	*3.4*	*4.4*	*5.4*	*6.4*	*7.4*	*8.4*	*9.4*	*10.4*	*11.4*	*12.4*	*13.4*	*14.4*	*15.4*	*16.4*	*17.4*
PV factor	[H = 1/ (1+F)^G]			*0.959*	*0.877*	*0.798*	*0.725*	*0.659*	*0.599*	*0.545*	*0.495*	*0.450*	*0.409*	*0.372*	*0.338*	*0.308*	*0.280*	*0.254*	*0.231*	*0.210*	*0.191*
Present value of cash flows of the Project	**[E * H]**	**$ m**	**$ 575.2**	**$ (20.2)**	**$ (27.0)**	**$ (65.7)**	**$ (93.9)**	**$ -**	**$ 89.2**	**$ 89.3**	**$ 81.3**	**$ 73.9**	**$ 65.9**	**$ 49.1**	**$ 39.8**	**$ 33.9**	**$ 29.8**	**$ 26.5**	**$ 23.8**	**$ 21.9**	**$ 19.8**
Present value of cash flows during the period of FIT-Contract		**$ m**	**$ 556.2**																		
Present value of cash flows after the FIT-Contract		**$ m**	**$ 19.0**																		

Windstream v. Canada
Schedule 1
Discounted Cash Flows analysis

Years ended December 31st		unit	Total	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055
No. of development months				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of construction months				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of operational months				12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	0
PPA months				12	12	12	12	12	12	12	0	0	0	0	0	0	0	0	0	0	0
Non- PPA Months				0	0	0	0	0	0	0	12	12	12	12	12	12	12	12	12	12	0
Project capacity		MW		297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	-
Generation factor (P50)		%		44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	-
Generation period (24 hours for 365.25 days in a year)		hours		8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	8,766	-
Annual wind power generation		GWh	34,796	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	-
Generation under the FIT-Contract	*[A]*	**GWh**	**23,197**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	-	-	-	-	-	-	-	-	-	-	-
Generation after the FIT-Contract	*[B]*	**GWh**	**11,599**	-	-	-	-	-	-	-	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	**1,160**	-
Fixed price component		$ / MWh		$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ 203.0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Indexed price component		$ / MWh		65.7	67.0	68.3	69.7	71.1	72.5	73.9	-	-	-	-	-	-	-	-	-	-	-
Tariff as per the FIT-Contract	*[C]*	**$ / MWh**		**$ 268.7**	**$ 270.0**	**$ 271.4**	**$ 272.7**	**$ 274.1**	**$ 275.5**	**$ 277.0**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Wholesale power price after the FIT-Contract term		$ / MWh		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 74.7	$ 78.5	$ 82.5	$ 86.9	$ 90.3	$ 93.7	$ 96.3	$ 98.5	$ 99.6	$ 100.5	$ -
Less: discount for costs associated with sale of power		%		-	-	-	-	-	-	-	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	-
Realizable tariff after the term of the FIT-Contract	*[D]*	**$ / MWh**		**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 70.9**	**$ 74.5**	**$ 78.4**	**$ 82.6**	**$ 85.8**	**$ 89.0**	**$ 91.5**	**$ 93.6**	**$ 94.6**	**$ 95.5**	**$ -**
Gross revenue	*[A*C + B*D]*	$ m	$ 7,133.9	$ 311.7	$ 313.2	$ 314.7	$ 316.3	$ 317.9	$ 319.6	$ 321.3	$ 82.3	$ 86.4	$ 90.9	$ 95.8	$ 99.5	$ 103.3	$ 106.1	$ 108.5	$ 109.7	$ 110.7	$ -
Less: Annual wind land rental charges		$ m	(145.5)	(6.4)	(6.4)	(6.4)	(6.5)	(6.5)	(6.5)	(6.6)	(1.7)	(1.8)	(1.9)	(2.0)	(2.0)	(2.1)	(2.2)	(2.2)	(2.2)	(2.3)	-
Less: Administrative land rent		$ m	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	-
Less: Base land rent fees		$ m	(2.8)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net revenue		**$ m**	**6,985.6**	**305.3**	**306.8**	**308.3**	**309.9**	**311.5**	**313.1**	**314.7**	**80.6**	**84.7**	**89.1**	**93.8**	**97.5**	**101.2**	**103.9**	**106.3**	**107.5**	**108.5**	-
Less: Operating and maintenance expenses		$ m	(1,299.5)	(41.4)	(42.3)	(43.1)	(44.0)	(44.9)	(45.8)	(46.7)	(47.6)	(48.6)	(49.5)	(50.5)	(51.5)	(52.6)	(53.6)	(54.7)	(55.8)	(56.9)	-
Less: insurance costs		$ m	(176.8)	(5.5)	(5.6)	(4.3)	(4.4)	(4.4)	(4.4)	(4.5)	(4.5)	(4.5)	(4.5)	(4.5)	(4.5)	(4.5)	(4.5)	(4.5)	(4.5)	(4.5)	-
Less: Other fixed expenses		$ m	(23.5)	(0.7)	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(1.0)	(1.0)	(1.0)	(1.0)	-
EBITDA		**$ m**	**5,485.8**	**257.6**	**258.2**	**260.1**	**260.7**	**261.4**	**262.1**	**262.7**	**27.7**	**30.8**	**34.2**	**37.9**	**40.6**	**43.2**	**44.9**	**46.2**	**46.3**	**46.1**	-
Less: debt related costs																					
Interest		$ m	(403.0)	(14.2)	(11.2)	(8.1)	(3.3)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agency cost on debt		$ m	(1.9)	(0.1)	(0.1)	(0.1)	(0.1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt structuring costs		$ m	(13.2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Commitment Fees		$ m	(7.7)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: LC costs on unspent capex		$ m	(15.5)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: LC Costs on unfunded decommissioning liability		$ m	(45.7)	(2.5)	(2.5)	(2.5)	(2.5)	(2.1)	(1.2)	(0.4)	-	-	-	-	-	-	-	-	-	-	-
Less: Depreciation for tax purposes		$ m	(1,230.5)	(0.4)	(0.2)	(0.1)	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	-
Earnings before tax		**$ m**	**3,768.4**	**240.4**	**244.3**	**249.4**	**254.8**	**259.3**	**260.8**	**262.3**	**27.7**	**30.8**	**34.2**	**37.9**	**40.6**	**43.2**	**44.9**	**46.2**	**46.3**	**46.1**	-
Less: Tax		$ m	(998.6)	(63.7)	(64.7)	(66.1)	(67.5)	(68.7)	(69.1)	(69.5)	(7.3)	(8.2)	(9.1)	(10.1)	(10.8)	(11.4)	(11.9)	(12.2)	(12.3)	(12.2)	-
Earnings after tax		**$ m**	**2,769.8**	**176.7**	**179.5**	**183.3**	**187.3**	**190.6**	**191.7**	**192.8**	**20.3**	**22.6**	**25.1**	**27.9**	**29.8**	**31.7**	**33.0**	**33.9**	**34.0**	**33.9**	-
Add: Depreciation for tax purposes		$ m	1,230.5	0.4	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
Less: Planning and development expenditure (devex)		$ m	(49.2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: Capital expenditure (capex)		$ m	(1,153.2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: Interest during construction		$ m	(28.0)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Add: refund of letter of credit at commissioning		$ m	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Add / (Less): Working capital changes		$ m	-	(0.1)	(0.1)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)	19.6	(0.3)	(0.3)	(0.3)	(0.2)	(0.2)	(0.1)	(0.1)	(0.0)	0.0	3.8
Add / (Less): O&M reserve account		$ m	-	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	14.2	-
Less: Decommissioning costs		$ m	(141.1)	-	-	-	-	(47.0)	(47.0)	(47.0)	-	-	-	-	-	-	-	-	-	-	-
Add: tax benefit on decommissioning costs		$ m	37.4	-	-	-	-	12.5	12.5	12.5	-	-	-	-	-	-	-	-	-	-	-
Net cash flows before changes in debt balance		**$ m**	**2,672.1**	**176.8**	**179.5**	**183.0**	**187.1**	**155.8**	**156.9**	**158.0**	**39.7**	**22.1**	**24.6**	**27.3**	**29.3**	**31.3**	**32.6**	**33.6**	**33.7**	**48.1**	**3.8**
Add / Less: Debt																					
Debt raised		$ m	1,054.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt repayment		$ m	(1,054.9)	(73.7)	(76.9)	(80.3)	(83.9)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt Service Reserve Account (DSRA)		$ m	-	(0.1)	(0.2)	0.6	43.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Free cash flows to equity	*[E]*	**$ m**	**$ 2,672.1**	**$ 103.1**	**$ 102.4**	**$ 103.3**	**$ 146.7**	**$ 155.8**	**$ 156.9**	**$ 158.0**	**$ 39.7**	**$ 22.1**	**$ 24.6**	**$ 27.3**	**$ 29.3**	**$ 31.3**	**$ 32.6**	**$ 33.6**	**$ 33.7**	**$ 48.1**	**$ 3.8**
Cost of Equity discount rate, nominal	*[F]*	%		10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Mid-period	*[G]*	years		*18.4*	*19.4*	*20.4*	*21.4*	*22.4*	*23.4*	*24.4*	*25.4*	*26.4*	*27.4*	*28.4*	*29.4*	*30.4*	*31.4*	*32.4*	*33.4*	*34.4*	*34.9*
PV factor	*[H = 1/ (1+F)^G]*			*0.174*	*0.158*	*0.143*	*0.130*	*0.119*	*0.108*	*0.098*	*0.089*	*0.081*	*0.074*	*0.067*	*0.061*	*0.055*	*0.050*	*0.046*	*0.042*	*0.038*	*0.036*
Present value of cash flows of the Project	*[E * H]*	**$ m**	**$ 575.2**	**$ 17.9**	**$ 16.2**	**$ 14.8**	**$ 19.1**	**$ 18.5**	**$ 16.9**	**$ 15.5**	**$ 3.5**	**$ 1.8**	**$ 1.8**	**$ 1.8**	**$ 1.8**	**$ 1.7**	**$ 1.6**	**$ 1.5**	**$ 1.4**	**$ 1.8**	**$ 0.1**
Present value of cash flows during the period of FIT-Contract		**$ m**	**$ 556.2**																		
Present value of cash flows after the FIT-Contract		**$ m**	**$ 19.0**																		

Windstream v. Canada
Schedule 1
Discounted Cash Flows analysis

Transaction Structuring Analysis

Target IRR of Equity Investor	**15.0%**

		Consideration		Project Cash flows -->																	
		Upfront	Contingent	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
				10	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mid-period dates		**18-Feb-20**	**20-Feb-23**	**Jul-20**	**Jun-21**	**Jun-22**	**Jun-23**	**Jun-24**	**Jun-25**	**Jun-26**	**Jun-27**	**Jun-28**	**Jun-29**	**Jun-30**	**Jun-31**	**Jun-32**	**Jun-33**	**Jun-34**	**Jun-35**	**Jun-36**	**Jun-37**
Project free cash flows to equity	$ m			(21.0)	(30.8)	(82.4)	(129.6)	-	148.9	163.9	164.1	164.2	161.0	131.9	117.6	110.2	106.6	104.2	103.2	104.2	103.7
Acquisition payments*	$ m	(46.1)	(376.4)																		
Equity cash flows to a hypothetical buyer	**$ m**	**$ (46.1)**	**$ (376.4)**	**$ (21.0)**	**$ (30.8)**	**$ (82.4)**	**$ (129.6)**	**$ -**	**$ 148.9**	**$ 163.9**	**$ 164.1**	**$ 164.2**	**$ 161.0**	**$ 131.9**	**$ 117.6**	**$ 110.2**	**$ 106.6**	**$ 104.2**	**$ 103.2**	**$ 104.2**	**$ 103.7**

Equity IRR to a hypothetical buyer	**15.0%**

*Contingent payment is calculated as a plug figure using Excel, such that the hypothetical buyer would earn the target Equity IRR from the cash flows of the Project after making an upfront payment and a contingent payment at Financial Close.

Windstream v. Canada
Schedule 1
Discounted Cash Flows analysis

Transaction Structuring Analysis

Target IRR of Equity Investor	**15.0%**

		Consideration		Project Cash flows -->																	
		Upfront	Contingent	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055
				12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	0
Mid-period dates		**18-Feb-20**	**20-Feb-23**	**Jun-38**	**Jun-39**	**Jun-40**	**Jun-41**	**Jun-42**	**Jun-43**	**Jun-44**	**Jun-45**	**Jun-46**	**Jun-47**	**Jun-48**	**Jun-49**	**Jun-50**	**Jun-51**	**Jun-52**	**Jun-53**	**Jun-54**	**Dec-54**
Project free cash flows to equity	$ m			103.1	102.4	103.3	146.7	155.8	156.9	158.0	39.7	22.1	24.6	27.3	29.3	31.3	32.6	33.6	33.7	48.1	3.8
Acquisition payments*	$ m	(46.1)	(376.4)																		
Equity cash flows to a hypothetical buyer	**$ m**	**$ (46.1)**	**$ (376.4)**	**$ 103.1**	**$ 102.4**	**$ 103.3**	**$ 146.7**	**$ 155.8**	**$ 156.9**	**$ 158.0**	**$ 39.7**	**$ 22.1**	**$ 24.6**	**$ 27.3**	**$ 29.3**	**$ 31.3**	**$ 32.6**	**$ 33.6**	**$ 33.7**	**$ 48.1**	**$ 3.8**

Equity IRR to a hypothetical buyer	**15.0%**

*Contingent payment is calculated as a plug figure using Excel, such that the hypothetical buyer would earn the target Equity IRR from the cash flows of the Project after making an upfront payment and a contingent payment at Financial Close.

Windstream v. Canada

Schedule 1A

Sensitivities on Capex and Opex Estimates

Valuation of the Project using the Transaction Structuring Analysis

$ millions	Capex		
Opex	Low	Mid	High
Low	$ 329.6	$ 304.1	$ 282.0
Mid	$ 318.9	**$ 293.4**	$ 271.2
High	$ 306.8	$ 281.2	$ 258.9

Valuation of the Project using the Project Stage Risk Adjustment Factor Approach - 55%

$ millions	Capex		
Opex	Low	Mid	High
Low	$ 345.8	$ 326.8	$ 310.6
Mid	$ 335.4	**$ 316.4**	$ 300.1
High	$ 323.6	$ 304.5	$ 288.2

Valuation of the Project using the Project Stage Risk Adjustment Factor Approach - 60%

$ millions	Capex		
Opex	Low	Mid	High
Low	$ 377.2	$ 356.5	$ 338.8
Mid	$ 365.9	**$ 345.1**	$ 327.4
High	$ 353.0	$ 332.2	$ 314.4

Windstream v. Canada

Schedule 2

Sources & Uses (as of COD)

Amounts in $ millions

Sources	$	%
Project equity	263.7	20%
Project debt	1,054.9	80%
Total	**1,318.6**	**100%**

Uses		$	%
DEVEX: Planning and development		49.2	4%
CAPEX:			
Foundation or Gravity Based Foundation (GBF)	343.2		
Wind Turbine (WTG)	295.1		
Offshore high voltage substation (OVHS)	52.2		
Array and export cables	68.4		
Installation costs	197.3		
Onshore interconnection	50.2		
Insurance	27.3		
Management costs	14.4		
Contingency	105.1	1,153.2	87%
Financing Costs			
Base land rent during construction	2.8		
Agency cost of debt (construction period)	0.2		
Interest Costs during Construction	28.0		
Upfront costs	13.2		
Commitment Fees	7.7		
LC Costs	15.5		
DSRA	40.8		
O&M reserve	8.0	116.2	9%
Total		**1,318.6**	**100%**

Notes:

1 Refer to Schedule 1.

Windstream v. Canada
Schedule 3
Summary of Past Costs Incurred
Amounts in CAD, unless otherwise noted

Category	Item	Notes	Feb 18, 2020	Multiplication Factor	Upfront Consideration	Dec 31, 2015	Costs incurred since NAFTA 1
			A			B	A - B
Project costs capitalized by WWIS	Capitalized costs	1	$ 4,784,530	2	$ 9,569,060	$ 4,335,435	449,095
Costs incurred not captured in capitalized costs	Costs incurred not captured in capitalized costs above	2	-	2	-	-	-
Management fees, White Owl Capital	Management fees, White Owl Capital, paid	3	1,029,818	2	2,059,635	710,000	319,818
Management fees, White Owl Capital	Management fees, White Owl Capital, unpaid	4	945,949	1	945,949	185,541	760,408
Management fees, 905085 Ontario Inc.	Management fees, 905085 Ontario Inc., paid	5	2,000,000	2	4,000,000	1,477,000	523,000
Management fees, 905085 Ontario Inc.	Management fees, 905085 Ontario Inc., unpaid	6	1,593,673	1	1,593,673	293,581	1,300,092
Letter of credit, with bank fees	Letter of credit	7	6,000,000	1	6,000,000	6,000,000	-
Letter of credit, with bank fees	Letter of Credit Fees, paid	7	120,000	1	120,000	-	120,000
Interest paid, net of interest earned	Interest earned	7	(46,322)	1	(46,322)	-	(46,322)
Interest paid, net of interest earned	Interest paid	8	9,230,757	2	18,461,514	5,268,000	3,962,757
Legal fees incurred between NAFTA 1 and NAFTA 2 to advance the Project	Legal fees incurred between NAFTA 1 and NAFTA 2 to advance the Project, paid	9	745,659	2	1,491,319	-	745,659
Public relations fees to Navigator Ltd	Public relations fees to Navigator Ltd, paid	10	79,286	2	158,573	-	79,286
Data room services costs to Donelly Financial Solutions	Data room services costs to Donelly Financial Solutions, paid	11	38,450	2	76,900	-	38,450
Expert report fees	Expert Reports, paid	12	-	2	-	-	-
Government relations fees to Rubicon Strategy	Government relations fees to Rubicon Strategy, paid	13	270,000	2	540,000	-	270,000
IESO costs reimbursement relating to 2018/2019 proceedings	IESO costs reimbursement relating to 2018/2019 proceedings	14	750,000	1	750,000	-	750,000
Accounting fees to Andersen Tax	Accounting fees to Andersen Tax, paid	15	175,460	2	350,920	-	175,460
Equityholder expenses reimbursed by Windstream	Equityholder expenses reimbursed by Windstream, paid	16	36,900	2	73,799	-	36,900
Tax payments	Tax Payments, Paid	17	-	2	-	-	-
	Total		**$ 27,754,159**		**$ 46,145,019**	**$ 18,269,557**	**$ 9,484,602**

Notes

1 *Feb 18, 2020 balance: "Incomplete project" per **C-2261** - Windstream Wolfe Island Shoals Inc 2019 Financial Statements.*
*Dec 31, 2015 balance: "Incomplete project" per **C-2019** - Windstream Wolfe Island Shoals Inc 2015 Financial Statements.*

2 *Per discussions with Windstream, no costs were incurred in January and February of 2020.*

3 ***Management fees, White Owl Capital, paid***
*Feb 18, 2020: Per **C-2082** - Windstream Payouts provided by Windstream.*

Payment date	FX rate at date	Payment - USD	Amount (CAD)	Description
5/8/2017	1.37309	750,000	**1,029,818**	WOCP-Accrued Management Fees
9/1/2020	1.30456	120,000	156,547	Paid after Valuation Date
Total			1,186,365	

Dec 31, 2015: Per Deloitte Report 2 dated June 2015, Schedule 3b.
NAFTA 1, C-1891 shows calculation of total management fees based on a monthly fee of $10,000 per C-1882.

4 ***Management fees, White Owl Capital, unpaid***
*Per **C-2409** - 905085 Ontario Inc. and WOCP Accruals to 2-18-20.*
Feb 18, 2020: See tab "905085, WOCP Management Fees" and change toggle on cell G3 to "After Award".
Dec 31, 2015: See tab "905085, WOCP Management Fees" and change toggle on cell G3 to "At Dec 2015".
*Per **C-2492** - David Mars invoice shows $20,000 monthly fee.*

5 ***Management fees, 905085 Ontario Inc, paid***
*Feb 18, 2020: Per **C-2082** - Windstream Payouts provided by Windstream.*

Payment date	Amount (CAD)	Description
5/8/2017	1,250,000	905085 Ontario -Accrued Management Fees
5/8/2017	750,000	905085 Ontario -Accrued Management Fees
Total	**2,000,000**	

Dec 31, 2015: Per Deloitte Report 2 dated June 2015, Schedule 3b.
NAFTA 1, C-1886 shows calculation of total management fees based on Controltech service contracts (C-1877 and C-1879).
Per discussions with Nancy Baines, they changed the name of the company from Controltech Engineering Inc. to 905085 Ontario Inc. on Oct 4, 2013.

6 ***Management fees, 905085 Ontario Inc, unpaid***
*Per **C-2409** - 905085 Ontario Inc. and WOCP Accruals to 2-18-20.*
Feb 18, 2020: See tab "905085, WOCP Management Fees" and change toggle on cell G3 to "After Award".
Dec 31, 2015: See tab "905085, WOCP Management Fees" and change toggle on cell G3 to "At Dec 2015".

7 Interest earned on $6 million line of credit

*Per **C-2082** - Windstream Payouts provided by Windstream:*

Payment date	Amount (CAD)	Description
6/26/2017	**6,000,000**	BMO-Letter of Credit Deposit
6/26/2017	**120,000**	BMO-2 Years LC Fees
3/26/2020	(6,162,886)	Money coming from BMO
Total	(42,886)	

Interest earned in UBS Account

*Per **C-2082** - Windstream Payouts provided by Windstream:*

Payment date	Amount (CAD)	Description
12/31/2017	(3,135)	UBS Account Interest for 2017 (net of fees)
12/31/2018	(199)	UBS Account Interest for 2018 (net of fees)
12/31/2019	(103)	UBS Account Interest for 2019 (net of fees)
12/31/2020	(1,107)	UBS Account Interest for 2020 (net of fees)
Total	(4,544)	
Total, 2017-2019	(3,437)	
Total interest earned	**(46,322)**	

8 Interest paid

*Per **C-2082** - Windstream Payouts provided by Windstream:*

WRZ-LC Interest	1,632,623
Lucky Star-LC Interest	3,457,370
Steve Webster-LC Interest	1,632,623
Total Interest - USD	6,722,616
Date	5/8/2017
FX rate at date	1.37309
Total Interest - CAD	**9,230,757**

Dec 31, 2015: Per Deloitte Report 2 dated June 2015, Schedule 3b.
NAFTA 1, C-1889 shows calculation of total interest as at June 19, 2015.

9 Legal feeds, paid

Per **C-2082** - Windstream Payouts provided by Windstream:

Payment date	FX rate at date	Payment - USD	Amount (CAD)	Notes
Dentons				Per discussions with David Mars, Dentons was working on government relations; i.e., project advancement and should be included in costs.
5/8/2017	1.37309	20,000	27,462	
8/17/2017	1.26491	9,851	12,461	
2/19/2019	1.32567	2,562	3,396	
			43,319	
Gordon Kaiser				We have assumed all legal fees paid after the Valuation Date of Feb 18, 2020 were for arbitration and not to advance the project.
9/1/2020			10,000	
12/14/2020			10,510	
			20,510	
Torys				
4/21/2017			191,386	We have not included amounts paid on April 21, 2017 as they seem to be disbursements to Torys out of the proceeds of the award, i.e. likely relates to unpaid Tory's invoices from 2016/early 2017.
8/17/2017			288,895	Per discussions with David Mars, this relates to project advancement.
11/2/2017			35,641	Per discussions with David Mars, this relates to project advancement.
1/30/2018			182,615	Per discussions with David Mars, this relates to project advancement.
7/6/2018			58,762	Per discussions with David Mars, this relates to project advancement.
8/13/2018			25,661	Per discussions with David Mars, this relates to project advancement.
10/3/2018			23,378	Per discussions with David Mars, this relates to project advancement.
11/7/2018			35,752	Per discussions with David Mars, this relates to project advancement.
2/19/2019			38,118	Per discussions with David Mars, this relates to project advancement.
11/27/2019			28,576	Per discussions with David Mars, only a portion of this payment relates to project advancement. See below.
2/28/2020			62,527	We have assumed all legal fees paid after Feb 18, 2020 were for arbitration and not to advance the project.
6/22/2020			79,786	
9/1/2020			94,777	
12/14/2020			156,227	
			1,302,101	
11/27/2019			(15,058)	Portion of Nov 27, 2019 payment relating to NAFTA 2; i.e., excluded as not project advancement.
Legal Fees - Aug 17, 2017 to Dec 31, 2019			**745,659**	
Legal Fees - Total to date			1,365,930	

10 Public relations, Navigator

Per **C-2082** - Windstream Payouts provided by Windstream:

Payment date	Amount (CAD)
5/8/2017	76,099
8/17/2017	3,188
To include in past costs	**79,286**

11 Data room service fees, Donnelley Financial Solutions

*Per **C-2082** - Windstream Payouts provided by Windstream:*

Donnelley Financial Solutions - USD	30,000
Date	11/2/2017
FX rate at date	1.28166
Donnelley Financial Solutions - CAD	**38,450**

12 Expert report fees

*Per **C-2082** - Windstream Payouts provided by Windstream:*

Payment date	FX rate at date	Payment - USD	Payment - CAD	
4C Offshore				
6/22/2020	1.3546	9,043	12,250	As these were paid after Feb 18, 2020 we have assumed all expert report fees were for arbitration and not to advance the project (i.e., not included in costs).
12/14/2020	1.27852	13,520	17,286	
			29,536	
Secretariat				
6/22/2020	1.3546	N/A	7,140	
12/14/2020	1.27852	N/A	47,679	
			54,819	
Well Walk Partners LTD				
12/14/2020	1.27852	13,325	17,036	
Expert Reports - Total at Feb 18, 2020			-	
Expert Reports - Total to date			101,391	

13 Government relations fees, Rubicon

*Per **C-2082** - Windstream Payouts provided by Windstream:*

Payment date	Amount (CAD)	
8/13/2018	90,000	We have assumed these are all related to project advancement.
11/7/2018	90,000	
11/27/2019	90,000	
Total	**270,000**	

14 Payment to Windstream Energy:

*Per **C-2082** - Windstream Payouts provided by Windstream:*

Payment date	Amount (CAD)	Description	
8/17/2017	50,000	Accounting, Misc	Per discussions with David Mars, these Accounting and Misc Expenses are internal transfers of money from the parent company, to cover off expenses paid by the subsidiary; therefore, we have excluded these costs.
11/2/2017	50,000	Accounting, Misc	
1/30/2018	50,000	Misc Expenses	
3/13/2018	100,000	Accounting, Misc	
10/3/2018	50,000	Accounting, Misc	
6/22/2020	75,000	Accounting, Misc	As thiis was paid after Feb 18, 2020, we have assumed it was not incurred to advance the project.
9/22/2020	750,000	Legal Settlement	Per David Mars Witness Statement, this payment relates to the legal settlement with IESO from the 2018/2019 dispute, which is a project development cost owing as at the Valuation Date. See **C-2304** - Letter to M. Seers re back-up for Bill of Costs dated June 3, 2020.
To include in past costs	**750,000**		
Total at Feb 18, 2020	300,000		
Total to date	1,125,000		

15 Accounting fees, Andersen Tax

*Per **C-2082** - Windstream Payouts provided by Windstream:*

Payment date	FX rate at date	Payment - USD	Payment - CAD	
11/2/2017	1.28166	8,800	11,279	Based on our review of the payment dates and amounts, we have assumed that these are regular accounting fees, which count as project advancement.
1/30/2018	1.23389	15,500	19,125	
7/6/2018	1.30822	28,000	36,630	
10/3/2018	1.28251	30,000	38,475	
11/7/2018	1.31097	23,000	30,152	
2/19/2019	1.32567	20,000	26,513	
11/27/2019	1.32848	10,000	13,285	
2/28/2020	1.34152	20,000	26,830	As these were paid after Feb 18, 2020, we have excluded them from costs.
3/18/2020	1.45215	5,500	7,987	
6/22/2020	1.3546	1,600	2,167	
9/1/2020	1.30456	3,800	4,957	
To include in past costs, total as of Feb 18, 2020			**175,460**	
Total to date			392,862	

16 Payments to William R. Ziegler

*Per **C-2082** - Windstream Payouts provided by Windstream:*

Payment date	FX rate at date	Payment - USD	Payment - CAD	Description
11/2/2017	1.28166	6,770	8,677	WRZ-2016 Expenses
1/30/2018	1.23389	15,048	18,567	WRZ-2017 Expenses
11/27/2019	1.32848	7,268	9,656	WRZ-2018/2019
To include in past costs			**36,900**	

17 Tax Payments

*Per **C-2082** - Windstream Payouts provided by Windstream:*

Payment date	FX rate at date	Payment - USD	Payment - CAD	Decription
8/13/2018	1.31217	2,729	3,581	Ken Hannan-Tax
11/27/2019	1.32848	6,000	7,971	Mars-Tax Payment
To include in past costs			-	Limited info on the nature of these payments; therefore, we have excluded them from costs.
Total			11,552	

Name	Country	Investors	Round	Status	Capacity (MW)	PPA Date	FC Date	Commissioning date (Actual / Expected)	FC achieved as of the Valuation Date
Projet de parc éolien en mer de Saint-Nazaire	France	EDF (50%), Enbridge (25.5%), CPPIB (24.5%)	Round 1 (2011)	Pre-Construction	480.0	6-Apr-12	19-Sep-19	31-Dec-22	Yes
Block Island	United States	Ørsted		Fully Commissioned	30.0	11-Aug-10	2-Mar-15	7-Feb-17	Yes
Hornsea Project One	United Kingdom	Ørsted (50%), Global Infrastructure Partners (50%)	Round 3	Fully Commissioned	1,218.0	23-Apr-14	3-Feb-16	31-Dec-19	Yes
Walney Extension	United Kingdom	Ørsted (50%), PKA (25%), PFA (25%)	Round 2.5	Fully Commissioned	659.0	23-Apr-14	28-Oct-15	6-Sep-18	Yes
Eneco Luchterduinen	Netherlands	Eneco (50%), Mitsubishi (50%)	Round 2 (NL)	Fully Commissioned	129.0	5-Nov-11	1-Apr-13	21-Sep-15	Yes
Tahkoluoto Offshore Wind Power Project	Finland	Suomen Hyötytuuli		Fully Commissioned	42.0	19-Nov-14	27-Jan-16	31-Aug-17	Yes
Burbo Bank Extension	United Kingdom	Ørsted (50%), PKA (25%), Kirkbi (25%)	Round 2.5	Fully Commissioned	254.2	23-Apr-14	19-Dec-14	1-Apr-17	Yes
Nissum Bredning Vind	Denmark	Nissum Brednings Vindmøllelaug (55%), Jysk Energi (45%)	Test Scheme/Open Door (DK)	Fully Commissioned	28.0	10-Feb-16	20-Sep-16	26-Mar-18	Yes
Cape Wind	United States	Energy Management		Cancelled	468.0	11-May-10	NA	NA	No, cancelled
Eoliennes Offshore du Calvados project	France	EDF (42.5%), Enbridge (21.7%), CPPIB (20.8%), WPD (15%)	Round 1 (2011)	Consent Authorised	450.0	6-Apr-12	22-Feb-21	1-Jan-24	No
Parc éolien en mer de Fécamp	France	EDF (35%), WPD (30%), Enbridge (17.9%), CPPIB (17.1%)	Round 1 (2011)	Pre-Construction	498.0	6-Apr-12	2-Jun-20	31-Dec-23	No
Projet éolien en mer de la Baie de Saint-Brieuc	France	Iberdrola	Round 1 (2011)	Pre-Construction	496.0	6-Apr-12	9-Mar-20	31-Dec-23	No
Parc éolien en mer de Dieppe - Le Tréport	France	OceanWinds (60.5%), Sumitomo (29.5%), Caisse des dépôts et consignations (10%)	Round 2 (2013)	Consent Authorised	496.0	7-May-14	N/A	N/A	No
Parc des Iles d'Yeu et de Noirmoutier	France	OceanWinds (60.5%), Sumitomo (29.5%), Caisse des dépôts et consignations (10%)	Round 2 (2013)	Consent Authorised	496.0	7-May-14	N/A	N/A	No
								Total Project Count	**14**
								Count of 'Yes'	**8**
								Count of 'No'	**6**

Notes

1 Source: **C-1913** - 4C Comparables.
2 Eoliennes Offshore du Calvados project FID: **C-2494** - News article "EDF Renewables, Enbridge and wpd launch construction of the Calvados offshore wind farm" (February 22, 2021).
3 Refer to section 6.L of our report.
4 Valuation Date: 18-Feb-20

Windstream v. Canada
Schedule 5
Calculation of Comparable Transactions Multiples
Amounts in CAD, unless otherwise noted

Project Acquired	Notes	Buyer	Seller	Project Country	Transaction Announcement Date	Financial Close	PPA Date	PPA Price (original currency, per MWh)		PPA Price [11] ($/MWh)	Transaction Value (original currency, millions)		Transaction Value [12] ($ millions)	% Acquired	Project MWs	MW Acquired	Value / MW ($ millions)
													A	*B*	*C*	*D = B x C*	*E = A / D*
Deutsche Bucht	1	Northland Power	Highland	Germany	3-Mar-17	18-Aug-17	18-Feb-20	EUR	184	$ 264	CAD	310.2	$ 310.2	100.0%	252	252	$ 1.23
Borssele III & IV	2	Partners Group	Blauwwind Consortium	Netherlands	8-Jan-18	29-Jun-18	1-Dec-16	EUR	55	77	EUR	300.0	446.4	45.0%	732	329	1.36
Moray East	3	Diamond Generation Europe Limited	EDPR	United Kingdom	23-Mar-18	6-Dec-18	11-Sep-17	GBP	58	92	GBP	35.8	65.1	20.0%	950	190	0.34
Neart na Gaoithe	4	EDF	Mainstream	United Kingdom	3-May-18	28-Nov-19	26-Feb-15	GBP	114	220	EUR	500.0	770.2	100.0%	450	450	1.71
Triton Knoll	5	J Power, Kansai Electric Power	Innogy SE	United Kingdom	13-Aug-18	31-Aug-18	11-Sep-17	GBP	75	120	EUR	472.0	706.9	41.0%	860	353	2.00
Moray East	6	Diamond Generation Europe Limited	EDPR	United Kingdom	16-Nov-18	6-Dec-18	11-Sep-17	GBP	58	92	GBP	54.0	91.2	13.4%	950	127	0.72
Dieppe-Le Treport & Yeu-Noirmoutier	7	Sumitomo	EDPR	France	18-Dec-18	N/A	20-Jun-18	EUR	150	231	EUR	79.2	121.3	13.5%	992	134	0.91
Revolution Wind & South Fork	8	Eversource	Orsted	United States	8-Feb-19	N/A	18-Feb-20	USD	115	152	USD	225.0	183.0	50.0%	834	417	0.44
Formosa 1	9	Orsted, Macquarie	Swancor Renewable	Taiwan	25-Jan-17	8-Jun-18	1-Dec-17	TWD	6,044	256	TWD	914.6	38.2	85.0%	128	109	0.35
Formosa 2	10	Stonepeak	Swancor	Taiwan	31-Jul-19	29-Oct-19	12-Dec-18	TWD	5,850	253	USD	68.7	90.4	23.8%	376	89	1.01
																Average	**$ 1.01**
																Median	**$ 0.96**

Notes

1 Transaction date, PPA price, % acquired and MW capacity: **C-2077** - Northland Power press release dated March 3, 2017

PPA price: EUR184 for the first 8 years and EUR149 for the next 5 years.

Financial close date: **C-2112** - Northland Power press release dated August 18, 2017

Transaction value: **C-2062** - Northland Power 2017 Annual Report, Note 3, page 68

Due to limited information on the date of the PPA award, we have translated the PPA price using the foreign exchange rate at the Valuation Date

2 Transaction date, % acquired, and MW capacity: **C-2137** - Partners Group press release dated January 8, 2018

Financial close date, PPA price, transaction value: **C-2159** - IJGlobal article dated July 5, 2018

PPA price: EUR54.49 for the first 15 years, after which the power will be sold at prevailing rates.

Per **C-2137**, Borssele will benefit from the Dutch offshore feed-in tariff for a period of 15+1 years.

3 Transaction date and MW capacity: **C-2147** - EDPR press release dated March 23, 2018

Financial close date: **C-2157** - Moray East press release dated December 6, 2018

PPA price: **C-2117** - Offshorewind.biz article dated September 11, 2017; GBP57.50 (not specified whether this is the average/levelized price; therefore, we have assumed this is the price at COD).

Per **C-2117**, successful projects receive 15-year contracts.

Transaction value and % acquired: **C-2189** - EDPR 2018 Annual Report, page 36

Windstream v. Canada
Schedule 5
Calculation of Comparable Transactions Multiples
Amounts in CAD, unless otherwise noted

Project Acquired	Notes	Buyer	Seller	Project Country	Transaction Announcement Date	Financial Close	PPA Date	PPA Price (original currency, per MWh)		PPA Price [11] ($/MWh)	Transaction Value (original currency, millions)		Transaction Value [12] ($ millions)	% Acquired	Project MWs	MW Acquired	Value / MW ($ millions)
													A	*B*	*C*	*D = B x C*	*E = A / D*
Deutsche Bucht	1	Northland Power	Highland	Germany	3-Mar-17	18-Aug-17	18-Feb-20	EUR	184	$ 264	CAD	310.2	$ 310.2	100.0%	252	252	$ 1.23
Borssele III & IV	2	Partners Group	Blauwwind Consortium	Netherlands	8-Jan-18	29-Jun-18	1-Dec-16	EUR	55	77	EUR	300.0	446.4	45.0%	732	329	1.36
Moray East	3	Diamond Generation Europe Limited	EDPR	United Kingdom	23-Mar-18	6-Dec-18	11-Sep-17	GBP	58	92	GBP	35.8	65.1	20.0%	950	190	0.34
Neart na Gaoithe	4	EDF	Mainstream	United Kingdom	3-May-18	28-Nov-19	26-Feb-15	GBP	114	220	EUR	500.0	770.2	100.0%	450	450	1.71
Triton Knoll	5	J Power, Kansai Electric Power	Innogy SE	United Kingdom	13-Aug-18	31-Aug-18	11-Sep-17	GBP	75	120	EUR	472.0	706.9	41.0%	860	353	2.00
Moray East	6	Diamond Generation Europe Limited	EDPR	United Kingdom	16-Nov-18	6-Dec-18	11-Sep-17	GBP	58	92	GBP	54.0	91.2	13.4%	950	127	0.72
Dieppe-Le Treport & Yeu-Noirmoutier	7	Sumitomo	EDPR	France	18-Dec-18	N/A	20-Jun-18	EUR	150	231	EUR	79.2	121.3	13.5%	992	134	0.91
Revolution Wind & South Fork	8	Eversource	Orsted	United States	8-Feb-19	N/A	18-Feb-20	USD	115	152	USD	225.0	183.0	50.0%	834	417	0.44
Formosa 1	9	Orsted, Macquarie	Swancor Renewable	Taiwan	25-Jan-17	8-Jun-18	1-Dec-17	TWD	6,044	256	TWD	914.6	38.2	85.0%	128	109	0.35
Formosa 2	10	Stonepeak	Swancor	Taiwan	31-Jul-19	29-Oct-19	12-Dec-18	TWD	5,850	253	USD	68.7	90.4	23.8%	376	89	1.01
																Average	**$ 1.01**
																Median	**$ 0.96**

Notes

4 Transaction date, value, % acquired and MW capacity: **C-2154** - Reuters article dated May 3, 2018
Financial close date: **C-2250** - EDF press release dated November 28, 2019
PPA price: **C-2014** - Offshorewind.biz article dated February 26, 2015; GBP114.39 (not specified whether this is the average/levelized price; therefore, we have assumed this is the price at COD).
Per **C-1913** - 4C Comparables, successful projects receive 15-year contracts.

5 Transaction date and % acquired: **C-2168** - Triton Knoll press release dated August 13, 2018
Financial close date and MW capacity: **C-2170** - Triton Knoll press release dated August 31, 2018
PPA price: **C-2117** - Offshorewind.biz article dated September 11, 2017; GBP74.75 (not specified whether this is the average/levelized price; therefore, we have assumed this is the price at COD).
Per **C-2117**, successful projects receive 15-year contracts.
Transaction value is based on increase in shareholders' equity due to the sale (no info on actual transaction price): **C-2135** - RWE 2018 Annual Report, page 95

6 Transaction date, value, and % acquired: **C-2105** - EDPR press release dated November 16, 2018
Financial close date and MW capacity: **C-2157** - Moray East press release dated December 6, 2018
PPA price: **C-2117** - Offshorewind.biz article dated September 11, 2017; GBP57.50 (not specified whether this is the average/levelized price; therefore, we have assumed this is the price at COD).
Per **C-2117**, successful projects receive 15-year contracts.
C-2329 - Low Carbon Contracts press release dated October 19, 2018 shows a milestone for the Moray East wind farm between the 2 transactions, which explains the higher multiple for the Nov 2018 transaction vs. March 2018.

Project Acquired	Notes	Buyer	Seller	Project Country	Transaction Announcement Date	Financial Close	PPA Date	PPA Price (original currency, per MWh)		PPA Price [11] ($/MWh)	Transaction Value (original currency, millions)		Transaction Value [12] ($ millions)	% Acquired	Project MWs	MW Acquired	Value / MW ($ millions)
													A	B	C	D = B x C	E = A / D
Deutsche Bucht	1	Northland Power	Highland	Germany	3-Mar-17	18-Aug-17	18-Feb-20	EUR	184	$ 264	CAD	310.2	$ 310.2	100.0%	252	252	$ 1.23
Borssele III & IV	2	Partners Group	Blauwwind Consortium	Netherlands	8-Jan-18	29-Jun-18	1-Dec-16	EUR	55	77	EUR	300.0	446.4	45.0%	732	329	1.36
Moray East	3	Diamond Generation Europe Limited	EDPR	United Kingdom	23-Mar-18	6-Dec-18	11-Sep-17	GBP	58	92	GBP	35.8	65.1	20.0%	950	190	0.34
Neart na Gaoithe	4	EDF	Mainstream	United Kingdom	3-May-18	28-Nov-19	26-Feb-15	GBP	114	220	EUR	500.0	770.2	100.0%	450	450	1.71
Triton Knoll	5	J Power, Kansai Electric Power	Innogy SE	United Kingdom	13-Aug-18	31-Aug-18	11-Sep-17	GBP	75	120	EUR	472.0	706.9	41.0%	860	353	2.00
Moray East	6	Diamond Generation Europe Limited	EDPR	United Kingdom	16-Nov-18	6-Dec-18	11-Sep-17	GBP	58	92	GBP	54.0	91.2	13.4%	950	127	0.72
Dieppe-Le Treport & Yeu-Noirmoutier	7	Sumitomo	EDPR	France	18-Dec-18	N/A	20-Jun-18	EUR	150	231	EUR	79.2	121.3	13.5%	992	134	0.91
Revolution Wind & South Fork	8	Eversource	Orsted	United States	8-Feb-19	N/A	18-Feb-20	USD	115	152	USD	225.0	183.0	50.0%	834	417	0.44
Formosa 1	9	Orsted, Macquarie	Swancor Renewable	Taiwan	25-Jan-17	8-Jun-18	1-Dec-17	TWD	6,044	256	TWD	914.6	38.2	85.0%	128	109	0.35
Formosa 2	10	Stonepeak	Swancor	Taiwan	31-Jul-19	29-Oct-19	12-Dec-18	TWD	5,850	253	USD	68.7	90.4	23.8%	376	89	1.01
																Average	**$ 1.01**
																Median	**$ 0.96**

Notes

7 Transaction date, % acquired, and MW capacity: **C-2186** - EDPR press release dated December 18, 2018

Financial close: **C-2303** - Sumitomo article dated June 2020 states they are still working to achieve financial close

PPA price: **C-2158** - Offshorewind.biz article dated June 20, 2018; EUR150 (not specified whether this is the average/levelized price; therefore, we have assumed this is the price at COD).

Transaction value: **C-2260** - EDPR 2019 Annual Report, page 44

8 Transaction includes 257sq mile tract of land (164,480 acres). In order to arrive at a value for the wind farms only, we have reduced the transaction value by 164,480 acres x $1,408.15/acre leasing cost (per Leasing Transactions Analysis) x 50% interest acquired (i.e., US$225 million x 1.3281 FX rate - (164,480 x $1,408.15 x 50%)

Transaction date, value, % acquired, and MW capacity: **C-2209** - Orsted press release dated February 8, 2019

Financial close date: **C-2412** - Wind Power Engineering article dated November 24, 2021

PPA price: **C-2193** - Eversource 2019 Annual Report, page 30; calculated as follows:

Due to limited information on the date of the PPA award(s), we have translated the below PPA prices using the foreign exchange rate at the Valuation Date.

Wind farm	Term (years)	PPA Price (USD)	Val Date	FX Rate	PPA Price (CAD)	Description
Revolution-Rhode Island	20	$ 98.43	2/18/2020	1.3260	$ 130.52	Fixed price contract; no price escalation
South Fork-New York	20	160.33		1.3260	212.59	2 percent average price escalation
South Fork-New York 2	20	86.25		1.3260	114.37	2 percent average price escalation
Average	**20**	**$ 115.00**			**$ 152.49**	Based on the above, we have assumed that the PPA prices disclosed are the price at COD.

Windstream v. Canada
Schedule 5
Calculation of Comparable Transactions Multiples
Amounts in CAD, unless otherwise noted

Project Acquired	Notes	Buyer	Seller	Project Country	Transaction Announcement Date	Financial Close	PPA Date	PPA Price (original currency, per MWh)		PPA Price [11] ($/MWh)	Transaction Value (original currency, millions)		Transaction Value [12] ($ millions)	% Acquired	Project MWs	MW Acquired	Value / MW ($ millions)
													A	*B*	*C*	*D = B x C*	*E = A / D*
Deutsche Bucht	1	Northland Power	Highland	Germany	3-Mar-17	18-Aug-17	18-Feb-20	EUR	184	$ 264	CAD	310.2	$ 310.2	100.0%	252	252	$ 1.23
Borsselle III & IV	2	Partners Group	Blauwwind Consortium	Netherlands	8-Jan-18	29-Jun-18	1-Dec-16	EUR	55	77	EUR	300.0	446.4	45.0%	732	329	1.36
Moray East	3	Diamond Generation Europe Limited	EDPR	United Kingdom	23-Mar-18	6-Dec-18	11-Sep-17	GBP	58	92	GBP	35.8	65.1	20.0%	950	190	0.34
Neart na Gaoithe	4	EDF	Mainstream	United Kingdom	3-May-18	28-Nov-19	26-Feb-15	GBP	114	220	EUR	500.0	770.2	100.0%	450	450	1.71
Triton Knoll	5	J Power, Kansai Electric Power	Innogy SE	United Kingdom	13-Aug-18	31-Aug-18	11-Sep-17	GBP	75	120	EUR	472.0	706.9	41.0%	860	353	2.00
Moray East	6	Diamond Generation Europe Limited	EDPR	United Kingdom	16-Nov-18	6-Dec-18	11-Sep-17	GBP	58	92	GBP	54.0	91.2	13.4%	950	127	0.72
Dieppe-Le Treport & Yeu-Noirmoutier	7	Sumitomo	EDPR	France	18-Dec-18	N/A	20-Jun-18	EUR	150	231	EUR	79.2	121.3	13.5%	992	134	0.91
Revolution Wind & South Fork	8	Eversource	Orsted	United States	8-Feb-19	N/A	18-Feb-20	USD	115	152	USD	225.0	183.0	50.0%	834	417	0.44
Formosa 1	9	Orsted, Macquarie	Swancor Renewable	Taiwan	25-Jan-17	8-Jun-18	1-Dec-17	TWD	6,044	256	TWD	914.6	38.2	85.0%	128	109	0.35
Formosa 2	10	Stonepeak	Swancor	Taiwan	31-Jul-19	29-Oct-19	12-Dec-18	TWD	5,850	253	USD	68.7	90.4	23.8%	376	89	1.01
																Average	**$ 1.01**
																Median	**$ 0.96**

Notes

9 Transaction date, % acquired, MW capacity: **C-2069** - Macquarie press release dated January 25, 2017
Financial close: **C-2155** - Orsted press release dated June 7, 2018
Transaction value: **C-2128** - Swancor 2017 FS, page 38
PPA price: **C-2377** - Swancor Renewable Milestones page says PPA, which is effective for 20 years, was signed for Formosa 1 in Dec 2017
Assumed PPA price is equal to the 2017 FIT Price (Option #1) per **C-2081** - Flanders Investment and Trade paper, page 9.
Price of NT$6.0437/kWh for 20 years (not specified whether this is the average/levelized price; therefore, we have assumed this is the price at COD).
C-2493 - Taiwan Today article also points to NT$6/kWh FIT price in 2017, confirming the Flanders FIT price

10 Transaction date, % acquired, MW capacity, and transaction value: **C-2232** - inframationgroup.com article dated August 12, 2019
Transaction is for 95% of Swancor Renewables, which owns 25% of Formosa 2; i.e., transaction is for 95%*25% = 23.75%
Based on the initial payment of $41.7 million (USD25.98 million), this transaction would result in a multiple of $0.38/MW
Transaction value was calculated as: initial payment (USD25.98 million) + [contingent payment (USD75.02 million = 101-25.98) multiplied by our 57% probability factor]
Financial close: **C-2244** - Formosa 2 press release dated October 29, 2019
PPA price is based on **C-2139** - Jones Day Paper, page 12: As of Dec 1, 2017, Taipower had published a standard form PPA for offshore wind.
The 2018 fixed 20yr FIT price was NT$5.8498/kWh (fixed price; therefore, we have assumed this is the price at COD).
20-year PPA was awarded on December 12, 2018 per **C-2185** - offshorewind.biz article dated December 12, 2018.

11 PPA prices were translated to Canadian dollar using the foreign exchange rate from Capital IQ Pro at the time of the award, unless otherwise noted

12 Transaction values were translated to Canadian dollar using the foreign exchange rate from Capital IQ Pro at the time of the transaction announcement

Windstream v. Canada
Schedule 5A
Major Attributes of Comparable Transactions
Amounts in CAD, unless otherwise noted

Project	Grid Access	Permits	PPA Price at COD ($/MWh)	Length of PPA Contract (years)	Max # of Turbines	Max Turbine Capacity (MW)	Max Development Depth (m)	Wind Speed (m/s)
Deutsche Bucht	Y	Y	$ 264	13	31	8.4	41	10.04
Borsselle III & IV	Y	Y	77	16	77	9.5	37	10.21
Moray East	Y	Y	92	15	100	9.5	54	10.13
Neart na Gaoithe	Y	Y	220	15	54	8	55	9.57
Triton Knoll	Y	Y	120	15	90	9.5	18	9.16
Moray East	Y	Y	92	15	100	9.5	54	10.13
Dieppe-Le Treport & Yeu-Noirmoutier	1/2	1/2	231	N/A	62	8	25, 35	9.59, 8.73
Revolution Wind & South Fork	N	N	152	20	88, 15	8	46, N/A	8.73
Formosa 1	Y	N	256	20	20	6	30	11.81
Formosa 2	Y	N	253	20	47	9.5	55	11.81
Windstream	**Y**	**N**	**$ 254**	**20**	**66**	**4.5**	**30**	**8.47**

Notes

1 Grid access:

Deutsche Bucht: **C-1978** - Businesswire article dated October 29, 2012: "Windreich and TenneT agree on interim connections for offshore wind farm, Deutsche Bucht".

Borssele 3 & 4: **C-2137** - Partners Group press release dated January 8, 2018: "Partners Group to become largest investor in 730 MW Dutch offshore wind farm project"

Moray East: **C-2115** - ENGIE press release dated September 11, 2017: "EDP Renováveis and ENGIE consortium is awarded long-term CfD for 950 MW offshore wind project in UK".

Neart na Gaoithe: **C-2152** - EDF Renewables press release dated May 3, 2018: "EDF Group buys Mainstream Renewable Power offshore wind project".

Triton Knoll: **C-2025** - Triton Knoll submission to the Secretary of State for Energy and Climate Change dated February 24, 2016: "Triton Knoll Electrical System", ¶5.3 and 5.8.

Le Treport & Noirmoutier: **C-2210** - Prefect of the Seine-Maritime press release dated February 26, 2019: "Réalisation du parc éolien en mer au large de Dieppe et du Tréport et son raccordement".

Revolution Wind & South Fork: **C-2209** - Ørsted press release dated February 8, 2019: "Ørsted divests 50% of South Fork, Revolution Wind and two New England offshore wind lease areas to Eversource".

Formosa 1: **C-2150** - Orsted press release dated April 26, 2018: "Ørsted commits to invest in the second phase of Taiwan's Formosa 1 offshore wind farm".

Formosa 2: **C-2185** - Offshorewind.biz article dated December 12, 2018: "Formosa 2 Power Purchase Agreement All Set".

Schedule 5A

Major Attributes of Comparable Transactions

Amounts in CAD, unless otherwise noted

Project	Grid Access	Permits	PPA Price at COD ($/MWh)	Length of PPA Contract (years)	Max # of Turbines	Max Turbine Capacity (MW)	Max Development Depth (m)	Wind Speed (m/s)
Deutsche Bucht	Y	Y	$ 264	13	31	8.4	41	10.04
Borssele III & IV	Y	Y	77	16	77	9.5	37	10.21
Moray East	Y	Y	92	15	100	9.5	54	10.13
Neart na Gaoithe	Y	Y	220	15	54	8	55	9.57
Triton Knoll	Y	Y	120	15	90	9.5	18	9.16
Moray East	Y	Y	92	15	100	9.5	54	10.13
Dieppe-Le Treport & Yeu-Noirmoutier	1/2	1/2	231	N/A	62	8	25, 35	9.59, 8.73
Revolution Wind & South Fork	N	N	152	20	88, 15	8	46, N/A	8.73
Formosa 1	Y	N	256	20	20	6	30	11.81
Formosa 2	Y	N	253	20	47	9.5	55	11.81
Windstream	**Y**	**N**	**$ 254**	**20**	**66**	**4.5**	**30**	**8.47**

Notes

2 Permits:

Deutsche Bucht: **C-2126** - Green Giraffe publication dated December 1, 2017: "Deutsche Bucht story".

Borssele III & IV: **C-2256** - Netherlands RVO publication dated December 14, 2019: "Borssele Wind Farm Sites III & IV".

Moray East: **C-2115** - ENGIE press release dated September 11, 2017: "EDP Renováveis and ENGIE consortium is awarded long-term CfD for 950 MW offshore wind project in UK".

Neart na Gaoithe: **C-2152** - EDF Renewables press release dated May 3, 2018: "EDF Group buys Mainstream Renewable Power offshore wind project".

Triton Knoll: **C-2036** - Triton Knoll press release dated September 6, 2016: "Consent granted for Triton Knoll Offshore Wind Farm Electrical System".

Le Treport & Noirmoutier: **C-2210** - Prefect of the Seine-Maritime press release dated February 26, 2019: "Réalisation du parc éolien en mer au large de Dieppe et du Tréport et son raccordement".

Revolution Wind & South Fork: **C-2209** - Ørsted press release dated February 8, 2019: "Ørsted divests 50% of South Fork, Revolution Wind and two New England offshore wind lease areas to Eversource".

Formosa 1: **C-2150** - Orsted press release dated April 26, 2018: "Orsted commits to invest in the second phase of Taiwan's Formosa 1 offshore wind farm"; states that the permitting process is on schedule (i.e., still ongoing).

Formosa 2: N/A.

3 PPA prices and length of contracts: see **Schedule 5** for sources.

4 Maximum # of turbines, Maximum turbine capacity, Maximum development depth, and Wind speed are from **C-1913** - 4C Comparables.

Windstream Maximum # of turbines, Maximum turbine capacity, Maximum development depth: Wood Report, Table 1-1, page 3.

Windstream Wind speed: Wood Report, Section 5, page 38.

Windstream v. Canada
Schedule 6
Calculation of Valuation Multiples from Leasing Transactions

Notes	Project	Cost (USD)	Cost (CAD)	Acres	Transaction / Leasing Date	$/Acre
			A	*B*		*A/ B*
1	Garden State	20,000	20,103	70,098	16-Nov-12	0.29
2	Skipjack	10,000	9,934	26,332	1-Dec-12	0.38
3	Sunrise	1,260,000	1,297,460	67,252	31-Jul-13	19.29
4	Coastal Virginia	1,600,000	1,677,184	112,799	4-Sep-13	14.87
5	South Fork	260,000	268,671	13,700	1-Oct-13	19.61
6	Revolution	1,570,000	1,622,360	83,798	1-Oct-13	19.36
7	MarWin	8,701,098	9,508,473	79,707	19-Aug-14	119.29
8	Bay State	280,000	354,018	187,523	29-Jan-15	1.89
9	Vineyard Wind 1	90,000	113,518	101,590	1-Apr-15	1.12
10	Park City	60,000	75,679	65,296	1-Apr-15	1.16
11	Ocean	880,715	1,169,563	160,480	9-Nov-15	7.29
12	Atlantic Shores	1,010,000	1,355,814	183,353	1-Mar-16	7.39
13	Empire	21,230,000	28,453,720	39,675	15-Dec-16	717.17
14	Empire II	21,230,000	28,453,720	39,675	15-Dec-16	717.17
15	Beacon	135,000,000	180,377,550	128,811	13-Dec-18	1,400.33
16	Mayflower	135,000,000	180,377,550	127,388	13-Dec-18	1,415.97
17	Liberty	135,100,000	180,511,163	132,370	13-Dec-18	1,363.69
18	EDF-US Wind	215,000,000	290,649,900	183,353	20-Dec-18	1,585.19

Notes

1 Garden State (GSOE, LLC)
Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*
Leasing date per ***C-2452*** *- BOEM State Activities: "Delaware Activities".*

2 Skipjack
Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*
Leasing date per ***C-2452*** *- BOEM State Activities: "Delaware Activities".*

3 Sunrise
Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*
Leasing date per ***C-2456*** *- BOEM State Activities: "Sunrise Wind Activities".*

4 Coastal Virginia
Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*
Leasing date per ***C-2451*** *- BOEM State Activities: "CVOW-C" (Coastal Virginia Offshore Wind).*

5 South Fork
Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*
Leasing date per ***C-2450*** *- BOEM State Activities: "Commercial Wind Leasing Offshore Rhode Island And Massachusetts".*

6 Revolution
Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*
Leasing date per ***C-2450*** *- BOEM State Activities: "Commercial Wind Leasing Offshore Rhode Island And Massachusetts".*

Windstream v. Canada

Schedule 6

Calculation of Valuation Multiples from Leasing Transactions

Notes	Project	Cost (USD)	Cost (CAD)	Acres	Transaction / Leasing Date	$/Acre
			A	*B*		*A/ B*
1	Garden State	20,000	20,103	70,098	16-Nov-12	0.29
2	Skipjack	10,000	9,934	26,332	1-Dec-12	0.38
3	Sunrise	1,260,000	1,297,460	67,252	31-Jul-13	19.29
4	Coastal Virginia	1,600,000	1,677,184	112,799	4-Sep-13	14.87
5	South Fork	260,000	268,671	13,700	1-Oct-13	19.61
6	Revolution	1,570,000	1,622,360	83,798	1-Oct-13	19.36
7	MarWin	8,701,098	9,508,473	79,707	19-Aug-14	119.29
8	Bay State	280,000	354,018	187,523	29-Jan-15	1.89
9	Vineyard Wind 1	90,000	113,518	101,590	1-Apr-15	1.12
10	Park City	60,000	75,679	65,296	1-Apr-15	1.16
11	Ocean	880,715	1,169,563	160,480	9-Nov-15	7.29
12	Atlantic Shores	1,010,000	1,355,814	183,353	1-Mar-16	7.39
13	Empire	21,230,000	28,453,720	39,675	15-Dec-16	717.17
14	Empire II	21,230,000	28,453,720	39,675	15-Dec-16	717.17
15	Beacon	135,000,000	180,377,550	128,811	13-Dec-18	1,400.33
16	Mayflower	135,000,000	180,377,550	127,388	13-Dec-18	1,415.97
17	Liberty	135,100,000	180,511,163	132,370	13-Dec-18	1,363.69
18	EDF-US Wind	215,000,000	290,649,900	183,353	20-Dec-18	1,585.19

Notes

7 *MarWin*

*Acres per **C-2410** - Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

*Cost and leasing date per **C-2454** - BOEM State Activities: "Maryland Activities".*

8 *Bay State*

*Cost and acres per **C-2410** - Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

*Leasing date per **C-2448** - BOEM State Activities: "Bay State Wind (OCS-A 0500)".*

9 *Vineyard Wind 1*

*Cost and acres per **C-2410** - Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

*Leasing date per **C-2457** - BOEM State Activities: "Vineyard Wind South Activities".*

10 *Park City*

*Cost and acres per **C-2410** - Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

Leasing date per C-2455 - BOEM State Activities: "Massachusetts Leases OCS-A 0500 (Bay State Wind) And OCS-A 0501 (Vineyard Wind)".

11 *Ocean*

*Acres per **C-2410** - Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

*Cost and leasing date per **C-2449** - BOEM State Activities: "Commercial Wind Leasing Offshore New Jersey".*

12 *Atlantic Shores*

*Cost and acres per **C-2410** - Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

*Leasing date per **C-2447** - BOEM State Activities: "Atlantic Shores" and **C-2027** - BOEM Lease OCS-A 0499.*

Windstream v. Canada

Schedule 6

Calculation of Valuation Multiples from Leasing Transactions

Notes	Project	Cost (USD)	Cost (CAD)	Acres	Transaction / Leasing Date	$/Acre
			A	*B*		*A/ B*
1	Garden State	20,000	20,103	70,098	16-Nov-12	0.29
2	Skipjack	10,000	9,934	26,332	1-Dec-12	0.38
3	Sunrise	1,260,000	1,297,460	67,252	31-Jul-13	19.29
4	Coastal Virginia	1,600,000	1,677,184	112,799	4-Sep-13	14.87
5	South Fork	260,000	268,671	13,700	1-Oct-13	19.61
6	Revolution	1,570,000	1,622,360	83,798	1-Oct-13	19.36
7	MarWin	8,701,098	9,508,473	79,707	19-Aug-14	119.29
8	Bay State	280,000	354,018	187,523	29-Jan-15	1.89
9	Vineyard Wind 1	90,000	113,518	101,590	1-Apr-15	1.12
10	Park City	60,000	75,679	65,296	1-Apr-15	1.16
11	Ocean	880,715	1,169,563	160,480	9-Nov-15	7.29
12	Atlantic Shores	1,010,000	1,355,814	183,353	1-Mar-16	7.39
13	Empire	21,230,000	28,453,720	39,675	15-Dec-16	717.17
14	Empire II	21,230,000	28,453,720	39,675	15-Dec-16	717.17
15	Beacon	135,000,000	180,377,550	128,811	13-Dec-18	1,400.33
16	Mayflower	135,000,000	180,377,550	127,388	13-Dec-18	1,415.97
17	Liberty	135,100,000	180,511,163	132,370	13-Dec-18	1,363.69
18	EDF-US Wind	215,000,000	290,649,900	183,353	20-Dec-18	1,585.19

Notes

13 *Empire*

Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

Leasing date per ***C-2453*** *- BOEM State Activities: "Empire Wind".*

14 *Empire II*

Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

Leasing date per ***C-2453*** *- BOEM State Activities: "Empire Wind".*

15 *Beacon*

Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

Leasing date per ***C-2446*** *- BOEM State Activities: "Commercial Leases OCS-A 0520, 0521, And 0522."*

16 *Mayflower*

Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

Leasing date per ***C-2446*** *- BOEM State Activities: "Commercial Leases OCS-A 0520, 0521, And 0522."*

17 *Liberty*

Cost and acres per ***C-2410*** *- Orennia Offshore "Wind-lytics: Sea you there", dated November 15, 2021, page 10.*

Leasing date per ***C-2446*** *- BOEM State Activities: "Commercial Leases OCS-A 0520, 0521, And 0522."*

18 *EDF-US Wind*

Cost, acres, and transaction date per C-2188 - PR Newswire article dated December 20, 2018: "US Wind Inc. agrees to sell its New Jersey offshore lease to EDF Renewables North America."

19 *Leasing costs were translated to Canadian dollar using the foreign exchange rate from Capital IQ Pro at the Transaction / Leasing Date, unless otherwise noted.*

Windstream v. Canada
Schedule 7
Calculation of Valuation Multiples from Onshore Wind Transactions in Ontario
Amounts in $ million, unless otherwise noted

Transaction Date	Project	Buyers	Sellers	Stage	Turbines	Capacity (MW)	FIT Contract Date	FIT Contract Price ($/MWh)	Remaning FIT Contract Period
11-Oct-19	Henvey Inlet	Pattern Energy Group Inc.	Pattern Energy Group LP.	Comissioned September 2019	Vestas 3.4 MW	300	25-Feb-11	150	19.9 years
2-Aug-19	North Kent Wind Facility	Pattern Energy Group Inc.	Pattern Energy Group LP.	Comissioned February 2018	Siemens 3.2 MW	100	1-Apr-15	128	18.5 years
2-Aug-19	Belle River Wind Facility	Pattern Energy Group Inc.	Pattern Energy Group LP.	Comissioned September 2017	Siemens 3.2 MW	100	22-Sep-14	115	18.1 years

Transaction Date	Project	Purchase Consideration	Stake Acquired	Equity Value	Debt	Enterprise Value	Capacity (MW)	EV/ MW	Debt/Total Capital
11-Oct-19	Henvey Inlet	$ 242.4	50.0%	$ 484.8	$ 1,448.0	$ 1,932.8	300	6.44	75%
2-Aug-19	North Kent Wind Facility	$ 31.2	35.0%	$ 89.1	$ 223.2	$ 312.3	100	3.12	71%
2-Aug-19	Belle River Wind Facility	$ 20.8	21.7%	$ 95.8	$ 227.1	$ 322.9	100	3.23	70%
Median								3.23	71%

Windstream v. Canada
Schedule 7
Calculation of Valuation Multiples from Onshore Wind Transactions in Ontario
Amounts in $ million, unless otherwise noted

Henvey Inlet

			Notes
Location		Georgian Bay, Ontario, Canada	*[1]*
Capacity		300 MW	*[1]*
FIT-Contract date		25-Feb-11	*[5]*
FIT-Contract period		20-year	*[3]*
FIT-Contract price ($/MWh)		$ 150.0	*[4]*
Operation start date		September 2019	*[1]*
Turbines		Vestas 3.4 MW turbines	*[1]*
Transaction Announced Date		11-Oct-19	*[1]*
Buyers/Investors		Pattern Energy Group Inc.	*[1]*
Sellers		Pattern Energy Group LP.	*[1]*
Purchase price	*[A]*	$ 242.4	*[2]*
Stake Acquired	*[B]*	50%	*[1]*
Equity value	***[C= A / B]***	**$ 484.8**	
Debt	*[D]*	$ 1,448.0	*[6]*
Enterprise value (EV)	***[E = C + D]***	**$ 1,932.8**	
Implied Debt/Total Capital	***[D / E]***	***74.9%***	
EV / MW	***[E / 300]***	**$ 6.44**	

Notes:

1 **C-2240** - Purchase and sale agreement, Appendix C, part II.
2 **C-2230** - Purchase and sale agreement, Appendix B, part I.
3 **C-2242** - Press release by Pattern Energy Operations LP dated October 15, 2019.
4 **C-1955** - Feed-In Tariff Prices for Renewable Energy Projects in Ontario, base date July 2, 2010.
Calculated as: ($0.135 / kWh + $0.015 / kWh for Aboriginal price adder) * 1000 = $150 / MWh.
5 **C-2088** - Henvey Inlet Wind LP-Application for leave to construct, dated May 4, 2017, para. 21.
6 **C-2262** - Pattern Energy Group Inc., Form 10k for 2019, Note 5 'Acquisitions'.
Calculated as: $724 million / 50% = $1,448 million.

Windstream v. Canada
Schedule 7
Calculation of Valuation Multiples from Onshore Wind Transactions in Ontario
Amounts in $ million, unless otherwise noted

North Kent Wind Facility

				Notes
Location		Chatham-Kent, Ontario, Canada		[2]
Capacity		100 MW		[2]
FIT-Contract date		1-Apr-15		[3]
FIT-Contract period		20-year		[4]
FIT-Contract price ($/MWh)		$	128.0	[5]
Operation start date		February 2018		[2]
Turbines		Siemens 3.2 MW		[2]
Transaction Date		2-Aug-19		[1]
Buyers/Investors		Pattern Energy Group Inc.		[1]
Sellers		Pattern Energy Group LP.		[1]
Purchase price	*[A]*	$	31.2	[1]
Stake Acquired	*[B]*		35%	[2]
Equity value	***[C= A / B]***	**$**	**89.1**	
Debt	*[D]*	$	223.2	[4]
Enterprise value (EV)	***[E = C + D]***	**$**	**312.3**	
Implied Debt/Total Capital	***[D / E]***		***71.5%***	
EV / MW	*[E / 100]*	$	3.12	

Notes:

1 **C-2230** - Purchase and sale agreement, Appendix B.
2 **C-2230** - Purchase and sale agreement, Appendix C.
3 **C-2230** - Purchase and sale agreement, Appendix D-2.
4 **C-2201** - Pattern Energy Q2 2019 results, note on 'New Acquisitions'.
Debt calculated as: USD 169 million / 0.7573 = $223.2 million.
5 **C-2007** - FIT Price Schedule, effective September 30, 2014.

Windstream v. Canada
Schedule 7
Calculation of Valuation Multiples from Onshore Wind Transactions in Ontario
Amounts in $ million, unless otherwise noted

Belle River Wind Facility

			Notes
Location		Lakeshore, Essex County, Ontario	*[2]*
Capacity		100 MW	*[2]*
FIT-Contract date		22-Sep-14	*[3]*
FIT-Contract period		20-year	*[4]*
FIT-Contract price ($/MWh)		$ 115.0	*[5]*
Operation start date		September 2017	*[2]*
Turbines		Siemens 3.2 MW	*[2]*
Transaction Announced Date		2-Aug-19	*[1]*
Buyers/Investors		Pattern Energy Group Inc.	*[1]*
Sellers		Pattern Energy Group LP.	*[1]*
Purchase price	*[A]*	$ 20.8	*[1]*
Stake Acquired	*[B]*	21.7%	*[1, 4]*
Equity value	***[C= A / B]***	**$ 95.8**	
Debt	*[D]*	$ 227.1	*[4]*
Enterprise value (EV)	***[E = C + D]***	**$ 322.9**	
Implied Debt/Total Capital	***[D / E]***	***70.3%***	
EV / MW	***[E / 100]***	**$ 3.23**	

Notes:

1 **C-2229 -** Purchase and sale agreement, Appendix B.
2 **C-2229 -** Purchase and sale agreement, Appendix C-3.
3 **C-2229 -** Purchase and sale agreement, Appendix D-2, item 10.
4 **C-2201** - Pattern Energy Q2 2019 results, note on 'New Acquisitions'.
Debt calculated as: USD 172 million / 0.7573 = $227.1 million.
5 **C-1988** - FIT Price Schedule, effective August 26, 2013.

Entity Name	Notes	Ticker	Total Capacity (MW)	Wind Capacity (MW)	Development Capacity (MW)	Wind Capacity as % of Total Capacity	Development Capacity as % of Total Capacity	Enterprise Value (EV) ($ million)	Market Capitalization ($ million)	Market Capitalization, with Premium ($ million)	Other TEV Components ($ million)	EV with Premium ($ million)	EV / MW ($ million)	EV / MW with Premium ($ million)
			A	*B*	*C*	*D = B / A*	*E = C / A*	*F*	*G*	*H = G x (1 + 30%)*	*I = F - G*	*J = H + I*	*K = F / A*	*L = J / A*
Arise AB (publ)	*1*	OM:ARISE	967	967	828	100%	86%	$ 318.1	$ 240.7	$ 312.9	$ 77.3	$ 390.3	$ 0.33	$ 0.40
Boralex Inc.	*2*	TSX:BLX	4,958	4,161	2,928	84%	59%	6,406.2	3,049.2	3,964.0	3,357.0	7,321.0	1.29	1.48
EDP Renováveis, S.A.	*3*	ENXTLS:EDPR	12,356	12,072	994	98%	8%	23,501.1	16,191.3	21,048.7	7,309.8	28,358.5	1.90	2.30
Fintel Energija a.d.	*4*	BELEX:FINT	901	901	855	100%	95%	352.1	212.0	275.6	140.1	415.7	0.39	0.46
Ørsted A/S	*5*	CPSE:ORSTED	13,307	10,824	7,118	81%	53%	65,963.4	61,637.8	80,129.2	4,325.5	84,454.7	4.96	6.35
Polenergia S.A.	*6*	WSE:PEP	2,065	1,948	1,808	94%	88%	629.1	496.0	644.9	133.1	777.9	0.30	0.38
Terna Energy S.A.	*7*	ATSE:TENERGY	1,935	1,904	548	98%	28%	2,491.8	1,403.6	1,824.7	1,088.2	2,912.9	1.29	1.51
												Average	**$ 1.49**	**$ 1.84**
												Median	**1.29**	**1.48**

Notes

1 *Arise AB (publ)*

*Total capacity: **C-2259** - Arise 2019 Annual Report (calculated as: 828 in development per page 17 and 139.2 operating per page 103).*

*Wind capacity: As shown in **C-2259** - Arise 2019 Annual Report, pages 8-9, their portfolio is fully comprised of wind farms.*

*Development capacity: **C-2259** - Arise 2019 Annual Report, page 17.*

2 *Boralex Inc.*

*Total capacity: **C-2192** - Boralex 2019 Annual Report, page 32 (calculated as: 2,703 in the pipeline, 225 in Growth Path, 2,040 in operation less 9.75 not owned as shown below).*

Wind capacity: calculated as follows:

Capacity	*Description*	*Source*
1,795	*Operating*	***C-2192**, page 24*
659	*Early stage*	***C-2192**, page 32*
1,256	*Mid stage*	***C-2192**, page 32*
236	*Advanced stage*	***C-2192**, page 32*
225	*Growth path*	***C-2192**, page 32*
-10	*Not owned*	*See below*
4,161		

*Development capacity: **C-2192** - Boralex 2019 Annual Report, page 32 (calculated as: 2,703 in the pipeline + 225 in Growth Path).*

*Capacity figures are reduced by capacity not owned per **C-2192** - Boralex 2019 Annual Report, page 27.*

Wind farm not owned	*Capacity*	*% Owned*	*MW not owned*
Val aux Moines	*15*	*65%*	*5.25*
Moose Lake	*15*	*70%*	*4.5*
			9.75

3 *EDP Renováveis, S.A.*

*Total capacity, Wind capacity, and Development capacity: **C-2285** - EDP Renováveis, S.A. 2019 Volumes & Capacity Statement.*

Total capacity calculated as: 11,362 operating + 994 under construction.

Wind capacity calculated as: 11,078 operating + 330 offshore under construction + 664 onshore under construction.

Development capacity calculated as: 330 offshore under construction + 664 onshore under construction.

Windstream v. Canada
Schedule 8
Calculation of Public Companies Trading Multiples

Entity Name	Notes	Ticker	Total Capacity (MW)	Wind Capacity (MW)	Development Capacity (MW)	Wind Capacity as % of Total Capacity	Development Capacity as % of Total Capacity	Enterprise Value (EV) ($ million)	Market Capitalization ($ million)	Market Capitalization, with Premium ($ million)	Other TEV Components ($ million)	EV with Premium ($ million)	EV / MW ($ million)	EV / MW with Premium ($ million)
			A	*B*	*C*	*D = B / A*	*E = C / A*	*F*	*G*	*H = G x (1 + 30%)*	*I = F - G*	*J = H + I*	*K = F / A*	*L = J / A*
Arise AB (publ)	*1*	OM:ARISE	967	967	828	100%	86%	$ 318.1	$ 240.7	$ 312.9	$ 77.3	$ 390.3	$ 0.33	$ 0.40
Boralex Inc.	*2*	TSX:BLX	4,958	4,161	2,928	84%	59%	6,406.2	3,049.2	3,964.0	3,357.0	7,321.0	1.29	1.48
EDP Renováveis, S.A.	*3*	ENXTLS:EDPR	12,356	12,072	994	98%	8%	23,501.1	16,191.3	21,048.7	7,309.8	28,358.5	1.90	2.30
Fintel Energija a.d.	*4*	BELEX:FINT	901	901	855	100%	95%	352.1	212.0	275.6	140.1	415.7	0.39	0.46
Ørsted A/S	*5*	CPSE:ORSTED	13,307	10,824	7,118	81%	53%	65,963.4	61,637.8	80,129.2	4,325.5	84,454.7	4.96	6.35
Polenergia S.A.	*6*	WSE:PEP	2,065	1,948	1,808	94%	88%	629.1	496.0	644.9	133.1	777.9	0.30	0.38
Terna Energy S.A.	*7*	ATSE:TENERGY	1,935	1,904	548	98%	28%	2,491.8	1,403.6	1,824.7	1,088.2	2,912.9	1.29	1.51
												Average	**$ 1.49**	**$ 1.84**
												Median	**1.29**	**1.48**

Notes

4 *Fintel Energija a.d.*

Total capacity, Wind capacity, and Development capacity: ***C-2263*** *- Fintel Energija AD 2019 Consolidated Annual Report, PDF page 118.*

Wind capacity: As shown in C-2263, page 118, their portfolio is fully comprised of wind farms.

Development capacity calculated as: 901.3 total owned capacity less MW in operation (3.6 + 5.3 + 37.3).

Capacity figures are reduced by capacity not owned per ***C-2263*** *- Fintel Energija AD 2019 Consolidated Annual Report, PDF page 20.*

Below is a list of Fintel's wind farms per ***C-2263****, page 118 as well as their ownership % per page 20.*

Wind farm	*Capacity*	*% Owned*	*MW not owned*	*MW Owned*	*Status*
La Piccolina	*6.6*	*54%*	*3.0*	*3.6*	*In operation*
Kula	*9.9*	*54%*	*4.6*	*5.3*	*In operation*
Kosava Phase I	*69*	*54%*	*31.7*	*37.3*	*In operation*
Kosava Phase II	*65.5*	*54%*	*30.1*	*35.4*	*Under construction*
Ram	*10*	*54%*	*4.6*	*5.4*	*Under construction*
Kula 2	*10*	*54%*	*4.6*	*5.4*	*Final phase of development*
Lipar	*10*	*100%*	*0.0*	*10.0*	*Final phase of development*
Lipar 2	*10*	*100%*	*0.0*	*10.0*	*Final phase of development*
Dunav 1	*10*	*54%*	*4.6*	*5.4*	*Final phase of development*
Dunav 3	*10*	*54%*	*4.6*	*5.4*	*Final phase of development*
Maestrale Ring	*632.8*	*100%*	*0.0*	*632.8*	*Under development*
Project Torak	*140*	*100%*	*0.0*	*140.0*	*Under development*
Kosava 2	*9.9*	*54%*	*4.6*	*5.3*	*Under development*
	993.7		*92.4*	*901.3*	

Entity Name	Notes	Ticker	Total Capacity (MW)	Wind Capacity (MW)	Development Capacity (MW)	Wind Capacity as % of Total Capacity	Development Capacity as % of Total Capacity	Enterprise Value (EV) ($ million)	Market Capitalization ($ million)	Market Capitalization, with Premium ($ million)	Other TEV Components ($ million)	EV with Premium ($ million)	EV / MW ($ million)	EV / MW with Premium ($ million)
			A	*B*	*C*	*D = B / A*	*E = C / A*	*F*	*G*	*H = G x (1 + 30%)*	*I = F - G*	*J = H + I*	*K = F / A*	*L = J / A*
Arise AB (publ)	*1*	OM:ARISE	967	967	828	100%	86%	$ 318.1	$ 240.7	$ 312.9	$ 77.3	$ 390.3	$ 0.33	$ 0.40
Boralex Inc.	*2*	TSX:BLX	4,958	4,161	2,928	84%	59%	6,406.2	3,049.2	3,964.0	3,357.0	7,321.0	1.29	1.48
EDP Renováveis, S.A.	*3*	ENXTLS:EDPR	12,356	12,072	994	98%	8%	23,501.1	16,191.3	21,048.7	7,309.8	28,358.5	1.90	2.30
Fintel Energija a.d.	*4*	BELEX:FINT	901	901	855	100%	95%	352.1	212.0	275.6	140.1	415.7	0.39	0.46
Ørsted A/S	*5*	CPSE:ORSTED	13,307	10,824	7,118	81%	53%	65,963.4	61,637.8	80,129.2	4,325.5	84,454.7	4.96	6.35
Polenergia S.A.	*6*	WSE:PEP	2,065	1,948	1,808	94%	88%	629.1	496.0	644.9	133.1	777.9	0.30	0.38
Terna Energy S.A.	*7*	ATSE:TENERGY	1,935	1,904	548	98%	28%	2,491.8	1,403.6	1,824.7	1,088.2	2,912.9	1.29	1.51
												Average	**$ 1.49**	**$ 1.84**
												Median	**1.29**	**1.48**

Notes

5 *Ørsted A/S*

*Total capacity: 18,995 per **C-2198** - Orsted 2019 Annual Report, page 160, less 5,688 (MW not owned per below).*

*Wind capacity calculated as follows (**C-2198** - Orsted 2019 Annual Report, page 160).*

Capacity	*Description*
6,820	*Installed - offshore wind*
987	*Installed - onshore wind*
3,038	*Decided - offshore wind*
671	*Decided - onshore wind*
4,996	*Awarded and contracted - offshore wind*
-5,688	*Not owned (see below)*
10,824	

Development capacity calculated as: 4,129 + 4,996 less non-operating MW not owned per below.

*Capacity figures are reduced by capacity not owned per **C-2198** - Orsted 2019 Annual Report, page 152-157 and **C-1913** - 4C Offshore Comparable Transactions Database ("4C Comparables.xlsm").*

Wind farm not owned	*Capacity*	*% Owned*	*MW not owned*	*MW Owned*	*Status per **C-1913** - 4C Comparables*
Anholt	*400*	*50%*	*200*	*200*	*Operating*
Bay State Wind	*2,000*	*50%*	*1,000*	*1,000*	*Under development*
Borkum Riffgrand 1	*312*	*50%*	*156*	*156*	*Operating*
Borkum Riffgrand 2	*465*	*50%*	*233*	*233*	*Operating*
Burbo Bank Extension	*259*	*50%*	*130*	*130*	*Operating*
Garden State	*300*	*50%*	*150*	*150*	*Under development*
Gode Wind 1	*345*	*50%*	*173*	*173*	*Operating*
Gode Wind 2	*263*	*50%*	*132*	*132*	*Operating*
Gunfleet Sands 1 & 2	*173*	*50%*	*87*	*87*	*Operating*
Horns Rev 1	*158*	*40%*	*95*	*63*	*Operating*
Hornsea 1	*1,218*	*50%*	*609*	*609*	*Operating*
Lincs	*270*	*25%*	*203*	*68*	*Operating*
London Array	*630*	*25%*	*473*	*158*	*Operating*
Nysted	*166*	*43%*	*95*	*71*	*Operating*
Race Bank	*573*	*50%*	*287*	*287*	*Operating*
Revolution Wind	*704*	*50%*	*352*	*352*	*Awarded*
South Fork	*130*	*50%*	*65*	*65*	*Awarded*
Sunrise Wind	*880*	*50%*	*440*	*440*	*Awarded*
Walney 1 & 2	*367*	*50%*	*184*	*184*	*Operating*
Walney Extension	*659*	*50%*	*330*	*330*	*Operating*
West of Duddon Sands	*389*	*50%*	*195*	*195*	*Operating*
Westermost Rough	*210*	*50%*	*105*	*105*	*Operating*
			5,688		

Entity Name	Notes	Ticker	Total Capacity (MW)	Wind Capacity (MW)	Development Capacity (MW)	Wind Capacity as % of Total Capacity	Development Capacity as % of Total Capacity	Enterprise Value (EV) ($ million)	Market Capitalization ($ million)	Market Capitalization, with Premium ($ million)	Other TEV Components ($ million)	EV with Premium ($ million)	EV / MW ($ million)	EV / MW with Premium ($ million)
			A	*B*	*C*	*D = B / A*	*E = C / A*	*F*	*G*	*H = G x (1 + 30%)*	*I = F - G*	*J = H + I*	*K = F / A*	*L = J / A*
Arise AB (publ)	*1*	OM:ARISE	967	967	828	100%	86%	$ 318.1	$ 240.7	$ 312.9	$ 77.3	$ 390.3	$ 0.33	$ 0.40
Boralex Inc.	*2*	TSX:BLX	4,958	4,161	2,928	84%	59%	6,406.2	3,049.2	3,964.0	3,357.0	7,321.0	1.29	1.48
EDP Renováveis, S.A.	*3*	ENXTLS:EDPR	12,356	12,072	994	98%	8%	23,501.1	16,191.3	21,048.7	7,309.8	28,358.5	1.90	2.30
Fintel Energija a.d.	*4*	BELEX:FINT	901	901	855	100%	95%	352.1	212.0	275.6	140.1	415.7	0.39	0.46
Ørsted A/S	*5*	CPSE:ORSTED	13,307	10,824	7,118	81%	53%	65,963.4	61,637.8	80,129.2	4,325.5	84,454.7	4.96	6.35
Polenergia S.A.	*6*	WSE:PEP	2,065	1,948	1,808	94%	88%	629.1	496.0	644.9	133.1	777.9	0.30	0.38
Terna Energy S.A.	*7*	ATSE:TENERGY	1,935	1,904	548	98%	28%	2,491.8	1,403.6	1,824.7	1,088.2	2,912.9	1.29	1.51
												Average	**$ 1.49**	**$ 1.84**
												Median	**1.29**	**1.48**

Notes

6 *Polenergia S.A.*

Total capacity: Calculated as: sum of Wind operating capacity, Other operating capacity, and Development capacity per below sources.

*Wind operating capacity: 249.3 per **C-2293** - Polenergia Group Q4 2019 Financial Results presentation dated March 2020, slide 7.*

*Other operating capacity (solar/photovoltaic): 8 per **C-2293** - Polenergia Group Q4 2019 Financial Results presentation dated March 2020, slide 22.*

*Development capacity: per **C-2293** - Polenergia Group Q4 2019 Financial Results presentation dated March 2020, slide 22, calculated as:*

Description	*Capacity (MW)*
Offshore wind development	*1,500*
Wind under construction	*38*
Onshore wind development	*161*
Photovoltaic development	*109*
	1,808

*Per **C-2265** - Directors' Report on the Operations of the Polenergia Group for the Year Ended on 31 December 2019, page 8-9: Polenergia owns 50% of the 3GW Baltyk I, II, III development projects.*

Therefore, only 1.5GW was included in the calculation of Offshore wind development capacity above.

7 *Terna Energy S.A.*

Total capacity: Calculated as sum of:

*Total operating capacity: 1,386.5 per **C-2264** - Terna Energy 2019 Annual Report, page 11.*

*Total development capacity: 451 under construction + 97 in pipeline per **C-2295** - Terna Energy FY 2019 Results Presentation dated April 3, 2020, slide 4.*

Wind capacity: Calculated as: sum of Wind operating and development capacity below.

*Wind operating capacity: 1,357.6 per **C-2264** - Terna Energy 2019 Annual Report, page 11.*

*Wind developing capacity: 119 + 330 + 30 + 67 per **C-2295** - Terna Energy FY 2019 Results Presentation dated April 3, 2020, slide 6.*

*Development capacity: 548.4 per **C-2295** - Terna Energy FY 2019 Results Presentation dated April 3, 2020, slide 4.*

8 *Enterprise Value: Calculated as: sum of Market Capitalization, Net Debt, Minority Interest, and Preferred Equity, per Capital IQ database.*

9 *Market Capitalization: Per Capital IQ database.*

10 *Acquisition Premium: 30% per **C-2270** - Mergerstat Control Premium Study (CPS), Q1 2020.*

Windstream v. Canada
Schedule 9A
Calculation of Pre-award Interest
Transaction Structuring

Damages		$	$ 262,180,426
Total pre-award interest		$	$ 29,236,282
Interest rate			
Benchmark	*[1]*	CDOR	3 month
Spread		%	2.0%
Valuation Date			18-Feb-20
Award Date	*[2]*		31-Dec-23
CDOR rate available up to	*[3]*		15-Feb-22
CDOR rate for future period			0.86%

Interest Schedule *[4]*

Start date	End date	Period (days)	CDOR rate	Spread	Interest rate	Opening	Interest	Closing
[A]	*[B]*	*[C = B - A + 1]*	*[D]*	*[E]*	*[F = D + E]*	*[G]*	*[H = F * E * C /365]*	*[I = G + H]*
19-Feb-20	30-Apr-20	72	1.96%	2.00%	3.96%	$ 262,180,426	$ 2,049,964	$ 264,230,389
1-May-20	31-Jul-20	92	0.66%	2.00%	2.66%	264,230,389	1,773,239	266,003,629
1-Aug-20	31-Oct-20	92	0.53%	2.00%	2.53%	266,003,629	1,698,816	267,702,444
1-Nov-20	31-Jan-21	92	0.49%	2.00%	2.49%	267,702,444	1,680,145	269,382,589
1-Feb-21	30-Apr-21	89	0.44%	2.00%	2.44%	269,382,589	1,601,074	270,983,662
1-May-21	31-Jul-21	92	0.44%	2.00%	2.44%	270,983,662	1,663,172	272,646,834
1-Aug-21	31-Oct-21	92	0.44%	2.00%	2.44%	272,646,834	1,676,815	274,323,649
1-Nov-21	31-Jan-22	92	0.48%	2.00%	2.48%	274,323,649	1,713,057	276,036,707
1-Feb-22	30-Apr-22	89	0.75%	2.00%	2.75%	276,036,707	1,847,593	277,884,300
1-May-22	31-Jul-22	92	0.86%	2.00%	2.86%	277,884,300	1,999,701	279,884,001
1-Aug-22	31-Oct-22	92	0.86%	2.00%	2.86%	279,884,001	2,014,091	281,898,092
1-Nov-22	31-Jan-23	92	0.86%	2.00%	2.86%	281,898,092	2,028,585	283,926,677
1-Feb-23	30-Apr-23	89	0.86%	2.00%	2.86%	283,926,677	1,976,558	285,903,235
1-May-23	31-Jul-23	92	0.86%	2.00%	2.86%	285,903,235	2,057,407	287,960,641
1-Aug-23	31-Oct-23	92	0.86%	2.00%	2.86%	287,960,641	2,072,212	290,032,853
1-Nov-23	31-Dec-23	61	0.86%	2.00%	2.86%	290,032,853	1,383,854	291,416,707

Notes:

1 Source: Bloomberg
2 Enter the date of award or the date up to which the interest is being calculated.
3 CDOR rates were available till February 15, 2022. For interest periods starting after that date we have used the rate as of February 15, 2022.
4 Compounding based on the tenure of CDOR selected in the analysis (3-months).
5 The calculation of pre-award interest can be updated closer to the evidentiary hearing or the award, based upon the actual CDOR rates that will become available after the issuance of our report.

Windstream v. Canada
Schedule 9B
Calculation of Pre-award Interest
Risk Adjustment Factor

Damages		$	$ 299,564,444
Total pre-award interest		$	$ 33,405,051
Interest rate			
Benchmark	*[1]*	CDOR	3 month
Spread		%	2.0%
Valuation Date			18-Feb-20
Award Date	*[2]*		31-Dec-23
CDOR rate available up to	*[3]*		15-Feb-22
CDOR rate for future period			0.86%

Interest Schedule *[4]*

Start date	End date	Period (days)	CDOR rate	Spread	Interest rate	Opening	Interest	Closing
[A]	*[B]*	*[C = B - A + 1]*	*[D]*	*[E]*	*[F = D + E]*	*[G]*	*[H = F * E * C /365]*	*[I = G + H]*
19-Feb-20	30-Apr-20	72	1.96%	2.00%	3.96%	$ 299,564,444	$ 2,342,266	$ 301,906,710
1-May-20	31-Jul-20	92	0.66%	2.00%	2.66%	301,906,710	2,026,084	303,932,794
1-Aug-20	31-Oct-20	92	0.53%	2.00%	2.53%	303,932,794	1,941,048	305,873,842
1-Nov-20	31-Jan-21	92	0.49%	2.00%	2.49%	305,873,842	1,919,715	307,793,556
1-Feb-21	30-Apr-21	89	0.44%	2.00%	2.44%	307,793,556	1,829,369	309,622,925
1-May-21	31-Jul-21	92	0.44%	2.00%	2.44%	309,622,925	1,900,321	311,523,246
1-Aug-21	31-Oct-21	92	0.44%	2.00%	2.44%	311,523,246	1,915,911	313,439,157
1-Nov-21	31-Jan-22	92	0.48%	2.00%	2.48%	313,439,157	1,957,320	315,396,477
1-Feb-22	30-Apr-22	89	0.75%	2.00%	2.75%	315,396,477	2,111,039	317,507,517
1-May-22	31-Jul-22	92	0.86%	2.00%	2.86%	317,507,517	2,284,836	319,792,353
1-Aug-22	31-Oct-22	92	0.86%	2.00%	2.86%	319,792,353	2,301,278	322,093,631
1-Nov-22	31-Jan-23	92	0.86%	2.00%	2.86%	322,093,631	2,317,839	324,411,470
1-Feb-23	30-Apr-23	89	0.86%	2.00%	2.86%	324,411,470	2,258,393	326,669,863
1-May-23	31-Jul-23	92	0.86%	2.00%	2.86%	326,669,863	2,350,770	329,020,633
1-Aug-23	31-Oct-23	92	0.86%	2.00%	2.86%	329,020,633	2,367,687	331,388,319
1-Nov-23	31-Dec-23	61	0.86%	2.00%	2.86%	331,388,319	1,581,176	332,969,495

Notes:

1 Source: Bloomberg
2 Enter the date of award or the date up to which the interest is being calculated.
3 CDOR rates were available till February 15, 2022. For interest periods starting after that date we have used the rate as of February 15, 2022.
4 Compounding based on the tenure of CDOR selected in the analysis (3-months).
5 The calculation of pre-award interest can be updated closer to the evidentiary hearing or the award, based upon the actual CDOR rates that will become available after the issuance of our report.

Windstream v. Canada
Schedule 9C
Calculation of Pre-award Interest
Market Approach - Low

Damages		$	$ 253,515,857
Total pre-award interest		$	$ 28,270,078
Interest rate			
Benchmark	*[1]*	CDOR	3 month
Spread		%	2.0%
Valuation Date			18-Feb-20
Award Date	*[2]*		31-Dec-23
CDOR rate available up to	*[3]*		15-Feb-22
CDOR rate for future period			0.86%

Interest Schedule *[4]*

Start date	End date	Period (days)	CDOR rate	Spread	Interest rate	Opening	Interest	Closing
[A]	*[B]*	*[C = B - A + 1]*	*[D]*	*[E]*	*[F = D + E]*	*[G]*	*[H = F * E * C /365]*	*[I = G + H]*
19-Feb-20	30-Apr-20	72	1.96%	2.00%	3.96%	$ 253,515,857	$ 1,982,216	$ 255,498,073
1-May-20	31-Jul-20	92	0.66%	2.00%	2.66%	255,498,073	1,714,637	257,212,710
1-Aug-20	31-Oct-20	92	0.53%	2.00%	2.53%	257,212,710	1,642,673	258,855,383
1-Nov-20	31-Jan-21	92	0.49%	2.00%	2.49%	258,855,383	1,624,619	260,480,002
1-Feb-21	30-Apr-21	89	0.44%	2.00%	2.44%	260,480,002	1,548,161	262,028,163
1-May-21	31-Jul-21	92	0.44%	2.00%	2.44%	262,028,163	1,608,207	263,636,370
1-Aug-21	31-Oct-21	92	0.44%	2.00%	2.44%	263,636,370	1,621,400	265,257,770
1-Nov-21	31-Jan-22	92	0.48%	2.00%	2.48%	265,257,770	1,656,444	266,914,214
1-Feb-22	30-Apr-22	89	0.75%	2.00%	2.75%	266,914,214	1,786,534	268,700,747
1-May-22	31-Jul-22	92	0.86%	2.00%	2.86%	268,700,747	1,933,615	270,634,362
1-Aug-22	31-Oct-22	92	0.86%	2.00%	2.86%	270,634,362	1,947,529	272,581,891
1-Nov-22	31-Jan-23	92	0.86%	2.00%	2.86%	272,581,891	1,961,544	274,543,436
1-Feb-23	30-Apr-23	89	0.86%	2.00%	2.86%	274,543,436	1,911,236	276,454,672
1-May-23	31-Jul-23	92	0.86%	2.00%	2.86%	276,454,672	1,989,413	278,444,085
1-Aug-23	31-Oct-23	92	0.86%	2.00%	2.86%	278,444,085	2,003,729	280,447,814
1-Nov-23	31-Dec-23	61	0.86%	2.00%	2.86%	280,447,814	1,338,120	281,785,935

Notes:
1 Source: Bloomberg
2 Enter the date of award or the date up to which the interest is being calculated.
3 CDOR rates were available till February 15, 2022. For interest periods starting after that date we have used the rate as of February 15, 2022.
4 Compounding based on the tenure of CDOR selected in the analysis (3-months).
5 The calculation of pre-award interest can be updated closer to the evidentiary hearing or the award, based upon the actual CDOR rates that will become available after the issuance of our report.

Windstream v. Canada
Schedule 9D
Calculation of Pre-award Interest
Market Approach - High

Damages		$	$ 267,872,517
Total pre-award interest		$	$ 29,871,019
Interest rate			
Benchmark	[1]	CDOR	3 month
Spread		%	2.0%
Valuation Date			18-Feb-20
Award Date	[2]		31-Dec-23
CDOR rate available up to	[3]		15-Feb-22
CDOR rate for future period			0.86%

Interest Schedule [4]

Start date	End date	Period (days)	CDOR rate	Spread	Interest rate	Opening	Interest	Closing
[A]	[B]	[C = B - A + 1]	[D]	[E]	[F = D + E]	[G]	[H = F * E * C /365]	[I = G + H]
19-Feb-20	30-Apr-20	72	1.96%	2.00%	3.96%	$ 267,872,517	$ 2,094,470	$ 269,966,987
1-May-20	31-Jul-20	92	0.66%	2.00%	2.66%	269,966,987	1,811,737	271,778,724
1-Aug-20	31-Oct-20	92	0.53%	2.00%	2.53%	271,778,724	1,735,698	273,514,422
1-Nov-20	31-Jan-21	92	0.49%	2.00%	2.49%	273,514,422	1,716,621	275,231,044
1-Feb-21	30-Apr-21	89	0.44%	2.00%	2.44%	275,231,044	1,635,834	276,866,878
1-May-21	31-Jul-21	92	0.44%	2.00%	2.44%	276,866,878	1,699,280	278,566,158
1-Aug-21	31-Oct-21	92	0.44%	2.00%	2.44%	278,566,158	1,713,220	280,279,378
1-Nov-21	31-Jan-22	92	0.48%	2.00%	2.48%	280,279,378	1,750,249	282,029,626
1-Feb-22	30-Apr-22	89	0.75%	2.00%	2.75%	282,029,626	1,887,705	283,917,332
1-May-22	31-Jul-22	92	0.86%	2.00%	2.86%	283,917,332	2,043,116	285,960,448
1-Aug-22	31-Oct-22	92	0.86%	2.00%	2.86%	285,960,448	2,057,818	288,018,266
1-Nov-22	31-Jan-23	92	0.86%	2.00%	2.86%	288,018,266	2,072,627	290,090,893
1-Feb-23	30-Apr-23	89	0.86%	2.00%	2.86%	290,090,893	2,019,470	292,110,362
1-May-23	31-Jul-23	92	0.86%	2.00%	2.86%	292,110,362	2,102,074	294,212,437
1-Aug-23	31-Oct-23	92	0.86%	2.00%	2.86%	294,212,437	2,117,201	296,329,638
1-Nov-23	31-Dec-23	61	0.86%	2.00%	2.86%	296,329,638	1,413,898	297,743,536

Notes:

1 Source: Bloomberg
2 Enter the date of award or the date up to which the interest is being calculated.
3 CDOR rates were available till February 15, 2022. For interest periods starting after that date we have used the rate as of February 15, 2022.
4 Compounding based on the tenure of CDOR selected in the analysis (3-months).
5 The calculation of pre-award interest can be updated closer to the evidentiary hearing or the award, based upon the actual CDOR rates that will become available after the issuance of our report.

TAB 2

6.20.247560.CAN.R.004

4

Windstream Energy Inc.

Wolfe Island Shoals Offshore Wind Farm

Technical Expert Report

18 February 2022

Report

Executive Summary

Wood (formerly SgurrEnergy) has been appointed by Windstream Energy Inc. (Windstream) to assess the technical feasibility of the Wolfe Island Shoals (WIS) Offshore Wind Project (the Project). The Project has a capacity of 297 MW made up of 66 Siemens Gamesa 4.5-145 MW wind turbine generators (wind turbines). The Project is in the northeastern part of Lake Ontario, approximately 10 km southwest of Wolfe Island. A 28km long, 230kV export cable connects the Project to the onshore Lennox Terminal Station, located adjacent to the existing 2,100MW Lennox Generating Station.

Previously, the Ontario Power Authority and Windstream had entered into a Feed-in-Tariff (FiT) contract and the Project had received conditional approval for interconnection.

SgurrEnergy (now Wood) submitted an Expert Report in July 2014 to Windstream in respect of proceedings against the Government of Canada pursuant to the North American Free Trade Agreement (NAFTA) (NAFTA1). The NAFTA1 report concluded that the Project was technically feasible and could be developed and constructed within the timelines specified in the FiT contract. The SgurrEnergy report is included in Appendix A of this report for convenience. The conclusions in SgurrEnergy's NAFTA1 report remain accurate; to the extent that components of the Project have changed since the NAFTA1 report was issued, this report addresses those changes.

Wood understands that the Ontario Government cancelled the FiT contract for the Project on 18 February 2020. Windstream submitted a notice of intent and notice of arbitration under the NAFTA in February and November 2020, respectively. These were submitted as part of the preliminary steps for a second round of (NAFTA) arbitration proceedings (NAFTA2).

Wood has conducted a comprehensive technical review of the following aspects:

- Wind turbine choice.
- Site layout.
- Wind resource assessment, including energy yield assessment and wind turbine site suitability.
- Site characteristics - ground conditions, wave, and ice.
- Foundations.
- Electrical Interconnection.
- Project implementation plan.
- Construction schedule.
- Staging areas.
- Long-term operation and maintenance plan.
- Decommissioning.
- Environmental attributes.

Wood has also undertaken an independent energy yield assessment (Section 5) and updated the development and construction schedule (Section 10.2). Table RS-1-1 provides an overview of key Project information. Figure RS-1 shows the proposed layout of the Project.

Wood concludes that the conclusion made in its NAFTA1 report remains accurate: the Project remains technically feasible and that it is more likely than not that the Project could be built, but for the imposition of the moratorium and cancellation of the FiT contract.

Table RS 1-1: Key Project Information

Key Project Information	
Location	Lake Ontario (northeastern)
Wind turbine	66 Siemens Gamesa (SG) 4.5-145 MW
Wind turbine hub height / rotor diameter	100m / 145m
Project capacity	297 MW
Wind turbine foundation type	Gravity based foundation
Water depth	10 to 30m
Export cable	230 kV
Point of Interconnection	Lennox Generating Station Switchyard

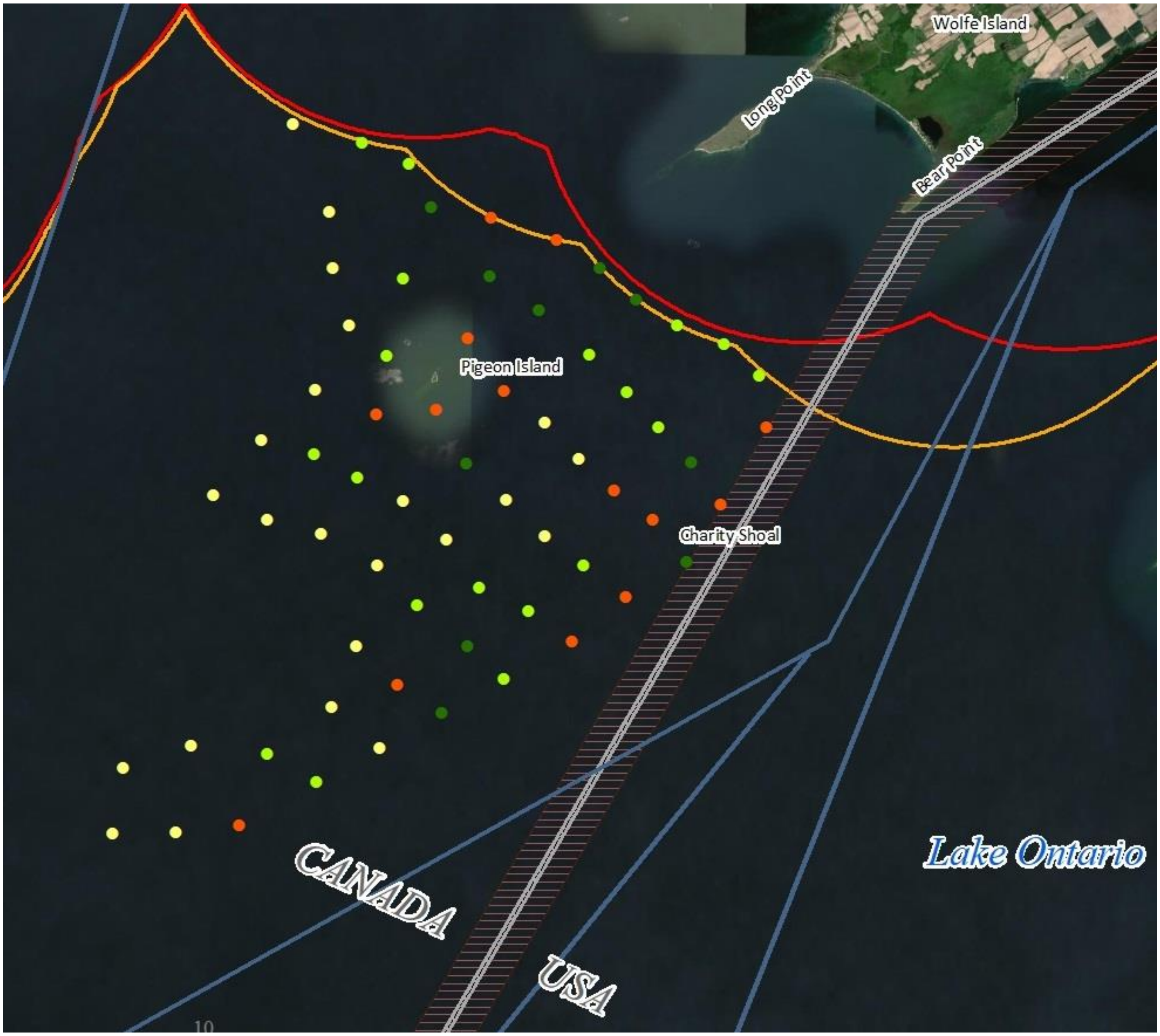

Figure RS-1-1: Proposed Layout (Wind Turbine Locations)

In offshore locations, wind speeds are higher and less turbulent, or smoother, when compared to onshore wind projects. The Project benefits from such smooth wind flow and higher wind speeds. Lake Ontario offers higher wind speeds (more energy), and lower turbulence (longer life) compared to onshore sites, where the Project economics improve with fewer larger capacity wind turbines as used for this Project layout.

The Project was in the advanced stages of development and had the following aspects in place:

- A site identified.
- An interconnection point (where the electricity generated by the wind turbines can be exported to the Ontario grid) confirmed.

- Power / electricity sale contract with the Ontario Government in the form of a FiT contract dated May 2010.
- Extensive engineering and environmental works completed.

Wood notes that Windstream would have started the permitting and construction works soon after, within a year from when the contract was signed. However, these works were halted because the Ontario Government issued a moratorium on offshore wind projects in Ontario in February 2011. This moratorium remains in place as of the date of this report.

The moratorium created substantial delays to the Project. The Project has been limited in its ability to complete all scientific and engineering studies needed to complete the development and achieve financial close of the Project. Achieving financial close would allow the start and completion of construction. Windstream has made best allowable efforts to advance the Project by commissioning various studies supported by data gathered by independent consultants and publically available information.

Wood understands that Windstream has retained other experts to address specific technical and regulatory issues. Wood has reviewed the reports listed in Section 3.2 and has referenced them where appropriate.

Wood believes and concludes that the Project has several notable aspects that contribute to its continued viability. These include:

- A FiT contract (prior to cancellation by the Government in February 2020).
- A robust grid interconnection point conveniently located between two major electricity load centres with significant existing grid transmission capacity.
- The freshwater, inland, non-tidal location limits corrosion and provides favorable metocean (wind, wave, current, and ice) conditions when compared to most ocean-based offshore wind projects constructed.
- Proximity and availability of raw materials and industrial manufacturing capacity. Manufacturing capacity for the fabrication of the gravity based foundation (used to support the wind turbines) and wind turbine tower manufacturing.
- Robust wind energy resource that will lead to significant renewable energy delivery to the Ontario electrical grid.
- Suitable lakebed conditions for the use of gravity based foundations.

Wood has developed a detailed Project schedule which outlines key activities, discussed in Section 8.2 and included in Appendix B. The schedule shows that the development and construction activities could be completed in a total of 58 months, starting from 18 February 2020, and completing on 20 December 2024. This supports the conclusion that the Project can achieve commercial operations within the timelines specified in the FiT contract.

As discussed in detail within this report, Wood considers the Project technically feasible but for the Government-imposed restrictions outlined below, and capable of achieving commercial operations within the timelines in the FiT Contract.

Report Details

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Report Distribution:	
Windstream Energy Inc.:	Ian Baines, Nancy Baines
Wood:	File
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Date of issue:	18 February 2022		

Amendment Record

Revision Number	Date	Summary of Amendments	Purpose of Revision
1	20 January 2022	Final	For Client issue
2	18 February 2022	Updated, based on minor edits and Exhibits referencing	For Client issue

Contents

Figures

Tables

1 Introduction and Project Overview

Wood (formerly SgurrEnergy) has been appointed by Windstream Energy Inc. (Windstream) to assess the technical feasibility of the Wolfe Island Shoals (WIS) Offshore Wind Project (the Project). The Project has a capacity of 297 MW made up of 66 Siemens Gamesa 4.5-145 MW wind turbine generators (wind turbines). The Project is in the northeastern part of Lake Ontario, approximately 10 km southwest of Wolfe Island. A 28km long, 230kV export cable connects the Project to the onshore Lennox Terminal Station, located adjacent to the existing 2,100MW Lennox Generating Station.

Previously, the Ontario Power Authority and Windstream had entered into a Feed-in-Tariff (FiT) contract and the Project had received conditional approval for interconnection.

SgurrEnergy (now Wood) submitted an Expert Report in July 2014 to Windstream in respect of proceedings against the Government of Canada pursuant to the North American Free Trade Agreement (NAFTA) (NAFTA1). The NAFTA1 report concluded the Project was technically feasible and could be developed and constructed within the timelines specified in the FiT contract. The SgurrEnergy report is included in Appendix A of this report for convenience. The conclusions in SgurrEnergy's NAFTA1 report remain accurate; to the extent that components of the Project have changed since the NAFTA1 report was issued, this report addresses those changes.

Wood understands that the Ontario Government cancelled the FiT contract for the Project on 18 February 2020. Windstream submitted a notice of intent and notice of arbitration under the NAFTA in February and November 2020, respectively. These were submitted as part of the preliminary steps for a second round of (NAFTA) arbitration proceedings (NAFTA2).

Wood has conducted a comprehensive technical review of the following aspects:

- Wind turbine choice.
- Site layout.
- Wind resource assessment, including energy yield assessment and wind turbine site suitability.
- Site characteristics - ground conditions, wave, and ice.
- Foundations.
- Electrical Interconnection.
- Project implementation plan.
- Construction schedule.
- Staging areas.
- Long-term operation and maintenance plan.
- Decommissioning.
- Environmental attributes.

Wood has also undertaken an independent energy yield assessment (Section 4) and updated the development and construction schedule (Section 10.2).

Table 1-1 outlines the key Project information. Figure 1-1 shows the Project layout which considers the project-specific buffers (described below).

Table 1-1: Key Project Information

Key Project Information	
Location	Lake Ontario (northeastern)
Wind Turbine Generator (wind turbine)	66 Siemens Gamesa (SG) 4.5-145 MW
Wind turbine hub height / rotor diameter	100m / 145m
Project capacity	297 MW
Wind turbine foundation type	Gravity based foundation
Water depth	10 to 30m
Export cable	230 kV
Point of Interconnection	Lennox Generating Station Switchyard

Wolfe Island Shoals Offshore Wind Farm Site Map – 5 km Buffer from Base of Main Points – 2021 Layout (66 Turbines)

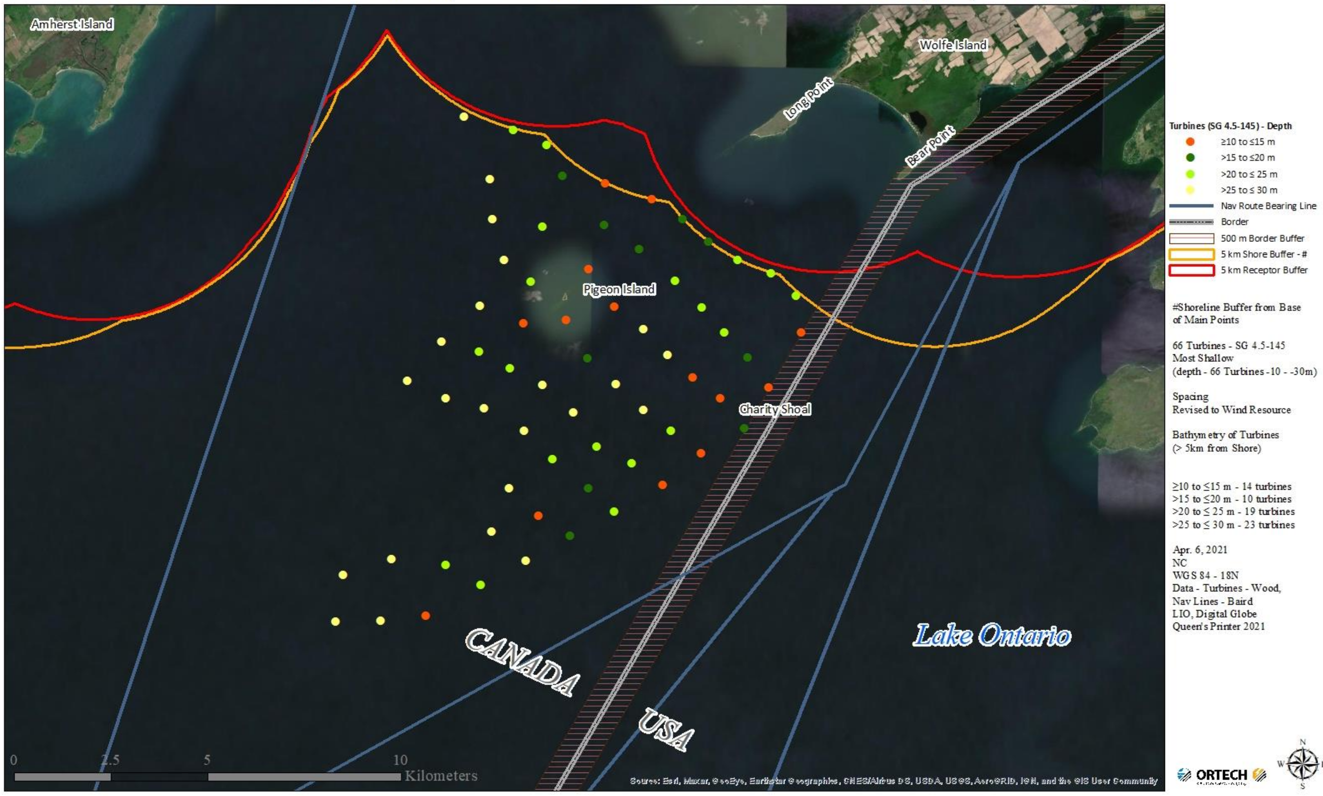


Figure 1-1: Project Layout including Buffers (Source: Ortech)

The Project layout considers the following project-specific considerations:

- Shoreline buffer of 5 km (Note: shoreline is considered to exclude uninhabited or uninhabitable points such as Long Point on Wolfe Island)
- Points of noise receptor buffer of 5 km (Note: Aercoustics, (2021) confirmed any changes in noise receptors in the area since 2015)
- Total 1 km wide Canada / US border buffer (500 m on either side of centreline)
- WF Baird (2021) proposes a 2450 m wide navigation buffer allowance adjacent to the wind turbine area for a distance of around 10 km for the Project timeframe of 2020 – 2025. Note: this buffer is a little wider than the previous total 1.5 km wide shipping lane buffer (750 m on either side of the centre line of the defined shipping lane) reflected in the costal constraint study by WF Baird (2014, 2015).
- Preferred water depths in range of approximately 10 m to 30 m for constructability.
- Considering the same general project area as previous (i.e. SW of Long Point between Wolfe Island and Main Duck Island).

Figure 1-2 below shows the map of the Lennox Generating Station. Figure 1-3 shows the Lennox Generating Station.

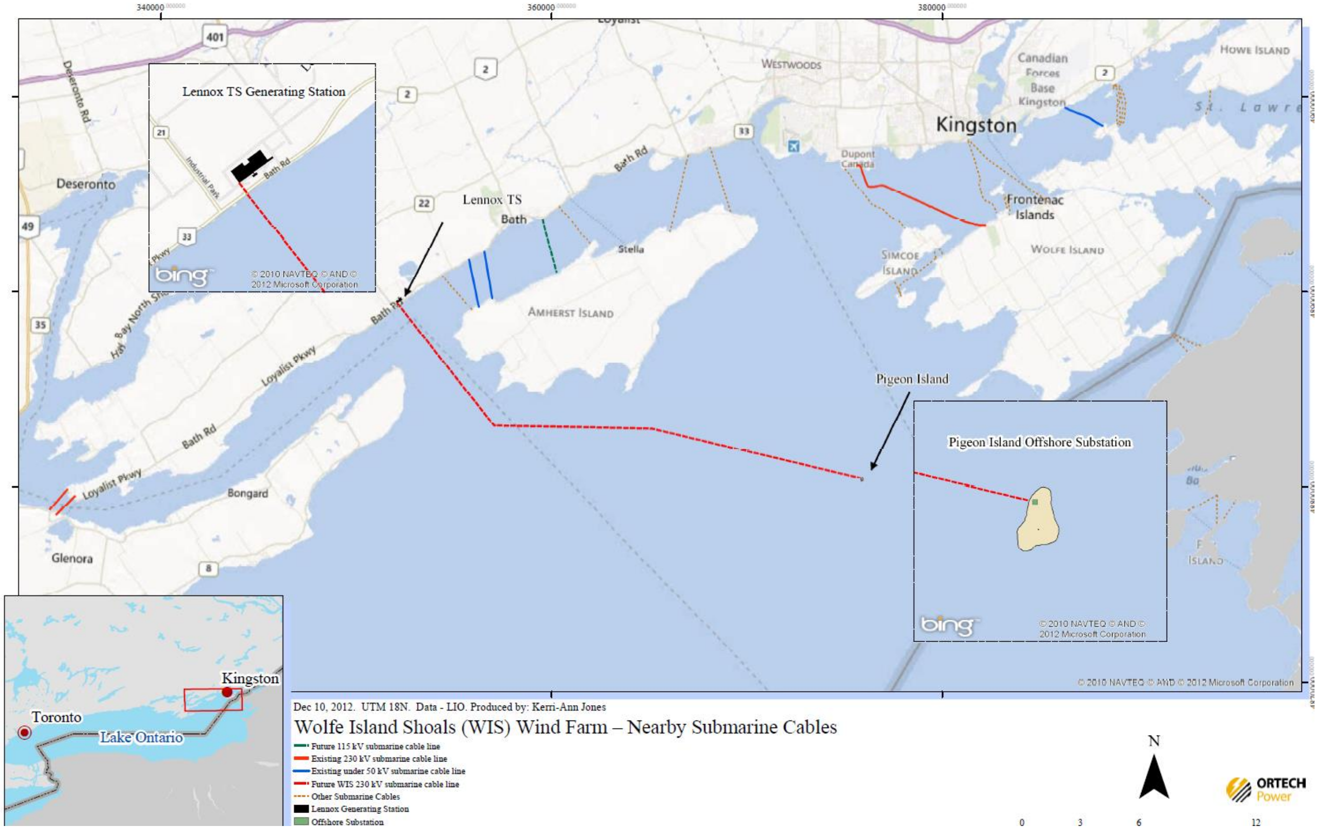


Figure 1-2: Lennox Generating Station Map (Source: Ortech)

Figure 1-3: Lennox Generating Station[1]

[1] C-2434, Powering Ontario > Gas power | OPG (February 2022)

2 Wood Qualifications

Wood has amassed an extensive offshore wind track record with almost 21 GW of merger and acquisition transaction technical support and almost 13 GW projects requiring project financing, globally.

Wood has a strong and extensive track record acting as lenders' technical advisor in achieving financial close on offshore wind projects with innovative technical aspects. These technical innovations include new turbine models, new manufacturing plants and suppliers, deep dive reviews of turbine technology, use of new foundation types, and operation and maintenance strategies.

Wood's Renewables business, formerly SgurrEnergy, is a leading multi-disciplinary engineering consultancy specializing in renewable energy. We have the capability to deliver at every phase of a project, from the early stages of site selection, feasibility, and design right through to project management of the construction phase and operation and maintenance. Our highly qualified staff have extensive international experience providing consultancy services in over 90 countries across six continents. To date we have assessed over 200 GW of renewable energy development internationally and this figure is growing rapidly every month.

We offer expertise in wind, solar, and hybrid energy technologies, and provide a wider range of services, including biomass, hydro, hydrogen and marine based technologies.

We operate an integrated management system and are committed to delivering the highest standards of quality, environmental and health and safety assurance. Our global offices follow the same corporate policies and processes in place in locations where we hold certification to the ISO 9001 (Quality), ISO 14001 (Environmental), OHSAS 18001 (Health and Safety) and ISO17025 (Testing) standards. Wood is also a permanent member of the Measuring Network of Wind Energy Institutes (MEASNET) for measurement of wind turbine power performance.

Further details of the company can be found at www.woodplc.com/cleanenergy.

Wood is a global leader in engineering, project, and technical services to various markets. A graphic is shown in Figure 2-1.

Figure 2-1: Wood Graphic

Figure 2-2 presents the evolution of Wood, which entails SgurrEnergy's acquisition by Wood Group in 2010 followed by Wood Group's acquisition of Amec Foster Wheeler in 2017, and rebranding. The acquisition of Amec Foster Wheeler continued the expansion of Wood Group as a global engineering consultancy focused on energy and the built environment.

Figure 2-2: SgurrEnergy Transition to Wood

2.1 Rationale for Offshore Wind Projects

With continued innovation in the Offshore Wind industry, the overall costs associated with developing new offshore wind projects have decreased. As the economic rationale for offshore wind projects has become increasingly clear, new projects around the world representing a significant wind energy resource have been announced and developed. This trend has been particularly pronounced since SgurrEnergy's NAFTA1 Report. This section outlines the general rationale for Offshore Wind Projects and provides background on recent developments in Offshore Wind Projects throughout the world with particular focus on projects that Wood has been identified as having similar characteristics to the Project.

Continued innovation is key to bringing down the cost of offshore wind. For example, in the UK, there are several organizations providing innovation support, such as Offshore Renewable Energy Catapult, and the Offshore Wind Accelerator. Such continued innovation drives down the cost of offshore wind and continues to reduce the industry's risk profile which is essential to ensuring ongoing confidence in the industry and securing of finance.

Wind turbines are sited offshore to access a more consistent wind resource and to allow for the installation of larger wind turbines. While offshore wind installations are more complex and costly to build, the better wind resource offshore has led to an increasing number and size of offshore wind projects. These same characteristics apply for offshore wind in North America. A better wind resource is defined as having higher, more consistent, and less turbulent wind speeds. These higher, more consistent, and less turbulent winds result in higher electrical generation capacity per wind turbine. Lake Ontario offers higher wind speeds (more energy), and lower turbulence (longer life) compared to onshore sites, where the Project economics improve with fewer larger capacity wind turbines as used for this Project layout.

The Project has several benefits that make it both attractive and technically feasible:

- Strong and consistent wind resource at the Project location.
- Transmission capacity constraints make it difficult to bring renewable energy from some large rural onshore wind farms to load centers.
- The Project is sited near the major transmission access point, allowing a strong connection into the grid without the need for onshore transmission system overhaul.
- The Project offers the ability to provide significant amounts of renewable energy generation in a single project in Ontario.

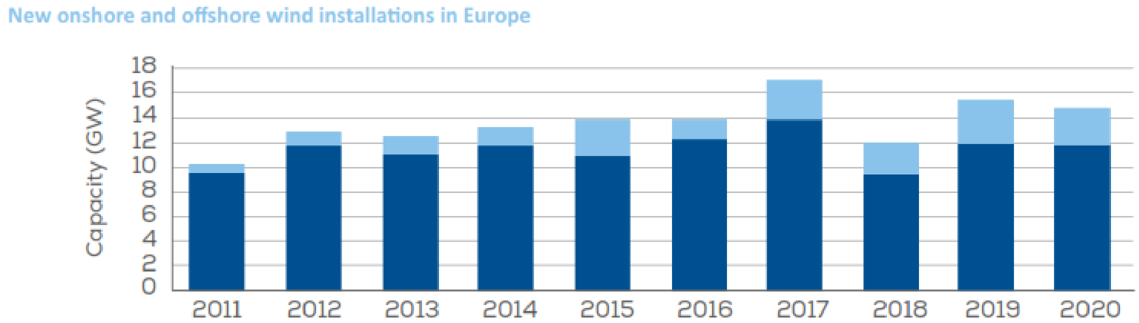
According to the Global Wind Energy Council (GWEC), 2020 was a historical year for the global wind industry experiencing year on year growth of 53%, with 93GW installed even in 2020 (a difficult year for renewable energy projects generally due to the pandemic). Global total wind capacity increased to 743 GW. Half of the installed capacity was in China; consistent growth was also observed in Europe (including the Netherlands, Belgium, the UK, Germany, and Portugal). According to its market intelligence, projections indicate that another 469 GW of new capacity will be added in the next five years.

The offshore wind industry has expanded rapidly in recent years with growth of the sector attributed to several key factors such as policy, support mechanisms, availability of finance, and expansion of supply chain.

The offshore wind industry continues to push boundaries in terms of technology and site location, including into deeper waters. Projects are also increasingly deploying larger wind turbines, which reduces the overall levelized cost of energy for an offshore wind farm.

2.1.1 European Offshore Wind

In 2020, Europe amassed 25 GW of offshore wind capacity. As per Figure 2-3, 14.7 GW of wind energy was installed across Europe. Offshore wind accounted for 2.9 GW which was in line with pre-COVID-19 projections.



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Offshore	0.8	1.2	1.5	1.5	3.0	1.6	3.2	2.7	3.6	2.9
Onshore	9.5	11.7	11.0	11.7	10.9	12.3	13.9	9.4	12.0	11.8
Total	**10.3**	**12.9**	**12.6**	**13.2**	**13.9**	**13.8**	**17.1**	**12.1**	**15.6**	**14.7**

Source: WindEurope

Figure 2-3: European Capacity (Source: WindEurope)

The Netherlands added 1.98 GW to its total, with 75% of this capacity accounting for offshore wind.

In the next five years, WindEurope anticipates that 105 GW of new wind capacity will be added to Europe's record. The European Union needs to install 18 GW per year to achieve its wind targets.

It is expected that 29 GW of new offshore wind will be added over the next five years, which signifies an increased rate from 3 GW to 5.8 GW annually. The UK is expected to install most of this European capacity at 18 GW, with offshore wind accounting for 15 of that 18 GW. The remaining capacity is expected to be installed in Germany (16 GW), France (12 GW), Sweden (7GW), and the Netherlands (6 GW).

2.2 Offshore Wind in North America and Elsewhere

An overview of the various offshore wind projects in the northeast of the US is presented in Figure 2-4.

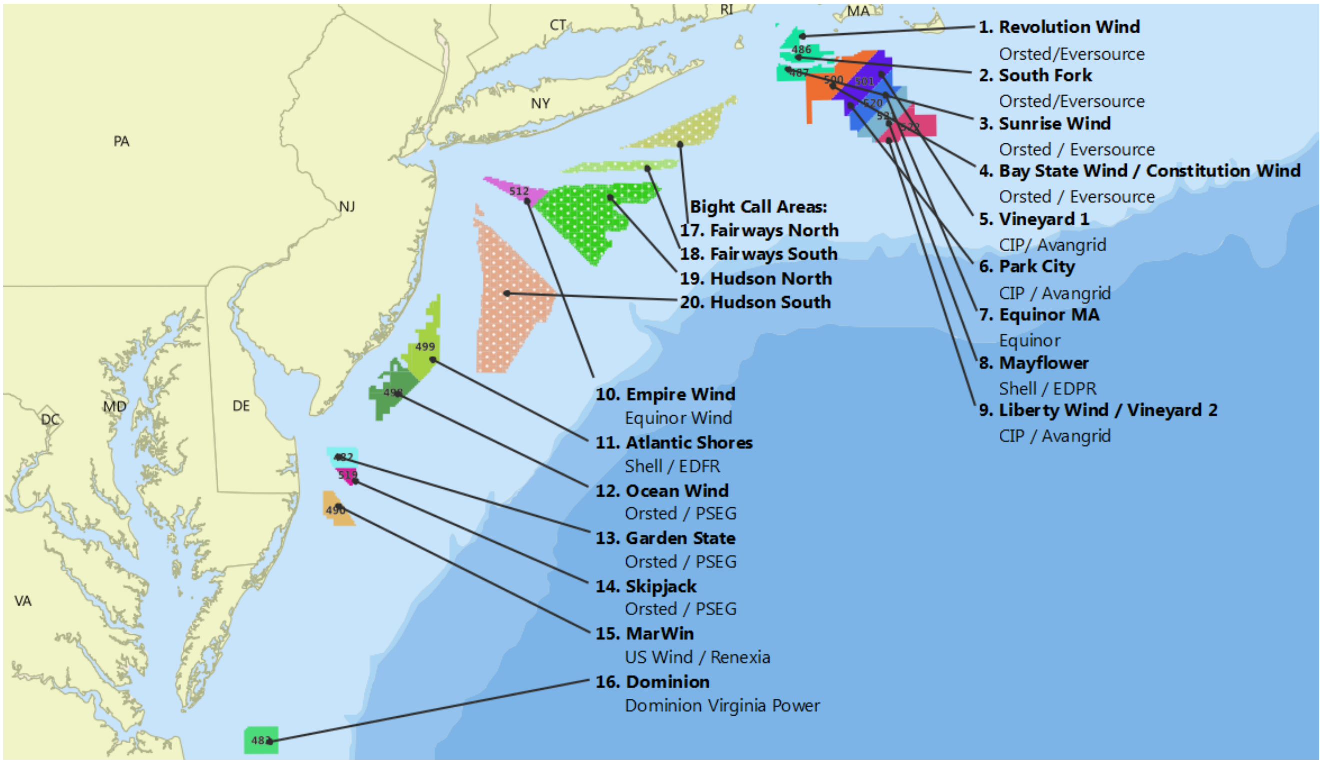


Figure 2-4: US Development Zones (Wood)

2.2.1 USA

On 29 March 2021, the Biden Administration announced a set of bold actions, and coordinated steps to catalyze the offshore wind sector in the US and support rapid growth, aimed at achieving the following[2]:

- Advancing ambitious wind energy projects to create good-paying jobs.
- Investing in American infrastructure to strengthen the domestic supply chain and deploy offshore wind.
- Supporting critical research and development and data-sharing.

These encompass initiatives including:

- Announcement of the new priority lease area in the New York Bight (adjacent to large population centers), 30 GW target by 2030 (discussed Appendix E).
- Upcoming preparation of the environmental impact statement for the 1,100 MW Ocean Wind project.
- Investment in port infrastructure, research, and development funding, pioneering data sharing agreements.

[2] C-2356, News Release (White House), FACT SHEET: Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs | The White House (29 March 2021)

- Studying the impacts of offshore wind.

On 14 October 2021, the Biden administration announced seven areas on both coasts and the Gulf of Mexico in the next few years, which will help meet the 30 GW target (introduced above). The lease solicitation is planned around the coasts of Maine, New York, the mid-Atlantic, Carolinas, and Oregon.

According to the American Clean Power [3], the trade group previously known as American Wind Energy Association, the US has a total offshore wind pipeline of 28 GW in federal lease areas issued to date. It is anticipated that 14 offshore wind projects representing over 9 GW will be operational by 2026.

In the US, there are two notable operational offshore wind projects:

- Block Island, a 30 MW project off the coast of Rhode Island became operational in 2016.
- Coastal Virginia Offshore Wind (CVOW), a 12 MW pilot project which came online in January 2021.

At the State-level, there are established targets with six states which have selected almost 9 GW of offshore wind through state-led solicitations.

Offshore wind activity in the US, Canada, and Vietnam (nearshore projects) are outlined in more detail in Appendix E.

2.3 Offshore Wind Project Case Studies

2.3.1 Baltic Sea

Since the Baltic Sea has low salinity, or salt concentration, comparable water depths and more benign metocean conditions compared to ocean environments such as the North Sea or Atlantic Ocean, it is similar to freshwater or lake environments. Offshore projects in the Baltic Sea are therefore good comparators to the Project.

The first offshore wind farm, Vindeby, was constructed in the Baltic Sea near the Danish Island of Lolland in 1991 and was operated successfully for more than 25 years[4]. The project was decommissioned in 2017.

Since then, and particularly within the last two years, significant offshore wind development was announced for the Baltic Sea, following seven Baltic countries (Poland, Germany, Sweden, Finland, Lithuania, Estonia, and Latvia) signing a joint declaration to accelerate the build out of new offshore wind projects in the area.

Baltic Sea offshore wind projects and the stages (planning to decommissioning) are shown in Figure 2-5.

[3] C-2435, Offshore Wind Power Facts | ACP (cleanpower.org) (February 2022)

[4] C-2114, World's First Offshore Wind Farm Disappears from Horizon (Video) | Offshore Wind (06 September 2017)

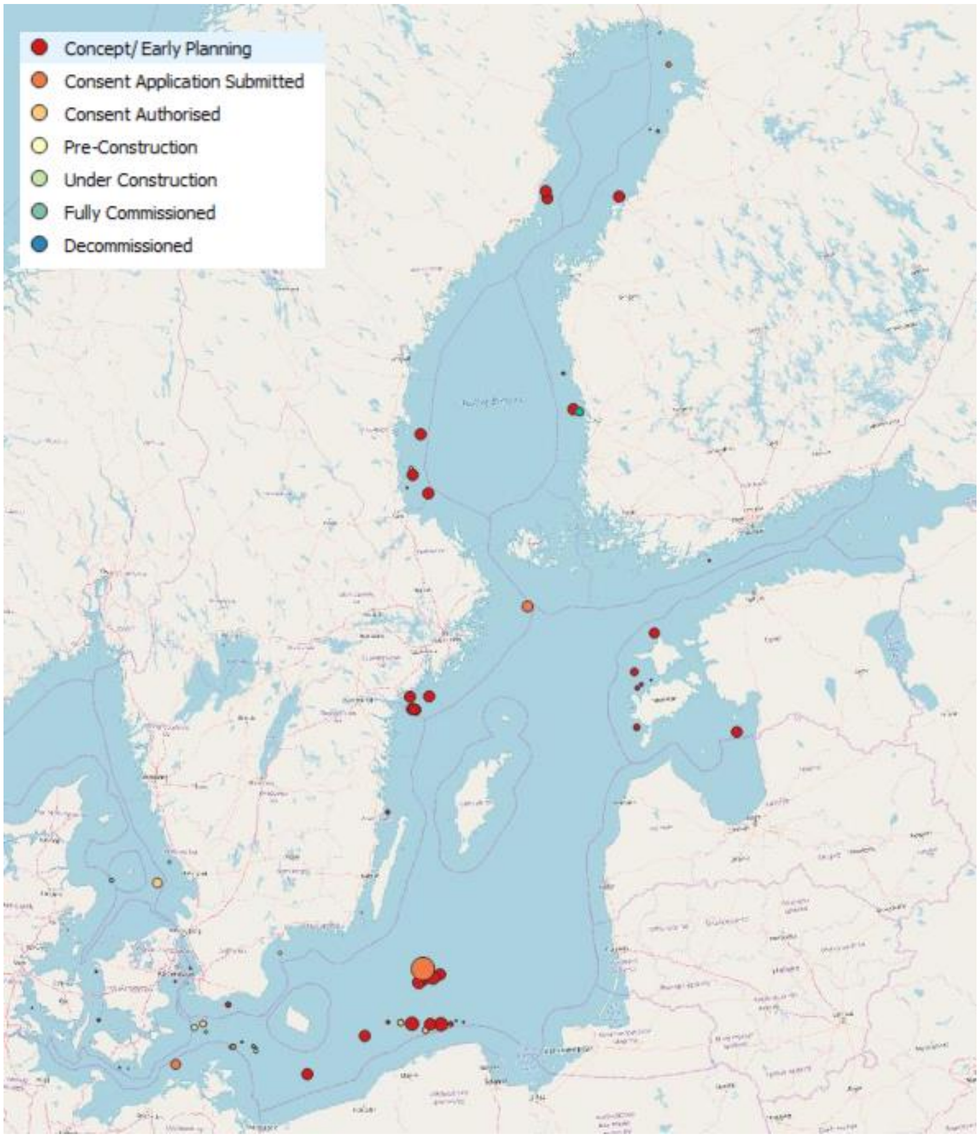


Figure 2-5: Baltic Sea Projects (Source: BalticLINes)[5]

2.3.2 Lake Vänern

A 30MW wind farm on Sweden's Lake Vänern (largest freshwater lake in the European Union) has been operational since late 2009 / 2010, shown in Figure 2-6. The Lake Vänern offshore wind farm consists of 10 WinWinD 3MW wind turbines installed on gravity based foundations. These wind turbines have a hub height of 88 m and 100 m rotor diameter[6]. The conditions on Lake Vänern are similar to those on Lake Ontario

[5] C-2213, Baltic-LINes-Offshore-Wind-and-Grid-in-the-Baltic-Sea-–-Status-and-Outlook-until-2050.pdf (vasab.org) (22 March 2019)

[6] C-1954, The first Vänern offshore wind farm inaugurated | REVE News of the wind sector in Spain and in the world (evwind.es) (24 May 2010)

with each site subject to icing conditions. According to the website of ReWind Offshore AB (ReWind)[7], the developer of the Lake Vänern offshore wind farm, the project is in water depths ranging from 1 to 22m, with an average distance of 7km from shore. It is expected that lessons learned from the Lake Vänern offshore windfarm would be available to the Project, especially as it relates to the movement of pack ice.

As set out in SgurrEnergy's NAFTA1 report, the developers had proposed a new wind farm in Lake Vänern (southwest of the existing wind farm) with up to 20 additional wind turbines in the 3 to 4.5MW range and had submitted the required Environmental Impact Statement for the project in 2011.

In 2020, Cloudberry Clean Energy AS entered into an exclusivity agreement with Downing LLP (UK-based) for the construction and ownership of ReWind's other Vänern 100 MW offshore (Stenkalles grund) wind farm in Lake Vänern. ReWind Vänern will be comprised of 16 wind turbines in shallow water. Construction is expected to start in 2021 / 2022, with project commissioning expected in 2023[8]. The Nordic energy company declared plans in September 2020 to develop 2,500 MW of offshore wind power in Sweden by 2030 through a development portfolio of freshwater and shallow water projects.

The Lake Vänern offshore wind farm developer has been actively engaged with participants of the Lake Erie Energy Development Corporation's (LEEDCo) on Lake Erie (discussed in more detail in Appendix E); the construction methods used on the Lake Vänern Offshore wind farm are considered informative due to the similarity of conditions in Lake Vänern and at the LEEDCo project. Figure 2-6 presents the Lake Vänern wind turbine installation and Figure 2-7 shows the location.

[7] C-1910, About ReWind Offshore AB - Om ReWind Offshore AB Eng (rewindenergy.se) (undated)

[8] C-2330, Cloudberry Finds Partner for Swedish Lake Wind Farm | Offshore Wind (06 November 2020)

Figure 2-6: Lake Vänern Wind Turbines Installation

Figure 2-7: Lake Vänern Map[9]

2.3.3 Wolfe Island Onshore Wind Farm

The Wolfe Island Onshore Wind farm is a 200MW project located on Wolfe Island, Ontario, approximately 5km northeast of the Project site. This island-based project is a precursor to the Project, and the data and experience gathered in executing the island onshore project informed the development of the Project.

Wind assessments conducted for the Wolfe Island onshore project had shown that higher wind speeds were available over water and near shore than in most other Ontario onshore areas. The Wolfe Island project's

[9] C-1991, Offshore-Wind Development and the Environment – West Michigan Wind Assessment - Wind-Brief-10-Offshore-Wind-and-Environment.pdf (michiganseagrant.org) (2014)

island location required the employment of many of the same means and methods associated with offshore wind farm construction, including:

- Wind turbine delivery: wind turbines for the project were delivered by sea transport to the Port of Ogdensburg, NY. The wind turbine components were staged at the port and loaded onto transport barges for delivery to the project site.
- The Project's 200MW size and distance to a suitable grid connection point required the installation of a submarine cable to interconnect the wind farm to the Ontario grid.
- The Wolfe Island project required many of the same environmental investigation and permitting requirements required for an offshore project including cable route studies, drinking water impacts, geotechnical investigations, and avian studies.

3 Project History

The following sub-sections provide the Project background including development summary, studies undertaken, and current status.

3.1 Development History Summary

The development history summary for the Project is set out in Section 2 of the NAFTA1 Report and remains accurate. Figure 3-1 presents the layout of the Project showing sediment thickness.

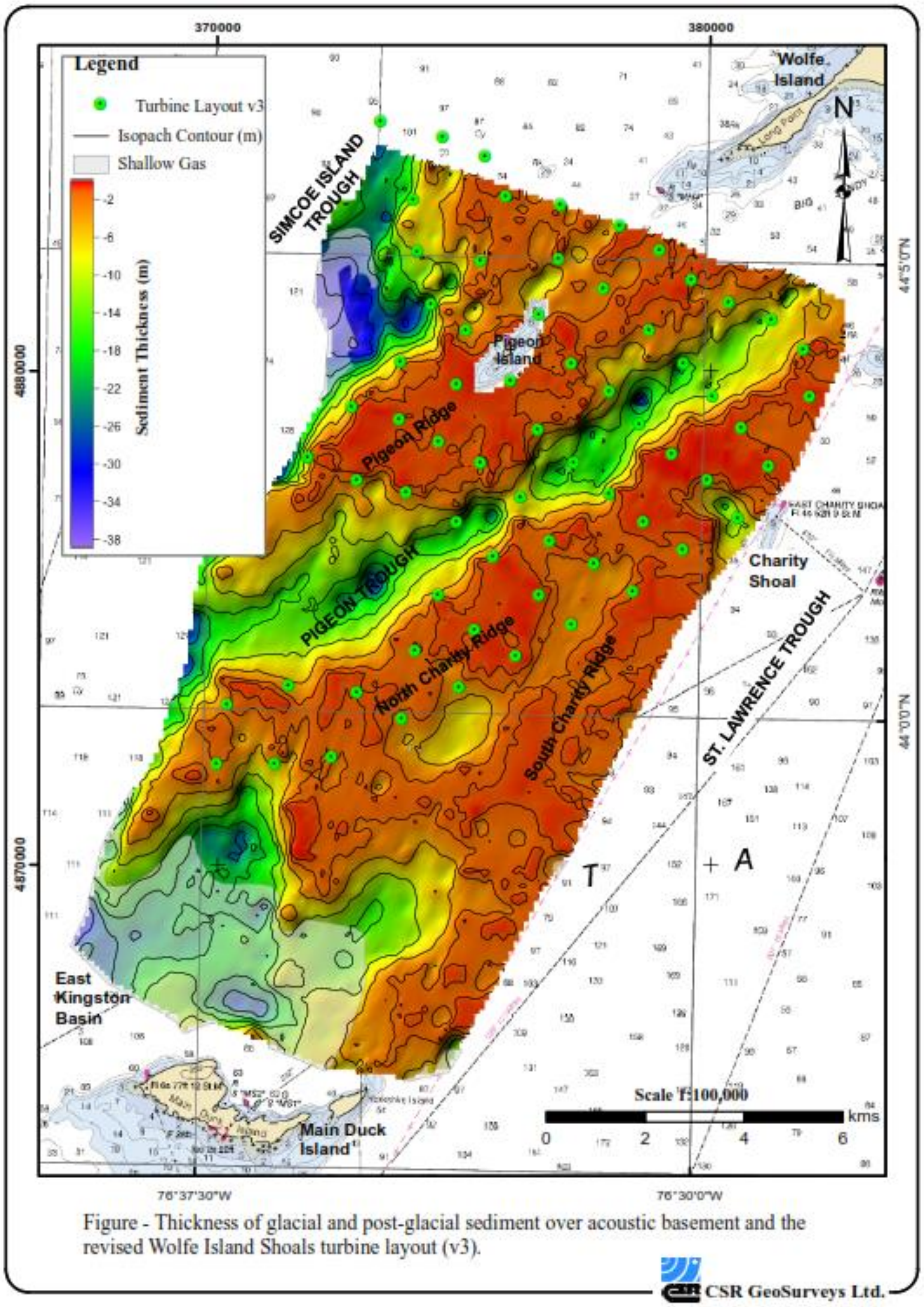


Figure 3-1: Project Layout Isopach[10] (Source: CSR)

A visualization of the wind turbine layout looking south from Wolfe Island with the 5 km setback is shown in Figure 3-2.

[10] a line drawn on a map connecting all points of equal thickness of a particular geologic formation.

Figure 3-2: Visualization of Wolfe Island Shoals Project

3.2 Studies Undertaken

Windstream has conducted a significant amount of investigation, a long-running wind measurement campaign and studies to support the development of the Project and to confirm its feasibility. These studies are comprehensive and have followed prudent industry practice in undertaking the steps to successfully develop an offshore wind project.

Windstream has assembled a highly qualified team of professional consultants to assist in the development activities and studies in respect of both NAFTA1 and NAFTA2. These consultants have extensive expertise in their respective fields and familiarity with offshore wind projects, and bring significant knowledge, data bases, and lessons learned to the Project.

Previously SgurrEnergy (now Wood) submitted an Expert Report in July 2014 to Windstream in support of its North American Free Trade Agreement (NAFTA) arbitration proceedings held during 2014 to 2016 and referred to as NAFTA1. This original expert report concluded the Project to be technically feasible, and is included in Appendix A for convenience. SgurrEnergy's Report in turn relied on a number of studies prepared by sub-specailty experts. The list of these experts relied upon in respect of NAFTA1 is included in Section 3.3 of SgurrEnergy's NAFTA1 Report.

In addition to ongoing engineering studies conducted from 2016 to 2019, several updated and new studies were commissioned in support of NAFTA2, including this Report, which considers updates to the NAFTA1 Report in light of developments subsequent to the NAFTA1 arbitration proceedings. The following reports have been prepared:

- Wood's Energy Yield Assessment (EYA), referred to as Wood (2021-EYA)
- Two Dogs Projects' Turbine Selection (TS), referred to as Two Dogs (2021-TS)[11]

[11] CER-Two Dogs (Wind Turbine Selection Report)

- Two Dogs Projects' Capex and Opex Sensitivity Analysis, referred to as Two Dogs (2021-Capex)[12]
- COWI's Wind Turbine Gravity based foundation (GBF) Design, referred to as COWI (2021-GBF)[13]
- COWI's Opinion of Probable Cost (OPC), referred to as COWI (2021-OPC)[14]
- Weeks Marine' Construction Installation Means and Methods, referred to as Weeks (2021)[15]
- Aercoustics' Sound Study, referred to as Aercoustics (2021)[16]
- WF Baird's coastal engineering assessment covering various topics, referred to as WF Baird (2021)[17]
- Ventolines' document review and gap analysis, looking at additional wind turbine installation vessel aspects, referred to as Ventolines (2021)[18]
- Canadian Seabed Research's (CSR) wind turbine layout geological assessment, referred to as CSR (2021)[19]
- Tulloch Engineering's Geotechnical Review, referred to as Tulloch (2021)[20]

3.3 Current Status

Wood believes Windstream has conducted sufficient studies to confirm the technical feasibility of the Project, based on the level of information typically gathered for major European offshore wind farms at a similar stage of development.

Provided the FiT contract was not cancelled, but for the Government imposed moratorium, Windstream would have advanced through the typical next development steps. This would involve even more extensive final studies to confirm site characteristics for permitting activities, detailed and final design, and obtaining sufficient data for refinement of final construction costs and the technical assumptions in the financial model.

As is the case for all renewable energy projects, these final studies are needed to take the Project from its current state of development to financial close and construction.

Generally, final studies needed to advance the Project towards financial close / construction would include:

[12] CER-Two Dogs (Capex Opex Sensitivity Report)

[13] CER-COWI (Wind Turbine Gravity Base Foundation Design)

[14] CER-COWI (Opinion of Probably Cost)

[15] CER-Weeks-2

[16] CER-Aercoustics-2

[17] CER-Baird-3

[18] C-2385

[19] C-2485

[20] C-2484

- Additional comprehensive geotechnical and geophysical lake bottom explorations including borings, to inform final decisions on foundation design, and underwater cabling.
- Additional detailed metocean (wind, wave, current, and ice) measurement campaign to further supplement the already extensive metocean studies.
- Further and additional detailed environmental studies as required in support of the Renewable Energy Approval process once the specific study area of the Project is finalized. Windstream has not conducted such detailed environmental studies for the study area due to the cancellation of the FiT contract. Windstream has undertaken noise studies as outlined above and considered the appropriate set back in the latest layout.

Wood considers the additional detailed studies identified above to be typical of large renewable energy projects. Windstream has not been able to complete these additional studies – which would occur in the final design stages around financial close - due to the ongoing Ontario moratorium on offshore wind and the cancellation of the FiT contract.

4 Project Participants Review

The summary of the Project investors and the Windstream management team are set out in Section 3 of SgurrEnergy's NAFTA1 Report, which remains accurate. The core team of experts are presented in the following sub-sections.

4.1 Core Team of Experts

4.1.1 ORTECH

ORTECH has been acting as the lead consultant under contract to Windstream. ORTECH with offices in Mississauga, Sarnia, and Windsor, Ontario, serves clients in the industrial, manufacturing, municipal, and renewable energy sectors throughout North America.

ORTECH Environmental and ORTECH Power are the divisions of ORTECH involved in the Project. ORTECH Environmental has been performing permitting and compliance services in Ontario for over 40 years. ORTECH Power is focused on consulting services for renewable energy projects assisting developers with wind, solar, and hydro-electric projects. ORTECH Power offers technical due diligence and other services to renewable energy projects under development, construction, and operation. It has extensive experience in industrial project permitting, planning, and renewable energy assessment.

ORTECH also has a meteorological division that provides expert wind analysis and resource assessment. ORTECH conducted early resource analysis which confirmed the potential wind resource offshore. This was based on extensive modelling conducted for the Wolfe Island onshore project over several years.

ORTECH has an organization of over 40 staff members and has completed over 500 renewable energy projects in the last ten years. The company's experience includes the following notable projects:

- RMS Energy: ORTECH was instrumental in all phases of the development, construction, and financing of this 54MW wind facility located in Pictou County, Nova Scotia. Services provided by ORTECH included wind resource analysis, turbine selection, negotiation of turbine supply and operations support agreements with General Electric, turbine layout and micro-siting, negotiation of equity and debt financing, budgeting and project management. The facility entered into commercial operation in November 2009.

- Erie Shores Wind Farm: This 99MW wind farm located on the north shore of Lake Erie at Port Burwell, Ontario was acquired by Macquarie Power and Infrastructure Fund in 2007. ORTECH provided due diligence services to Macquarie including a review of wind data and an assessment of operational performance.
- Horizon Rimouski: Horizon Legacy Energy engaged ORTECH as a technical advisor with respect to a proposed 100MW wind project located in Rimouski, Quebec that was entered into the Hydro-Quebec 2007 RFP for 2000MWs of wind power. The project involved the use of computational fluid dynamic modelling for wind in complex terrain and sophisticated financial modelling employing multiple indices, currencies, and turbine configurations.

4.1.2 Two Dogs Projects

Ian Irvine of Two Dogs Projects has provided a report on the wind turbine selection and Capex & Opex for the Project. Mr. Irvine has over 30 years' experience in the offshore wind and Renewables industry. He has been at the forefront of the industry, starting with senior management roles at ScottishPower (utility), and Ingenco (engineering consultancy) in the early 1990s.

In 2002, he founded SgurrEnergy, a renewable energy engineering consultancy. Ian led the team and grew the business from two to over 300 dedicated professionals leading and supporting hundreds of renewable energy projects globally. SgurrEnergy became a leader and innovator in the renewable energy industry. In 2016, SgurrEnergy was sold to Wood Group (see **Figure 2-2**). In 2017, Ian exited Wood Group and created the consultancy Two Dogs Projects. Through Two Dogs Projects, Ian provides consulting services, including in respect of the Project. Since 2017, Ian has been on the Board of Point and Sandwick Power Limited, which is the UK's largest community owned onshore wind farm. Since 2019, he has also been on the Board of Clir Renewables Inc., which is a renewable energy asset management and reporting start-up company going through rapid growth.

Ian has been involved in the European offshore wind industry for decades, providing expert technical advice on significant (order of Gigawatts) of projects to developers and financiers in relation to offshore wind measurement campaigns, wind turbine selection, wind farm design, wind turbine performance assessment, and due diligence. He has also advised on several offshore wind farms worldwide including in North America.

4.1.3 WSP

WSP has been commissioned by Windstream to update its report provided in respect of NAFTA1 and provide a current regulatory review) and new Renewable Energy Approvals (REA) guidance review based on the current regulatory / permitting landscape should the Project have been allowed to re-start the development and construction process in 2020.

WSP is a global professional services firm with 49,000 staff who develop creative, comprehensive, and sustainable engineering solutions for a future where society can thrive spanning featured services of design-build, environmental due diligence, façade and enclosure engineering, program / project management, rail design, and transportation planning.

WSP provides development support, engineering and construction management, operations and performance assessment, due diligence services (including expert witness services) in relation to onshore and offshore wind projects.

4.1.4 WF Baird

WF Baird was commissioned by Windstream to update previous metocean analysis provided in the context of NAFTA1. The updated WF Baird study also evaluated the potential for underwater noise impacts.

Baird holds over 40 years of metocean and engineering experience. The company, which was founded in 1981, provides best in engineering and science in terms of coastal, riverine, estuarine, and ocean environments, formed of scientists, engineers, and designers. Baird's capabilities cover the following topics:

- Ports, terminals & Vessel Operations.
- Coastal & Marine Structures.
- Waterfronts, Marinas, & Resorts.
- Coastal & River Environmental.
- Shoreline & Coastal Restoration.
- Hazards, Risk & Resilience.
- Metocean Studies & Offshore Renewable Energy

Baird performs metocean analysis, numerical modelling (wind and waves), and field services. It has expertise with in-water projects, especially on Lake Ontario.

In 2012, W.F. Baird & Associates Coastal Engineers Ltd. (Baird) in association with Beacon Environmental Ltd. (Beacon), G. Comfort Ice Engineering Ltd (Comfort), and Scarlett Janusas Archaeology Inc. (SJAI) conducted studies for Windstream in relation to the Project, including an ice study. Baird also prepared a study comparing metocean and marine specific conditions of Lake Ontario to the Baltic Sea.

Additional engineering input was provided by Comfort Engineering specific to the impact of ice on the foundations

Comfort Engineering has over 35 years of engineering experience specializing in Artic and Cold Regions engineering. In the updated Baird analysis, Comfort provided an updated ice study.

4.1.5 COWI

COWI and Ocean and Coastal Consultants (OCC, the North American division of COWI) developed the foundation conceptual design, and installation strategy for the offshore parts of the Project as part of their 2012 study, which was submitted as part of NAFTA1. It was asked to update this work in 2021.

Founded in 1930, COWI is a leading consulting group that provides state-of-the-art multidisciplinary engineering services with due consideration for the environment and society. Globally, COWI has nearly 7,400 staff operating from more than 35 international offices. In North America, COWI is a prominent and award-winning specialty marine and coastal engineering firm with more than 240 technical staff.

COWI has extensive experience in relation to design services for offshore wind farms, wind turbine foundations, offshore substations, electrical systems, and staging ports. The company has been involved in large scale offshore wind farms and port infrastructure projects in the US and globally, spanning over 800 wind projects. COWI has been involved in wind turbine foundation design since the 1980s when it supported the first offshore wind farm, Vindeby.

COWI has designed 184 of the offshore wind gravity foundations that are either fully commissioned or under construction and nearly 14% of all European offshore wind foundations. OCC has been actively engaged in the offshore renewable energy market in North America and Europe since 2003 designing offshore foundations including monopiles, offshore jackets, suction pile foundations, driven piles, hybrid foundations, and gravity based structures. OCC/COWI has supported numerous US DOE efforts to support the development of offshore wind, including: detailed analyses of North American port and terminal facilities and their capacity to support the development of the offshore wind industry, the Freshwater Wind program developing Great Lakes specific offshore wind strategies and Nautica's Advanced Floating Turbine project.

Additional detail regarding COWI's extensive gravity based foundation design experience is provided in Appendix D

4.1.6 Weeks Marine Inc.

Weeks Marine was commissioned to provide an updated report detailing the means and methods for the gravity based foundations and the wind turbines.

Weeks Marine is a 102-year-old company specializing in marine construction, with other divisions of the company working in dredging, stevedoring, heavy lift and salvage, towing, and equipment charter. Recently, the company has been ranked 126th in the top 400 contractors in the Engineering News Record 2020. The company's construction division specializes in the engineering and construction of marine facilities globally whilst the dredging division is one of the largest in the US market. It is the largest marine contractor on the East Coast of North America.

Weeks Marine has completed projects in Canada, Caribbean basin, Gulf of Mexico, Central / South America, Central Pacific Islands of Micronesia, and along the US coastlines and waterways. Its marine construction vessel spread is one of the largest in North America.

Windstream commissioned Weeks Marine to develop the offshore means and methods plans for the Project in 2021 following on from the previous means and methods plans prepared during NAFTA1.

Weeks Marine was awarded the contract for the Offshore Installation Works for the 468MW Cape Wind Project (defunct). This scope included the provision of all vessels and labor to support the installation of foundations, wind turbines and the offshore substation.

4.1.7 Aercoustics

Aercoustics was commissioned by Windstream to update previous noise modelling/propagation studies conducted in respect of NAFTA1.

Aercoustics Engineering Limited is a wholly owned, privately held Canadian corporation that has dedicated itself to providing high quality consulting services in the science and engineering of acoustics, noise, and vibration since its inception in 1971.

Aercoustics has had extensive experience and exposure to the challenge of quantifying the noise impact of wind turbines on residential receptors. Since the advent of wind energy projects within Ontario, Aercoustics has been at the vanguard of noise and vibration related issues with regards to wind turbines. Aercoustics has worked for many different stakeholders in relation to wind generation, including wind developers, regulatory bodies and government agencies, manufacturers and residents affected by wind turbine noise. Aercoustics also regularly publishes scientific research on wind turbine noise, and often participates in the organizing committees for the bi-annual International Conference on Wind Turbine Noise. Aercoustics is also accredited by the Standards Council of Canada to perform Acoustic Noise measurements of Wind Turbine noise in accordance with IEC 61400-11 and serves as the only Canadian representation on the TC 88's IEC 61400-11 working group on wind turbine noise standards.

4.1.8 Ventolines

Windstream commissioned Ventolines to study the various viable options and solutions available for feeder vessels and wind turbine installation vessels for the Project.

Ventolines has over 2 GW of installed renewable energy capacity, supporting development, construction and management of land-based and water-based solutions including wind (offshore and onshore), solar, and system integration. The company has over 100 experts located in the US and the Netherlands.

The company has been involved in two lake-based projects located in the Netherlands:

- Westermeerwind, which is a 144 MW project using 48 SG 3.0-108 wind turbines, completed in 2016.
- Fryslân, which is a 383 MW project using SG 4.3-130 wind turbines, under construction.

Ventolines has direct experience developing wind turbine installation solutions in locations where standard jack-up vessels are not suitable.

4.1.9 Project Participants Conclusion

Windstream has assembled a group of key Project Participants with deep expertise. This group has conducted numerous studies, all of which support Wood's conclusion that the Project is technically feasible.

4.2 Other Project Participants

This section covers other participants such as the Ontario Power Authority, Independent Energy System Operator and Hydro One Networks Inc. (Hydro One).

4.2.1 Siemens Gamesa Renewable Energy

Siemens Gamesa Renewable Energy (Siemens Gamesa, SGRE) supplies the preferred wind turbine proposed for the Project. It is a world leader in the offshore wind industry and its involvement is an asset for the Project, given its technical strength, experience in Ontario, and extensive global fleet of onshore and offshore WTGs.

Siemens Gamesa was formed in April 2017 when Siemens and Gamesa merged its respective wind power businesses. Together, having amassed almost 40 years of wind energy experience[21], Siemens Gamesa is one of the world's main wind turbine manufacturers, with a cumulative installed capacity of 107 GW[22] globally. Siemens Gamesa has a particularly strong presence in the offshore wind market.

Siemens Gamesa is a member of the Project team and will have a critical role with involvement in all aspects of planning and execution. Siemens Gamesa is a market leader within the wind industry and Wood considers the company a capable and reputable wind turbine supplier and O&M provider. Further discussion of the selected Siemens Gamesa wind turbine is provided in Section 6.

4.2.2 Ontario Power Authority

The Ontario Power Authority was an independent, not for profit organization established through the Electricity Restructuring Act, 2004. It was the agency of the Ontario government responsible for ensuring a reliable, cost-effective, and sustainable electricity supply for Ontario. Its main activities were focused on strategic coordination of conservation efforts across the province, planning the long-term power system, and ensuring the development of required generation resources. Previously, the Ontario Power Authority purchased all power used by the Independent Energy System Operator (owner / operator of the Ontario electricity grid). The Ontario Power Authority granted the FiT contract for the Project (04 May 2010).

The Ontario Power Authority and Independent Energy System Operator merged in January 2015. The Independent Energy System Operator is discussed in Section 4.2.3.

4.2.3 Independent Energy System Operator (IESO)

The Independent Energy System Operator (IESO) manages Ontario's electrical grid.

The IESO performed a system impact assessment of the Project that determined that the incorporation of the Project into the grid would have no adverse impact on grid reliability (IESO, 08 November 2010). The IESO also confirmed the project size by confirming that 300 MW of capacity existed at the proposed

[21] C-2436, Siemens Gamesa Renewable Energy - https://www.siemensgamesa.com/en-int/about-us/company-history (February 2020)

[22] C-2269, Siemens Gamesa Renewable Energy Annual Report 2020 - https://www.siemensgamesa.com/en-int/-/media/siemensgamesa/downloads/en/investors-and-shareholders/annual-reports/2020/siemens-gamesa-renewable-energy-annual-report-2020-en.pdf

connection site (Lennox Generating Station). After the FiT contract was issued, the IESO requested a minor change to the connection point, which Windstream confirmed.

4.2.4 Hydro One Networks Inc.

Hydro One Networks Inc. (HONI) performed a Customer Impact Assessment to determine the impact of the Project on existing customers connected to the transmission system. HONI determined the Project would increase the electricity supply available to the Lennox area and provide electricity generation in the area when the Lennox Generating Station is operating at a lower capacity. HONI concluded that the Project is not expected to adversely impact the transmission customers in the area (HONI, November 2010).

5 Energy Yield Assessment

Wood had previously reviewed energy yield assessment reports prepared by DNV GL, AWS Truewind, and ORTECH[23]. This work is reflected in SgurrEnergy's NAFTA1 Report.

In 2021, Windstream tasked Wood to perform an updated independent energy yield assessment Wood (2021-EYA)[24] for the Project based on raw data collected by Windstream. The raw data was measured and collected at the onshore 80 m tall lattice meteorological (met) mast (Long Point). A new and updated energy yield was needed as the wind turbine model and the layout had been updated since SgurrEnergy's NAFTA1 Report. Energy yield assessments depend on the wind turbine type and layout. Both elements were updated in 2021. Wood's 2021 energy yield assessment has been included in Appendix C for convenience.

[23] CER-SgurrEnergy, Wolfe Island Shoals Offshore Wind Farm Engineers Report - 14/7017/001/USA/0/ER/001 Revision: B1 - SgurrEnergy Wolfe Island Shoals Offshore Wind Farm, dated July 2014

[24] Appendix C - Wolfe Island Shoals Wind Farm Energy Yield Assessment - 191540.CAN.AM.REP.01 Wolfe Island Shoals Wind Farm - Energy Yield Assessment (B4) dated 04 June 2021

The energy yield assessment was performed for a layout made of 66 Siemens Gamesa (SG) 4.5-145 wind turbines. The Project area and site layout are shown in Figure 5-1 below including the Long Point met mast (shown as a triangle).

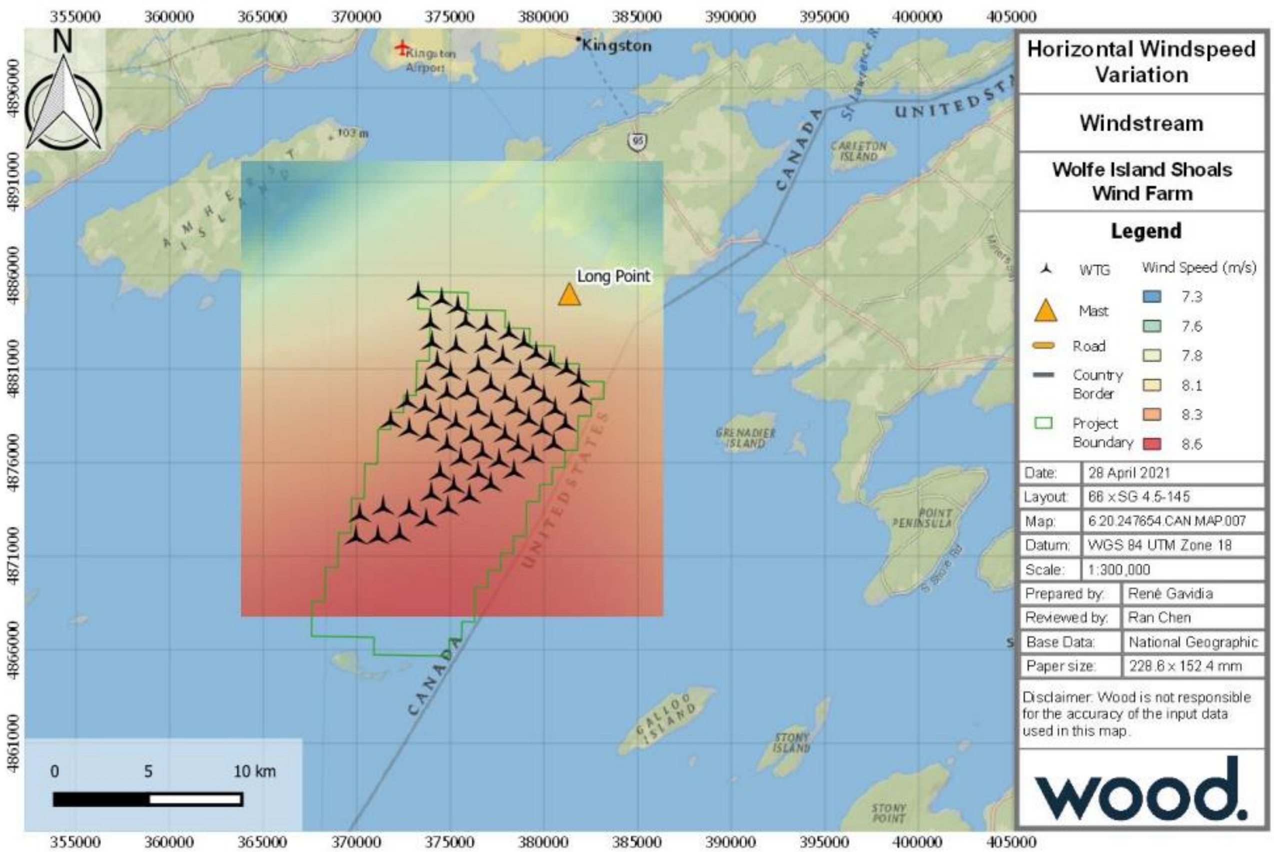


Figure 5-1: Project Map and Wind Turbine Layout

The predicted average long term mean wind speed across the wind turbine locations is 8.47 m/s at 100 m hub height. The hub height is the distance from the mean level of Lake Ontario to the middle of the wind turbine's rotor.

The summary of Wood's results, assessed in the Project's probability of exceedance (P50, P90, and P99) energy yield estimates, (reflecting 20 years of interannual variation in wind speed) is, presented in Table 5-1. The probability of exceedance is the level of confidence associated with the energy yield prediction. The P50, means there is a 50% chance of the level of energy yield being reached or exceeded when comparing the mean annual energy production over a given 20-year period. For a 20-year P90, there is predicted to be a 90% chance of the stated level of production being reached or exceeded for any given 20-year period.

As set out in Table 5-1, Wood's analysis concludes that the Project estimated to generate a P50 Energy Yield of 1159.9 GWh / annum.

Table 5-1: Energy Yield Summary (20-year Probability of Exceedance)

Parameter / Unit	Value
P50 Energy Yield [GWh/annum]	1159.9
P50 Capacity Factor [%]	44.6
P90 Energy Yield [GWh/annum]	1069.3
P90 Capacity Factor [%]	41.1
P99 Energy Yield [GWh/annum]	995.5
P99 Capacity Factor [%]	38.3

6 Site Suitability and Wind Turbine Selection

The original Project design presented during NAFTA1 (2014, 2016) consisted of 130 No. Siemens 2.3 MW – 113 wind turbines. Since then, continued evolution of offshore wind turbine technology means that fewer turbines with larger capacity can be used to achieve the same overall project capacity. This also means that the cost of construction and operation – and therefore the overall cost of energy - is reduced.

Windstream commissioned Two Dogs to conduct a detailed review and selection of the wind turbine should the Project have been allowed to re-start the development and construction process in 2020.

Since wind turbines need to be designed for optimal performance and reliability, no matter the weather conditions, location and site class counts[25]. These weather conditions at the site, from a gentle breeze to a strong wind, matter throughout the lifetime of the wind turbine.

Prior to wind turbine selection, it is essential to define the site's wind regime as wind turbines are typically designed and certified to International Electrotechnical Commission (IEC) 61400-1 Wind Turbine Generator Systems – Part 1 Design Requirements (2005) which specifies the wind turbine classes as presented in Table 6-1 below.

Table 6-1: Basic Parameters for IEC 61400-1 (2005) Wind Turbine Classes

Parameter	Class I (High Wind)	Class II (Medium Wind)	Class III Low Wind)	Class S
V_{ref} (m/s)[26]	50	42.5	37.5	Defined by manufacturer
Annual Average Wind Speed (m/s)	10	8.5	7.5	
V_{e50}[27]	70	59.5	52.5	
Wind shear coefficient	0.2			

The wind measurement campaign and wind regime described in Two Dogs' Wind Turbine Selection Report outline the characteristics of wind flow based on site measurements. Wood views the meteorological mast measurements recorded by Windstream sufficient for characterizing the wind flow in relation to candidate wind turbines with an effective hub height of up to 200 m above the mean level of Lake Ontario. This conclusion is supported by the heights at which the wind measurements were taken, and the duration of the measurement campaign, which produced a dataset to accurately quantify the wind flow characteristics.

[25] C-2437, What is a wind class? | LM Wind Power (February 2022)

[26] V_{ref} is the maximum average 10-minute 50-year wind speed

[27] V_{e50} is the maximum three-second gust wind speed

Two Dogs considered European projects that used gravity base foundations (rotor diameter, hub height, and maximum water depth) to plot the hub height of these reference projects and that of the Project, which showed rotor diameters between 110 – 150 m were installed at hub heights between 90 – 100 m. It was decided that the shortest standard wind turbine tower height would be used for the Project, consistent with the wind regime class type. Two Dogs considered nearby operational wind farms (Ernestown and Amherst Island) which would be subject to the same wind regime as the Project. This analysis showed that appropriate mitigation was arrived at for the V_{ref} Class II limit (150° wind direction) for nearby wind farms, which strongly suggest that the preferred selection is appropriate for the conditions at the site, subject to wind turbine supplier assessment which would typically take place during the negotiation of a turbine supply agreement.

Two Dogs (2021- TS)[28] considered a variety of factors leading to selection of the Siemens Gamesa 4.5MW-145 as the current preferred wind turbine for the Project. Figure 6-1 outlines the key steps and wind turbine selection process from the Two Dogs (2021-TS) report.

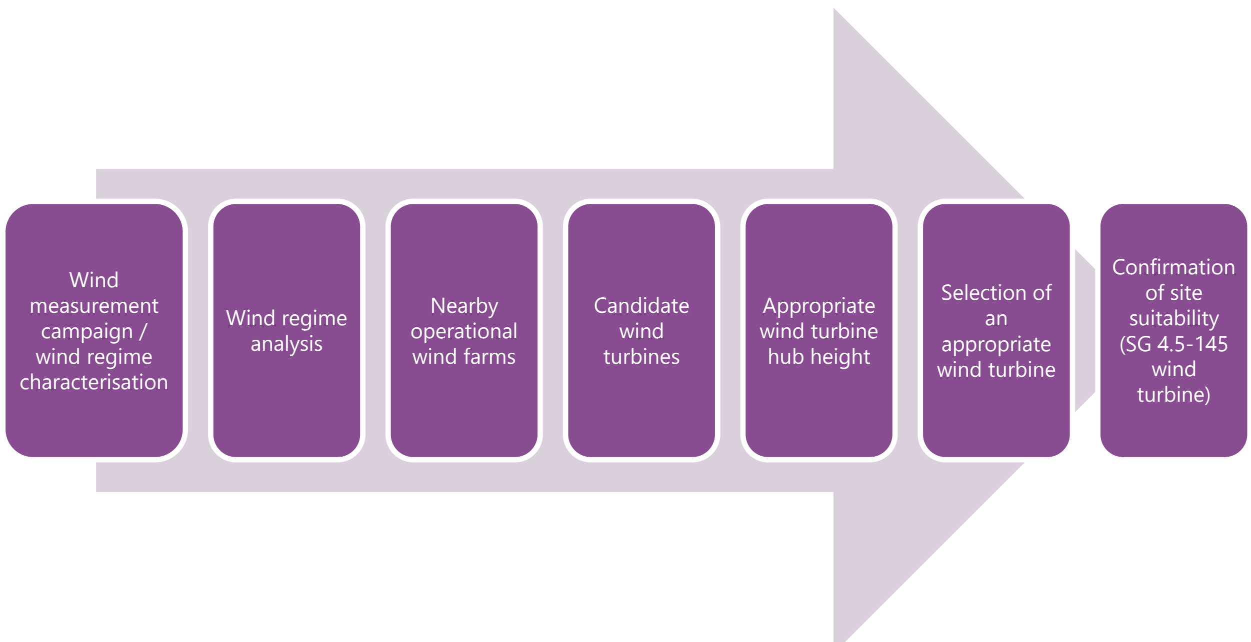


Figure 6-1: Wind Turbine Selection Process

One of the important factors in the selection of the wind turbine is the suitability of the wind turbine model (and class) for the wind characteristics of the area in which these wind turbines will be placed. The Siemens Gamesa 4.5MW-145 wind turbine is considered suitable for the Project, for the reasons discussed in this section and more detail in Appendix F.

[28] CER-Two Dogs Wind Turbine, *Wind Turbine Selection Report 07JUL21* dated 07 July 2021 authored by Two Dogs Projects Ltd

In terms of wind turbine selection undertaken in 2021, several key criteria had to be met. The wind turbine had to be compatible with the RD Macdonald installation vessel proposed by Weeks Marine, and the original GBF proposed by COWI for the Project. Also, the wind turbine needed to be in the 4 MW range to reduce the total number of wind turbines, be of Class II_B and be available in the Canadian market. Wind turbine location or placement needed to be in water depth between approximately 10 to 30 m for the purposes of the layout.

7 Site Characteristics

Windstream has commissioned significant additional studies to update the extensive studies conducted in respect of NAFTA1 in support of further project design and to confirm that the site-specific conditions are consistent with those observed on other wind projects in close proximity to the area. These studies include wind resource measurement campaign, geotechnical surveys, geophysical and bathymetry surveys, metocean conditions, and ice conditions.

The following sub-sections provide a summary of the studies / surveys conducted.

8 Wind Resource

A detailed wind resource assessment campaign has been conducted in support of the Project by a host of well-respected firms including, ORTECH (2010, 2011, 2012, 2014, 2015, 2017), AWS (2013), GLGH (2013) and most recently Wood (2021-EYA), based on the chosen wind turbine (briefly discussed in Section 6).

The raw data used for Wood's energy yield assessment was measured and collected at the onshore 80 m tall lattice meteorological (met) mast (Long Point) for the period from December 2011 to July 2015. The measurement campaign or data collection was undertaken for a long period of time. A new and updated energy yield was needed as the wind turbine model and the layout had been updated. Energy yield assessments depend on the wind turbine type and layout.

A detailed summary of the wind resource assessment based on the measurement campaign can be found in Appendix C.

8.1 Geotechnical

Windstream commissioned a geotechnical investigation in support of the meteorological mast / tower installation on Wolfe Island (at Long Point) located near the Project site, which is summarized in SgurrEnergy's NAFTA1 report.

Recently, Windstream commissioned Tulloch Engineering to conduct a desk-top geotechnical review for the Project, Tulloch (2021)[29]. Tulloch included a review of previous studies commissioned by Windstream in support of NAFTA1 as well as a review of documentation and information in the public domain including

[29] C-2484, *21-1401-20-2050-0001 - Desktop Geotechnical Review for an Offshore Wind Project near Kingston ON (Rev. 0)* dated 09 July 2021

geotechnical investigation assessment reports pertaining to the nearby Kingston Third Crossing Bridge project.

Tulloch (2021) provides a high-level summary of the subsurface geologic conditions for the Project area and cable route including local geology, and bathymetry and marine geophysics.

Tulloch concludes that the previous geotechnical studies completed by Windstream are comprehensive and provided sufficient information to facilitate the conceptual design for the Project foundations and provides information about typical investigations that would occur later in the design process, should the FiT Contract not have been cancelled and the Project been permitted to proceed.

A detailed summary of the geotechnical studies is located in Appendix A.

8.2 Geophysical and Bathymetric

Previously, Windstream commissioned a geophysical and bathymetric survey conducted at the Project site by Canadian Seabed Research (CSR) in late 2010, with the report issued in March 2011.

The bathymetric survey documented that water depths in the site area ranged from a depth of 6 m to 41 m, with some areas on the cable route reaching a depth of 60 m.

The geophysical survey indicated that the cable route and lake bottom consisted of primarily unconsolidated sediments overlying bedrock, with bedrock outcroppings and occasional sediment filled channels, and depressions. This compares favorably to conditions documented in the studies cited earlier in this section, and SgurrEnergy's NAFTA1 Report (Section 7.3). The geophysical survey was to be confirmed with a wind turbine specific geotechnical (physical) survey campaign, as is common practice conducted in support of construction projects whether land based or offshore. However, that work did not progress due to the Provincial moratorium.

A further bathymetric survey was conducted in cooperation with the Canadian Hydrographic Services (CHS) in areas of common interest specifically Charity Shoal and the Upper gap of Adolphus Reach (between Amherst Island and the mainland). The survey was conducted by CHS in October 2010 and results provided to Windstream under a data sharing agreement.

All of these geophysical and bathymetry studies were summarized in SgurrEnergy's NAFTA1 report.

Since SgurrEnergy's NAFTA1 report, in 2017, Windstream commissioned CSR GeoSurveys Ltd. (CSR) to update surveys conducted in 2010. The objective was to compile an updated geological assessment based on the interpretation of reprocessed geophysical data collected during the surveys in 2010.

Again in 2021, Windstream commissioned CSR GeoSurveys Ltd. (CSR) to undertake additional follow-on work based on the updated wind turbine layout (66 wind turbines locations). The objective of the updated study CSR (2021)[30] was to estimate the thickness of unconsolidated sediment over the acoustic basement and characterize the sediment sequences at the wind turbine locations (Figure 8-1).

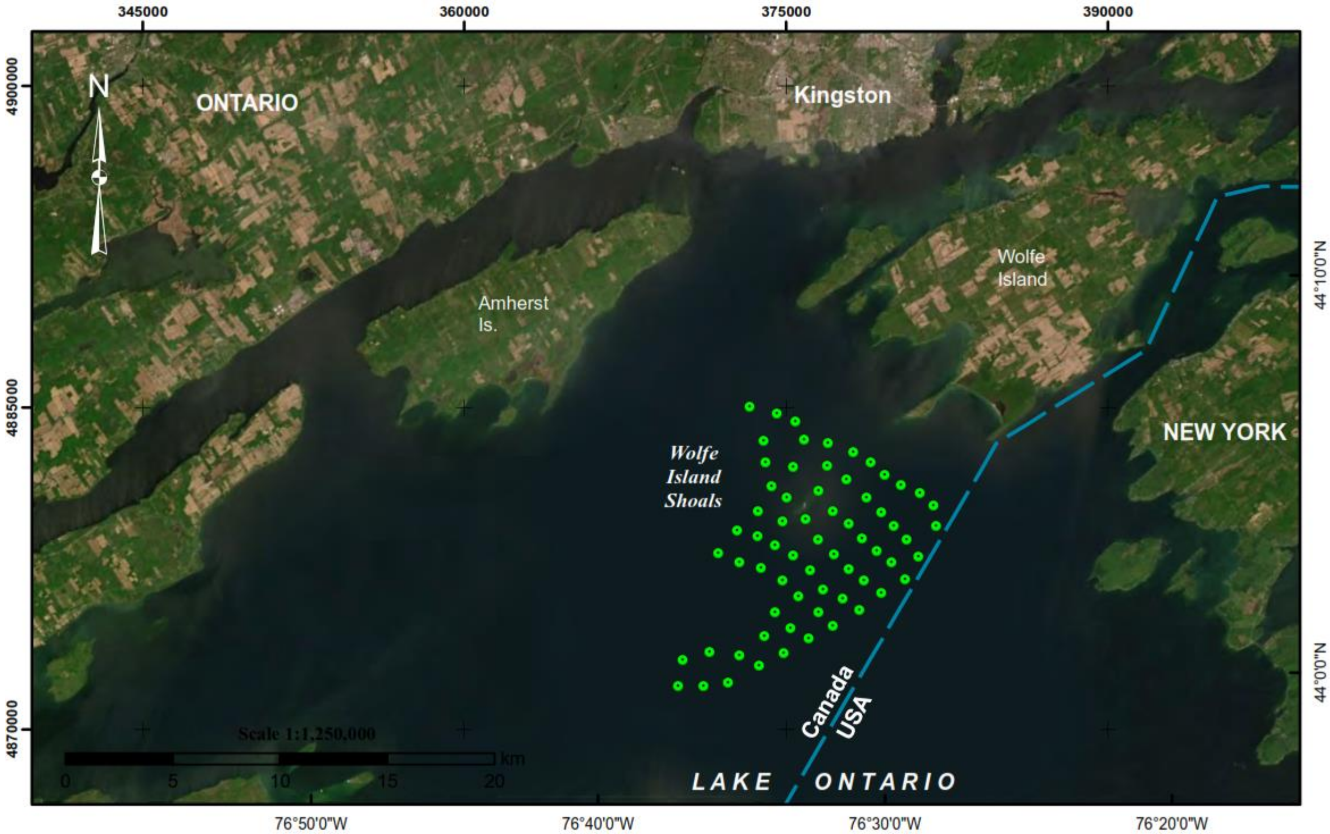


Figure 8-1: Project 2021 Layout (Source: CSR)

CSR (2021) reviewed the single channel seismic, side-scan sonar and bathymetry data at each wind turbine location and presented a summary of results including the wind turbine location, wind turbine distance to nearest survey line, water depth, and sediment thickness in the updated geological assessment.

CSR (2021) also mapped out the latest locations (66 wind turbines) against the 2010 survey and survey track lines, which showed that five wind turbines are slightly outside of the area surveyed in 2010. CSR (2021) also conducted a search in the public domain to support the characterization of the sub-bottom geological units in the Project area.

CSR (2021) confirms that the surficial geology is divided into three main units (post glacial sediments, undifferentiated post glacial / glacial sediments, glacial till, and bedrock.

[30] C-2485 *CSR-2126 2021 Turbine Layout Geological Assessment Wolfe Island Shoals, Lake Ontario*

The CSR (2021) report was considered by the foundation design experts in COWI (2021- GBF), in determining that the gravity based foundations are suitable for the Project and site conditions.

Further details regarding the bathymetric and geophysical studies are provided in Appendix A.

8.3 Metocean

In 2013, Windstream commissioned ORTECH to conduct a review of metocean (wind, wave, and ice) conditions. The metocean study was a compilation of data collected by Environment Canada and National Oceanic and Atmospheric Association weather buoys in proximity to the Project site.

Windstream also later engaged WF Baird (2014 and 2015) to conduct a comparison of metocean and marine specific conditions of Lake Ontario with the Baltic Sea. Those studies demonstrated that the waves and coastal processes at the Project are well understood and that the Project is technically feasible from a metocean perspective.

These studies were detailed in SgurrEnergy's NAFTA1 report.

In 2021, Windstream again commissioned WF Baird (2021) to confirm these metocean studies. It confirmed the findings in the 2014 and 2015 studies that the waves and coastal processes at the Project are well understood and that the Project is technically feasible from a metocean perspective.

In Wood's experience, the metocean conditions identified in the metocean study were within the operational limits of typical offshore construction vessels for a large portion of the ice-free season. This study supports the expectation that metocean conditions at the Project site are significantly better than those experienced on most offshore wind projects.

A detailed summary of the metocean studies is located in Appendix A.

8.4 Ice Study

Windstream engaged WF Baird to conduct an ice study for the Project area, completed in 2012, which provided detailed ice conditions and associated foundation design parameters for the Project.

Windstream commissioned WF Baird in 2015 to update these previous ice studies. The study results indicated that the site experiences winter icing with annual variation in thickness and persistence. Ice formation typically starts between mid-December and early January and spreads from the bays and shore into the open portions of the lake. Ice commonly persists into early March. The interannual variation is highlighted by years where no ice forms and others where ice persists into April.

The WF Baird study provided detailed information regarding the movement of ice and the loading of ice on typical offshore wind foundations including gravity base structures.

These studies are summarized in SgurrEnergy's NAFTA1 report.

In 2021, Windstream commissioned WF Baird (2021) to update the previous ice studies. Comfort Engineering performed an ice investigation on behalf of WF Baird for the Project. The ice study sets out key objectives and supporting scope of work around the consideration of any new developments since 2015 (since NAFTA1). The scope of work included an investigation of the ice conditions and ice design criteria, assessment of ice structure interaction scenarios of concern and ice loads, and an assessment of the potential for ice contact with the submarine cable.

This study considers the latest layout, gravity based foundation with a down-breaking cone at the ice line, and primary component dimensions. The study covers ice loads from ridges and ice loads from level ice flow impacts in relation to the gravity base foundations selected for the Project.

The latest study considers the advancement in practice guidelines and codes and confirms that the ice conditions at the Project site and the ice design considerations are well understood. In addition, this latest study shows that the ice design loads previously established for the gravity base foundations are conservative and could be reduced through further analysis as it would typically occur as the Project advances.

This finding is further substantiated by the ice conditions and design loads for the LEEDCo Icebreaker project on Lake Erie (described in more detail in Appendix E) which were identified and resolved through the application of the state-of-the-art ice design processes and codes, for design and regulatory purposes. The Icebreaker project has been approved following intense review and scrutiny.

WF Baird (2021) considered the impact of ice on the Project submarine cables and ice-related risks were also analyzed. In general, two ice-related risks were considered; deep ice ridges that contact the lakebed, and ice contacts with the shoreline (ice push events). Through review of the site-specific geophysical surveys undertaken previously and considering the design basis that the cables would be unburied (consistent with existing unburied submarine cables in the area) the study concludes that the submarine cables are not likely to be prone to ice-related issues. Previous studies showed no existence of ice scour in the site area or cable route, and for deeper water, the lakebed was not scoured. A number of ice studies have been performed to date. The latest study considers the ice loads on the selected wind turbine and associated layout and concludes that further optimization and additional assessments would typically be carried out during the detailed design phases.

Furthermore, the ice study concludes that the nearshore ice conditions are less severe, and experience indicates that unburied existing submarine cables in the same general area as the Project have been performed satisfactorily. Further details of the ice studies are provided in Appendix A.

8.5 Conclusions

Windstream has conducted extensive and appropriate site characterization studies in support of the Project. The efforts to categorize the site to date indicate that site conditions are consistent with those observed in the surrounding area. Windstream continues to consider lake icing in its engineering development scope. Wood agrees with this approach and considers the effects of lake icing to be a design and operational factor that has been designed and planned for on numerous freshwater projects including offshore wind projects. The extensive work undertaken for site characterization supports Wood’s conclusions that the development, construction, and operations of the Project are feasible.

9 Wind Turbine Foundation

SgurrEnergy's NAFTA1 report details its foundation parametric study for the Project. The SgurrEnergy study analyzed the available information on site conditions, area supply chain and likely fabrication and installation methods and compared this information with its database of European offshore wind projects. This process confirmed that the gravity based foundations selected for the Project were suitable and technically feasible.

Further studies and assessments undertaken in 2021 concluded that the gravity based foundation continues to be suitable for use at the Project. More details on the types of foundation options, selection criteria and previous studies / design process, details of the gravity based foundations, and installation are contained in Appendix G.

9.1 Foundation Design Selection Update

The selection of an appropriate foundation for an offshore wind project is a process driven by a host of factors including the metocean environment, water depth, wind turbine selection, and geologic conditions. In its 2021 report, COWI[31] reiterates that the semi-floating GBF design was chosen for the Project due to these criteria, readily available supply of raw materials, and existing supply chain (concrete construction).

COWI's 2022 report reflects the selected wind turbine model and layout, and presents the design parameters, and the comparison of these during NAFTA1 and in 2021, for NAFTA2.

The wind turbine loads for NAFTA1 used COWI's database of loads, for projects installed and planned during from 2010 to 2014. The loads for the selected wind turbine, were estimated by Wood based on recent projects with similar wind turbines from several top tier wind turbine suppliers.

COWI notes that the changes proposed between NAFTA1 and NAFTA2, involving higher capacity wind turbines, will be fundamentally similar to the foundation selected and considered in NAFTA1, with no significant structural changes.

COWI's recent study also takes into consideration the recent studies discussed in Section 7.

COWI notes that the use of supplemental floatation barges (discussed in Appendix G) is a low-cost option and that these vessels can be re-purposed from an existing fleet or built at small / medium shipbuilding yards or steel fabrication facility with access to bodies of water.

Furthermore, this option brings the potential for significant cost and schedule advantages to the Project. It is worth noting that these advantages have not been considered in the Construction Schedule.

COWI notes that GBF have been implemented at around 40 offshore wind projects in various stages of development. The GBF foundations proposed are similar to those being installed in 2021 to support the third crossing bridge in Kingston, which is located about 10 km away.

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[31]CER-COWI (Wind Turbine Gravity Base Foundation Design) 20220218A221714-01-01 Windstream Expert Witness Report_

In 2021, Windstream commissioned COWI to review the technical suite of documentation to affirm or update the foundation design, fabrication plan, and fabrication schedule. COWI (2021-GBF) concludes that the previous work undertaken is still applicable, and that the advancement of wind turbine technology has enabled the consideration and use of higher capacity wind turbines on a gravity base foundation design which is essentially the same as the design that was described in the NAFTA1 Report. Similarly, Weeks Marine was commissioned by Windstream in 2021 to review the technical suite of documentation to affirm or update the proposed means and methods of installing the gravity base foundations and wind turbines in Weeks (2021).

Wood believes that the conclusions drawn by both COWI and Weeks Marine are reasonable.

10 Project Implementation

Implementation of large-scale projects is a complex process requiring planning and ongoing development. Successful projects identify challenges early on and implement systems to identify and manage them. Windstream and the Project have made great progress toward this goal and have assembled a highly experienced team to continue the development of this process. In Wood's opinion, to build on the extensive work done to date, and but for the cancellation of the FiT Contract and the Government-imposed moratorium, Windstream would continue the development of a comprehensive project implementation strategy, covering:

- Project management and contracting strategy.
- Schedule.
- Permitting and environmental restrictions.
- Engineering and technical considerations.
- Identification of fabrication and staging facilities.
- Vessels.
- Submarine cable.
- Offshore substation.
- Onshore control centre.

Further information on project implementation, including typical process in offshore wind projects, included in Appendix J

10.1 Project Management

As with all project management efforts the goal is to ensure the smooth execution of the Project. Accordingly, the ongoing development of the organization to manage the Project is progressing. A key consideration in the development of the Project team is the incorporation of experience from European offshore wind projects.

As a typical project at a similar stage as the Project develops further, the approach to contract and project management would be decided based on a variety of inputs. There are several factors affecting this decision including available development capital, project schedule, financing requirements, financial risk and the suppliers and contractors selected for the Project. But for the termination of the FiT Contract, the Project was expected to continue to develop along its current path with the major contracts for the Project split into key packages under the balance of plant (BoP), and wind turbine supply agreement (TSA).

There are different project implementation contracting strategies or approaches that have been employed to implement offshore wind projects in Europe from an engineer, procure, construct, and installation (EPCI), to a multi-contracting strategy managed by the developer. Each contracting strategy has strengths and weaknesses, with the most appropriate contractual structure for each project dependent on several key factors, typically:

- Experience, capability, and market position of project developers.
- Experience and risk appetite of project owners, investors, and lenders.
- Location of project and development of regional / local offshore wind sector.
- Availability of contractors and vessels.

Early in the development of the European offshore wind sector, full wrap (low risk) EPCI arrangements were most common due to the inexperience of project owners and low appetite for risk of investors and lenders. Increasingly, multi-contracting strategies are being implemented by experienced project developers / owners to reduce Capex (or construction costs) and give the owner(s) greater visibility and control of project risks.

An established / large EPCI contractor can be an attractive option because of the resources and experience that it brings to a complex project. However, this strategy, generally brings significant and higher base cost.

In Wood's opinion, Windstream has proceeded in a prudent manner employing a smaller project team to advance the Project. The wisdom of this decision is further reinforced by the constraints placed on the Project by Government of Ontario moratorium, and more recently by the cancellation of the FiT contract.

In the ordinary course (but for the cancellation of the FiT Contract and the provincial moratorium), Wood expects that the Project would progress through the development phase before a final contract execution strategy is selected. For example, a full EPCI or a multi-contracting approach is to be chosen. In addition, final work the Project's design would take place, including:

- Finalizing the most likely foundation solution for the Project.
- Finalizing likely installation vessels.
- Finalizing likely foundation fabrication and staging sites.
- Updating and finalizing electrical interconnection and offshore substation design.
- Refining electrical equipment requirements and sizing.
- Confirming and conducting the environmental and site impact investigations required to support project permitting.

Windstream has not been allowed to proceed on many activities required to support the further development of the Project because of the Government imposed moratorium on offshore wind development in Ontario and more recently the FiT contract cancellation. This has in turn restricted the ability of Windstream to execute much of the design scope and financial arrangements required to advance the Project beyond its current state.

Despite the restrictions imposed, Windstream has made considerable progress in advancing the design of the Project. In Wood's opinion, as summarized in the following sub-sections. Windstream would have been well-placed to continue the development of the Project through the final design, contract negotiations, and financial close of the Project.

10.2 Schedule

Wood has prepared a detailed schedule which outlines the key activities required for the Project to be successfully implemented. The Project schedule is based on the original version prepared by SgurrEnergy (now Wood) for NAFTA1, titled *Wolfe Island Shoals Development Plan*, dated 11 June 2015. The Project schedule has been updated to reflect the current Project design and offshore wind market conditions.

The NAFTA1 schedule had a total duration of 63 months with a start date of 11 February 2011 and an end date of 23 May 2016. The updated schedule prepared in support of NAFTA2 has a total duration of 58 months with a start date of 18 February 2020, and an end date of 20 December 2024. The improvement in the duration of the schedule is due to the reduced number of WTGs. The schedule also considers the approach taken by current and recent offshore wind projects in Europe; accordingly, any updates in the market, since 2015, have also been taken into account. The updated Project schedule focusses on the following main areas:

- Permitting and regulatory activities.
- Environmental, geotechnical and wind resource surveys.
- Financial and commercial obligation timelines.
- Engineering development and design.
- Equipment procurement and fabrication.
- Installation and commissioning.

The development, design and fabrication period allows time to conduct required environmental and site characterization studies. These studies then inform the design, contracting strategy, fabrication, and financing aspects. The timelines associated with these studies are achievable, assuming a timely and effective permitting process.

The offshore installation schedule is similar to those seen on other projects. The first installation season consists primarily of foundation preparation and installation followed by the installation of the submarine cabling and the offshore substation. Project activities are suspended in the winter months and commence in April of the following year. In the second installation season remaining foundations are installed, and all wind turbines are installed by two turbine installation vessels. The second installation season also sees the final substation and submarine cable installation and the commissioning of the electrical systems and wind turbines.

Wood focused on optimizing the NAFTA2 project schedule across all aspects of the development program. This includes the initial studies, permits, and approvals required from the relevant authorities to develop a wind farm on Lake Ontario. Wood has also focused on benchmarking the durations of construction tasks against similar European and US offshore wind projects by using knowledge of procurement timelines and offshore wind installation methodologies which have been incorporated into the Project schedule. Where necessary, input from various experts (COWI, Two Dogs, Weeks Marine, WSP, WF Baird) has contributed towards the final project schedule.

The updated construction schedule prepared by Wood is contained in Appendix B.

10.3 Regulatory, Financial and Commercial Obligations

The early development stage of the Project allows time to undertake the necessary environmental and site characterization studies, informing the design, permitting, financing, contracting and construction phases. There have been minimal changes to the regulatory, permitting, financial and commercial aspects of the Project schedule; these requirements and processes have remained consistent with what was expected at the time the original schedule was commissioned by Windstream in support of the NAFTA1 process. To the extent that regulatory and permitting changes have occurred since 2015, these have been considered in WSP's 2021 report. According to WSP, the permitting process for a large renewable energy project in Ontario is expected to have a 36-month duration.

10.4 Construction Packages

The schedule considering the various construction packages has been updated to reflect changes to the Project design since NAFTA1.

The most significant update to the Project schedule relates to the number of wind turbines based on the current preferred wind turbine and associated layout. A total of 66 SG 4.5-145 MW wind turbines have been selected as the final wind turbine model with an associated layout for the Project. Further details of the wind turbine selection process are presented in Section 6. The reduction from the 130 wind turbines presented during NAFTA1, to 66 wind turbines has subsequently reduced the number of foundations, and inter-array cables required for the Project. This has also reduced the overall foundation fabrication and installation activity durations for these construction packages.

The updated wind turbine model has had a minimal impact on the foundation design of the Project. Based on similar foundation design and fabrication improvements in recent years, the total fabrication duration for a full set of three gravity base foundations is 120 days. The installation method of gravity based foundations has remained unchanged and therefore the rate of installation activities has also remained broadly in line with the original schedule prepared in support of NAFTA1.

The Project's electrical system design has remained unchanged from the original schedule prepared for NAFTA 1. The procurement, manufacture, construction and installation duration of the onshore substation, offshore substation, export cable and array cables have been benchmarked against current offshore wind projects and therefore are considered to reflect current market conditions. The interfaces of the construction activities between the various construction packages have also been considered in the updated Project schedule.

Manufacturing of the 66 wind turbines would commence at the date of financial close for the Project. The wind turbines will then be transported and pre-assembled at the load out yard prior to installation. The total duration for one wind turbine installation vessel (supported by feeder vessels) to install five wind turbines is approximately 14 days. This involves wind turbine component load out onto the vessel, wind turbine installation activities as well as transit to and from the Project site. Wind turbine commissioning will follow the wind turbine installation using an alternative vessel and will require temporary generator sets until grid power is available through the substation.

Float (i.e. time) between construction packages has also been considered within the development of the updated Project schedule. This ensures that sufficient contingency, or space between time is built into the overall Project schedule to ensure that any delays to construction package (i.e. fabrication, installation) are considered appropriately, thus reducing the risk of impacting another dependent construction package. Wood has determined the amount of float required for the Project based on its extensive experience with other offshore wind projects.

Another consideration for the Project schedule is winter conditions on Lake Ontario that can restrict offshore construction activities between 01 January and 31 March each year, due to low temperature and ice formation on the lake. Although offshore installation activities are assumed to be not possible during this period due to weather conditions at the Project site, for the purpose of developing the Project schedule, onshore manufacture and construction works can progress, as these are not expected to be significantly impacted by the winter conditions.

The Project's critical path has been considered throughout the development of the updated schedule. The critical path identifies key tasks that are necessary to the successful implementation of the Project and therefore present the highest risk if delays are experienced. The critical tasks that are required to achieve financial close are the crown land site release, Renewable Energy Approval application, notice to proceed and completion of a bank-grade energy yield assessment. There are two main critical paths for the construction phase of the Project for the commercial operations date to be achieved. The first relates to the foundation installation, array cable installation, and wind turbine installation. The second relates to the onshore substation, offshore substation, and wind turbine commissioning. As both paths are critical, it is vital to manage the interfaces between these construction packages to ensure that the commercial operations date can be met in line with the updated schedule.

Given a strong and effective project management and stakeholder plan is implemented, Wood considers the development programme to be an accurate reflection of the technical feasibility of the Project, detailing the necessary milestones the Project should achieve for successful completion.

The engineering and technical considerations, fabrication / staging facilities, vessels, submarine cable, offshore substation, and control centre, are included in Appendix J.

Wood concludes that the Project is feasible, less technically challenging than some European projects of similar size, and presents several advantages:

- Well established regional supply chain for raw and finished steel and concrete products.
- Established multi-mode transportation system with a track record of supporting wind projects in immediate vicinity.
- Proximity to robust grid connection point.
- Comparatively benign metocean (wind, wave, current, ice) conditions.
- Island based offshore substation.
- Submarine cable installation directly on lakebed, avoiding cable burial costs.
- Geologic conditions suitable for gravity foundation installation.

In addition, it will be relatively straightforward to expand the existing Project team with staff who have existing direct experience of offshore wind farm construction from Europe. Wood is also well placed to provide expert assistance in advancing the development and construction of the Project using this expertise to optimize Project implementation.

11 Operations and Maintenance Phase

Following commissioning of the Project after construction, or the end of the implementation phase, the Project moves into the operations phase. The operations and maintenance aspects of the Project remain largely the same as summarized in SgurrEnergy's NAFTA1 report. Key aspects are summarized below.

11.1 Onshore Facilities

The onshore facilities for the Project are expected to be in the vicinity of Kingston, with a population of approximately 127,700[32] (2016). This population base and its business community will likely provide a diversified and suitable base of support for the Project. The location of the operations and maintenance facility has not been finalized by Windstream at this time. There are several possible locations that provide ample area for the operations and warehouse facility as well as potential staging areas needed to support major component repair. Such areas are around 25 km radius of the Project, a short distance providing quick access via service vessels for most of the year.

The ideal site would capitalize on an existing deep-water facility with ample lay down area and proximity to the TransCanada highway system; there are several sites in the area that could fulfil this requirement.

Alternate methods will be explored to provide access to the Project site during the winter months when ice is present. Access to the site during the winter ice season may be accomplished using an ice breaking vessel or potentially via an air cushion vehicle or helicopter as required. Access to offshore sites via helicopter or vessel with ice breaking capability is common in many parts of the world.

[32] C-2212, (City of Kingston - Projects - Planning - Population Housing Employment Forecast - Final Report - March 2019) (05 March 2019)

11.2 Wind Turbine Operations and Maintenance

The wind turbine operations and maintenance agreement would be negotiated with the wind turbine manufacturer at a later stage in the development of the Project. This is a typical approach for most offshore wind farms. It is expected that Siemens Gamesa would manage the operations and maintenance for the wind turbines. Wood's experience recommends that an operations and maintenance agreement be negotiated to ensure that Siemens Gamesa is responsible for the maintenance and availability of the wind turbines. Incentives for increased availability and capacity should also be negotiated as part of the agreement. Wood understands that Windstream has not proceeded with the negotiation of such an agreement due to the cancellation of the FiT Contract.

Site conditions are expected to limit accessibility to the wind turbines during the winter ice season. It is expected that the majority of wind turbine maintenance work will be scheduled and completed in the approximately nine-month ice free period from April to December. It is worth noting that the similarity with existing North Sea offshore wind projects where most of the maintenance is done in the summer and winter work is avoided due to weather risk. That is, there are operational offshore wind farms where maintenance cannot be done for several months of the year, so there is no major concern with the Project being potentially icebound.

Non routine repairs and maintenance events during any periods of limited accessibility will be evaluated and addressed with a larger project view in mind. It is expected that the determination to perform non-scheduled wind turbine maintenance will be based on an analysis of accessibility, risk to personnel and equipment as well as energy loss. A year-long access strategy will be developed as a priority, so that the most economical solution for the Project is incorporated.

11.3 Balance of Plant Operations and Maintenance

Balance of plant operations and maintenance activities are coordinated with the wind turbine maintenance program and will likely be conducted almost exclusively during non-ice periods, typically from April to December. Balance of plant repairs and unscheduled maintenance in the January to March time frame are expected to be evaluated and conducted using the same risk-based strategy developed for wind turbine operations and maintenance.

11.4 Offshore Substation Operations and Maintenance

Major operations and maintenance work on the offshore substation are expected to be planned and executed during the April to December window as well with routine maintenance and troubleshooting proceeding year-round. It is assumed that the offshore substation will be readily accessible by either vessel or helicopter year-round. It is important to the operation of the entire project that safe and secure access is designed into and provided for the offshore substation on a year-round basis.

11.5 Service Vessel Plan Accessibility

The overall predicted accessibility for the Project would be informed by a further detailed metocean study, typically conducted leading up to the final design and financial close phases. The data from the metocean study will be analyzed to finalize access strategies and develop the operating requirements of service vessels. It is expected that several service vessels will be required, and it would be reasonable to investigate the inclusion of a vessel or vessels with some degree of ice hardening. A suitable vessel could increase the accessibility for the Project and potentially reduce downtime and energy loss. Novel approaches such as small hovercraft may offer opportunities. Helicopters are also a tried and tested method for improving offshore wind farm availability, and therefore production and revenues.

11.6 Operations and Maintenance Plan Summary

All maintenance and repair activities conducted on the Project will be evaluated using a risk-based approach and informed by detailed metocean study over the life of the Project.

12 Decommissioning Phase

A decommissioning phase for the Project is assumed and adequate funding to support this activity should be considered in the financial model from the early stages of the Project. A decommissioning plan will be prepared ahead of construction start to address removal of the Project, recycling of components, and returning the area to pre-existing conditions. In general, a decommissioning plan will address the removal of onshore cables, submarine export cables, array cables, wind turbines, and foundations as well as the electrical substation. Information regarding decommissioning such as the proposed methodology, and estimated costs is usually required for the permitting process; however, additional plans regarding decommissioning are generally formulated later in the project's lifecycle.

It is assumed that the Project will continue operation, perhaps with upgraded wind turbines (repowering) beyond the original twenty-year period specified in the FiT Contract. In the European market, offshore wind projects assume a typical useful life or operational life of 30 years.

Repowering of the site is also an option that can be considered, with continued advancement in wind turbine technology. This is a common approach or option for projects nearing the end of the initial life cycle.

Windstream would evaluate the environmental and economic benefits of repowering as the Project nears the end of the original 20-year period.

13 Overall Conclusions

Based on the findings of SgurrEnergy's NAFTA1 Report, and recent information, experience, updated studies, and further assessments, Wood considers the Project to be technically feasible. Wood acknowledges that Windstream has made substantial progress in various aspects of the Project and would have continued various development and detailed design activities but for the Provincial moratorium on offshore wind and cancellation of the FiT contract.

The Project's advantages include:

- Use of proven technology and installation methodologies
- Sufficient site information and data for site-specific conditions
- Sufficient measurement data from the Long Point met mast for the energy yield assessment
- Considered and realistic foundation fabrication strategy
- Proximity to a robust grid connection point
- Comparatively benign metocean conditions (wind, wave, current, ice), reducing weather risk improving accessibility and therefore wind turbine availability during the operational phase
- Island-based offshore substation, avoiding high capital costs usually seen for offshore substations on European projects
- Submarine cable installation directly on lakebed avoiding cable burial costs

Wood has developed an updated detailed Project schedule which outlines key activities, discussed in Section 10.2 and included in Appendix B. The schedule has a total duration of 58 months, starting from 18 February 2020 and concluding 20 December 2024.

In addition, it will be relatively straightforward to expand the existing team with staff who have existing direct experience of offshore wind farm construction from Europe. Wood is also well placed to provide expert assistance with developing and assessing the Project's risk register and using this to optimize the cost assumptions.

Wood anticipates that further development phase work would have proceeded in the ordinary course but for the termination of the FiT Contract and Government-imposed moratorium, and, supported by the extensive studies conducted to date, would have proceeded onto as the detailed design, and financial close phases of the Project.

Appendix A Previous Expert Report

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Appendix B Construction Schedule

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Appendix C Wood's Energy Yield Assessment

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P.01 Wolfe Island Sl

As set out in Section 5, Wood has performed an independent energy yield assessment Wood (2021-EYA) for the Project based on raw data collected by Windstream.

The typical steps involved in taking the raw data from the measurement campaign to the energy yield estimates, are presented in Figure C-1.

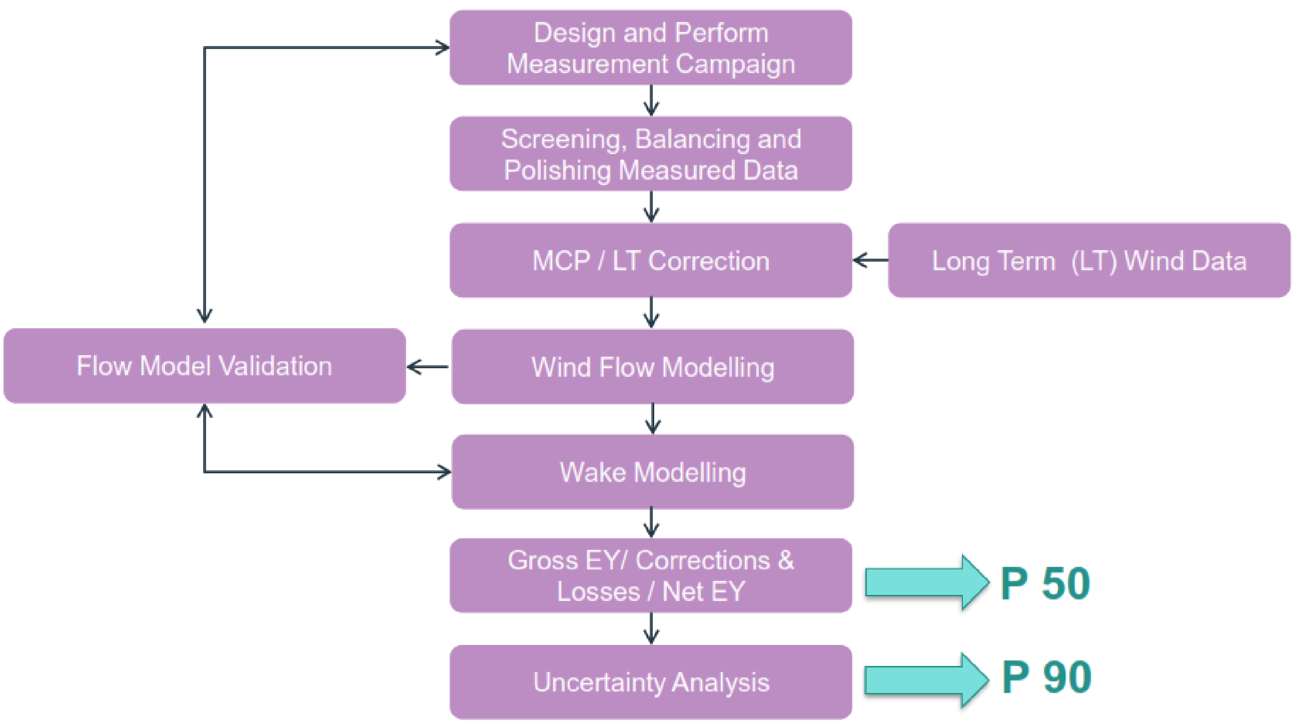

Figure C-1: Wind Energy Yield Assessment

Appendix D Project Participants

COWI's extensive gravity-based foundation design experience is presented in Table D-1 below[33].

Table D-1: COWI Gravity based Foundation Design Project Experience

Project	Design Level / Project Status	Details (Country / Characteristics)
Thornton Bank Phase 1	Detailed Design / Installed	Belgium, (2006-2009): Detailed design, 6 GBF of the conical type for REpower 5 MW wind turbines. Water depth 21-27 m lowest astronomical tide (LAT).
Kårehamn	Detailed Design / Installed	Sweden (2012-2013): Detailed design, 16 GBF for Vestas 3 MW wind turbines at 8m -21 m mean sea level (MSL) water depth in the Baltic Sea near Øland in Sweden.
Nysted	Detailed Design / Installed	Denmark (2001-2002): Detailed design, 72 GBF for Siemens 2.3 MW wind turbines and 1 OSS foundation Water depth 5 – 13 m MSL.
Rødsand 2	Detailed Design / Installed	Denmark (2001-2002): Detailed design, 90 GBF for Siemens 2.3 MW wind turbines and 1 OSS foundation. Water depth 5 – 13 m MSL.
Empire Wind	Pre-FEED	New York, USA (2018): One of four teams selected to prepare conceptual design of GBF for Equinor's Empire Wind I project. Empire Wind will provide 816 MW to New York generated from 10-15 MW wind turbines.
Lillebaelt Syd O	Concept Design	Denmark (2018): Concept design of two variants, 20 x 8.0 MW GBF and 40 x 4.0 MW GBF. Water depth 9 to 22m MSL.
Freshwater Wind	Technology Advancement Project	Lake Erie, New York, USA: Design of holistic foundation, fabrication facility, transportation, and installation program for semi-floating GBF, GBF with skirt, and GBF with integrated tower variants. All foundation types subject to freshwater ice loading.
Palmetto Wind / SEA WIND	Conceptual Design	South Carolina, USA: Concept design, 10-20 foundations for 3.6-4.0 MW wind turbines. Water depth 24-60 ft mean lower low water (MLLW).
Fecamp Tender Design	Tender Design	France (2013): Tender design 83 GBF for Alstom (GE) 6 WM wind turbines. Water depth varies -27 to -33m LAT.

[33] CER- COWI (Wind Turbine Gravity based Foundation Design) 20220218 A221714-01-01 Windstream Expert Witness Report

Appendix E Offshore Wind Activity in the US, Canada, and Vietnam

E.1 US Department of Energy

The US Department of Energy (DOE) has actively supported the development of the US offshore wind industry for several years. Since 2011, the DOE has been supporting a wide range of aspects for the development of the offshore wind sector such as wind research, development, and demonstration projects[34]. It also published a new *National Offshore Wind Strategy* in collaboration with the US Department of Interior (DOI) in 2016[35].

The advanced technology demonstration program features innovative offshore wind technologies that are pioneering, and yet to be deployed on a commercial basis. These projects are progressing through the permitting, and interconnection processes ultimately supporting the country's wind industry. Two such projects are:

- Lake Erie Energy Development Corporation's (LEEDCo's) Icebreaker project
- University of Maine's New England Aqua Ventus I floating wind project

These and other DOE projects support the reduction of the levelized cost of energy (LCOE) for offshore wind in the US. The DOE's list of projects can be found on its Wind Energy Technologies Office Projects Map[36]. The DOE expects that technology improvements, efficiencies from economies of scale, and deployment, and cost models indicate credible scenarios for cost reductions below $100/ MWh for many US-based sites by 2030.

The DOE acknowledges that there remain key challenges across the following topics:

- Reduction of technology costs and risks via resource and site characterization, technology advancement, and installation, O&M, and supply chain solutions.
- Support of effective stewardship through management of key environmental and human use concerns.
- Increase of understanding of the benefits and facilitate investment in the sector through evaluation of electricity delivery and grid integration including communication of costs / benefits.

Both DOE and DOI identify the specific actions needed in the *National Offshore Wind Strategy*.

In March 2021, the DOE in partnership with the Departments of Interior and Commerce, announced a national target to deploy 30 GW of offshore wind by 2030. This is estimated to support approximately 77,000 jobs, generate electricity to power over 10 million homes, and cut 78 million metric tons of carbon

[34]C-2237, Offshore Wind Initiatives at the U.S. Department of Energy Office of Energy Efficiency & Renewable Energy- weto-offshore-wind-fact-sheet-oct2019.pdf (energy.gov) (October 2019)

[35]C-2038, National Offshore Wind Strategy: Facilitating the Development of the Offshore Wind Industry in the United States | Department of Energy (09 September 2016)

[36]C-1911, Wind Energy Technologies Office Projects Map | Department of Energy (undated)

dioxide emissions. Beyond these benefits, the target will stimulate $12bn in investment on an annual basis, support construction of up to 10 new manufacturing plants for wind turbine components, new ships to install wind turbines, and up to $500m in upgrades to ports.

Other initiatives include advancing research and development (R&D) solutions and a loans program for up to $3bn in funding, which is available to offshore wind and offshore transmission developers, suppliers, and other financing parties.

E.2 Lake Erie Development Corporation (LEEDCo)

The Lake Erie Energy Development Corporation (LEEDCo) was founded in 2009 as a non-profit public-private partnership to spearhead a sustainable offshore wind industry in the Great Lakes. Through three key missions, the organization aims to create and develop sustainable offshore wind in the Great Lakes by 2030 and the initial step is through the Icebreaker wind project. This is a 20.7 MW demonstrator project consisting of six Mitsubishi Heavy Industries Vestas Offshore Wind (MVOW) V126-3.45MW wind turbines situated in Lake Erie, north of Cleveland, Ohio. This project is set to be the first North American freshwater offshore wind farm, due to be operational by the end of 2022. The project will utilize an innovative foundation solution comprising of a mono bucket, combining a gravity base, monopile and suction bucket, which is suited to the Great Lakes geology.

Based on information from Ventolines, who previously worked with LEEDCo, the Icebreaker project will utilize a mobile crane on barge solution for the wind turbine installation vessel.

As set out in SqurrEnergy'sNAFTA1 Report, Windstream had previously signed up to a data sharing agreement with LEEDCo and has worked closely with the company for several years to share scientific studies relating to offshore wind in the Great Lakes.

E.3 Canada

At the time of writing, no offshore wind projects are in operation, though a number are proposed[1].

Several offshore wind projects have been proposed in Canada, such as:

- Trillium Power Wind 1 – 600 MW, Lake Ontario with a further four projects. This Project has increased in capacity since SgurrEnergy's NAFTA1 Report (from 414 MW in 2015 to 3500MW today).
- Toronto Hydro Research platform – Offshore met mast near Toronto for follow-on project[2]
- Naikun Wind (Oceanic Wind Energy Inc) – 400 MW, off the coast of Haida Gwaii in Hecate Strait, British Columbia (Northland Power acquired 100% of the project in 2020)[3]. This Project has increased in capacity since SgurrEnergy's NAFTA1 Report (from 200 MW in 2015 to 400MW today). Map presented in Figure E-2.

Figure E-2: Naikun (Source: Oceanic Wind Energy Inc)[4]

- Atlantic Canada Offshore Developments (ACOD) – 180 MW St. George's Bay in Newfoundland, and three other projects in Atlantic Canada. ACOD is a joint venture between Copenhagen Infrastructure Partners (CIP), a fund management company with investments in varying energy infrastructure assets, and Beothuk Energy, a local developer based in St. John's Newfoundland. Copenhagen Offshore Partners (COP) is selected as the project's developer. This project has been developed since SgurrEnergy's NAFTA1 Report.

[1] CER – Canada's Adoption of Renewable Power Sources - Energy Market Analysis - Emerging Technologies (cer-rec.gc.ca)

[2] Newsroom - Toronto Hydro

[3] Offshore Wind Project | Oceanic Wind

[4] Project Site | Oceanic Wind

E.4 Vietnam

The international body Global Wind Energy Conference (GWEC) considers Vietnam a key market to watch as it has the potential for rapid growth in the wind market, with 7 GW of additional wind projects approved by the Prime Minster in 2020. There is tremendous opportunity in Vietnam especially in nearshore areas with 3,000 km of coastline, translating into 475 GW of offshore wind energy resource potential in the next few years.

There are several nearshore projects planned for Vietnam that are either in the construction phase or late stages of development, which shows that projects similar to the Project (in that they are nearshore projects) are being developed and constructed.

Appendix F Site Suitability and Wind Turbine Selection

Prior to wind turbine selection, it is essential to define the site's wind regime, as wind turbines are typically designed and certified to International Electrotechnical Commission (IEC) 61400-1 Wind Turbine Generator Systems – Part 1 Design Requirements (2005) which specifies the wind turbine classes as presented in Table F-2 below.

The wind turbine selected in 2021 as a result of the assessment (discussed in Section 6) is different to the wind turbine selected previously in 2015. The original Project design presented during NAFTA1 consisted of 130 Siemens 2.3 MW- 113 wind turbines. As a result of the studies done in 2021, and the process represented in the flow chart (Figure 6-1), the current wind turbine selection is the Siemens Gamesa 4.5 MW-145. The key steps are understanding the wind characterization, selection of suitable candidate wind turbines suitable for the site, choosing suitable hub height, and arriving at one model that is suitable for the site.

One of the main factors in the selection of the wind turbine is the suitability of the wind turbine model (and class) for the wind characteristics of the area in which these wind turbines will be placed.

There were several other criteria that had to be considered too, such as the RD Macdonald vessel compatibility, original gravity based foundation proposed by COWI, 4 MW capacity range (to reduce the total number of wind turbines), be Class II_B, suitable for the water depth range (10 to 20 m) and be available in the Canadian market.

As a result of these assessments done by Two Dogs (2021-TS) and supported by Wood, the Siemens Gamesa 4.5 MW-145 was selected.

Table F-2: Basic Parameters for IEC 61400-1 (2005) Wind Turbine Classes

Parameter	Class I	Class II	Class III	Class S
V_{ref} (m/s)[24]	50	42.5	37.5	Defined by manufacturer
Annual Average Wind Speed (m/s)	10	8.5	7.5	
V_{e50}[25]	70	59.5	52.5	
Wind shear coefficient	0.2			

The wind measurement campaign and wind regime outline the characteristics of wind flow based on site measurements taken by Windstream. Details of the wind measurement campaign and energy yield assessment are contained within Section 5 including the duration, met tower height, and location of Long Point. The energy yield assessment report is contained within Appendix C. Furthermore, a graphic which shows the steps from the measurement campaign all the way through to the energy yield is presented in Appendix C. The meteorological mast measurements recorded by Windstream were deemed by Wood to be sufficient for characterizing the wind flow in relation to candidate wind turbines with an effective hub height of up to 200 m above the mean level of Lake Ontario. This conclusion is supported by the location and heights at which the wind measurements were taken, and the duration of the measurement campaign, which produced a dataset to accurately quantify the wind flow characteristics.

Two Dogs considered European projects that used gravity base foundations (rotor diameter, hub height, and maximum water depth) to plot the hub height of these reference projects and that of the Project, which showed rotor diameters between 110 – 150 m were installed at hub heights between 90 – 100 m. It was decided that the shortest standard wind turbine tower height would be used for the Project, consistent with the wind regime class type, in this case, Class II_B. The reason for this was to maximize energy capture whilst being within the dimensional lifting capabilities of the RD Macdonald. Two Dogs considered nearby operational wind farms (Ernestown and Amherst Island) which would be subject to the same wind regime as the Project. This analysis showed that appropriate mitigation was arrived at for the V_{ref} Class II limit (150° sector) for nearby wind farms, which indicates that this class of turbine is appropriate for the Project, albeit subject to wind turbine supplier assessment (which typically occurs later in the design phase, while a Turbine Supply Agreement is being negotiated).

Several possible wind turbine options were identified, and Wood worked closely and collaboratively with Two Dogs Projects, Windstream, and Ortech to arrive at the chosen wind turbine. Following extensive analysis and evaluation, the SG 4.5-145 wind turbine was chosen for the Project. For discussion on the chosen wind turbine model, please refer to Section 6.

The Two Dogs wind turbine selection report confirms that the site is nominally IEC Class II_B and recommends that an IEC Class II_B wind turbine (SG4.5MW-145) should be considered for the Project. Furthermore, there is a clear precedent for the use of IEC Class II_B wind turbines for the Project site, based on wind resource modelling and previous work conducted for the Project. The previous wind turbine selection was also an IEC Class II_B wind turbine, as described in Section 4.2 of SgurrEnergy's NAFTA1 Report.

Wood also analyzed the measured data to produce an energy yield assessment (Wood 2021-EYA) which is discussed in Section 5 and Appendix C of this expert report. Wood's energy yield assessment includes the site suitability assessment (Section 7) where the following inputs were assessed:

- Air density
- Site temperature
- Layout
- Mean wind speed and distribution
- Wind shear
- Wind shear at mast location
- Wind shear at wind turbine locations
- Extreme winds at mast location
- Extreme winds at wind turbine locations
- Turbulence Intensity
- Ambient Turbulence Intensity at mast location

- Ambient Turbulence Intensity at wind turbine locations
- Effective Turbulence Intensity

Wood notes that the chosen wind turbine (Siemens Gamesa 4.5-145) is part of the Siemens Gamesa 4.X platform which includes various wind turbine models. The Siemens Gamesa 4.5-145 wind turbine has two configurations, Mk 1 and Mk 2, with variable ratings between 4.2 and 4.8 MW for Mk1, and between 4.5 and 5.0 MW for Mk 2. Note that the application mode of the wind turbines is determined by Siemens Gamesa. For further details on typical application modes, please refer to Section 7 (Table 7-1) of Wood's Energy Yield Assessment, contained within Appendix C. This approach and assessment are industry standard and typically conducted during the detailed design phase of a project.

It is worth noting that IEC design parameters are not independent functions, and a wind turbine may be suitable for a site even if some operating conditions are above their design value, provided other conditions are more benign, such as a high wind speed site which has a low turbulence value. The site conditions are not absolute values, and these would be discussed and agreed with the wind turbine manufacturer during the final design phase of the Project.

Key conclusions drawn in relation to the site suitability aspect, referencing parameters in Table 6-1 are:

- Wind shear is slightly higher than the IEC Class II design parameter of 0.2 in the 90- degree (sector at low frequency) and 150-degree (sector at moderate frequency) at the met mast location (Long Point). However, since the wind shear was found to be 0.12 across the rotor plane at all individual wind turbine locations, Wood has minimal concern regarding wind shear at the Project, and any wind shear exceedance can be addressed and mitigated by the turbine manufacturer in the course of negotiating a turbine supply agreement and concludes that IEC Class II remains an appropriate selection.
- At the met mast location (100m hub height), it is predicted that the average (all wind direction sectors except as noted below) sector-wise 50 year extreme 10-minute wind speed (V_{ref}) is within the IEC Class II upper threshold of 42.5 m/s. Wood notes that exceedance of the Class II threshold is predicted in the 150-degree direction sector, which is the south to south-east direction. As with the wind shear exceedance, this will be assessed and mitigated through TSA negotiations and wind turbine optimization.
- Some exceedances of V_{ref} in these specific sectors may have a minor impact on the design life of the wind turbines. However, the lower turbulence intensity observed at the site in conjunction with implementation of appropriate wind turbine application mode as determined with Siemens Gamesa are expected to mitigate wind turbine loading, and hence impact on design life.

In terms of wind turbine selection undertaken in 2021, several key criteria had to be met. The wind turbine had to be compatible with the RD Macdonald installation vessel proposed by Weeks Marine, and the original GBF proposed by COWI for the Project. Also, the wind turbine needed to be in the 4 MW range to reduce the total number of wind turbines, be of Class IIB and be available in the Canadian market. Wind turbine location or placement needed to be in water depth between approximately 10 to 30 m for the purposes of the layout. Wood can confirm that all these criteria were met.

In support of the wind turbine selection process, and in consideration of the aforementioned selection criteria, Wood compiled information on various wind turbine models including rated power, hub height, number of wind turbines, wake loss (as a percentage), blockage (as a percentage), net capacity factor, and minimum / maximum wind speed at wind turbine locations. Wood prepared energy yield estimates based on the long-term wind speeds and optimized layouts and provided this information to Two Dogs. Two Dogs then used this information to prepare and set out its wind turbine selection analysis. Please refer to the Two Dogs (2021-TS) report for the wind turbine options investigated.

Appendix G Wind Turbine Foundation

G.1 Wind Turbine Foundation Background

There are four main types of wind turbine foundation widely utilized in the global offshore wind sector: (1) monopile, (2) tripod, (3) jacket, and (4) gravity based foundations. These are shown in Figure G-3.

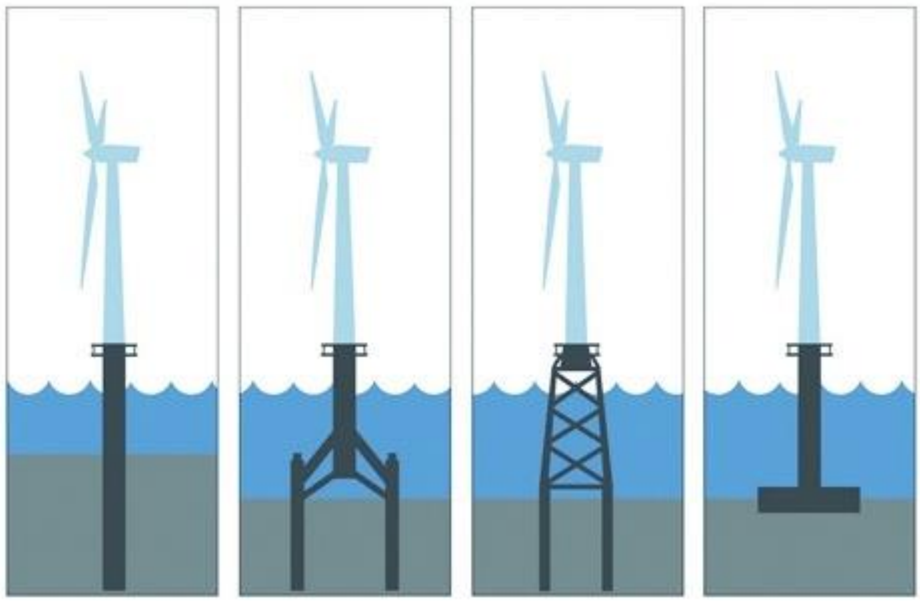

Figure G-3: Wind Turbine Foundation Types

Monopiles consist of a tubular steel pile topped by a transition piece, which is used to connect the foundation to the wind turbine tower and includes all secondary steel (boat landing and J-tubes). Monopiles are fabricated from steel and pile driven into the seabed using a hydraulic hammer operated from a jack-up vessel or other vessel. Due to the installation methodology, significant noise is produced and permitting conditions often require projects to monitor sound levels during installation and ensure that mitigation is in place to avoid distressing and impacting marine life during piling.

A tripod design is a welded steel structure which typically comprises of a central vertical column welded to three legs (also vertical columns). The feet of the tripod are pinned to the seabed using conventional piling techniques. Tripod foundations provide a larger base than monopiles which brings stability against overturning and allows for installation in deeper waters. These are stiffer which simplifies the design for natural frequencies in deeper water. However, due to the joints being more complex than jacket foundations, this has caused manufacturing delays during serial ramp-up production. Tripod foundations pose challenges in transportation due to the increased weight and footprint.

Jacket foundations which originate in the oil and gas (O&G) industry, comprise a frame structure with piles driven through the pile sleeves at the base of the structure. The wide base of jacket foundations does offer stability during installation and resistance to overturning. Since there are numerous welded joints, the fabrication of the structure is usually labour intensive, and time consuming and manufacturing schedule assumptions require careful consideration. Transportation is more difficult than monopiles and hence more expensive. Generally, jacket foundations are preferred options for water depths of 40 to 60 m.

Lastly, gravity based foundations or structures rely on a low centre of gravity combined with a large base to resist overturning. A typical conical GBF is presented in Figure G-4.

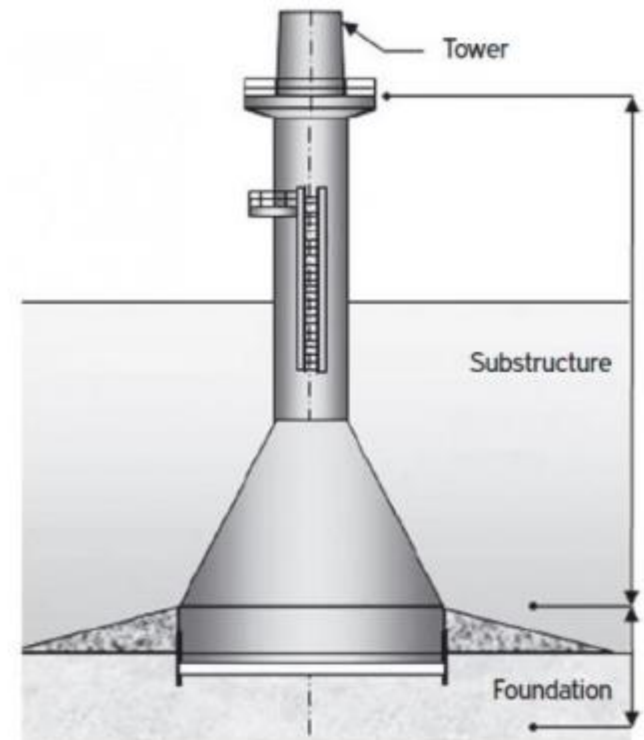

Figure G-4: Typical GBS Foundation[37]

The main advantage of GBF is ease of installation as the structure does not require pilling (unlike monopiles, jackets, and tripods) and as a consequence the noise levels during installation are generally low. GBFs are used under certain ground conditions. GBFs are fabricated onshore and due to their self-buoyant nature could be transported by tugboats, thus simplifying installation.

Table G-3 provides a summary comparison of the conventional foundation types.

Table G-3: Comparison of Conventional Foundations

	Monopiles	Tripods	Jackets	GBF

[37] Source: Biegaj J., Mielniczuk K., Stryjecki M., Guide..., Warszawa, 2011

Water depth	~ 40 m maximum	~ 50 m maximum	~ 60 m maximum	~ 60 m maximum
Order of pricing	Lower (simple structure but dependent on steel prices).	Highest (multiple legs require more labour and no saving due to steel amounts).	Moderate (lattice requires many labour-intensive welds, but less steel is required).	Lower (concrete cast structure).
Manufacturing complexity	Low (large steel tubular structure is reasonable with proper facilities).	Medium (large steel structure with numerous welds. Extent of some individual welds introduces extra complexity).	Large (large steel lattice structure with numerous welds introduces extra complexity).	Medium but labour intensive (concrete cast structure, hard to move due to size and mass).
Installation complexity	High (high energy piling required).	High (only three standard piles required for every foundation, but structure is difficult to transport).	High (standard piles required but structure is difficult to transport).	Medium for lifted solutions (careful ground preparation required).
Usage	Standard solution across Europe	Deployed in several projects	Popular in O&G, deployed in deeper waters	Historically used, potential in US northeast market
Structural strength	Good	Better	Best	Better
Corrosion resistance	Medium (TP joint often sealed).	Good (learning from offshore O&G).	Good (learning from offshore O&G).	Best (coating consists of concrete, no exposed steel).
Ground condition limitations	Suitable for sites without large boulder obstructions or rock head. Difficult but possible use in softer rocks.	Suitable for sites without large boulder obstructions or rock head. Difficult but possible use in softer rocks.	Suitable for sites without large boulder obstructions or rock head. Difficult but possible use in softer rocks.	Sensitive to soil conditions, hard to achieve verticality but appropriate solution when piling is prohibitive.
Installation noise	High (high energy piling).	Medium (low energy piling).	Medium (low energy piling).	Low (no piling, only dredging).

G.2 Foundation Type Selection

The selection of an appropriate foundation for an offshore project is a process driven by a host of factors including metocean environment, water depth, wind turbine selection, geologic site conditions and supply chain.

In 2013, Wood (previously SgurrEnergy) was engaged by Windstream to conduct a foundation parametric study for the Project. This study analyzed the available information on site conditions in the area, supply chain and likely fabrication and installation methods and compared this information with our database of European offshore projects.

SgurrEnergy (2014) considered foundation concepts: steel monopile, concrete monopile, gravity base, jacket, and tripod foundations. These concepts were analyzed in terms of geotechnical conditions, lakebed bathymetry, ice effects, noise and vibration, transportation and installation and previous experience in similar conditions, mainly in the Baltic Sea, with the following outcomes:

- The drilled steel and drilled concrete monopile are feasible options for all foundation locations, however they are expected to require extensive drilling operations and heavy lift vessels support for installation.
- The jacket type foundation is a feasible option in water depths of over 15m. Jacket installation will require piling and associated drilling operations to support their installation. Jacket structures experience the highest ice loading of any foundation type. Jacket foundations also require heavy lift vessel support for installation.
- The tripod foundation is not considered a realistic option for the Project because of the geotechnical conditions, potential design issues and fabrication costs.
- The gravity base foundation is considered the most likely solution for the Project.
- This is based on several factors, including the avoidance of drilling operations the site geological make up, availability of raw materials and the avoidance of heavy lift vessels if a floating or semi-floating foundation design is employed.

Previously, SgurrEnergy provided the required information to allow Windstream to select gravity based foundations as the most appropriate foundation design for the Project. This decision was based on the following factors:

- Site investigations indicate that bedrock is in close proximity to the lake bottom.
- Readily available raw materials and supply chain to support construction.
- Avoidance of extensive lake-bed drilling and associated reduction of construction risk.
- Reduced requirements for specialized construction vessels to support foundation installation.

Following the parametric study, COWI and Weeks Marine were selected and engaged to develop a project specific foundation design and installation strategy. Both companies are well respected in their field and bring years of experience in the design and installation of coastal and offshore structures.

The following sections provide a more detailed description of the gravity foundation selection process, and the foundation design.

Wood notes that nothing has changed in terms of wind turbine foundation design selection, and no updates are required from SgurrEnergy's NAFTA1 Report.

G.3 Gravity Based Foundation

In general, gravity based foundations rely on a low center of gravity combined with a large base to resist overturning. The main advantages are that they do not require piling or the use of big bubble curtains unlike monopiles, jackets or tripods, as noise levels are generally low. Bubble curtains are used underwater to minimize the noise impact from underwater activities such as piling.

In general, key drivers for the evolution of foundations and use of gravity base foundations are:

- Ambition of lowering Capex for offshore wind farms.
- Lowering of levelized cost of energy of offshore wind farms.
- Industry maturity.
- Increase in wind turbine size.
- Increase in water depth.
- Increase in distance from shore.
- Permitting constraints / requirements.

Gravity base structures have proven to be an effective solution for large structures on projects throughout the world and are commonly employed in areas where significant icing is a consideration. Gravity structures have been employed on offshore wind farms in Sweden, Belgium, and Denmark and in support of oil and gas projects worldwide including the Hibernia platform off the Newfoundland coast.

Concrete fabrication techniques for large concrete structures are well understood and have been successfully employed to construct gravity structures. Foundations are typically constructed using a typical slip forming methodology, a pre-cast and post tensioning methodology or some combination of the two.

A significant component of the engineering effort expended on gravity base structures is related to their size and weight. Typical of most large offshore construction projects, the installation requirements and fabrication methodology inform the design process from the earliest stages of development and design. Gravity structure installation techniques are driven by quantity, size, cost, and availability of appropriate equipment, while the fabrication methodology is governed by the site, construction techniques and facility logistics.

Gravity foundations for offshore wind projects have typically been constructed at a land level facility or on a barge. The foundations are then transported to the site via the heavy lift vessel or barge and lowered into position with a heavy lift vessel. Larger gravity structures like those employed in support of offshore oil and gas projects are often constructed in a floodable basin or large dry-dock. When the foundation is completed. the basin is flooded or dry-dock lowered and the foundation is floated to site where it is ballasted into position.

Floating and semi floating foundation designs are becoming more prevalent as they avoid the cost and limitations associated with large installation vessels and permit the construction of larger structures.

G.4 Design Process

COWI employed a typical developmental design process that incorporated its design experience with site specific studies to develop a site-specific foundation. Relevant site investigations that informed the design includes the site geophysical surveys, bathymetric surveys, ice studies, and metocean studies.

Gravity foundations employ a mix of their own weight and supplemental ballast to provide the solid foundation required for offshore structures. The foundations are named and differentiated by their respective designs and installation processes. The three major types of gravity foundations are depicted in Figure G-5 with the solid cone type on the left, a fully floating style in the middle, and the semi-floating on the right.

Figure G-5: GBF Designs

COWI and Weeks Marine reviewed the potential gravity foundation types and their associated installation methodologies and determined that the semi floating gravity foundation was the most appropriate foundation for the site. Foundation installation methodology was the primary driver in the selection of the foundation design and the design of the fabrication facility.

G.5 Project Foundation Design

The semi-floating foundation was initially designed to accommodate a 2.3 to 4.0MW wind turbine with a 100 to 113m diameter rotor and a water depth of 25m. The foundation has a maximum base diameter of 22m and an overall height of 35.5m. This design requires approximately 1450m^3 of concrete and 319t of reinforcing steel per foundation.

The design utilizes an inverted conical ring at the waterline to reduce ice loading. The conical ring is a common design feature that is installed on the majority of gravity based offshore wind foundations. The cone is employed to counteract the effects of a moving ice sheet by breaking it and forcing it downward. The ice cone is positioned such that it is centered at the water line with 2m of cone located above and below the waterline. The foundation as designed is depicted in Figure G-6.

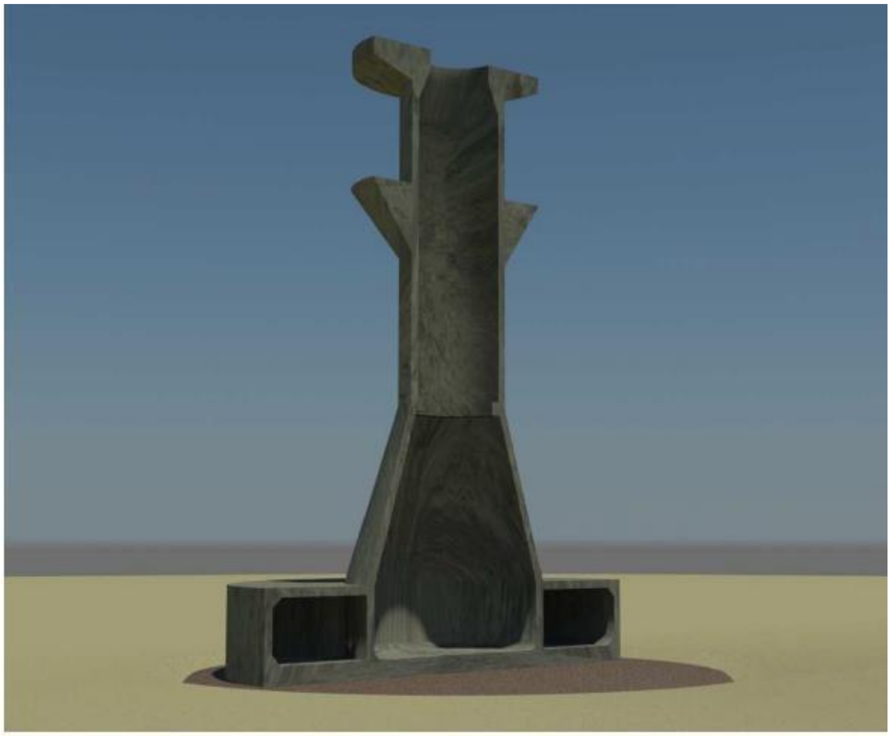

Figure G-6: Cross Section of Semi-Floating Gravity Base Foundation

Typical of offshore wind foundations, the foundation requires an access system with a boat landing, ladders, and service platforms. In addition, the foundation is designed to accommodate array cables and other platform equipment. For clarity, details of cable routing, equipment placement, service platforms and access systems were not considered in this phase of the design.

Based on COWI's 2021 study, the semi floating gravity based foundation design was selected for the Project based on site conditions, ready supply of raw materials, and supply chain experienced construction involving concrete. Furthermore, this type of foundation is well suited for installation at the Project, since the materials and technology are readily available, design is suited to the water depth at the project site, geotechnical conditions, and ice found on Lake Ontario. It is worth noting that similar designs are being studied or are in the process of being developed at other locations within the Great Lakes.

COWI's semi floating foundation design employs a supplemental floatation barge system for transportation and installation of the foundation. Employing a supplemental floatation system reduces the size of the foundation floatation chambers (when compared to a fully floating solution) thereby reducing the size of the foundation. The project foundation with the supplemental buoyancy barge installed is shown in Figure G-7.

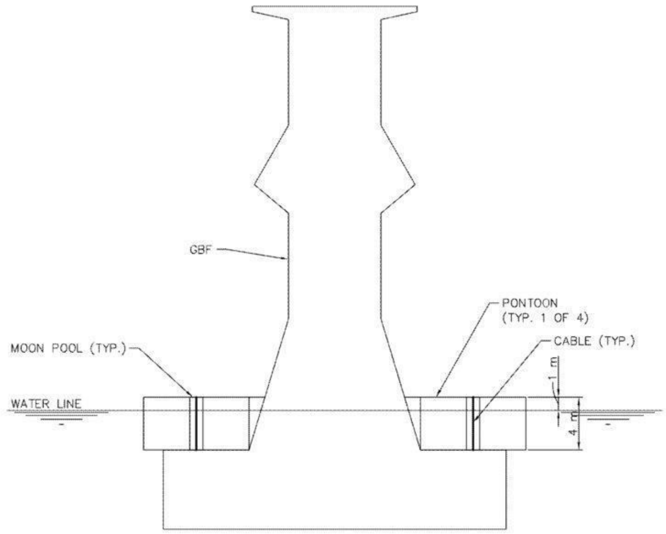

Figure G-7: Gravity Foundation with Supplemental Flotation System installed

When the foundation is installed in its final position on site the hollow chambers of the foundation are filled with sand to achieve the design weight. Higher density sands can impact the level of sand fill required. A cross section of a fully ballasted foundation is shown in Figure G-8.

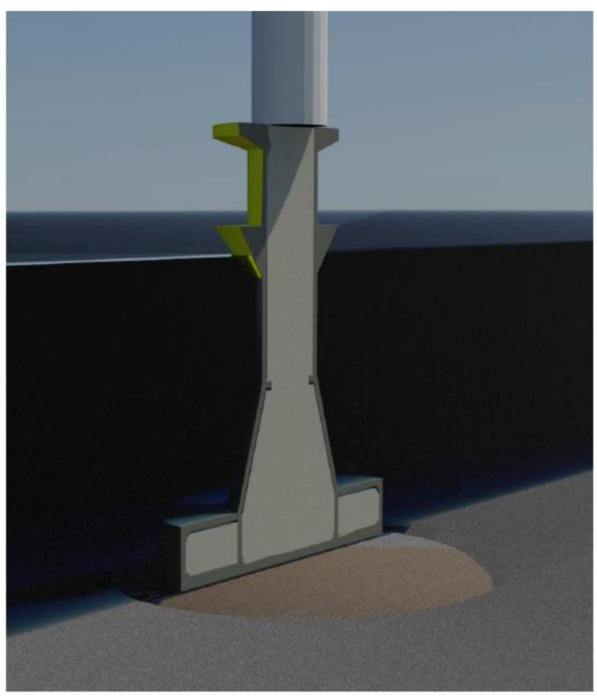

Figure G-8: Installed Semi Floating GBF

In its updated report, COWI notes that the main update is in relation to the selection of the SG 4.5-145 wind turbines, and the impacts of foundation selection and load were assessed.

COWI notes that the overall foundation structure in 2021 will essentially be similar to previous foundations. This means that the wind turbine design does not require change to the overall approach to foundation design.

Details of the updates to the foundation are described in the updated report by COWI (2021-GBF) report.

G.6 Foundation Fabrication Facility

Windstream had identified numerous potential fabrication facility sites on Lake Ontario. The fabrication sites were reviewed to determine if they had the required fabrication space, water depth, and access to construction materials to support project requirements. The effort indicated that several potential fabrication sites were available and suitable to support project activities. This is considered a significant benefit to the Project as the execution of the project is not contingent on a specific location for fabrication of the foundations.

The requirements of the foundation fabrication and staging facility were identified by COWI; the facility parameters include:

- Direct lake access.
- Proximity to aggregate and concrete supplies.
- 15 hectares for upland fabrication and staging area.
- 100 tonnes per square meter concrete skidding rail line bearing capacity.
- 8.2m navigable water depth with 13.2m depth below elevator platform.
- 40m air draft above the ground surface.

There are several existing facilities on Lake Ontario that meet all of the facility requirements. Windstream considered these port and industrial facilities and selected land adjacent to the St. Mary's cement facility in Bowmanville, Ontario as the representative fabrication yard location. The selection of the St Mary's cement facility was based on several factors including, existing infrastructure, proximity to a cement facility, access to deep water, and proximity to the project site. The Bowmanville site is depicted in Figure G-9 with a proposed facility layout superimposed.

Figure G-9: St Mary's Cement Facility Bowmanville, Ontario

The facility design was developed to allow its use for construction of foundations capable of supporting a range of wind turbines. The COWI fabrication facility design capitalizes on existing facilities and resources and incorporates the installation strategy in the design of the fabrication facility. The fabrication facility is designed to support the serial construction and launch of the foundations. To accomplish this facility employs two major systems, a series of concrete building ways or rails and the foundation elevator platform.

The concrete rails provide a level surface of the required bearing capacity and are arranged in a grid pattern to facilitate the movement of the foundations through the facility. The foundation elevator is used to lower the foundation from the land level fabrication facility into the water.

The fabrication facility design allows the foundations to be completed in a staged or serial approach. As the foundations complete a specific construction stage, they are moved on the concrete rails to the next construction station. This serial construction approach allows for the optimization of processes, equipment, and services to support specific construction stages. Once a foundation is complete it is moved to its storage location until it is required on site.

The serial construction process permits year-round foundation fabrication providing the required quantity of foundations to support the project installation cycle. Figure G-10 illustrates the sequential foundation construction process employed in support of a European offshore wind project.

Figure G-10: Gravity Foundation Production Facility

When the foundations are complete and ready for installation, they are lowered into the water on an elevator platform. Large elevator platforms are used throughout the world to move ships and large fabrications to and from the water. Elevator platforms are often used in place of a dry-dock. Elevator platforms can be more easily configured to support specific project requirements and can be delivered to a project site at a component level.

The Rolls Royce Naval Marine Inc. (RRNMI) Syncrolift is an example of an elevator platform. An example of a syncrolift employed in support of a civil construction project is provided in Figure G-11.

Figure G-11: Syncrolift Launching Concrete Caisson (Photo courtesy of RRNMI)

A proposed facility layout with fabrication rails and foundation elevator lift is shown in Figure G-12. The diagram provides an overview of the serial foundation fabrication process and depicts a foundation loaded on the elevator platform ready for launch.

Figure G-13 depicts the foundation in the lowered position ready for the installation of the supplemental floatation system.

Figure G-14 provides additional detail on the foundation elevator system.

Figure G-12: Fabrication Facility Layout with Foundation on Elevator

Figure G-13: Fabrication Facility with Foundation in Launch Position

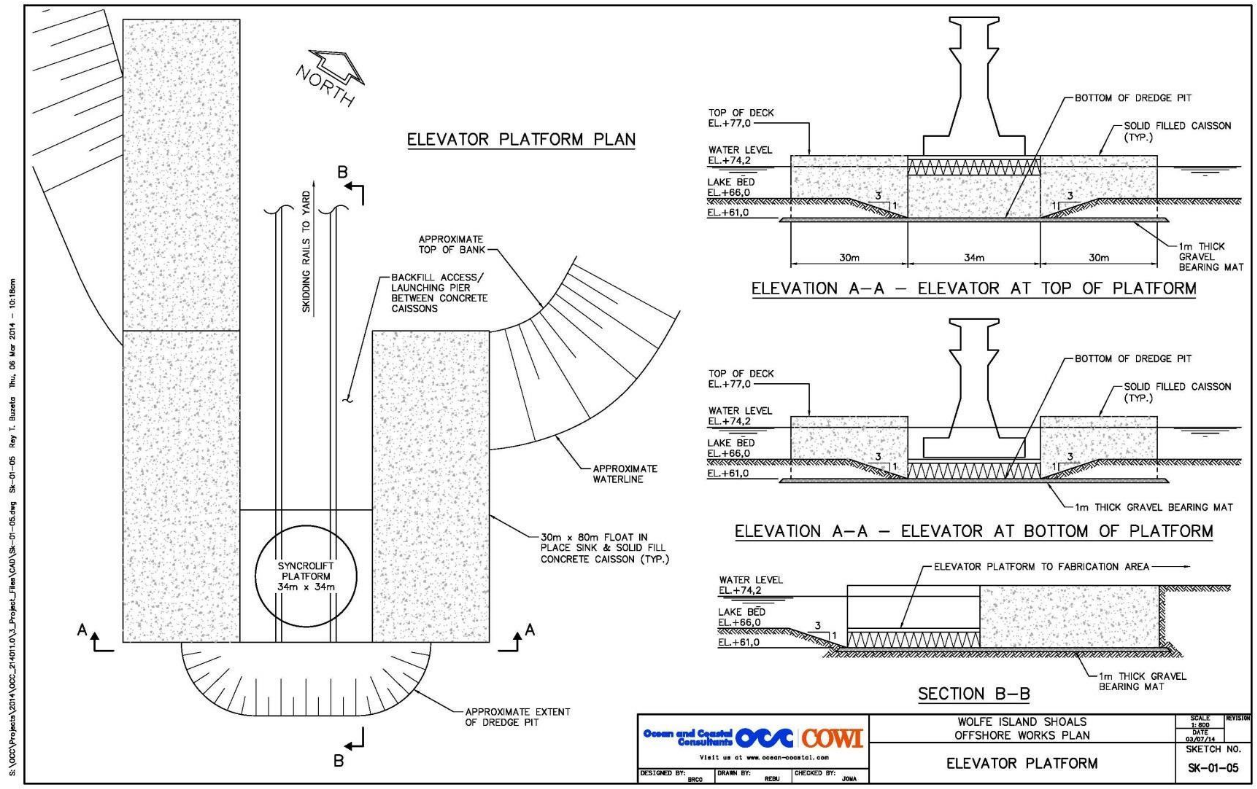

Figure G-14: Foundation Elevator Detail

In Wood's opinion, the foundation fabrication and launch strategy is realistic and is well suited to the Project. This proposed construction and launch methodology has been employed to support projects world-wide. The foundation launch methodology was included in the US Department of Energy report, Freshwater Wind I, Shallow Water Offshore Wind Optimization for the Great Lakes.

G.7 Foundation Installation

The transport and installation of foundations for any offshore project is a significant cost and schedule consideration. A general rule of thumb is that all efforts should be made to reduce offshore activities and vessel time required for installation at the offshore site. The ability to simplify and shorten the offshore process is an important factor in reducing project cost and risk by reducing vessel spread on hire durations and exposure to weather delays.

These fundamental assumptions were employed by COWI and Weeks Marine in their development of the Project installation strategy. A detailed means and method statement was developed leading up to SgurrEnergy's NAFTA1 report and updated in 2021 to support the transport and installation of the semi floating gravity foundation design for the Project. Weeks Marine prepared and updated its previous report as needed, which was based on a detailed review of the Project from a technical and scheduling perspective.

The Weeks Marine (2021)[38] report considers recent information and experience and confirms the feasibility of the Project including the selected wind turbine model, namely the SG 4.5 MW – 145. The report confirms the constructability of the Project.

The report sets out to explain the offshore installation contractor's (OIC) means and methods for installation of the GBFs and wind turbine erection.

The GBFs will be fabricated at the yard and skidded on concrete rails using hydraulic jacks, then loaded into an elevator platform which will lower the GBF into the water to transport it to the site.

The means and method statement previously evaluated all major phases of the foundation installation process and includes the following topics:

- Site Preparation.
- Foundation transport.
- Foundation installation.
- Ballasting.
- Installation of scour protection.

The means and method statement assumed that the foundations would be fabricated, launched and transported to the Project site from the St. Mary's cement facility in Bowmanville, Ontario. The installation methodologies planned for the Project are discussed in the following sections. Additional detail can be found in the Weeks Marine Installation Means and Methods Report[39].

G.8 Foundation Site Preparation

Most offshore foundations require some preparation of the seabed or lakebed to provide a level surface for foundation installation and to remove obstructions. Site preparation activities consist of excavating/dredging of loose or weak soils until sub grade is reached, that meets the required foundation loading requirements. Weeks indicates that the overburden will be removed at each foundation location using a mechanical dredge methodology, followed by stone bedding over the GBF footprint.

The site is then prepared and levelled by installing a layer of bedding material. The bedding material, typically stone, fills in the natural variations in the sub grade to provide a consistent and level surface to support the foundation.

Geophysical surveys of the Project site indicate that the lake bottom at site consists primarily of a shallow bedrock layer overlain on average by 1-2m of overburden and sediment. The observed site conditions are

[38] CER-Weeks-2 *Weeks Marine - Wolfe Island Shoals Gravity Based Foundation and Wind Turbine Generator Installation Means and Methods*

[39] CER-SgurrEnergy Weeks Marine Report – Wolfe Island Shoals Gravity Based Foundation and Wind Turbine Generator Installation, Offshore Installation Means and Methods, March 2014

consistent with those documented in the surrounding area. COWI notes that the bedrock may be exposed on the lakebed or may be overlaid with surficial sediments of varying thickness.

Based on the site data, Weeks Marine assumed that approximately on average 1-2m of overburden removal would be dredged from each foundation site to expose the underlying bedrock. Upon completion of dredging activities, the site is prepared and levelled with an approximately 1 m layer of bedding stone.

The Weeks Marine plan employs the floating derrick Weeks 571 or similar vessel, to support both dredging and bedding stone placement activities. The derrick is equipped with a clam shell bucket and is supported by a series of barges to store and transport both dredge spoils and bedding stone.

The recent means and methods report indicates that Weeks would undertake a pre-dredging hydrographic survey to form the baseline for the dredging work.

Tugboats will be deployed to transport and locate the W571 or similar vessel at each GBF location. Then, the dredge will be moored via an anchor system.

When dredging the derrick removes material from the lake bottom using the boom mounted GPS and other integrated survey equipment (control digging location / elevation) and deposits it into a waiting empty hopper barge. When the hopper barge is filled, it is moved to the designated dredge spoil storage or disposal location where the barge is unloaded. Utilizing two such hopper barges could be used to maximize the dredge efficiency. Dredge material of good structural quality may be employed to support site construction activities, or as ballast material for the GBF, while material that is of low structural value may be deposited at a designated dump site. The dredge depth and positioning of the derrick are monitored continuously throughout the dredging operation through a combination of onboard sensors and in water surveys.

The foundation bedding material installation process can begin after the dredging operation is complete. An inspection of the excavated area is performed as required to verify the site is properly prepared.

The stone bedding can be provided from local quarries transported to site using barges. These barges will be fitted with concrete wear decks and bin walls.

Several barges will be used to ensure sufficient bedding stone to allow continuous material placement. Hence, the rotation of the barges is critical in maximizing the placement efficiency.

The bedding material installation process is very similar to the dredging process and is planned to utilize the same or similar equipment. A derrick barge will place the bedding material at the site and level the material. Bedding material is supplied from a material barge moored alongside the derrick barge. The placement and levelling of the bedding material is controlled by the derricks onboard positioning system and verified by survey.   Weeks Marine has assumed that the bedding materials will be approximately 1 m deep.

Upon completion of the foundation site preparation scope, the foundations can be transported and installed at site. Weeks has proposed derrick barge Weeks 571 or similar equipment to support the dredging and bedding material installation scopes the barge is shown in Figure G-15. The arrangement of the derrick and a supporting material barge is depicted in Figure G-16.

Figure G-15: Weeks 571 Barge for Dredging and Bedding Stone Placement

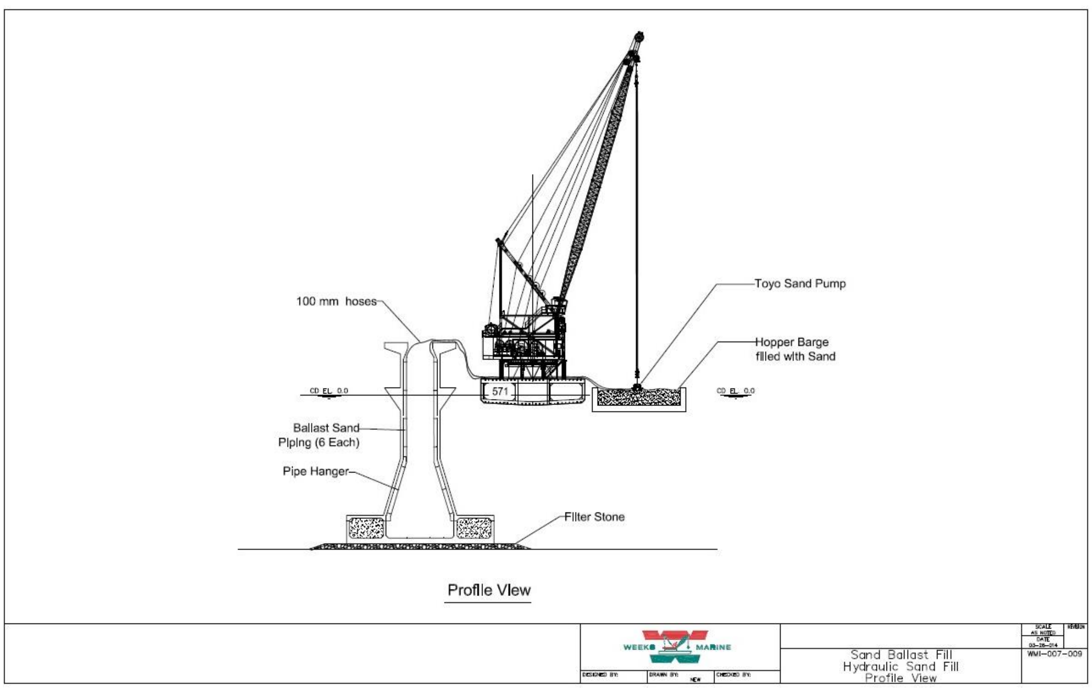

Figure G-16: Derrick Barge with Material Barge alongside

Once the dredging works are completed, a post dredge hydrographic survey will be undertaken, which will determine the amount of stone bedding required.

Hydrographic surveys will be performed and documented to make sure that the bedding stone is in line with the foundation specifications. Should holes or mounds be found during the survey, the material handling barge can return to the location with additional stone to fill such holes. For mounds, the grading process will be repeated to remove these. Again, further hydrographic surveys will be performed as needed to ensure requirements are met. Once the survey results are completed and approved, the locations are ready for GBF installation.

G.9 Foundation Transit and Installation

Mobilization of the floating equipment (derrick cranes, barges, tugboats) will take place from a US east coast port up the Saint Lawrence River and into Lake Ontario, then to the staging area at the St Mary's cement facility. Furthermore, specialized supplemental floatation barges and heavy lift devices will need to be fabricated and Weeks has provided conceptualized plans. Weeks Marine also indicates that the OIC has plenty of opportunities to utilize local and nearby resources for dredging, barge rental, tugboat leasing, steel fabrication, ballasting materials, and scour protection materials.

The GBFs are lowered via the Syncrolift / elevator platform where they are prepared for towing.

The foundations are to be transported from the fabrication yard to the site with a supplementary flotation system, which carries the foundation from the fabrication facility and installs it at the wind farm site. SFB will be utilized for the added floatation needed for the GBF transportation. Each SFB will be assembled from four specialized modular barges and contain 2.5 m diameter moon pools to allow the GBF lowering mechanism[40]. Once the four barges are aligned properly, they are interlocked via flange and pin system. The updated means and methods report indicates that the SFBs will be towed to the Bowmanville pre-cast yard via tugboats from the fabrication location.

The supplementary floatation system consists of a system of barges designed and fitted with the equipment required to lift the foundation from the fabrication facility elevator platform, transport the foundation and install it at the site. A foundation in transit mode with the supplemental flotation installed is shown in Figure G-17 and Figure G-18.

[40] CER-Weeks-2 *Wolfe Island Shoals Gravity Based Foundation and Wind Turbine Generator Installation Means and Methods*

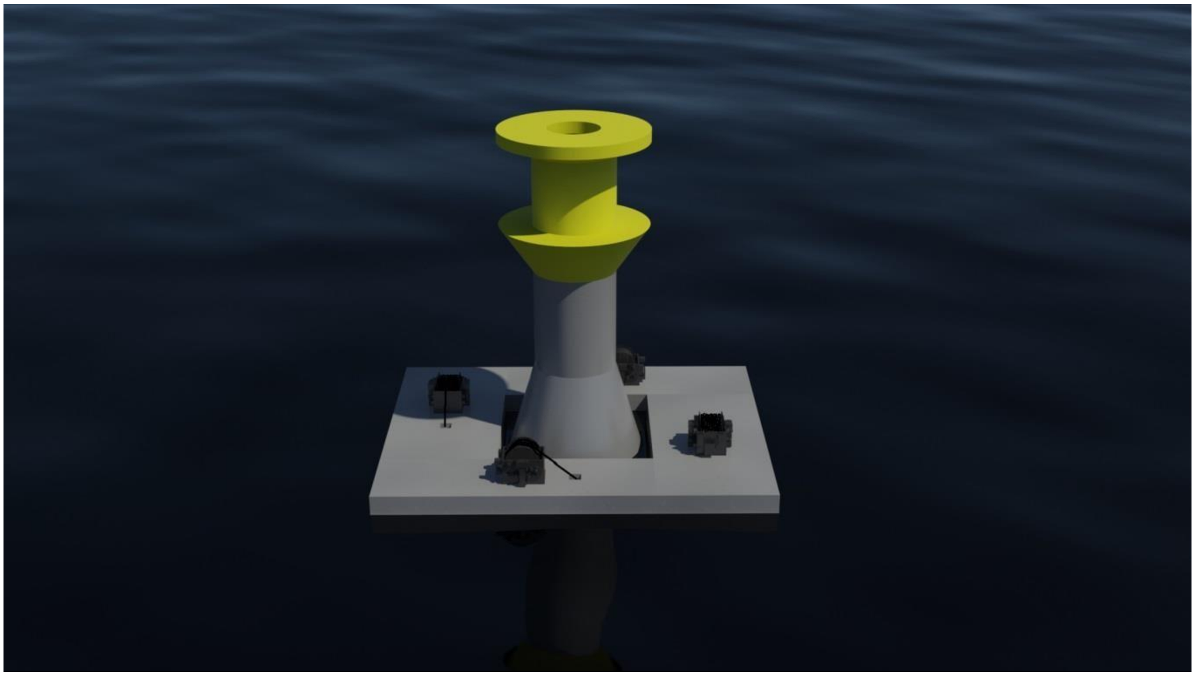

Figure G-17: Semi Floating Gravity Foundation with Supplemental Floatation

Jacking frames are to be designed and fabricated using wide flange beams, stiffener plates and pipe. Four frames will be needed, one for each of the jacking locations. The lower member or base of the jacking frame will consist of a steel plate girder that will sit on the barge. The top member, also a steel plate girder, will serve as the jacking member[41]. These jacking devices will be fabricated and delivered to the Bowmanville pre-cast yard, which will be assembled on the SFB barges.

The lower jacking frame is installed over the moon pools, ready for the tie rod attachment. Once the lower jacking frame is positioned the eight 1500-ton jacks are placed on the lower jacking frame[42]. Two jacks are installed per frame, followed by the top jacking frame and tie rods.

Following the proper positioning of the jacking equipment, 24 high strength rods are lowered through the top and lower jacking frame, moon pool, and connected to the load transfer plate with washers and nuts. The high strength rods will be attached to a gusseted plate which will be lowered through the moon pool and under the barge, attached to the GBF using a hydraulic pin release mechanism. The SFB barge will be secured to the GBF with mooring lines to limit movement during jacking operations.

Power packs provide power to the eight 1500-ton jacks to control the synchronization and raising / lowering. Load balancing is done by the system.

[41] See footnote 40

[42] See footnote 40

The GBF will be towed to site with no ballast to minimize the weight of the tow.

The supplemental floatation system is designed to have an end section of the barge removed. This allows the system to be installed and removed from the foundation at the fabrication facility and upon foundation installation.

The foundation lifting system consists of a series of jacks that are connected to the foundation with a series of steel rods/strands. The lifting system is connected to the foundation lifting points and passed through the barges and into the jacks.

To remove the foundation from the elevator, the flotation system is installed, and the jacking system connected. The jacking system is actuated, and the foundation is lifted into position below the floatation barges. This process lifts the foundation approximately one meter and locks the foundation and floatation barges together into a single unit. The foundation and floatation system are then removed from the elevator and towed to the project site.

Figure G-18 shows the lifting system in two modes the lowering/lifting mode is depicted in "Barge & Lift Device". The transit mode is shown in "GBF & Barge in Tow Configuration".

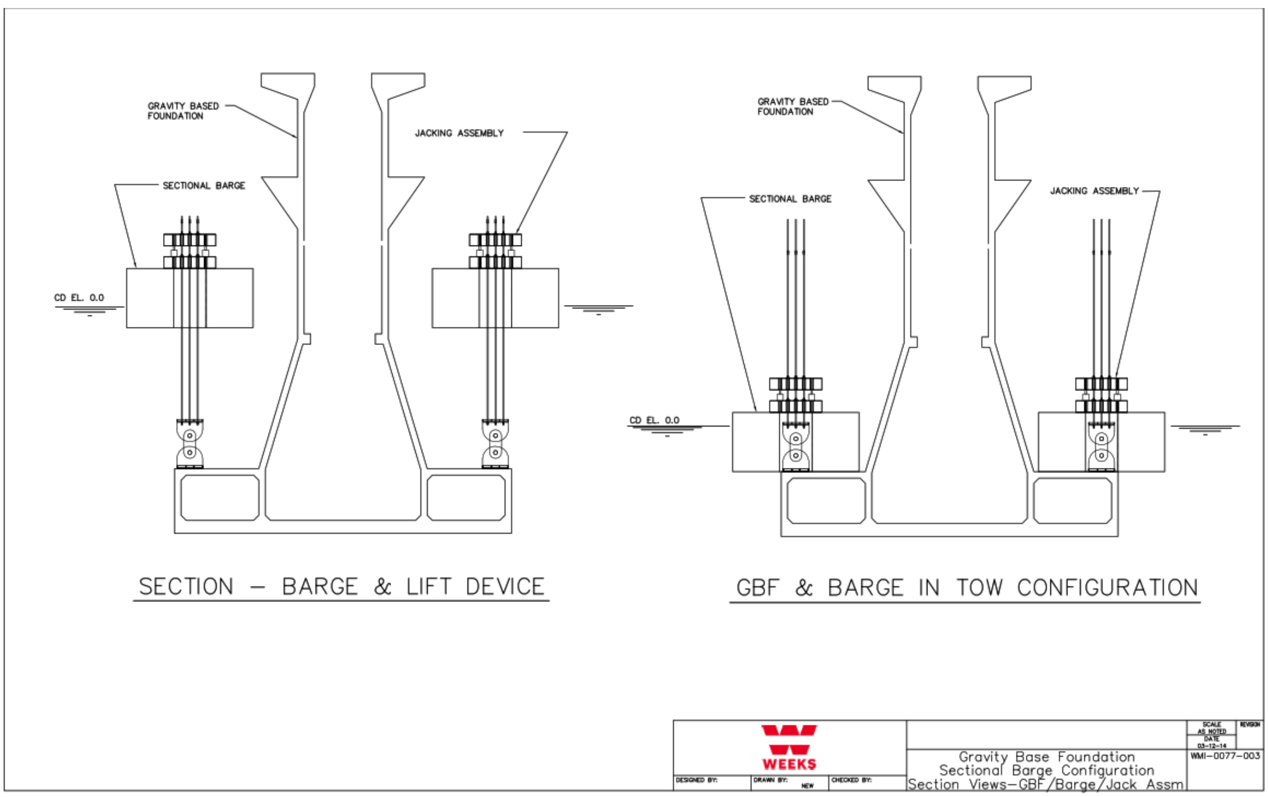

Figure G-18: Gravity Foundation with Supplemental Floatation System

At the project site the foundation is delivered to its prescribed location. The installation process is a tightly controlled process that combines the addition of water ballast, operation of the lifting/lowering equipment and verification of installation position.

As the foundation is submerged it becomes more buoyant generating an upward force that tends to float the foundation back to the surface. To counteract this effect, water ballast is added to the foundation to overcome the increased buoyancy. Water ballast is continually added to the foundation throughout the lowering and final positioning activities.

Once the foundation is in position on the lake bottom, its position and orientation are verified, and additional water ballast is added to ensure the foundation remains in position until the permanent foundation ballast is installed.

Upon confirmation of the installation position the supplementary floatation barge removal process commences with the removal of the foundation lifting system. The lifting system is disconnected from the foundation via a remote release system and the lifting rod/strands are recovered. The appropriate barge is removed from the supplementary flotation and the entire system is removed from the foundation. The supplementary flotation is then towed back to the fabrication yard to commence the installation process again.

No changes in this area were required and therefore there are no updates to the SgurrEnergy NAFTA1 Report.

G.10 Foundation Ballast Installation and Scour Protection

The final steps in the foundation installation process include the installation of permanent ballast and scour protection. Permanent ballast installation provides the additional mass required for the foundation to maintain position and develop its full overturning moment resistance. Scour protection is installed to counteract the potential undermining of the foundation due to the combined effects of strong currents and wave action.

Foundation Ballast Installation

Once the GBF is set and its location verified, the ballasting operation can commence.

The installation of the permanent sand ballast is a multistage process, which utilizes a hopper barge, and ballast installation barge. The initial phase involves the installation of a sand-slurry into the lower chambers of the gravity foundation. The sand slurry is pumped from a material barge via a series of hoses to a piping system installed on the foundation. The piping system delivers the sand-slurry into the ballast chambers per an established sequence and displaces water installed during the installation process. This process is illustrated in Figure G-19.

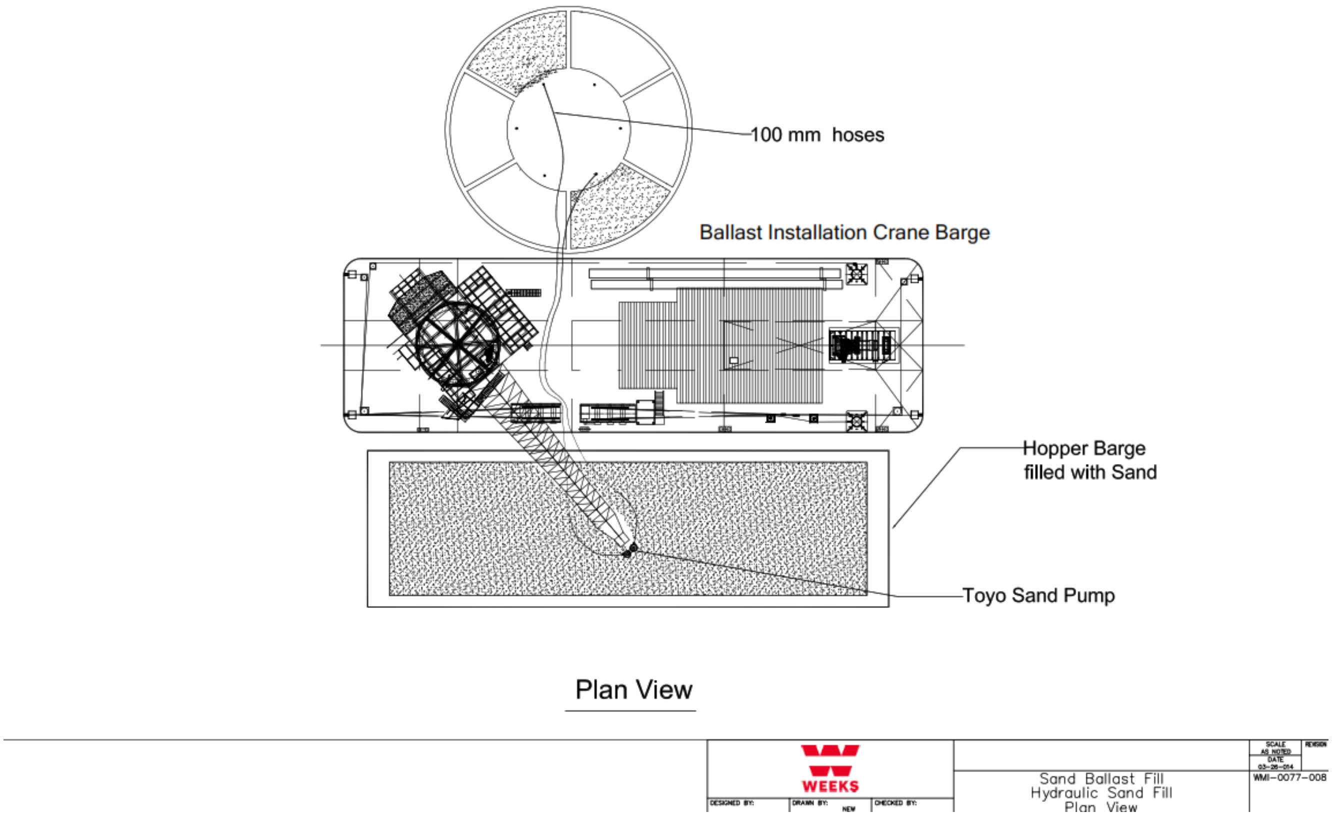

Figure G-19: Ballast Installation

The Toyo dredge pump is to be lowered and suspended into the hopper barge which is loaded with sand. Sand will be pumped through flexible pipelines into the GBF ballast cells. To prevent overloading the GBF on any one side, opposing tanks will be filled at the same time.

After the lower chambers of the foundation are filled the ballasting operation shifts to filling the central column. The central column ballasting procedure is accomplished by a derrick barge which picks sand from a material barge and places it in the central column. This process displaces the temporary water ballast (if any) that was installed during installation. The process is illustrated in Figure G-20.

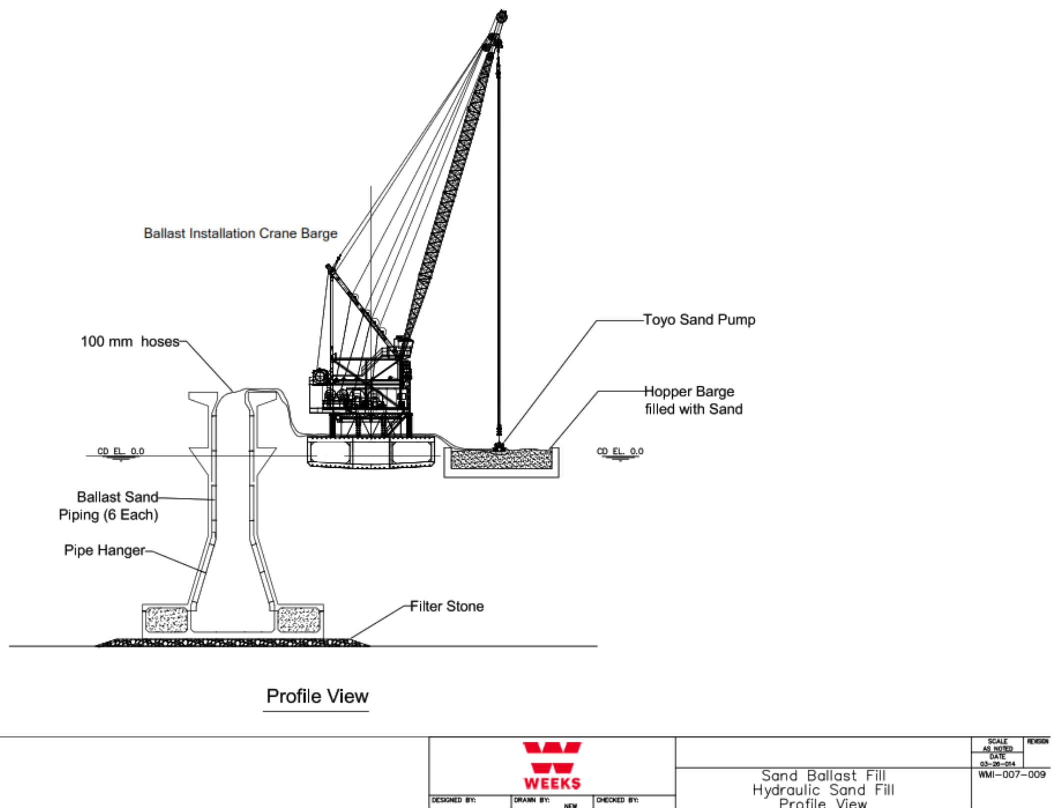

Figure G-20: Ballasting of Gravity Foundation Central Column

Foundation Scour Protection

Scour protection is often required for offshore projects to prevent the undermining of the foundation by the effects of waves and currents. The level of scour protection required at each foundation is determined from a variety of factors including geologic conditions, water depth, currents, and wave action. In general, more scour protection is required in shallower water and at sites with strong currents and wave action. Preliminary observations from site survey reports indicate that lake bottom at the site is relatively static without the bathymetric variation witnessed at many ocean-based offshore sites.

For the Project, Weeks Marine indicates that scour protection will be installed at the base of the GBF from the top of the ballast cell to the perimeter limits as defined by the foundation designer (typically done in the detailed design phase).

The material handling barge, either the Weeks 571 or similar, will be anchored directly adjacent to the GBF, whilst a deck barge fitted with a rip rap (armor) stone will be moored to its side. The material handling crane will load the clamshell bucket and / or skip pan with stone from the material barge moored next to it. The derrick will swing the loaded bucket to the designated grid on the cranes Hypac positioning system. Then the bucket will be lowered and opened releasing the stone on the lakebed over the already placed stone bed and fitter stone, as depicted in Figure G-21.

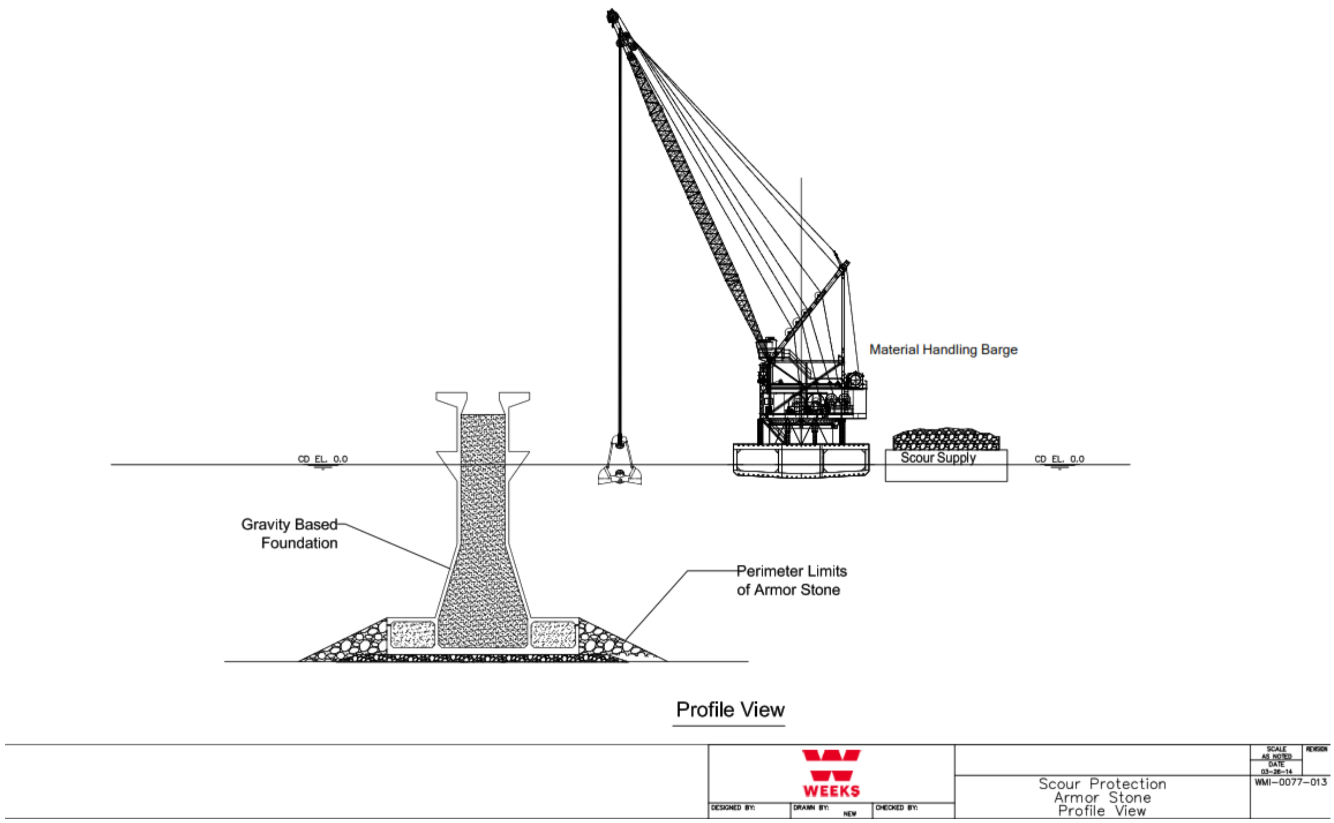

Figure G-21: Scour Protection Installation

After the scour protection placement is completed, the hydrographic survey of the GBF filter stone is conducted to ensure the filter stone is placed in line with the specifications.

G.11Foundation Summary

The semi floating gravity base foundation and supplemental floatation barge installation strategy proposed is reasonable and is believed to be the most appropriate foundation solution. It is understood by Wood that Windstream would perform the additional studies and site investigations required to support the foundation detailed design process at the appropriate stage in the development of the Project (if allowed to do so). The following observations have contributed to the selection of the viable foundation design and installation strategy:

- Metocean (wind, wave, ice, including extreme conditions) and geological conditions of the site support the selection of the gravity base foundation option. Additional data will help to refine the design and thus the cost estimates, but the existing data is sufficient to demonstrate that the selected foundation option is feasible.
- The foundation selection process employed provided the basis to develop more detailed foundation design. The studies completed by COWI (2021-GBF) and Weeks Marine (2021) are evidence of this. These studies illustrate the feasibility of the gravity base foundation for the Project.

- The installation process proposed is based on construction activities that are commonly employed in support of projects in both the salt and freshwater environments. Additional expertise is readily available from the established European market.
- Construction equipment to support foundation installation activities is readily available in the Great Lakes system.
- There are several potential foundation fabrication facility locations that could support the construction of the foundations.
- The major components in a gravity base foundation are concrete and stone, these can be readily supplied by the significant existing concrete and aggregate industry.
- Environmental considerations related to installation activities are well understood and have informed the design process. The current gravity based foundation design and installation strategy does require some dredging but has eliminated the need for piling and grouting operations.

Should the FiT contract have not been cancelled and the moratorium on offshore wind development removed, Windstream would have been able to execute the additional detailed geotechnical and metocean campaigns and advance to final foundation design.

Appendix H Wind Turbine Technology, Supply, and Installation

The wind turbine installation scope encompasses a broad spectrum of activities and requires coordination with the foundation and cable installation contractors. The installation scope of a wind turbine is well understood with physical installation typically supervised and conducted by the wind turbine supplier. The staging and logistics scope of the wind turbine installation scope varies significantly from project to project and influences the selection of installation vessels. Siemens developed detailed installation, transport, and storage procedures for its wind turbines to be employed throughout the Project in respect of NAFTA1 and which would typically be updated as part of the negotiation of a Turbine Supply Agreement. Selection and operation of the Project's wind turbine staging facility will be a joint effort between Windstream, the wind turbine supplier, the installation contractor, and the port facility operator.

H.1 Wind Turbine Technology

As previously discussed, the SG 4.5-145 wind turbine was chosen for the Project in 2021. Key technical specifications are presented in Table H-4.

Table H-4: Wind Turbine Technical Specifications[43]

Parameter	Details
Rated power	4.5 MW
Wind class	IEC II_B
Flexible power rating	4.2 – 4.8 MW
Control	Pitch and variable speed
Standard operating temperature	-20 degree to 35 degree
Diameter	145 m
Swept area	16,513 m^2
Rotational speed	10.77 rpm
Power density	254.35 W/m^2
Blade length	71 m
Blade material	Fiberglass reinforced epoxy resin
Height	Various
Generator	Doubly fed induction machine

H.2 Wind Turbine Delivery and Storage

Siemens Gamesa (SG) will be responsible for the delivery of the wind turbines to the Project staging facility as well as their care and custody prior to installation. SG will coordinate with the staging/port facility to manage the logistics associated with offloading and storing wind turbine components delivered from ocean going vessels, rail and truck transport as required. This will include the supply of appropriate cranes, yard transport equipment and supporting services.

It is expected that the majority of components will be delivered by ship, however depending on the manufacturing location of components some components such as tower sections or blades, may be delivered

[43] C-2151, SG 4.5-145 New SGRE turbine with the best-in-class LCoE >4 MW - siemens-gamesa-onshore-wind-turbine-sg-4-5-145-en.pdf (siemensgamesa.com) (May 2018)

by rail or trailer. The staging facility will support preassembly tasks and will be managed to effectively support the load out of the installation vessels.

There are several port facilities in close proximity to the project that can serve and have served as wind turbine staging facilities. These facilities handling wind turbine cargo include Ogdensburg NY, Hamilton ON, Toronto ON, and Oswego NY.

The port of Ogdensburg has successfully handled a large volume of wind turbine components. Ogdensburg served as the receiving and transshipment point for the Wolfe Island onshore Wind farm and has been assumed as the staging facility for the Project.

For the purposes of wind turbine installation, the wind turbine components will be transported to the Project site via feeder barges.

H.3 Wind Turbine Installation

The installation contractor is responsible for the supply of the wind turbine installation vessels and associated support equipment including barges, tugs, and crew transport vessels. The wind turbine supplier typically supplies the crew to complete the installation tasks with the vessel operator responsible for operating the vessel equipment including cranes.

The OIC works with the wind turbine supplier to clarify the vessel operating requirements including weather operational limits, crane capacities, installation crew accommodations, and sea fastening equipment.

In order to further develop the wind turbine installation plans for the Project, Windstream previously engaged Weeks Marine to develop a wind turbine installation means and method plan. Weeks Marine developed a detailed installation strategy to support the installation of the Project wind turbines that involves a jack-up installation vessel supplied by a series of feeder barges. The feeder vessel strategy has been employed in support of European projects and is a common strategy in marine construction projects. This strategy minimizes installation vessel transit time, allowing it to stay on site and maximize suitable installation weather windows. The means and methods report was updated in 2021 by Weeks Marine (*Weeks Marine - WIS Means and Methods - 20210517_Final (1)*).

Weeks Marine has assumed that its jack-up vessel the RD MacDonald (RDM) will be employed in support of the Project, which is a St Lawrence Seaway capable vessel, and suitable for Lake Ontario

The vessel was previously slated to conduct wind turbine installation work in support of the Cape Wind Project (defunct). The vessel is depicted in Figure H-22, in tow and in Figure H-23.

The first two sets of wind turbine components will be loaded onboard the RDM at the wind turbine staging port, using sea-fastening, which will be towed to the Project site. Once at site, the RDM will remain, while subsequent wind turbine components will be loaded out via feeder barges. This arrangement will maximize installation efficiency.

The crane for the RDM is a Manitowoc 750-ton main crane (4600 S4 Ringer) and is equipped with appropriate support equipment to conduct wind turbine installation operations.

The Weeks Marine proposal for project wind turbine installation is feasible as proposed and is similar to those they have employed in support of offshore construction projects throughout the Americas. The installation vessels employed in support of the wind turbine installation scope will ultimately be determined based on the project schedule and will likely employ additional vessels from the existing wind turbine installation fleet.

Once the RDM arrives at the site, one leg will be lowered to the lake floor, whilst tugs will orient the RDM, then the opposite leg will be lowered, after achieving the correct positioning. The tugs can help rotate the RDM, by pivoting on the lowered leg or 'walking' the RDM in the case the final position is not achieved.

The RDM legs will be preloaded using its weight to make sure sufficient bearing capacity is achieved prior to the jacking operation.

Figure H-22: Weeks Marine Jack-Up Vessel RD MacDonald (in tow)

Figure H-23: Weeks Marine Jack-Up Vessel RD MacDonald

As detailed in the updated means and method report, the wind turbine tower installation sequence is as follows:

- RDM ascends the lower tower section using internal ladders to attach rigging to top of lower tower section.
- Sea-fastening for lower tower section is released.
- RDM lifts the lower tower section and swings it in place over the GBF: personnel make the connection to the GBF and de-rig.
- RDM swings to top of the upper tower section, personnel attach rigging to top of top tower section.
- Sea-fastening is released.
- RDM crane lifts upper tower section and swings into place over top of the lower tower section.
- Final connection of tower sections is made by Weeks Marine personnel.

The drawings in Figure H-24 illustrates the installation sequence for the wind turbine tower sections.

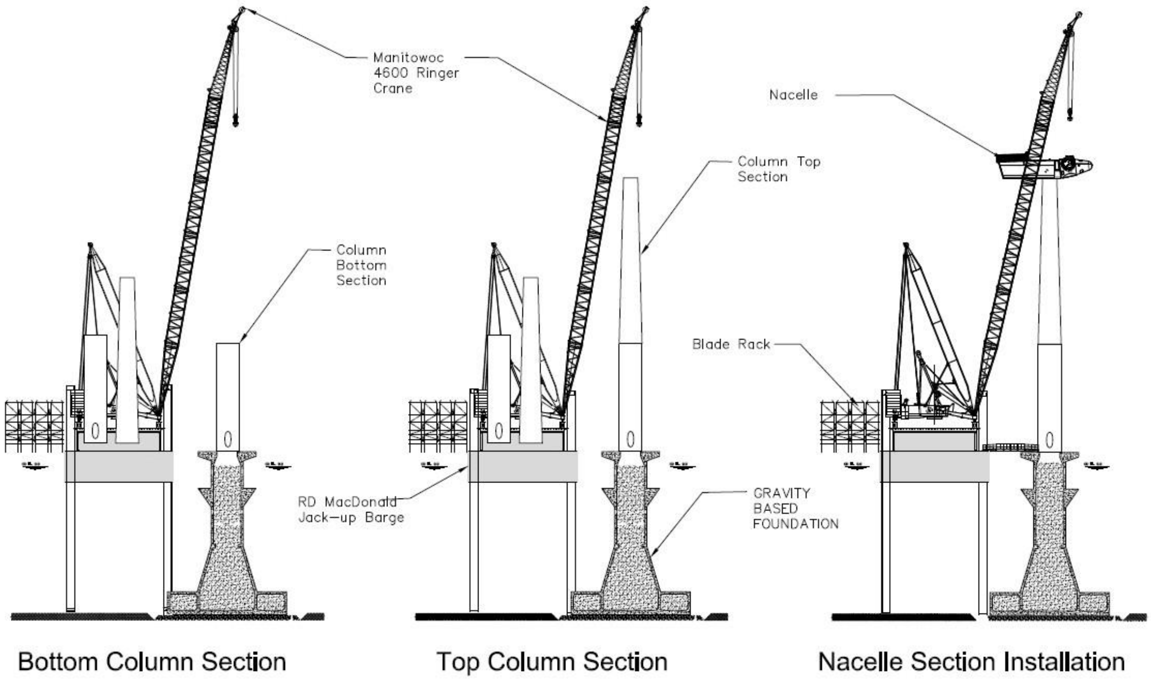

Figure H-24: Wind Turbine Tower and Nacelle Installation

The nacelle installation sequence is broken into two separate picks including the nacelle body and hub / generator:

- RDM picks nacelle rigging and personnel attach rigging to the top area of the body of the nacelle.
- Nacelle sea-fastening is removed.
- Crane hoists the load up to the top of the tower where craft personnel make the connection.
- RDM picks up hub rigging, and personnel attach the rigging to the hub / generator.
- Hub / generator sea-fastening is removed.
- Crane hoists the hub up to and places it in the nacelle where personnel secure the hub / generator in place and remove rigging.

Once the nacelle and hub / generator are installed, the RD will proceed to lift and install the blades, as follows:

- RDM picks the yoke rigging, personnel attach the rigging to yoke for lifting.
- RDM swings yoke to the marked locations on the first blade where personnel attach yoke to blade using man-lifts for access.
- RDM lifts the blade out of blade rack, swings it into position at the nacelle hub, then personnel make the connections and remove rigging.
- The process is repeated for all three blades.

Figure H-25: RDM Blade Installation (visual)

H.4 Additional Wind Turbine Installation Options

Windstream commissioned Ventolines to undertake a study in the available and viable options for wind turbine installation, which considered the project-specific wind turbine (SG 4.5-145 MW), providing alternatives to the Weeks Marine vessel solution.

Ventolines notes that there are numerous viable and proven strategies for feeder barges and wind turbine installation vessels for the Project, which are applicable to nearshore and lake-based projects. It is worth noting that Lorry Wagner, who was involved in the Icebreaker project (discussed in Appendix E) is now with Ventolines as Director of the US division, and also co-authored the study.

Ventolines notes that the use of custom designed lift vessels in nearshore or lake-based applications due to water depth and dimensions of the lochs or canals. There are two common solutions, namely floating sheerleg cranes and barges with land cranes that enable heavy lifts; these solutions are readily available globally and are less expensive than conventional wind turbine installation vessels. Various solutions deployed at European nearshore, freshwater, and lake-based projects are presented in the report.

The most recent Dutch freshwater projects, as introduced in Section 4.1.8, utilized the following installation solutions:

- Westermeerwind: crawler crane on a column-supported barge
- Fryslân: two customised solutions involving Sarens Soccer Pitch and Tom-Wim

Similarly, an increasingly common barge and land crane solution was deployed in the Vietnamese offshore projects in intertidal waters.

Ventolines' review indicates that a multi-barge solution with a pedestal crawler crane would be suitable for the Project, providing a proven alternative to the RDM. This solution is something that heavy lift contractors are familiar with, especially contractors with specific experience of wind turbine installation vessels in the Great Lakes. The Project's central location benefits from easy access to procurement, transport, and assembly services which could bring cost-effective solutions. Ventolines notes that such a proven alternative solution is available to the Project, instead of the RDM, and could be used in addition to the RDM to increase the rate of wind turbine installation. As an example, for the Fryslân project, two vessels were deployed to accelerate the wind turbine installation works, which meant that the installation of 89 wind turbines was completed in seven months.

Ventolines considered the project-specific assumptions around the St. Lawrence Seaway dimensional restrictions, distance, and others to propose potential transport solutions involving standard floating feeder barge, feeder barge with spuds or self-elevating capability, and feeder barge or vessel with a motion compensated platform. These alternatives were explored in the report including visual examples, followed by a comparison of the various solutions with pros / cons and notes.

In conclusion, Ventolines provides several feasible alternative or additional wind turbine installation options that the Project could consider, had it re-started the development process.

Appendix I Electrical System and Interconnection

The Project electrical system is a typical electrical collection and transmission system seen on existing offshore wind farms. The system consists of a series of array cables that collect the power from the individual wind turbines and deliver it to an offshore substation. At the offshore substation the voltage is increased to 230kV and transmitted to shore via a 30km 230kV submarine AC export cable. The cable makes land fall approximately 1 km from the Lennox Generating Station substation, where it is connected to the electrical grid.

The Project has been reviewed by the grid operation authority, Independent Electricity System Operator (IESO). IESO conducted a System Impact Assessment in conjunction with a Connection Impact Assessment by Hydro One in 2020; this review concluded that the project as proposed "will not result in a material adverse effect on the reliability of the IESO-controlled grid". While it is expected that the Assessment would have been updated as part of design, if the FiT Contract had not been cancelled and the Project been able to move forward, the System Impact Assessment results are indicative of current conditions, as the Project remains an approximately 300MW Project.

Had the FiT Contract not been cancelled, Windstream would have partnered with selected strategic suppliers as further engineering is completed, and further project specific details became available. including, the procurement of submarine cabling and main transformers.

A review of the electrical systems main components is provided in the following sections. The review covers areas associated with interconnection, system impact and technical details of the Project transmission and collection system.

I.1 IESO System Impact Assessment Report Findings

The document titled 'System Impact Assessment Report', dated 08 November 2010 and produced by IESO, assessed the acceptability of the Project to the local grid code requirements. The Report assessed the following criteria:

- Connection arrangement.
- The effect on existing grid circuit reliability/protection.
- Reactive power capacity.
- Thermal overload.
- Voltage maintenance.
- Transient performance.
- Fault ride-through.

In general, the Project adheres to the grid code requirements and does not cause undue stress to other aspects of the local grid, and thus was granted a 'Notification of Conditional Approval'. This is subject to standard requirements outlined within the report, none of which are considered unusual.

During the 9 November 2012 meeting with the IESO, ORTECH and Genivar, the following points were noted:

- The Ontario government has imposed a moratorium on offshore wind farms; however, the Ontario Power Authority's FIT contract with the Project was still in effect.
- The System Impact Assessment for the Project is still valid with no expiry, but if the existing conditions were to change significantly, the SIA would be amended.
- As long as the WIS FIT contract was in effect, the IESO considered the Project as committed.
- The System Impact Assessment for any new project connecting at Lennox will be done with the Project represented in the study model.
- SIAs for any other projects will not change the connection requirements for the Project.
- The IESO needs to be notified of any changes to the data and information that were submitted with the System Impact Assessment application. This may include a change of wind turbine or a change in the collector system.
- If the changes are material, the IESO will review the SIA and issue an addendum.
- The IESO report was conducted assuming ten strings of ten 3 MW wind turbines and will need to be updated to reflect the final wind turbine selected for the project. IESO will be notified of the final wind turbine selection and any changes in the collector system design to determine if the changes are material and if an update to the system impact study is required.

No updated IESO assessment was conducted or initiated by Windstream due to the cancellation of the FiT contract, and there is no reason to expect that any of the fundamental conclusions have changed.

I.2 Substations

The Project is situated to capitalize on the existing Lennox Generating Station Substation. Lennox station is approximately 25km from the project site and as indicated in the system impact study it provides a robust interconnection point. A substation for the Project will be constructed at the project site. This is a typical arrangement for a generating facility.

I.3 Offshore Substation

The Project substation will be located at the offshore site and will serve to collect the 35kV power generated by the individual wind turbines and step the voltage up to the 230kV submarine cable transmission voltage.

Offshore wind project substations are either island based, or platform based. Island based structures provide a significant potential to reduce substation cost by allowing the construction of the substation using typical land-based construction methods. Platform based structures are considerably more complex and typically require the use of specialized marine construction vessels to support installation. Platform based structures are typically employed on sites that are further from shore.

The Project offshore substation will be island based and is arranged as a typical land-based substation. The substation is configured with typical equipment including two main transformers, 35kV and 230kV switchgear, dis-connectors and capacitor banks. The offshore substation footprint is currently designed as an extension to Pigeon Island. This approach capitalizes on the existing island and will also serve to support offshore operations and maintenance.

The sizing and spacing of equipment have been determined employing conservative assumptions. It is assumed that the currently proposed 130m by 93m footprint of the substation can be modified or reduced as design is finalized. The proposed layout for the substation is depicted in Figure I-26.

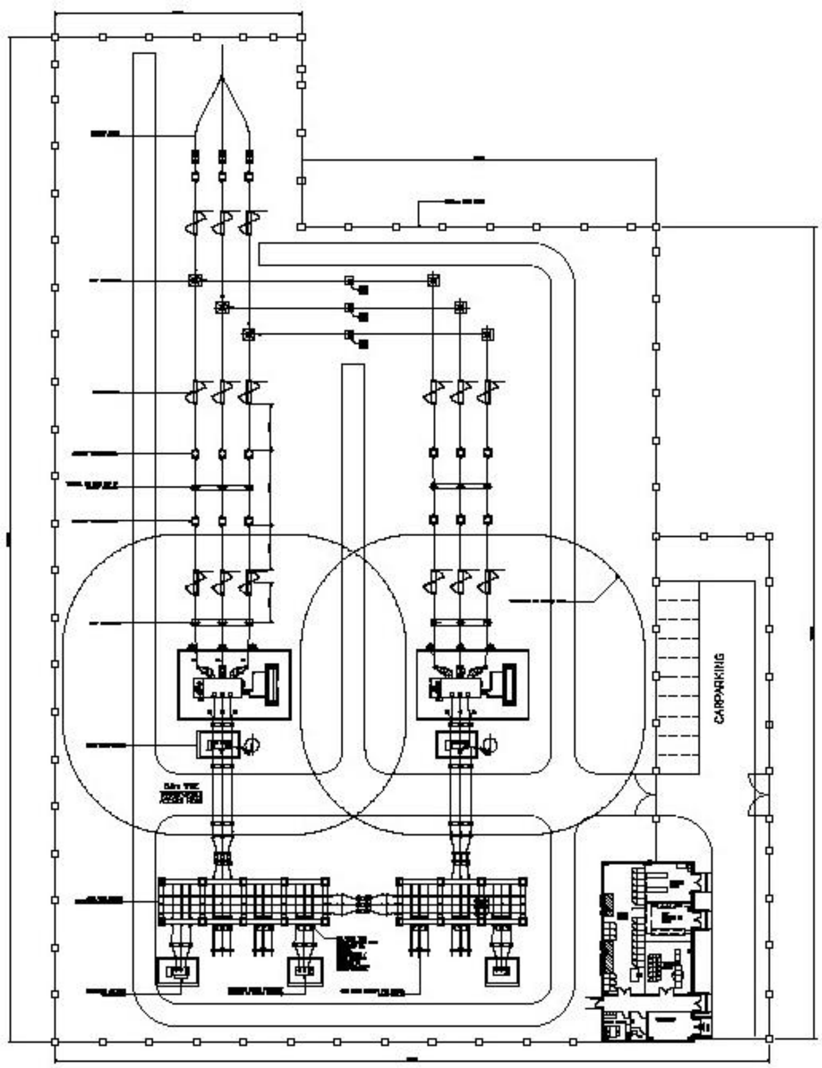

Figure I-26: Offshore Substation General Arrangement

To support the substation and to preclude interference with the existing Pigeon Island light house, the substation location is proposed on the North end of the island. The substation footprint will require the extension of the island. This common marine construction practice has been employed throughout the Great Lakes in support of marine terminal, waterfront structure construction and dredging operations. The impoundments or retaining structures for the islands are constructed and are commonly filled with the spoils from dredging operations conducted in support of the projects. The island substation provides the Project with significant advantages including:

- Allows for the use of lower cost land substation construction techniques.

- Provides a space to deposit site dredge spoils.
- Provides for a year-round offshore operations site.
- Avoids the significant cost of a platform style substation.

A conceptual drawing depicting the extension to Pigeon Island with a proposed substation layout is provided in Figure I-27. The green area in the drawing is the existing island; the lighter colored area represents the extension to the island.

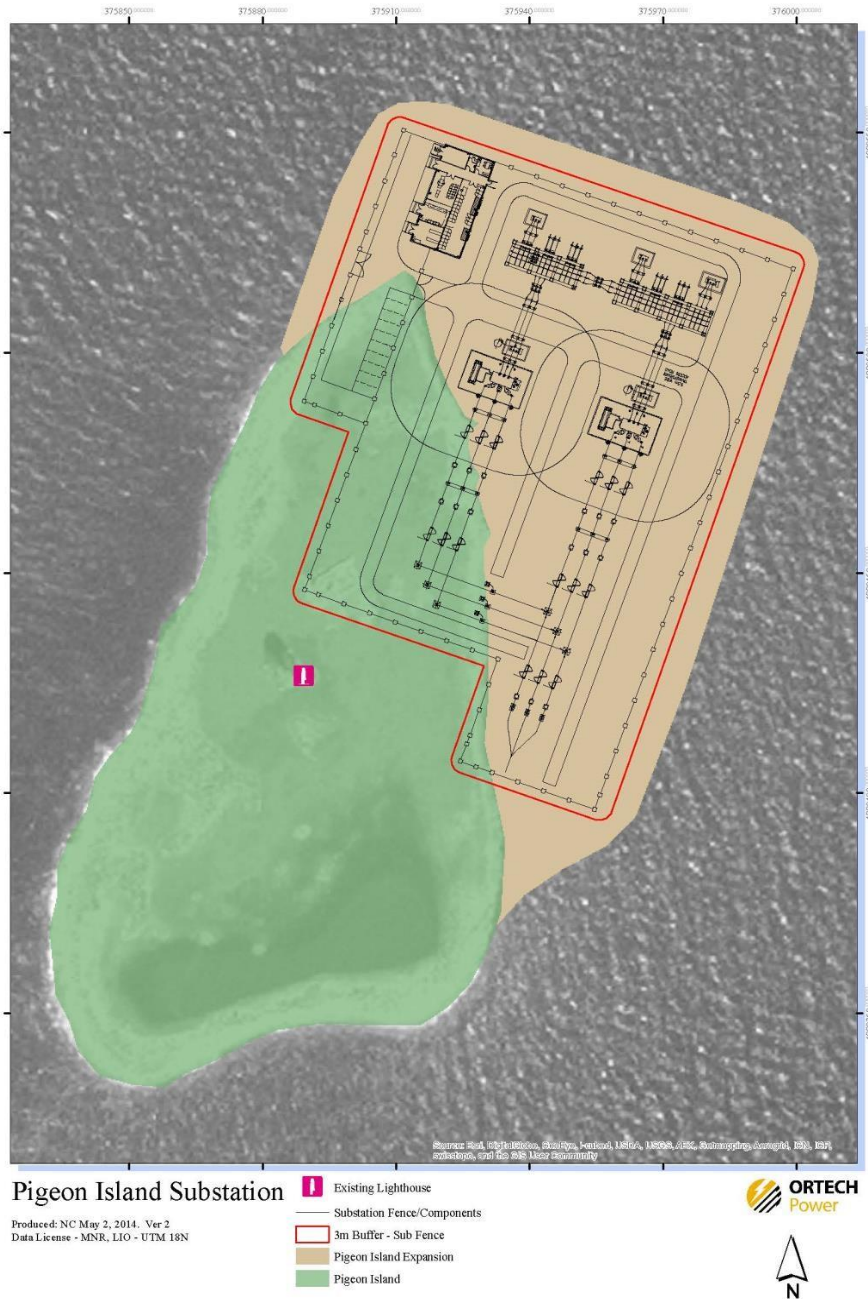

Figure I-27: Pigeon Island Substation

I.4 Onshore Substation

The Project will interconnect in the Lennox Generating Station Switchyard. The planned arrangement consists of an offshore to onshore junction station that will be situated approximately a kilometer from the Lennox

Station. The junction station serves as the landing point for the project submarine export cable and is the connection point to the upland export cable. The upland export cable will run underground from the junction station to the Lennox Switchyard and will be terminated at two 230kV breakers installed adjacent to lines X21 and X22. The projects interconnection rights were established in the interconnection agreement with IESO.

I.5 Submarine Cabling

The export cable and array cable will be laid on the lakebed (not buried) and protected through burial and appropriate armoring at shore landing zones. Submarine transmission cables throughout the Great Lakes are commonly installed employing this methodology with a successful record of operation as outlined in a study commissioned by Windstream and conducted by Genivar (Genivar, December 2012). This is in contrast to the methods employed in support of offshore wind and transmission projects located in ocean / sea environments. There are several factors based on the projects location that avoid the requirement for cable burial, these are as follows:

- There is a proven history of operation of power transmission cables in the Great Lakes.
- The geologic conditions of the lake bottom preclude burial with bed rock either exposed or close to the lake bottom in many areas.
- The metocean environment is less severe and the sites do not typically experience the same level of currents experienced at saltwater sites.
- The level and size of marine traffic in the cable areas is reduced when compared to ocean sites.
- Commercial fishing means and methods employed on the great lakes do not commonly involve trawling or dredging.

The ability to surface lay cable throughout the majority of the project site is a significant advantage for the project. Figure I-28 depicts the submarine cables currently installed in the area and includes the proposed Project export cable.

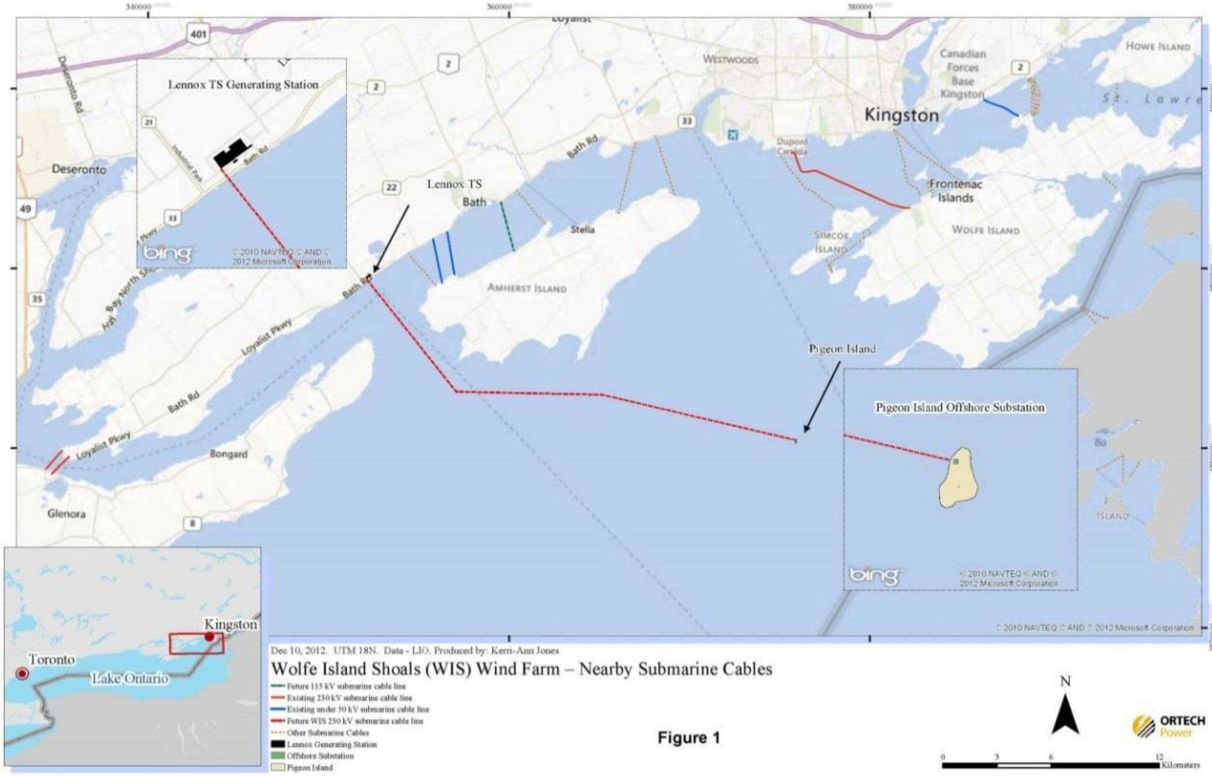

Figure I-28: Kingston area Submarine Cable Installations

Wood had been informed by Windstream that initial talks regarding array and submarine export cabling have been conducted with General Cable, Nexans, Mitsubishi, Pharos, Prysmian Power Cable Systems, Mallin Consultants and Roxtec. It is understood that detailed cable design will be provided if the Project were able to advance to the detailed design phase.

The submarine cable array to support the SG4.5-145 wind turbines consists of strings connecting multiple wind turbines. This array of cables operates at 35kV and collects the power generated by the wind turbines and feeds to the substation. The array cables connect individual wind turbines in sequence with the array cable size increasing as the cable approaches the substation and the number of wind turbines on the string increases. The strings are routed to the offshore substation where they will run through an underground conduit system into the island substation.

The export cabling is planned as a single 230kV cable approximately 1,000kcmil (thousands of circular mils) in size with a length of 30km. Wood reviewed the export cable calculations, and our opinion is the cable size as proposed is adequate to carry the full 300MW output of the Project. Wood assumes that the export cable sizing will be reviewed upon completion of further electrical system design work. Additionally, as part of the detailed design process, Windstream will investigate the option of a second export cable, which would reduce the size of the export cable and could have an impact on project cost with the added benefit of providing redundancy.

Wood has reviewed the documentation provided on submarine cabling. The array and export cabling scenario proposed are reasonable and in keeping with practice on European projects and with existing submarine cable installations on the Great Lakes.

I.6 Cable Installation

There are several well-established cable installation contractors in North America that can support the Project. Cable installation activities in the Great Lakes have typically been completed employing barge-based cable equipment. Durocher Marine, a Michigan based company, and Caldwell Marine, a New Jersey based company, have experience with the installation of submarine cabling in North, Central and South America.

Durocher Marine recently completed the installation of the 138kV export cable in support of the McLane Mountain wind farm in Lake Huron. Caldwell Marine completed the cable installation scope for the 87.5km 242kV Vancouver Island Transmission Reinforcement project. Caldwell Marine had also been contracted to conduct the cable installation scope for the now defunct Cape Wind project.

Barge based cable installation systems are expected to be employed in support of the project cable installation scope. Barge cable installation systems are modular in nature and can be mobilized onto a locally available barge. The cable installation equipment consists of a barge positioning system, cable carousel or tank, loading arm, cable engines, cable reels, ploughs, and remote operated vehicles. The arrangement of the barge is modified to suit the installation tasks. A vessel installing short runs of array cable will be configured differently than a vessel that is tasked with installing a large diameter export cable that is in excess of 20 km in length.

A typical cable installation barge configured to support the installation of an export, or long-distance transmission cable is pictured in Figure I-29. The cable carousel and loading arm located above the carousel can be seen clearly in the picture. Figure I-30 shows a cable installation barge conducting a cable shore landing. It should be noted that both barges depicted are supporting Canadian projects.

Figure I-29: Cable Installation Barge (Courtesy of Caldwell Marine)

Figure I-30: Cable Installation Barge Shore Landing (Courtesy of ITB Subsea Equipment)

The cable installation vessel fleet is growing rapidly with the fleet moving toward the use of offshore construction vessel designs modified for purpose. Maersk, the world's largest shipping company, has built numerous vessels in the past years that are currently under long term charter to European companies specializing in cable installation. Many of these vessels such as the Maersk Responder (shown in Figure I-31), are Great Lakes capable and are operated in support of export and array cable installation scopes.

Figure I-31: Cable Installation Vessel (Courtesy of Maersk)

The final cable installation strategy, including the selection of installation vessels will be developed in conjunction with the selected cable supplier. The location of the export cable supplier, the export cable length and size may heavily influence the installation vessel for this portion of the work. The array cable due to its smaller size and shorter lengths likewise impacts the installation vessel decision, due to its smaller size and shorter lengths. It may be determined that employing two separate installation vessels is the most appropriate installation strategy.

Wood understands that Windstream intends to work with a cable supplier and installation contractor to develop the overall installation strategy if the detailed design phase of the Project is allowed to proceed (this work is typically completed during the detailed design phase). In Wood's experience this strategy provides the most realistic and achievable cable installation strategy.

I.7 Electrical Interconnection Summary

The following observations are made regarding electrical systems and grid interconnection:

- The grid operator has confirmed the electrical interconnection at the Lennox Generating Station for 300MW is feasible for the Project.

- It is assumed that the additional electrical design work would progress if the Project were permitted to move forward, and through the detailed design process (as this work is typically completed during the detailed design phase).
- The advantage to the project of constructing the offshore substation on an island is significant and should be considered as a primary design assumption for the electrical transmission and collector system.
- Installation of submarine cabling directly on the lake bottom is a significant advantage and is the typical construction method performed in support of Great Lakes transmission cables. Upon completion of further engineering, an economic study may be prudent to compare the Capex of a larger export cable with that of dual export cables to determine if these would allow the Project to benefit from lower transmission losses and hence greater energy sales.
- Windstream intends to develop the submarine cabling supply and installation plan in conjunction with a suitably qualified cable supplier and installation contractor.

In Wood's opinion, the electrical interconnection system as currently proposed is in keeping with offshore wind installations of similar size in Europe. It has been designed to an appropriate level and has the potential to avoid significant costs when compared to offshore projects of a similar size and arrangement.

Appendix J Project Implementation

The design of an offshore wind farm, from feasibility or development to construction / operations, can take several years and will be informed by surveys, data collection, and studies.

Figure J-32 below depicts a typical project lifecycle of an offshore wind farm.

Figure J-32: Typical Offshore Wind Farm Lifecycle

After the design and installation phase, the project enters into the ramp up phase whereby wind turbines are commissioned and export power through the offshore substation. Typically, projects will have a 25 to 30 year operational or useful life, followed by ramp down whereby the owner / operator will seek to run the wind turbines until a point where it becomes economically more attractive to decommission or repower the project.

J.1 Engineering and Technical Consideration

There has been significant engineering and studies performed to date to support the feasibility of the Project. Additional engineering activities would be completed to finalize the design, issue construction tender packages and achieve financial close. At this point in time the critical technical studies required to further advance project design include further detailed metocean study and further detailed geotechnical/geophysical campaign to supplement the already extensive metocean and geotechnical study conducted for the Project. These studies cannot be conducted given the current status of the Project and would only be expected to occur to advance the Project in the absence of the Government-imposed moratorium and the cancellation of the FIT Contract.

The advancement of the electrical collector, substation, and transmission system interconnection design will follow if detailed design were allowed to proceed. These efforts will further inform design decisions and will be employed to affect equipment procurement decisions.

J.2 Fabrication and Staging Facilities

At this stage of development of the Project, it is envisioned that the foundation fabrication facility and wind turbine staging facility will be separate sites. The selection of these facilities will be decided based on the negotiated commercial terms and the proximity to the Project site.

The foundation fabrication facility is discussed in detail in Appendix G, and it is expected that this facility will be primarily employed to support foundation fabrication and installation activities including supply of stone and aggregate in support of offshore construction activities.

A more traditional port staging facility will be required to support the wind turbine installation and submarine cable installation scopes of work.

A smaller local staging facility will also be required to support project operations including personnel transfer, support vessel loading and smaller construction operations.

J.3 Staging Facilities

Staging facilities are important considerations throughout the project implementation phase. Due to the variety of activities, restricted construction seasons and sheer size of the project components the Project will require large staging areas. The staging areas would optimally be near the site with ready access to rail, road, and marine transport options. It is unlikely that all the project components will be able to be cost effectively stored in the immediate area of the Project. With this reality in mind Windstream has conducted investigations into the availability of existing storage and staging areas to support the project. Should the Project be allowed to proceed, an integrated project logistics plan will be developed and include the following:

- Shipping and delivery options for project components including durations and seasonal limitations.
- Component storage and maintenance requirements.
- Potential staging and storage areas including delivery and shipment options considering the proximity to the project site.

- Cost effectiveness and timeliness of shipping options from storage/staging areas to the Project site.
- Ability to perform secondary fit out preparatory works at storage/staging area.
- Size and weight of components.

Staging areas for the foundations are expected to be located at or near the foundation fabrication facility. The St. Marys Cement facility near Bowmanville, Ontario, described in Section G.6 is an example of a possible staging area for the foundations.

Several established facilities have been actively engaged in the transshipment of wind turbine components; these include the nearby ports of Oswego, NY and Ogdensburg, NY. Both facilities have direct rail access and can serve as transshipment facilities if components were to be delivered via oceangoing vessels. The port of Ogdensburg is an established wind turbine component transport port with approximately 70 acres of laydown area.

Table J-5 lists approximate distances from Lake Ontario ports with facilities that have or could support wind turbine staging activities.

Table J-5: Distances Project Site to Area Ports (Statute Miles)

Port	Distance
Kingston, Ontario	15
Ogdensburg, New York	65
Oswego, New York	45
Oshawa, Ontario	120
Hamilton, Ontario	170

Ogdensburg New York is the most likely wind turbine staging area. The harbor and slip depths at the Port of Ogdensburg are 27 feet (8.2m), which is standard Seaway depth. The marine terminal has a 1,250-foot (381m) wharf. There are over 70 acres of laydown area, much of which is in a Foreign Trade Zone. The facility has a history of handling wind turbine components, including offloading more than 20 vessels and reloading 100 barges for delivery to projects in New York and Canada.

Another potential staging area is Pier 26 in Hamilton, shown in Figure J-33. The facility is operated by Great Lakes Stevedoring Company and has approximately 30,000 m2 of exterior laydown area with 927m of seaway draft bulkhead. The facility has a history of handling bulk cargo including modular constructions as well as wind turbine components.

Figure J-33: Pier 26 Hamilton Ontario

J.4 Vessels Approach

The selection of appropriate and cost-effective installation vessels is part of the development and construction process for any offshore project. The physical limitations of the St Lawrence Seaway system preclude access to Lake Ontario for many the existing offshore wind farm installation vessels. However, the more moderate "sea" conditions on Lake Ontario allow for the use of vessels that could not be employed in the more severe weather conditions encountered on many European offshore wind projects. Furthermore, the Project location and chosen gravity based foundation option lend themselves to using vessels already available in the region, thus improving both vessel availability and overall Project costs.

Windstream has conducted metocean studies, which would be used to inform the vessel selection process. The Project team considered installation vessels as a fundamental component in the foundation selection and design process and Windstream should consider whether there is an opportunity for vessels to support multiple stages of the Project. This could provide cost savings in the form of longer-term charters and the potential for a "custom" vessel to be utilized for multiple project phases. See H.4 for a discussion on alternative or additional solutions.

J.5 Wind Turbine Installation Vessels

The choice of wind turbine installation vessels will depend largely on metocean conditions. In addition to the installation vessels proposed by Weeks Marine (2021), and alternative vessel considerations presented by Ventolines (2021), there are also other existing European wind turbine installation vessels that could be employed on the project. Wood expects early engagement with the vessel operator to confirm suitability of the vessel of the various wind turbine vessel options. Wood concludes that there are several options available to Windstream for vessels.

J.6 Vessel Considerations

The geology of the lake bottom suggests that traditional anchoring methods may be ineffective in some areas of the Project site. In advance of final design and vessel selection, a mooring / anchoring study will be undertaken to explore possible mooring systems.

Crew boats, tugs, material and service barges were not discussed, in detail in this report. However, these common vessels are required for the support of any offshore project and are considered to be readily available in the area.

J.7 Submarine Cable

Wood has previously reviewed the documentation provided on submarine cabling. The array and export cabling scenario proposed are reasonable and in keeping with practice on European projects and with existing submarine cable installations on the Great Lakes.

There are numerous cables currently installed throughout the Great Lakes. The cabling installation practice in the Great Lakes is for the cable to be laid directly on the lakebed with protection where the cable makes landfall. The export and array cable proposed for the Project are installed in this manner and it is considered to be a significant advantage for the Project as it avoids the cost, environmental impacts and other challenges often associated with cable burial. With these facts in mind, the installation of the array and export cable is considered to be routine for an experienced installation contractor.

There are numerous vessels of opportunity and marine construction vessels capable of accessing the Great Lakes System that can support the installation of the Project submarine cabling. There are several vessels of opportunity that have been employed on European offshore wind projects that would also be suitable for use on the project. Additionally, an area barge could be outfitted to accomplish this work scope (if needed).

Coordination with the vessel operator and cable manufacturer will be important factors when considering the final cable installation vessel.

J.8 Offshore Substation

The offshore substation is an integral portion of the Project. The Project plans to locate the offshore substation on reclaimed land adjacent to Pigeon Island. This is the most logical location for the substation and is a significant advantage to the Project. This option allows for more traditional civil-focused construction means and methods when compared to the construction of a typical offshore wind electrical service platform. The fill required to extend Pigeon Island will likely come from dredged material used to prepare the lake bottom before placement of the gravity based foundations.

J.9 Onshore Control Centre

An onshore control center for the Project will be required. Typically, these facilities are incorporated with the operations and maintenance facility. Preliminary information suggests that this facility would be located in the Kingston area. Potential locations for the onshore control center are depicted in Figure J-34.

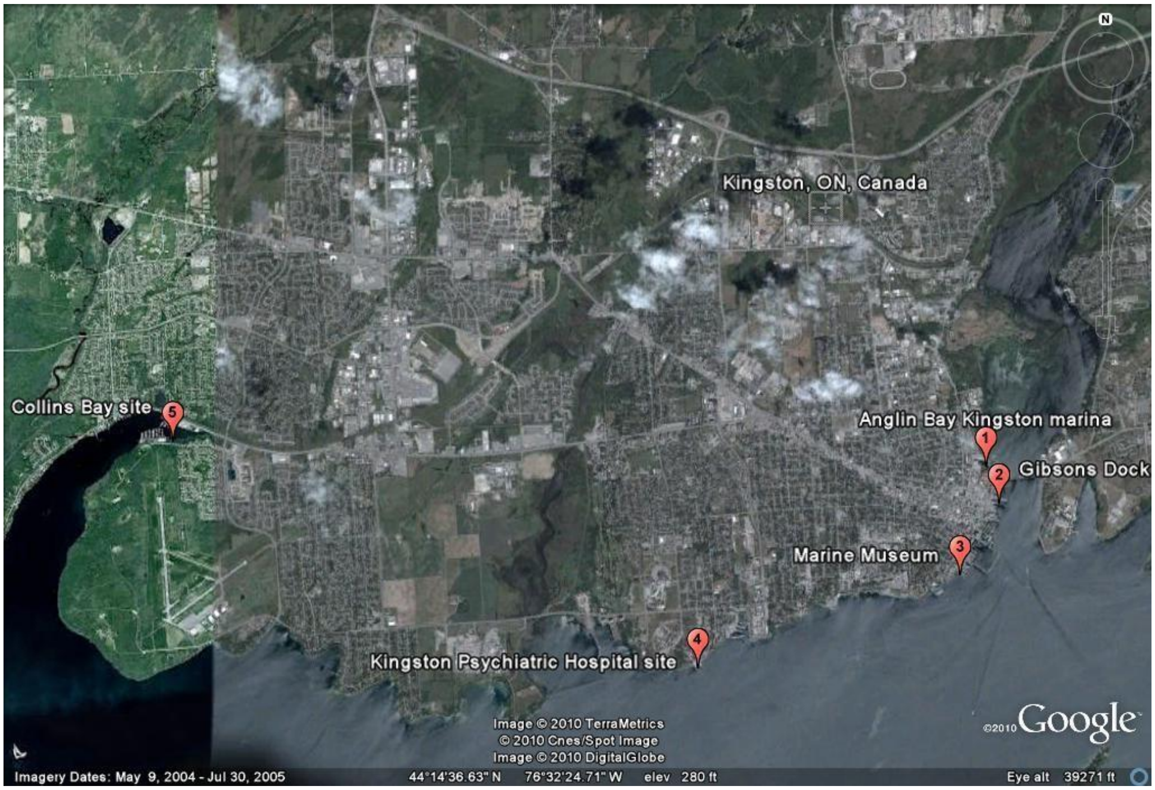

Figure J-34: Potential Locations for Project Operation and Control Center

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Glossary

Abbreviation	Definition	Abbreviation	Definition
Capex	Capital Expenditures	Metocean	Study of marine and meteorological conditions on a body of water
COD	Commercial Operation Date	MOE	Ministry of Environment, Conservation and Parks
EPC	Engineering Procurement and Construction	MW	Megawatt
GBF	Gravity Base Foundation, Gravity based foundation	O&M	Operations and Maintenance
GW	Gigawatt	Opex	Operating Expenditures
IEA	International Energy Association	OPA	Ontario Power Authority
IEC	International Electrotechnical Commission	PSS/E	Power System Simulator/Engineering
IESO	Independent Electricity System Operator	REA	Renewable Energy Approval
kcmil	Thousands of circular mils		
km	Kilometre	SGRE	Siemens Gamesa Renewable Energy
kV	Kilovolt	SMA	Service and Maintenance Agreement
$	USD	Wind Turbine	Wind Turbine Generator

sgurr energy

Windstream Energy Inc.

Wolfe Island Shoals Offshore Wind Farm

Engineers Report

July 2014

Report Details

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SF/04/023

Executive Summary

SgurrEnergy has been commissioned by Windstream Energy Inc. (Windstream) to assess the technical feasibility of the Wolfe Island Shoals Offshore Wind Project (the Project). The Wolfe Island Shoals Project is a proposed 300 MW offshore wind farm located at the northeastern end of Lake Ontario in Ontario, Canada centered approximately ten kilometres southwest of Wolfe Island.

The Project is in the advanced development stage with a Project site identified, a grid interconnection point confirmed, and power sale contract in place. A 28km long export cable will connect the Project to the onshore Lennox Thermal Generating Station at 230kV. The configuration currently being considered assumes quantity 130 - 2.3MW Wind Turbine Generators (WTGs).

The Project site is located south-west of Wolfe Island, Ontario, where the wind resource offshore is more consistent than onshore and allows for the installation of larger Wind Turbine Generators. Offshore wind farms have become common in Europe, since the first offshore wind farms were installed there in the 1990s. While offshore wind farms are more complex and costly to build than an onshore wind farm, the better wind resource offshore has led to an increase in number and size of offshore wind projects, in Europe and Asia. The Project has the potential to be Canada’s first offshore wind project.

The Project successfully obtained a Feed-In-Tariff (FIT) contract from the Province of Ontario in May 2010 which remains active and in good standing.

While not necessarily a current requirement, due to a World Trade Organization decision, Windstream intends to maximize Ontario content by fabricating the foundations in Ontario and purchasing the WTGs from Siemens who sources many of the materials locally. The company is on record with the Ontario Power Authority (OPA) as stating that 60% of the content could come from Ontario.

The bed of Lake Ontario is provincial crown land under jurisdiction of the Ministry of Natural Resources (MNR). The Ministry of Environment (MoE) proposed a 5km shoreline exclusive zone and MNR has supported this constraint which has yet to be confirmed as a project requirement. The rules regarding offshore wind have as yet remained unchanged and under the current requirements, a setback of only 550m from residences is required. Windstream has gone on record with the MoE and MNR as supporting a 5km set back from the shores of occupied islands.

The Provincial government issued a moratorium on offshore wind projects on Ontario in February 2011. The specific legal implications of the offshore wind moratorium for the Project are uncertain and outside the scope of this technical feasibility study. To our knowledge no regulatory changes have been made which would preclude the Project.

The moratorium has created substantial delays to the Project. In general the Project has been limited in its ability to complete all needed scientific and engineering studies to complete the development of the Project and complete construction. Windstream has made best allowable efforts to advance the Project by using information indirectly obtained, from a combination of studies of adjacent areas, and computer modelling. This has allowed Windstream to advance the project feasibility study and design while working within the constraints of the moratorium.

This study is intended to opine on the technical feasibility of constructing and operating the Project given the work performed to date by Windstream. Our study evaluated the known attributes of the site, transmission system, and general industry norms and practices established on the numerous offshore wind farms installed throughout Europe and planned for North America. The study references SgurrEnergy's extensive European offshore wind data base with particular emphasis on projects in the Baltic Sea; an area with Metocean and icing conditions that closely resemble those of Lake Ontario. Additional development has been completed on the foundation and installation aspects of the project and an overview of these efforts are included in the report. We have been informed by Windstream and their project consultant ORTECH Consulting Inc. (ORTECH) that they will address issues related to the FIT Contract, the moratorium, environmental permitting, regulatory issues and other non-technical matters through other Ontario based experts. These issues will be addressed by other reports that are outside of SgurrEnergy's technical study

SgurrEnergy believes the Project has several notable aspects that contribute to its viability. These include:

- A Feed in Tariff (FIT) contract is signed and in effect.
- The grid interconnection point is robust and located in between two major load centres with significant existing transmission capacity.
- Fresh water location limits corrosion and provides favorable metocean conditions when compared to most offshore wind projects already constructed.
- Proximity and availability of raw materials and industrial manufacturing capacity.
- Well experienced and financially sound WTG supplier, Siemens is engaged in the Project.
- Robust wind energy source that will lead to comparatively high capacity factor and significant energy delivery to the Ontario grid

Based on the data provided, and SgurrEnergy's broad knowledge of the state of the art of offshore wind industry practices, SgurrEnergy considers the Project technically feasible. The commercial viability of the Project cannot be fully warranted until final scientific and technical studies are completed, but such is always the process when developing electrical power generation projects. Given the strong financial support from the FIT, we believe it is reasonable to assume that the Project is commercially viable.

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Glossary

Abbreviation or Term	Definition
Capex	Capital Expenditures
COD	Commercial Operation Date
EPC	Engineering Procurement and Construction
FIT	Feed In Tariff
GBF	Gravity Base Foundation
GW	Gigawatt
IEA	International Energy Association
IEC	International Electrotechnical Commission
IESO	Independent Electricity System Operator
km	Kilometre
kV	Kilovolt
LiDAR	Light Detection and Ranging
MNR	Ministry of Natural Resources
Met	Meteorological
Metocean	Study of marine and meteorological conditions on a body of water
MW	Megawatt
NTP	Notice to Proceed
O&M	Operations and Maintenance
Opex	Operating Expenditures

OPA	Ontario Power Authority
PSS/E	Power System Simulator/Engineering
SMA	Service and Maintenance Agreement
SoDAR	Sound Detection and Ranging
TSA	Turbine Supply Agreement
WAsP	Wind Atlas Analysis Application Program
WTG	Wind Turbine Generator
$	Canadian Dollar

1 Introduction

SgurrEnergy has been commissioned by Windstream to assess the technical feasibility of the Wolfe Island Shoals Offshore Wind Project. The Wolfe Island Shoals project is a 300MW offshore wind farm consisting of quantity 130 - 2.3MW wind turbine generators located in Canadian waters at the northeastern end of Lake Ontario, centered approximately ten kilometres southwest of Wolfe Island. A 28km long, 230kV export cable connects the Project to the onshore Lennox Terminal Station, located adjacent to the existing 2,100MW Lennox Generating Station. A proposed Project layout is depicted in Figure 1-1 and Figure 1-2. The OPA and Windstream have entered into a binding Power Purchase Agreement and the Project has received conditional approval of its grid interconnection. SgurrEnergy has conducted an independent review of the Project based on our expertise in offshore wind, the Project history and the ability of Windstream and its team to manage the Project. SgurrEnergy has conducted a comprehensive technical review of the following attributes:

- Siemens WTG
- Site Layout
- Wind resource assessment, including energy yield (EY) and WTG site suitability.
- Site characteristics - ground conditions, wave, and ice.
- Foundations.
- Electrical Interconnection.
- Project implementation plan.
- Construction and Installation methodology.
- Staging areas.
- Project schedule.
- Long-term operation and maintenance (O&M).
- Decommissioning.
- Environmental attributes.

A comprehensive list of studies and reports completed in support of the Project is referenced in Appendix A.

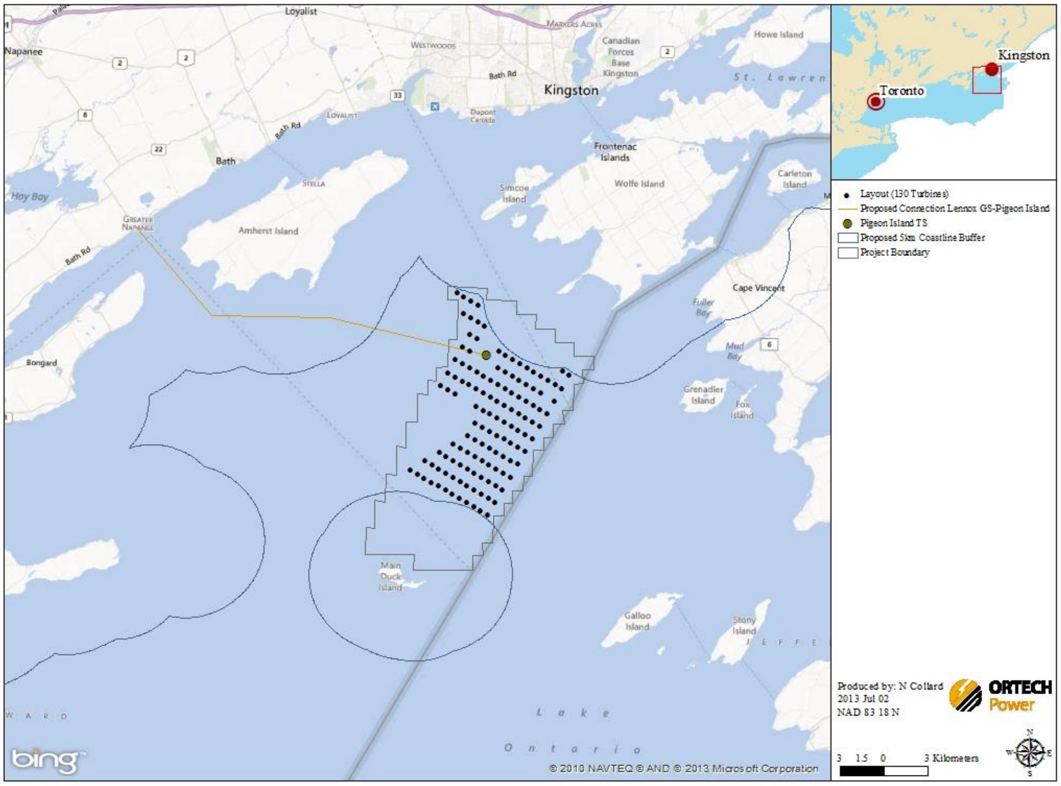

Figure 1-1: Project Location and Layout

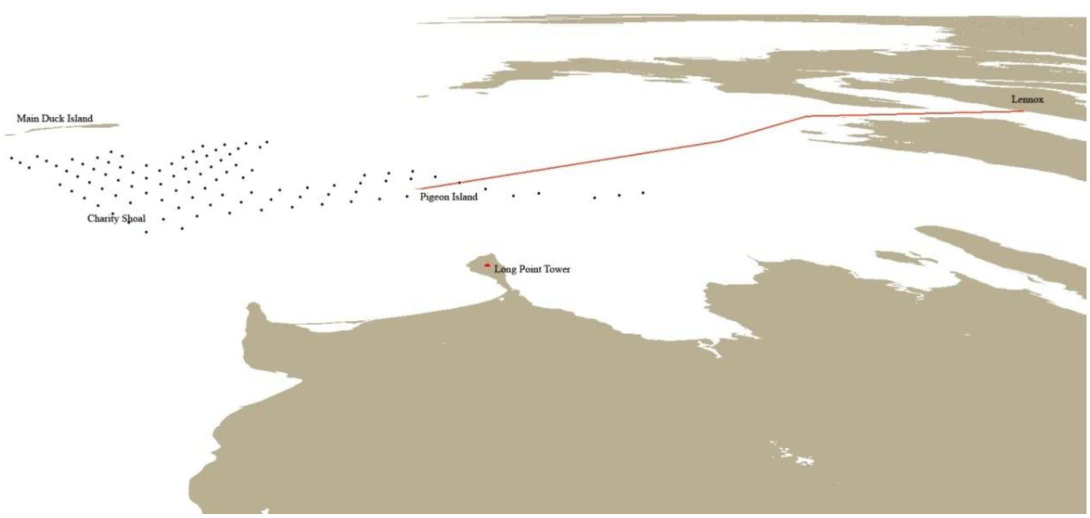

Figure 1-2: Project Aerial View

1.1 SgurrEnergy Qualifications

SgurrEnergy is internationally recognized as an authority on offshore wind and as such is highly qualified to undertake this independent review of the Project.

SgurrEnergy is the world leader for offshore wind lenders' technical advisory services, ranging from Q7/Princess Amalia through to Global Tech I and Lincs, with a track record covering lenders engineer, owner's engineer and independent engineer services for over 45 major offshore wind projects with a generating capacity in excess of 25GW. We are currently acting as technical advisor for more than 10 active offshore wind projects covering pre-financial close, construction phase and operational phase assignments.

Our experience includes playing a critical role in the development and delivery of the Cape Wind Project as owner's engineer. Other owner's engineer experience includes preparing and negotiating turbine supply and maintenance agreements for a number of European offshore wind developments, offshore wind resource measurements, modelling, and a number of project Front End Engineering Design (FEED) and foundation design assessments.

SgurrEnergy is a leading independent multi-disciplinary renewable energy consultancy. We have provided technical support, financial modelling, resource assessment, due diligence and project management to over 110GW of offshore and onshore wind We have provided support to clients at every phase of a project, from the early stages of site selection, feasibility and design through to project management of the construction and operation and maintenance phases. Our team of professional renewable energy consultants has extensive International experience in providing consultancy services in over 60 countries across 6 continents. We have offices in the UK, China, India, Ireland, Germany, France, United States, and Canada.

In September 2010, SgurrEnergy became a Wood Group company, joining the Wood Group Kenny business unit. This union supports our ongoing strategy to expand and enhance our renewable energy capability. Wood Group Kenny's extensive offshore project experience, together with our specific renewable energy expertise and proprietary technology create a leading player in the renewable energy services sector. The Wood Group is an international energy services company with approximately USD$7 billion in annual sales, employing 42,000 people worldwide and operating in 50 countries.

Windstream has entered an agreement with Siemens to supply and commission the wind turbine generators. SgurrEnergy has significant experience with Siemens offshore wind turbine generators on numerous projects throughout the EU and proposed projects in North America. An abbreviated project listing includes the world's largest offshore wind farms: London Array, Gwynt Y Mor, Lincs, Meerwind and Westernmost Rough with a combined capacity in excess of 1680 MW.

1.2 Rationale for Offshore Wind Projects

Globally, there has been a rapidly increasing deployment of wind energy projects, including offshore wind energy projects.

The construction and operation of onshore wind projects have come to represent the majority of newly installed electrical capacity in certain regions of North America. In some regions, the price of wind energy is competitive with new utility scale thermal generation assets.

In addition to the rapid expansion of onshore wind projects, offshore wind energy has become a significant contributor to new generation capacity in Europe.

WTGs are sited offshore to access a more consistent wind resource and to allow for the installation of larger WTGs. This has been the case in Europe where offshore wind has been actively pursued since the 1990's. While offshore wind installations are more complex and costly to build, the better wind resource offshore has led to an increasing number and size of offshore wind projects. These same characteristics apply for offshore wind in the North America. A better wind resource is defined as having higher, more consistent and less turbulent wind speeds. These higher, more consistent and less turbulent winds result in higher electrical generation capacity per WTG.

In the case of the Wolfe Island Shoals Project, there are several benefits that make this an attractive and feasible Project:

- Strong and consistent wind resource at the project location.
- Transmission capacity restraints make it difficult to bring renewable energy from some large rural onshore wind farms to load centres.
- The Project is sited near the major transmission access point, allowing a strong connection into the grid without the need for onshore transmission system overhaul.
- The Project offers the ability to provide significant amounts of renewable energy in a single project in Ontario.
- The stronger offshore wind resource.

- A power sale price that is considerably higher than competing energy prices which provides strong economic incentive for building this project.

1.3 Offshore Wind Energy in Europe

Due to its favourable policy environment, Europe has seen significant growth in its offshore wind energy sector. As a result, many European countries are seeking to expand their offshore wind industry. Underlying reasons for the support of offshore wind development include:

- A desire to increase the renewable energy portion of their national generation base as part of efforts to slow climate change.
- A component of an energy diversification strategy, with special consideration of the volatility of gas pricing and supplies that are susceptible to interruption.
- The use of the sea bed for energy production, given the limited available European land mass.
- An economic development tool. The capital and labor offshore wind industry has demonstrated its ability to provide economic revitalization of port areas and heavy manufacturing.

Offshore wind energy has expanded rapidly since the first projects were constructed slightly more than twenty years ago. Data published by the European Wind Energy Association indicates that as of 2013 there were 2,080 offshore WTGs installed in 11 different countries, representing 6,562MW of installed capacity with a reported average offshore wind farm size of 270MW.

The UK and Denmark are the leading countries in installing offshore wind farms. Germany and France are increasing their offshore wind efforts and have significant development and construction activities underway.

The locations of operating offshore wind farms are:

- North Sea (4,363MW: 66%).
- Atlantic Ocean (1,056MW: 16%).
- Baltic Sea (1,143MW: 17%).

The installations in the Baltic Sea are considered comparable to Wolfe Island Shoals due to the Baltic's low salinity and significant sea icing conditions.

The number of offshore wind projects in Europe continues to grow with approximately 2,879MW of additional capacity under construction and approximately 22GW of consented new capacity.

As the European offshore wind energy continues to flourish, it is supported by significant public and private investments that are serving to improve the technology and bring down the cost of energy. The "lessons learned" from the early European offshore wind projects, the advancements in technology and development of best practices benefit North American offshore wind projects. SgurrEnergy has taken advantage of our significant expertise in the offshore wind industry to optimize and confirm the viability of the Wolfe Island Shoals project.

Figure 1-3: Lake Vänern Offshore Wind Farm

1.4 Offshore Wind Energy in North America

The offshore wind energy in North America is moving forward with several projects expected to enter commercial operation in the next 2 to 3 years. The US has been actively supporting the development of offshore wind through the activities of the Bureau of Offshore Energy Management (BOEM) and Department of Energy (DOE). The DOE has provided loan guarantees and grants, while BOEM has auction over 300,000 acres of offshore wind site leases.

1.4.1 USA

In the USA, there are several offshore wind projects with Power Purchase Agreements (PPAs) and offshore lease rights. Projects worthy of mention are:

- Cape Wind Project off Massachusetts – 468MW, using 131 Siemens 3.6MW WTGs;
- Deepwater Wind Block Island Project – 30MW, using Alstom 6.0MW WTGs.
- Deepwater Wind was also awarded a lease for a Wind Energy Area of 164,750 acres offshore Massachusetts and Rhode Island.
- Dominion Power was awarded a lease for a Wind Energy Area of 112,800 acres offshore Virginia.
- Other early development projects proposed:
    - Three 350MW Projects off the Coast of New Jersey
    - 25MW Fishermen's Energy Project off the Coast of New Jersey
    - 350MW Project off the coast of Delaware
    - 200MW Project off the coast of Maryland
    - 20 to 30MW Lake Erie Offshore Wind Project

Several of these projects are expected to achieve financial close and begin implementation activities in the next one to two years. For example the Cape Wind Project is fully permitted and has recently announced contracts with Siemens for supply of WTGs and an offshore substation, Weeks Marine for the installation vessel scope for foundation and WTGs, EEW and Bladt for the supply of foundations and transition pieces and Caldwell marine for the installation of submarine cables.

1.4.1.1 The US Department of Energy (DOE)

The DOE has been actively supporting the development of the Offshore Wind Industry in the United States for several years. In support of this the DOE has established several programs to provide funding to innovative projects that would help to continue the development of the US offshore wind industry while simultaneously reducing the levelised cost of energy (LCOE) for offshore wind.

In 2012 the DOE selected seven Offshore Wind Advanced Technology Demonstration Projects to each receive $4 million to complete the first phase of their projects, which included engineering, site evaluation, and planning. In May 2014, the DOE Wind Program selected three of these projects to advance to the second phase of the demonstration, which includes follow-on design, fabrication, and deployment in order to achieve commercial operation by 2017. The three projects selected are each eligible for up to $46.7 million in additional funding over four years. A brief synopsis of each project is provided below:

- Dominion Virginia Power – Virginia Offshore Wind Technology Advancement Project (VOWTAP) two 6MW direct-drive WTGs 42km off the coast of Virginia Beach, Virginia.
- Fishermen's Energy Atlantic City Windfarm five 5MW direct-drive WTGs in state waters approximately three miles off the coast of Atlantic City, New Jersey.
- Principle Power Windfloat five 6MW direct-drive wind turbines approximately 29km off the coast of Coos Bay, Oregon, demonstrating the use of a domestically-developed semi-submersible floating foundation.

1.4.1.2 Lake Erie Development Corporation (LEEDCO)

LEEDCO is spearheading an effort to build and install an initial 18MW demonstration project in Lake Erie known as "Icebreaker". LEEDCO was awarded funding by the DOE to advance the development of their lake specific solution. The studies performed in support of this project provide information that is relevant to other wind farms in the Great Lakes. An April 2009 Feasibility Study (juwi GmbH, 2009) conducted for the Great Lakes Wind Energy Center indicated that project was technically feasible pending confirmation of final site specific studies on geotechnical and wind resource assessment.

Windstream has signed a data sharing agreement with LEEDCO and has worked closely with the company for several years to share scientific studies relating to offshore wind in the Great Lakes.

1.4.1.3 Freshwater Wind

Freshwater wind has proposed an approximately 30MW demonstration project located approximately 16km offshore Cleveland, Ohio. The project received funding from the DOE to partner with industry experts to develop innovative Gravity Base Foundation (GBF) concepts for a 500MW utility scale project in the Great Lakes (Lake Erie) with an overall goal of lowering the LCOE by 25%. The scope of the Project included the development of a GBF foundation as well as the supporting, fabrication yards, launching systems and installation equipment, In April of 2014 Freshwater Wind and the Department of Energy published Freshwater's final report for "Shallow Water Offshore Wind Optimization for the Great Lakes: A Conceptual Design for Wind Energy in the Great Lakes". The report conclusions determined that GBFs can be employed in support of projects in the Great Lakes and have the potential to lower the LCOE.

Many of the cost reduction methods highlighted in the Freshwater Wind report are similar to the methodologies employed for the Wolfe Island Shoals Project. The similar strategies employed by Freshwater Wind and Windstream illustrate the feasibility of offshore wind projects in the Great Lakes. The engineering completed in support of the projects has continued the development of an appropriate "lakes specific" offshore wind industry.

1.4.2 Canada

There have been several offshore wind projects proposed in Canada, in addition to the Project addressed in this report.

Offshore projects proposed and described in public media include:

- Trillium I – 414MW, Lake Ontario (with potential for three follow-on offshore wind projects resulting in 3,500MW capacity)
- Toronto Hydro – Offshore met mast near Toronto for follow-on wind project
- Naikun Wind – 300MW – Hecate Strait, British Columbia.
- There are several other Canadian offshore wind projects also proposed on other Great Lakes which are in the early development phase.

With the exception of the Wolfe Island Shoals Project, most Canadian offshore wind projects remain in the development phase and have not been permitted to progress into financing and construction phases due to limitations imposed by individual provinces.

The projects planned for Lake Ontario have been prohibited from progressing to the final development stages due to the provincial government's moratorium on the development of offshore wind. The provincial government's moratorium has limited the ability of Ontario offshore wind projects to conduct the geologic and site characterization studies required to finalize project design. In addition the moratorium has also prevented the participation and cooperation of the provincial ministries in the necessary environmental studies.

Of all the Canadian offshore wind projects being proposed, the Wolfe Island Shoals Offshore Wind Project is the most advanced and likely the most commercially viable project with respect to its ability to obtain financing. The Project is the only offshore wind project in Canada with a binding a PPA with the OPA FIT program and interconnection agreement from the Ontario Independent Electricity System Operator (IESO).

1.5 Offshore Wind Project Case Studies

In the context of offshore wind projects located on the Great Lakes, it is important to look to other instances where offshore wind technology has been applied with conditions comparable to those of Lake Ontario. The Baltic Sea and Lake Vänern experience similar metocean conditions to the Project site and are employed as case studies. The Baltic Sea is the "birthplace" of offshore wind, and continues to experience significant project development. Lake Vänern in Sweden is the first large scale fresh water offshore wind farm and has often been used as a case study in support of Great Lakes based offshore wind projects.

1.5.1 Baltic Sea

The first offshore wind farm was constructed in the Baltic Sea near the Danish island of Lolland in 1991 and has operated successfully for over 20 years. Since that initial project 19 additional wind farms have been constructed and are operational in the Baltic Sea in Finnish, Swedish, German and Danish waters with an installed capacity of 1,143MW.

The Baltic Sea is a large enclosed body of water that ranges in salinity from that of the open ocean in its northwest tip to virtually fresh in the northeast. The Baltic is significantly larger than Lake Ontario and experiences much higher sea states. Literature produced by the Finish Environment and Meteorological Institute state that the water in the Baltic Sea east of the Danish Straits is considered brackish with, average salinity being lower than 10 PSU compared to the global oceanic average salinity of 35 PSU.[1] Figure 1-4 illustrates the salinity gradient of the Baltic Sea and the location of operational offshore wind farms. It can be seen from the map that virtually all of the Baltic Sea offshore wind farms are located in areas with a salinity level of 8 PSU or lower.

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[1] The Baltic Sea Portal – maintained by the Finnish Environment Institute, the Finnish Meteorological Institute and the Ministry of Environment in Finland

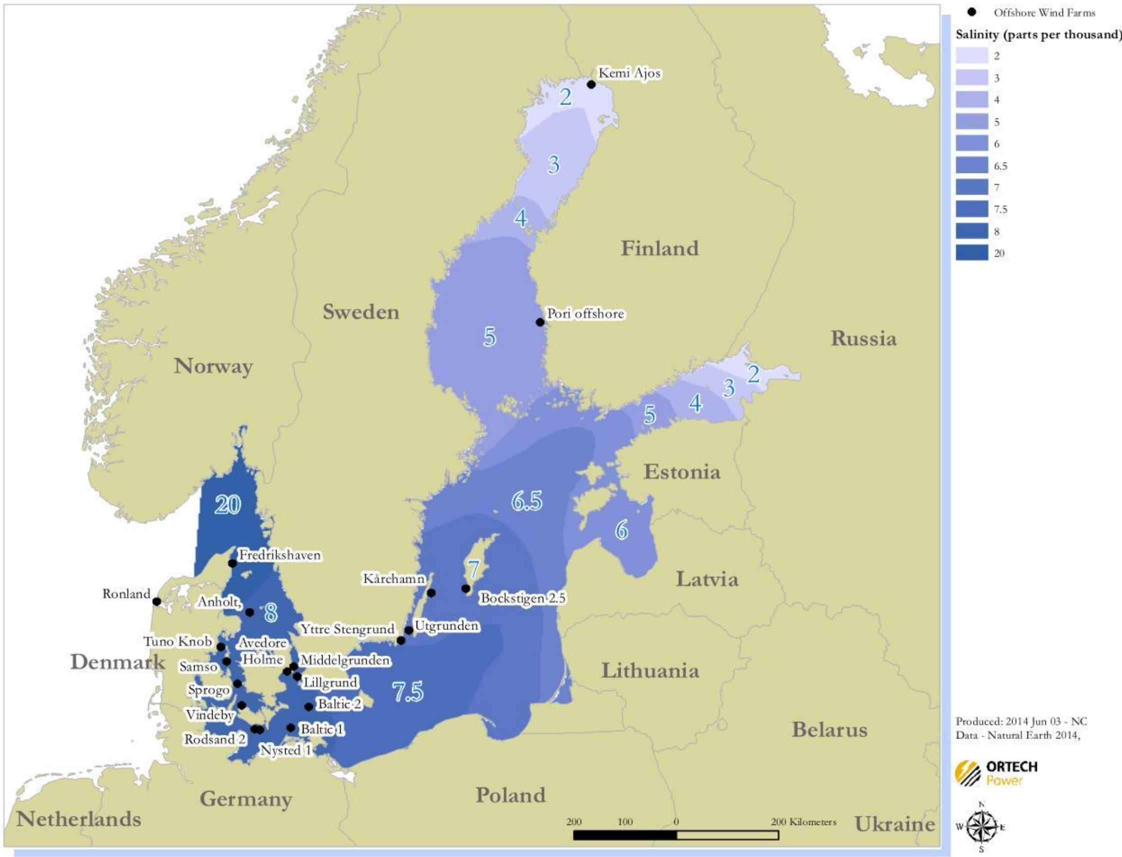

Figure 1-4: Baltic Sea Salinity and Operating Offshore Wind Farm's

The entire Baltic Sea experiences icing conditions that vary annually similar to conditions experienced on Lake Ontario. Icing conditions in the Baltic Sea range from heavy in the Gulf of Bothania to light in western portions where a complete ice covering develops less frequently.

An example ice chart of the Southern Baltic Sea and the Kattegat (the Western limit of the Baltic Sea) is provided in Figure 1-5 for the 2011-2012 ice season, the purple and pink areas of the chart depict ice that has formed. Ice charts are provided by Baltic Icebreaking management for the entire Baltic Sea and compare closely to those of the Canadian Ice Service and the United States National Ocean and Atmospheric Administration. It should be noted that the area of ice area indicated on the chart includes the majority of Danish offshore wind farms in the Baltic Sea including the newly commissioned 400MW Anholt Offshore Wind Farm.

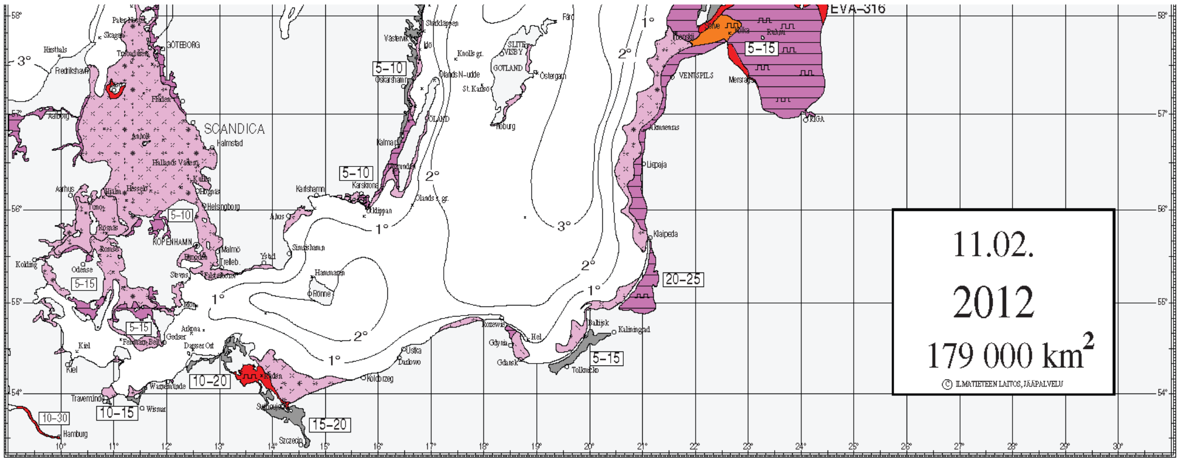

Figure 1-5: Southern Baltic Sea Ice Chart[2]

The recently completed 400MW Anholt Offshore Wind Project located in the western Baltic sea or Kattegat between Jutland and the island of Anholt provides a recent example of how offshore wind farms are designed to accommodate their environment, including icing conditions. The foundations for the Anholt Offshore Wind Project "have been constructed to manage the load from up to 40cm even ice, drifting ice and considerably thicker ice pack. The calculations are based on international standards and the historically registered conditions during previous severe winters. The calculations also take into account combinations of various weather situations and severe winters, including the risk that a storm may occur during a severe winter and result in large ice floes pounding against the foundations[3]"

The Anholt Offshore Wind Project was constructed by Danish Oil and Natural Gas A/S (DONG Energy), one of the leading developers of offshore wind projects. DONG Energy has nine operating offshore wind farms in the Baltic totalling over 1000MW. Similarly Vattenfall, a Swedish utility, operates two offshore wind farms with a combined capacity of 120MW in the waters north and east of Copenhagen.

These Projects, with sizeable investments, undertaken by experienced utility scale operators lend confidence to the fact that offshore installation can be successfully constructed and operated in areas that are subject to sea icing.

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[2] Baltic Sea icebreaking report 2011-2012 Baltice.org

[3] Dong Energy Anholt Offshore Wind Farm – Newsletter February 2013

1.5.2 Lake Vänern

There has been a 30MW wind farm in operation on Sweden's Lake Vänern since late 2009. The Lake Vänern offshore wind farm consists of 10 WinWinD 3MW WTGs installed on gravity foundations. The conditions on Lake Vänern are similar to those on Lake Ontario with each site subject to icing conditions. According to the website of ReWind Offshore AB, the developer of the Lake Vänern offshore wind farm, the project is located in water depths ranging from 1 to 22m, with an average distance of 7km from shore. It is expected that lessons learned from the Lake Vänern offshore windfarm will be available to the Wolfe Island Shoals Offshore Wind Project, especially issues related to the movement of pack ice.

The Project developers have proposed a new wind farm in Lake Vänern with up to 20 additional WTGs in the 3-4.5MW range and have submitted the required Environmental Impact Statement (EIS) for the project.

The Lake Vänern offshore wind farm developer has been actively engaged with participants of the LEEDCo in Ohio, the construction methods used on the Lake Vänern Offshore wind farm are considered informative.

Figure 1-6: Custom WTG Installation Vessel at Lake Vänern

1.5.3 Wolfe Island Wind Farm

The Wolfe Island Wind farm is a 200MW project located on Wolfe Island approximately 5km north of the Project site. This island based project is a precursor to the Wolfe Island Shoals project, the data and experienced gathered in executing the island onshore project informed the development of the offshore project.

Wind assessments conducted for the Wolfe Island onshore project had shown that higher wind speeds were available over water and near shore than in most other Ontario onshore areas. The projects island location required the employment of many of the same means and methods associated with offshore wind farm construction, including:

- WTG delivery: WTGs for the project were delivered by sea transport to the Port of Ogdensburg NY. The WTG components were staged at the port and loaded onto transport barges for delivery to the project site.

- The Project's 200MW size and distance to a suitable grid connection point required the installation of a submarine cable to interconnect the wind farm to the Ontario grid.
- The Wolfe Island project required many of the same environmental investigation and permitting requirements required for an offshore project including cable route studies, drinking water impacts, geotechnical investigations and avian studies.

1.6 Fresh Water Project Advantages and Design Considerations

SgurrEnergy compiled a list of advantages that fresh water offshore wind projects will experience when compared to ocean or salt water based projects. This list was compiled from several sources of information including SgurrEnergy's database of projects. A summary of these "Fresh Water Advantages" is as follows:

- The wave environment is significantly lower than that experienced in the ocean environment. This is a significant advantage that favourably impacts, design, construction, and O&M activities.
- Tropical storms are rarely experienced at Great lakes locations this simplifies design and reduces the risk of delays during construction and reduces operational risks.
- Less severe wave regime permits the use of lower cost installation methods and vessels as well as reducing access challenges for maintenance activities.
- The project installation methodology can be designed to capitalize on existing lakes capable vessels and facilities avoiding specialist offshore wind installation vessels from Europe should allow additional cost optimisation to be achieved.
- No tidal impacts simplifying design, construction activities, and O&M activities.
- Freshwater environment is less corrosive leading to lower maintenance costs over the life of the Project.
- The Project site experiences annual icing that will be considered as project design continues. Icing is a design consideration that is routinely accounted for in the design of fresh water structures including offshore wind foundations.
- Winter marine conditions which include icing will continue to be a component in the development of the Project O&M strategy. O&M access strategies for marine facilities in similar environments are well developed and will be useful in the continued development of the Project O&M plan.

1.7 Offshore Wind Case Study Summary

In SgurrEnergy's opinion the Wolfe Island Shoals project is feasible. Our opinion is based on our direct involvement in the offshore wind industry and the experience gained by the industry that has come from building and operating offshore wind projects for nearly 20 years. The successful operation of over 1,100MW of offshore wind in the Baltic with conditions similar to those expected at the project site is the most concrete evidence available that the construction and operation of the Wolfe Island Shoals project is feasible. Additional site specific factors that support our opinion include:

- The site investigations completed by Windstream.
- Continued development of Great Lakes specific foundations and associated installation strategies.
- The successful installation and operation of the nearby Wolfe Island wind farm provides specific relevant local evidence that the wind resources and site conditions are conducive to wind energy projects.
- Extensive continued development of offshore wind projects in the Baltic region.

The 1,143MW of operational and planned offshore wind farms in the Baltic Sea the Lake Vänern offshore wind farm, the development efforts completed by LEEDCO and Freshwater Wind provide a robust directly applicable knowledge base that can be employed in support of the Wolfe Island Shoals project. The experience working in cold climates with significant icing gained by these operating projects is a significant advantage.

The over 4,600MW of operating offshore wind farms installed globally confirms that offshore wind is a viable and feasible method of generating renewable electricity. The Wolfe Island Shoals project fits well within the parameters of the existing industry and is feasible.

2 Project history

2.1 Summary of Development History

The founder of Windstream, Ian Baines, is also the founder of Canadian Renewable Energy, the original owner and operator of the existing 200MW Wolfe Island onshore wind project. As the owner and operator Ian was responsible for the early development of the Wolfe Island onshore project. The Wolfe Island Shoals offshore project was a direct result of Ian's experience on the Wolfe Island onshore project.

The wind assessments conducted for the Wolfe Island onshore project illustrated that higher wind speeds were available over water and near shore than in most other Ontario onshore areas. At the same time, European wind developers were developing offshore projects that demonstrated technology and construction methods.

Because of the Wolfe Island onshore project location many of the same logistical challenges associated with offshore wind farm construction were encountered. Examples included the transport and delivery of project materials and WTGs via barge, the installation of submarine cabling and permitting. This experience combined with studies completed in support of the Wolfe Island onshore project formed the basis of the original Wolfe Island Shoals offshore project analysis.

More recent resource analysis work has confirmed the high wind speeds offshore. Confirmation of the wind resource at the Project site has been conducted and confirmed by three independent and respected meteorological firms working from a dozen nearby wind measuring sources in Canada and the US. These include a mast and SoDAR unit erected on Long Point, adjacent to the project site, NOAA and Environment Canada offshore buoys, airport wind speed measurement and wind measuring stations maintained by Environment Canada as well as the National Weather Service. The combination of wind speed measurements around and within eastern Lake Ontario and the multiple measurements on Wolfe Island itself provide a good assessment of the site wind resource. It should be noted that a number of these stations have been collecting data for in excess of 20 years. The data collection at the Long Point site commenced in 2012 and continues to this day.

Ontario considers all lakes and rivers as Crown Land. Crown land makes up about 86% of the province's land base. The disposition of crown land for wind power is regulated through various policy instruments under the *Public Lands Act* with policy updates implemented as required. On 28 January 2008, the Ontario Ministry of Natural Resources (MNR) updated the policy entitled "*Windpower Site Release (Non-competitive) for Crown Land" PL 4.10.04 Policy and Procedure which included* off-shore submerged lands. Windstream submitted applications for Lease of Crown Land in accordance with the policy on 08 February 2008, and received letters confirming these applications were suitable for an OPA application under the FIT program in the fall 2009.

In November 2009, Windstream contracted ORTECH to assist with the Project's application for a FIT Contract. ORTECH provided project management for the applications, which were made in the names of subsidiary firms specific to each of the eleven Sponsor's proposed wind project sites. An application for a 300MW project was made in the name of Wolfe Island Shoals Inc., a subsidiary of Windstream Energy LLC. A FIT contract for the Project was announced on 08April 2010, awarded on 04 May 2010 and formally executed in August 2010.

A delay in the execution of the FIT was proposed by the OPA in order for Windstream to understand the potential impact of a government study that could require offshore turbines to be located 5km from the shoreline. Windstream determined that it was able to accommodate this change if it became a requirement and proactively reconfigured the Project in support of this proposed regulatory change. The project configured with the 5km setback from the shore or major islands is illustrated in Figure 2-1.

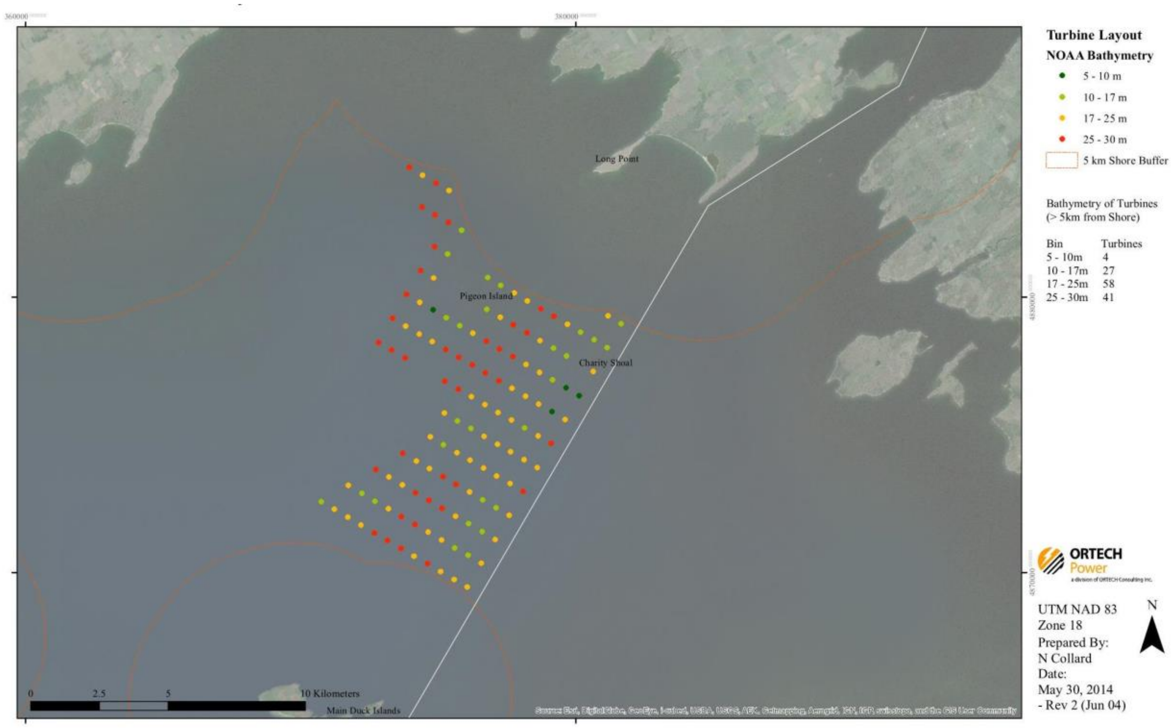

Figure 2-1: Project layout 5km Setback

A visualization of the Project looking south from Wolfe Island with the 5km setback is provided in Figure 2-2.

Figure 2-2: Visualization of Wolfe Island Shoals Project

It should be noted that, the 5km setback requirement has yet to be confirmed by a change in regulations. The current setback for wind turbines of 550m from sensitive receptors (e.g. homes) remains the regulatory minimum.

Windstream and ORTECH have indicated that the setback study was never completed and no offshore wind set back limit has been applied. The project layout assuming the 550m setback is illustrated in Figure 2-3.

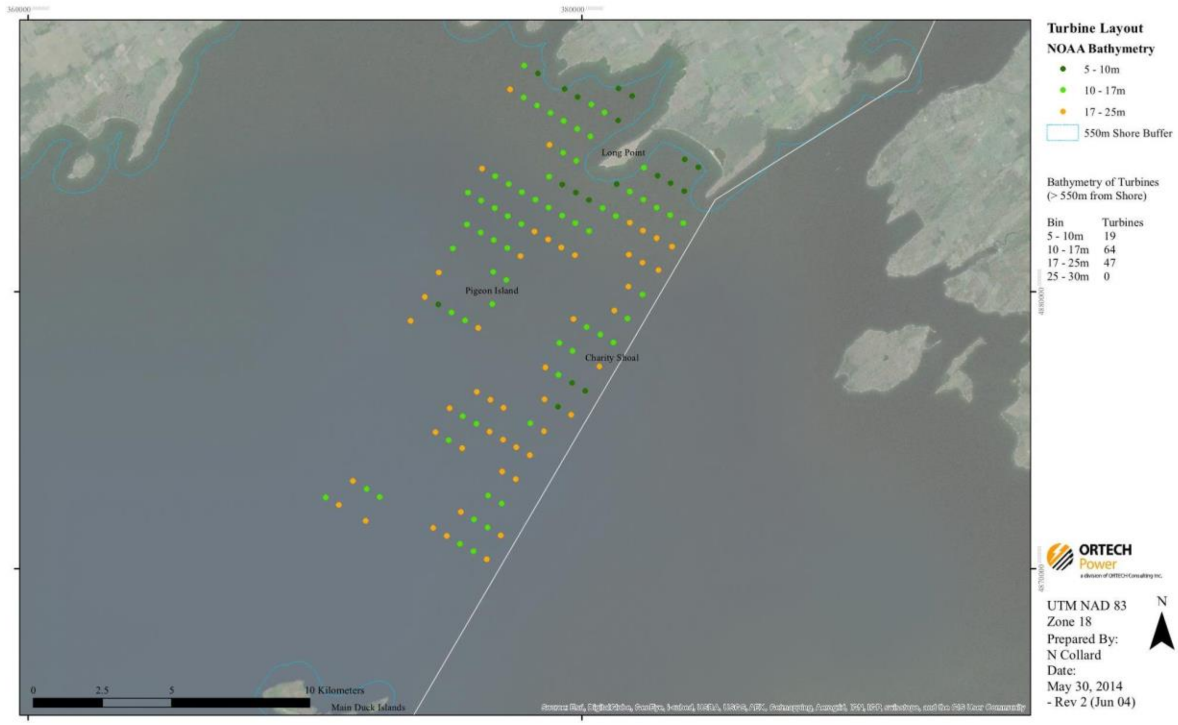

Figure 2-3: Project Layout 550m setback

Immediately after the FIT contract award was confirmed, Windstream engaged key service providers to assist in the early development work. ORTECH has served as overall project manager since April 2010. Early tasks included the development of a Project Management Plan including preliminary schedule, budgets and critical path analysis. Windstream has reported that starting in May 2010, a process of weekly (or more frequently as necessary) project management meetings was initiated to identify, prioritize and track tasks.

Project development activities increased significantly in 2010 after the FIT contract award and have continued to the present. Consultants conducted studies relating to cost projections, energy yield estimates, foundation design and environmental issues, while gathering available technical and scientific literature. Additionally the team worked to engage stakeholders and to interact and coordinate with the appropriate government ministries.

In February 2011, a moratorium on offshore wind development was announced by the provincial government. The result of the moratorium policy was that the Ministry of Environment indicated no Renewable Energy Approvals (REA) would be issued for offshore wind projects. In conjunction with the Ministry of Environment ruling, the Ministry of Natural Resources indicated that all applicants without FIT Contracts would have their access to Crown Lands removed.

The specific reasoning behind the moratorium was not well defined nor have the requirements for removal of the moratorium been announced. Despite the moratorium, Windstream has taken concrete actions to continue the advancement of the Project.

In September 2011, the OPA provided a waiver of their right to terminate the FIT Contract for convenience. In support of this waiver, Windstream signed a binding Turbine Supply Agreement (TSA) with Siemens.

Windstream reports that in November 2011, the OPA placed the project in Force Majeure as a result of uncertainty about when the crown land application would be concluded. The crown land application is a necessary next step in conducting the required REA studies, as it defines the project area in detail.

Despite the hindrance of the moratorium, Windstream indicates its intention to meet its commitments of the FIT contract, which includes meeting a commercial start date five years after the contract date. The FIT contract remains valid and as Windstream has not received information as to when the moratorium will be suspended they have been required to continue development activities to meet the five year FIT contract. Windstream has continued project management activities and conducted substantial engineering works, environmental review, wind resource assessment, logistical and supplier review.

In support of these efforts Windstream has continued to employ consultants, environmental, civil, electrical and mechanical engineers, wind analysts, scientists and project managers to continue project development activities so that sudden removal of the moratorium will not compromise their ability to reach commercial operation with the tight time constraints imposed by their FIT contract.

2.2 Studies Performed

Windstream has conducted a significant amount of investigation, a long-term wind measurement campaign and studies to support the development of the Project and to confirm its feasibility. These studies are comprehensive and have generally followed industry prudent practice in undertaking the steps to successfully develop an offshore wind project. These studies are referenced in this report and form the foundation for ongoing further development activities.

It is worth noting that Windstream has assembled a highly-qualified team of professional consultants to assist in the development activities and studies. Aside from the specifics of the Project site and Lake Ontario, these consultants have extensive expertise in their respective fields and familiarity with offshore wind projects. Accordingly, these parties bring significant knowledge, data bases, and lessons learned to the Project.

A detailed list of key technical and scientific reports produced completed to date are listed in Appendix A.

2.3 Current Status

SgurrEnergy believes Windstream has conducted sufficient studies to confirm the feasibility of the Project, based on the level of information typically gathered for major offshore wind farms in Europe at a similar stage of development.

Typical next steps involve more extensive final studies to confirm site characteristics for permitting activities, final design, and obtaining sufficient data for refinement of final construction costs and the financial model. These final studies are needed to take the project from its current state of development to financial close and on to construction.

These final studies would generally include:

- Comprehensive geotechnical and geophysical bottom explorations, including borings, to inform decisions on foundation type, foundation design, and underwater cabling.
- Offshore metocean measurement campaign with wind and wave measuring equipment located offshore.
- Environmental studies as may be required.

With the data resulting from these studies, Windstream would be able to conclude a more detailed foundation and electrical system design. Decisions based on these studies will inform the final project design, which in turn will determine, construction planning, installation vessel characteristics, identification of the supply chain, construction costs, and implementation schedule.

Windstream has advised SgurrEnergy that the final study activities identified above have been unable to occur due to the Ontario offshore wind moratorium.

3 Sponsor Capabilities

3.1 Investors

Windstream Energy LLC is a corporation organized under the laws of Delaware, USA. Windstream Energy LLC holds 100% of the shares of Windstream Energy Inc., a corporation incorporated under the laws of Ontario.

Windstream Energy LLC is owned by a New York-based investment group with over 35 years of substantial experience in the energy and technology sectors. The firm makes early stage investments in internet technology and financial services start-ups, as well as oil, gas and alternatives energy companies.

Its investors together have founded and later sold firms with an aggregate value of more than $11 billion, and currently have over $300 million invested in controlling stakes in a range of energy and technology companies worldwide. Ontario`s well publicized desire to attract investment in renewable energy came to the attention of Windstream's investors who founded the firm to invest and develop renewable energy projects.

As founders and operators of the largest offshore oil and gas drilling firm in America (R and B Falcon), Windstream's investors wanted to take advantage of their special expertise in offshore exploration and development to undertake significant offshore wind projects. The Wolfe Island Shoals Offshore Wind Project met their desire for a large capital investment, in a stable political climate and backed by a government contract that would leverage their US based energy and offshore experience.

3.2 Windstream Energy Inc.

The Project is being developed by Windstream Energy Inc. a wholly owned subsidiary of Windstream LLC. Windstream Energy Inc. supports the development of commercial, large scale wind projects. It has built a portfolio of wind projects in Ontario, British Columbia and Wyoming. The Ontario portfolio is the largest and most advanced of the portfolio, comprising eleven wind projects in total.

Windstream Energy Inc. was initially formed in 2007 as Ontario Clean Power Limited. The team developed several water power projects, including three with power sale agreements with the Ontario government. These projects confirmed the team's ability to build projects in the water as well as their ability to obtain the required approvals from the provincial agencies including the Ministry of Natural Resources and Ministry of the Environment. Ian Baines has been an owner and developer of nine hydroelectric projects in the province starting in 1992.

3.2.1 Windstream Energy Project Management Team

Windstream has a project team composed of seasoned veterans, some of whom were key participants in the Wolfe Island Onshore Wind Project. The Wolfe Island Onshore Wind Project is an operating 200MW windfarm utilizing Siemens 2.3MW WTGs. It is currently owned by TransAlta, an Alberta based utility.

Key project team members are:

- **Ian Baines, P.Eng. – President**

Ian graduated from Queen's University with a B.Sc. in Electrical Engineering in 1974, and has held a number of Directorships in the provincial energy sector, including the Ontario Water Power Association, Association of Power Producers of Ontario, Policy Advisory Council on Energy, Renewable Energy Task Team (Ontario), and Assistant Deputy Ministers Committee on Energy (Ontario).

Ian is a successful renewable energy project developer who has specialized in the development of commercial wind and small hydro projects for more than two decades. He is a Professional Consulting Engineer who has founded or held senior executive roles in several Canadian energy corporations, including Canadian Renewable Energy Corporation, Barrington Wind Energy Limited, Swift River Energy and Marsh Energy. Ian has extensive project management and engineering design experience gained in a wide variety of wind power, water power and cogeneration projects. He has been owner and engineer for two 200-megawatt wind energy projects and five small hydro projects in Ontario.

Ian was instrumental in conceiving and developing the Wolfe Island Wind Project. In the early 1990s, Ian and Fred Siemonson began to study the viability of WTGs on Wolfe Island. Eventually he formed Canadian Renewable Energy Corporation to develop The Wolfe Island Onshore Wind Project with Ian as its President and Chief Operating Officer. In 2004, Canadian Renewable Energy Corporation had joined forces with partner, Calgary-based Canadian Hydro Developers Inc. to continue the development of the Project, as well as another 200MW wind project at Melanchthon, Ontario. In time both projects were built successfully operate today under provincial government power sale contract. Ian has also built several small hydro projects as well as the first municipal district energy project in Ontario. He also has been engineer and constructor for a number of firsts, including hospital cogeneration plants and a large scale downtown energy centre that provides heating and power for a medium sized town. He extensively used Finnish and Swedish district energy expertise. At the same time as he was learning from the Europeans about district energy, he was developing the first concepts for Wolfe Island Wind. Ian is quick to credit European experience with forming his ideas, many of which were gained while living and working in France and Switzerland in the eighties and nineties.

- **Nancy Baines, B.Sc. – Director, Finance & Administration**

Nancy is an experienced executive who joined Windstream Energy in 2008 with over 32 years of business management experience in the pharmaceutical industry. During the course of her career, she has developed extensive skills in general management, including business development, operations, regulatory matters, financial analysis, marketing, sales and human resources. Nancy obtained a B.Sc. (Biochemistry) from Queen's University in 1976, and has completed numerous executive education courses (Harvard University, 1999, IMD International, Lausanne, 2001 and Rotman School of Management, University of Toronto, 2002). Prior to joining Windstream Nancy ran the operating divisions of two major international pharmaceutical corporations. She was responsible for operations in North America and the Caribbean.

- **Karen McGhee, P.Eng. – Technical Consultant**

Karen is a Consulting Engineer at McGhee-Krizan Engineering, Ltd. with over 15 years' experience in the energy sector. Her industry experience includes project management, independent engineering reviews/audits, environmental assessment, design, feasibility studies, energy and revenue forecasting, and construction administration. Karen is a graduate of the University of Western Ontario with a degree in Civil Engineering (B.E.Sc). Karen has worked with Ian as engineers on a number of waterpower as well as wind projects.

- **Fred Siemonson, P.Eng. – Technical Consultant**

Fred has been actively involved in renewable energy projects since 1993, most notably with the early development of the Wolfe Island wind power project near Kingston, Ontario. He earned a B.Sc. (Mechanical Engineering) from Queen's University in 1954, and since then, has held a wide variety of positions with increasing responsibility in light manufacturing and physical plant management. Fred has managed local stakeholder engagement on Wolfe Island and around the Kingston area continuously since 1993. He has also coordinated on-the ground activities such as met mast installation and operation, bathymetric surveys and geotechnical studies.

Fred teamed with Ian Baines at Canadian Renewable Energy Corporation in the conceiving, studying, and securing land options for the Wolfe Island Onshore Wind Project. In his capacity as Manager of Physical Plant for Kingston area hospitals Fred worked with Ian on several district energy and hospital cogeneration studies.

3.3 Core Team Members

3.3.1 ORTECH

ORTECH has been acting as the lead consultant under contract to Windstream. ORTECH with offices in Mississauga, Sarnia, and Windsor, Ontario, serves clients in the industrial, manufacturing, municipal, and renewable energy sectors throughout North America.

ORTECH Environmental and ORTECH Power are the divisions of ORTECH involved in the Project. ORTECH Environmental has been performing permitting and compliance services in Ontario for over 40 years. ORTECH Power is focused on consulting services for renewable energy projects assisting developers with wind, solar, and hydro-electric projects. ORTECH Power offers technical due diligence and other services to renewable energy projects under development, construction and operation. They have extensive experience in industrial project permitting, planning, and renewable energy assessment.

ORTECH also has a meteorological division that provides expert wind analysis and resource assessment. ORTECH conducted early resource analysis which confirmed the potential wind resource offshore. This was based on extensive modelling conducted for the Wolfe Island onshore project over several years.

ORTECH has an organization of over 40 staff members and reports it has completed over 500 renewable energy projects in the last ten years. The company's experience includes the following notable projects:

- **RMS Energy**

  ORTECH was instrumental in all phases of the development, construction and financing of this 54MW wind facility located in Pictou County, Nova Scotia. Services provided by ORTECH included wind resource analysis, turbine selection, negotiation of turbine supply and operations support agreements with General Electric, turbine layout and micro-siting, negotiation of equity and debt financing, budgeting and project management. The facility entered into commercial operation in November 2009.

- **Erie Shores Wind Farm**

  This 99MW wind farm located on the north shore of Lake Erie at Port Burwell, Ontario was acquired by Macquarie Power and Infrastructure Fund in 2007. ORTECH provided due diligence services to Macquarie including a review of wind data and an assessment of operational performance.

- **Horizon Rimouski**

  Horizon Legacy Energy engaged ORTECH as a technical advisor with respect to a proposed 100MW wind project located in Rimouski, Quebec that was entered into the Hydro-Quebec 2007 RFP for 2000MWs of wind power. The project involved the use of computational fluid dynamic modelling for wind in complex terrain and sophisticated financial modelling employing multiple indices, currencies and turbine configurations.

- **Canadian Research Energy Corporation**

  ORTECH was a founding shareholder of the Canadian Research Energy Corporation with one of its principals, Uwe Roeper, taking a lead role of what was to become the Wolfe Island Onshore Wind Project.

ORTECH Power has a comprehensive view among renewable energy firms in North America in that its principals originally entered the power business as developers. ORTECH literature indicates that ORTECH Power has assisted in the arrangement and backing of debt and equity capital for multiple wind power projects to a total of over $400 million in recent years. The specific recent experience of officers of ORTECH includes:

- **Wolfe Island Wind Farm:** Arranged $205 million in conditional equity and debt commitments for a 99MW wind project near Kingston, Ontario
- **Christian Island Wind Farm:** Assisted in arranging $161 million in conditional equity and debt commitments for a proposed 75MW wind project near Midland, Ontario.
- **Lakehead Wind Farm:** Assisted in arranging $222 million in conditional equity and debt commitments for a proposed 100MW wind project near Thunder Bay, Ontario.
- **Memramcook Wind Farm:** Assisted in arranging $76 million in conditional and debt commitments for a proposed 35MW wind project in New Brunswick

3.3.2 Siemens

Windstream has entered into a TSA with Siemens Wind Power to supply, erect, and commission the WTGs. Siemens is the world leader in offshore wind energy and their involvement is seen as very beneficial for the Project given their financial and technical strength, experience in Ontario, and extensive global fleet of onshore and offshore WTGs.

Siemens is a core member of the Project team and will have a critical role with involvement in all aspects of planning and execution. There is further discussion of the WTGs and Siemens role in the Project in Section 6 in this report.

3.4 Supporting Team Members

3.4.1 AWS TruePower

AWS Truepower of Albany, New York, is a respected and experienced firm in the field of wind resource assessment. The company has been involved with the assessment of several potential offshore wind sites in North America. Corporate literature indicates AWS TruePower has a team of 75 meteorologists, engineers, and specialists with 50GW of project experience of both onshore and offshore wind projects.

AWS Truepower has a good reputation in the renewable energy industry preforming various analyses relating to offshore wind energy. As a leading consultancy for offshore wind development in North America, AWS Truepower performs offshore wind resource assessments and met ocean studies, including met tower design and review. They employ innovative measurement techniques using floating platforms, jack-up barges, and remote-sensing technologies for wind measurement and atmospheric characterization such as LIDAR and SODAR. They are also an active participant in leading offshore industry studies, including the evaluation of new technologies

AWS Truepower has supported Windstream in assessing the wind resource data and performed an independent energy yield analysis.[4]

AWS Truepower has built up a considerable amount of onshore and offshore wind modelling experience, which is seen as a material benefit to the Project.

3.4.2 GL Garrad Hassan

The company has supported Windstream in assessing the wind resource data and has performed a preliminary energy assessment[5].

GL Garrad Hassan is one of the world's largest renewable energy consultancy. It offers independent technical and engineering services, products, and training courses to the onshore and offshore wind, wave, tidal and solar sectors across the globe.

[4] CITATION AWS13 \l 1033 July 9, 2013

[5] GL Garrad Hassan, 30 September 2013

GL Garrad Hassan has been acknowledgied as a very competent technical authority on onshore wind for nearly three decades. This long term industry involvment has provided significant technical expertise that has been applied and adapted to the offshore wind market. This expertise combined with isignificant offshore project managementexperience, earn GL Garrad Hassan a good reputation for their ability to provide support to developers.

A fomer Canadian renewable energy consultant, Helimax was acquired byGL Garrad Hassan in 2007, supporting a global expansion of the firm.

3.4.3 Zephyr North

Zephyr North's has been retained by Windstream to provide wind resource data collection and analysis. Zephyr North is one of Canada's most experienced companies in the wind resource assessment services sector. The company has carried out a wide variety of projects through the years including: field measurement and field experiment campaigns, provincial wind atlas and wind map generation, numerical modelling of wind flow in complex terrain, management of large arrays of wind monitoring stations, development of data processing software, wind farm design, and more. The company provides services in every province in Canada as well as internationally. They have services to a wide variety of private and public customers including numerous utilities, developers and WTG manufacturers.

3.4.4 Mott MacDonald

The Mott MacDonald Group has been engaged for the project to provide high level costing estimates for the project. Mott-MacDonald is a diverse management, engineering and development consultancy delivering solutions for public and private clients world-wide. They have a long history of providing these services for projects with extensive experience in all aspects of power generation including transmission and distribution. The company has provided services for numerous offshore and onshore wind projects throughout the world with recent experience with Ontario based projects. Mott-MacDonald provided initial high level costing data[6]

[6] Mott MacDonald, October 12, 2012

3.4.5 WSP/Genivar

WSP/Genivar has been retained by Windstream to provide electrical design services for the project. With headquarters in Montreal, Quebec, WSP is one of the world's leading professional services firms, working with governments, businesses, architects and planners and providing integrated solutions across many disciplines. The firm provides broad services from civil engineering, large infrastructure projects, energy, environmental, and other technical services. It has approximately 15,000 employees, mainly engineers, technicians, scientists and architects, as well as various environmental experts, based in more than 300 offices, across 35 countries, on every continent. WSP performs wind resource analysis and wind farm design with over 25 years of experience. The company advised it has designed over 80% of the installed wind power capacity in Western Canada and nearly 40% nationwide. WSP is active in all Canadian provinces.

The company is acting as the owner's Balance of Plant (BoP) engineer, undertaking studies on under water cabling, electrical interconnection, and onshore electrical works (Genivar, April 2010 to December 2012) .

3.4.6 Canadian Seabed Research Ltd [Geophysical]

Canadian Seabed Research Ltd. was founded by in 1985. Canadian Seabed Research has grown into one of the leading Geophysical Survey companies in Canada, specializing in Marine and Ground Geophysical surveys.

The company's experience is reported to range from inland lakes to major rivers, coastal bays and full ocean depth environments. Canadian Seabed Research has conducted surveys in Canada, Russia, the South China Sea, Norway, the Caribbean, South America, Alaska and the High Arctic. Survey solutions are innovative and based on a thorough understanding of marine geologic and geophysical principles.

Canadian Seabed research has conducted initial marine surveys for Windstream for the Project Area and export cable Area (Canadian Seabed Reserach Ltd., March, 2011).

3.4.7 Canadian Hydrographic Service

Windstream co-founded a detailed bathymetric study of the near shore cable route with the federally owned Canadian Hydrographic Service (CHS). Equipment and boats were provided by CHS and data sharing with the federal government initiated. Much of the project area had not been surveyed in detail before and federal agencies were interested in learning as much as possible from Windstream's work (Canadian Hydrographic Services, January 2011).

3.4.8 Baird

W.F Baird and Associates in association with G. Comfort Ice Engineering Ltd. completed an Ice Study for the Project, in December of 2012. Baird also drafted a study comparing metocean and marine specific conditions of Lake Ontario and the Baltic Sea in October 2013. Baird is an international coastal design firm. Baird provides engineering, design and construction services for complex coastal projects. G. Comfort Ice Engineering is an experienced engineer with 35 years of experience, who specialized in Artic and Cold Regions engineering. (Baird & Associates Coastal Engineers Ltd, December 21, 2012)

3.4.9 HGC Engineering

HGC Engineering is Canada's largest consulting engineering firm specializing exclusively in noise, vibration and acoustical studies. HGC was retained by Windstream to provide acoustical modeling for the Project[7]. HGC routinely undertakes acoustical studies and provides technical input to regulatory changes for the Ministry of the Environment.

3.4.10 M.K. Ince and Associates Ltd.

M.K. Ince and Associates Ltd. (MKI) is an engineering consulting firm with extensive experience in providing REA and permitting services to Ontario developers, as well as wind energy facility engineering, construction, and post-construction monitoring.

The company was retained to complete a scientific review of the literature on the impacts of offshore wind energy projects, a preliminary Natural Heritage Assessment Records Review of the proposed Wolfe Island Shoals project area, and a fatal flaws analysis for the Wolfe Island Shoals project under the existing Renewable Energy Approval regulations.

3.4.11 COWI

COWI and Ocean and Coastal Consultants (OCC) the North American division of COWI developed the foundation conceptual design, and installation strategy for the offshore components of the Project.

COWI is an international engineering, environmental science, and economics consultancy headquartered in Copenhagen Denmark. COWI was founded in 1930, and has a team of 6,500 employees with offices in 35 different countries. OCC joined COWI in 2007 and maintains five offices in the United States with a focus on waterfront engineering projects.

[7] HGC Engineering, August 26, 2013

COWI has designed 184 of the offshore wind gravity foundations that are either fully commissioned or under construction and nearly 14% of all European offshore wind foundations. OCC has been actively engaged in the offshore renewable energy market in North America and Europe since 2003 designing offshore foundations including monopiles, offshore jackets, suction pile foundations, driven piles, hybrid foundations, and gravity based structures. OCC/COWI has supported numerous US DOE efforts to support the development of offshore wind, including: detailed analyses of North American port and terminal facilities and their capacity to support the development of the offshore wind industry, the Freshwater Wind program developing Great Lakes specific offshore wind strategies and Nautica's Advanced Floating Turbine project.

3.4.12 Weeks Marine Inc.

Weeks Marine is a 94 year old privately owned company specializing in marine construction with other divisions of the company working in dredging, stevedoring, heavy lift & salvage, towing, and equipment charter. Recently Weeks Marine was the contract for the Offshore Installation Works for the 468MW Cape Wind Project, the first commercial scale offshore wind farm. This scope includes the provision of all vessels and labor to support the installation of foundations, WTGs and the offshore substation.

Weeks Marine is the largest marine contractor on the East Coast of North America completing projects in North, Central, and South America. These projects include the design, construction and rehabilitation of LNG berths, docks, piers, wharfs, offshore platforms, specialized ship mooring systems, breakwaters, submarine pipelines and cables. Weeks Marine owns one of the largest marine construction vessel inventories in the United States.

3.5 Other Project Participants

3.5.1 Ontario Power Authority

The OPA is the agency of the Ontario government responsible for ensuring a reliable, cost-effective and sustainable supply of electricity for Ontario. Their main activities are focused on strategic co-ordination of conservation efforts across the province, planning the power system for the long term, and ensuring the development of needed generation resources. The OPA purchases all power used by the IESO the provincially owned operator of the Ontario electrical grid. The OPA granted the FIT contract for the Project (Ontario Power Authority, 04 May 2010).

3.5.2 Independent Energy System Operator

The Independent Energy System Operator (IESO) manages Ontario's electrical grid. IESO performed a system impact assessment of the Project that determined that the incorporation of the Project into the grid would have no adverse impact on grid reliability. (IESO, 08 November 2010). The IESO also confirmed the project size by confirming that 300MW of capacity existed at the proposed connection site. After the FIT contract was issued the IESO requested a minor change in connection point, which Windstream confirmed.

3.5.3 Hydro One Networks Inc.

Hydro One Networks Inc. (HONI) performed a Customer Impact Assessment to determine the impact of the Project on existing customers connected to the transmission system. Hydro One determined the Project will increase the supply available to the Lennox area. It will provide generation in the area when Lennox Generating Station is operating at a lower capacity as well as the possibility of voltage support in the Lennox region. It is not expected to adversely impact the transmission customers in the area. (Hydro One Networks Inc., November 2010)

3.5.4 Lake Ontario Offshore Network (LOON)

The Lake Ontario Offshore Network (LOON) is comprised of large and small employers in the Hamilton, Burlington, Niagara and Kingston areas. The consortium of companies employs more than 7,000 people in Ontario and is comprised of companies that would supply and maintain the industry. LOON members are providing supply chain information to Windstream.

3.6 Project Participants Summary

Windstream has assembled a strong team with experience developing projects, in Ontario, North American and internationally. The in house team has a proven track record of developing successfully projects and has been prudent in its selection of partners. The project partners skills sets are well developed in their applicable sectors and their work product have supported Windstream's efforts to progress the Project. Notable team members include Siemens, Genivar, GL Garrad Hassan and Mott Macdonald that bring international experience to the team. In SgurrEnergy's opinion the team selected by Windstream has the experience required to move the Project through the design development phase and into the final design and implementation phase. Additional experience is readily available from participants in current European offshore wind farms, above and beyond the considerable experience already available to the Project via the current participants.

4 WIND TURBINE GENERATORS (WTGs)

Windstream entered into a TSA with Siemens Wind Power in November 2011 to supply, erect, and commission the WTGs. Siemens is the world leader in offshore wind energy and their involvement is seen as very beneficial for the Project. Siemens' history in Ontario and their financial and technical strength coupled with their global experience in the onshore and offshore WTG market make them a welcome addition to the project team. Siemens and Windstream agreed to an installed cost per MW of 1,700,000 Euro, for 130 2.3MW WTGs for a combined output of 299MW. This amount will be adjusted based upon actual turbine supply prices at the time of confirming the final order (post removal of the moratorium). This translates to a total TSA contract value of €508,300,000 or $706,886,000 (assumes a November 2011 exchange Rate of €0.719 = $1.00). Siemens requires that a Notice to Proceed be issued 24 months prior to the scheduled installation of the first WTG. This agreement is subject to review and re-pricing when the provincial moratorium is lifted. Pricing provided in the TSA assumes production of the WTGs commences in 2014. (Siemens, 29 November 2011)

4.1 Turbine Supply Agreement

Technical schedules for the TSA for the SWT-2.3-113 for the Project were reviewed. The scope of supply appears to be in line with industry standards for an offshore wind farm. The TSA contractor is responsible for supply of the WTGs and switchgear. However, Windstream is responsible for offshore transport and provision of installation vessels. While not an uncommon contractual arrangement, there are many interfaces between the TSA and implied transport and installation vessel contracts that will require careful attention to not hinder the project construction schedule and appropriately allocate risk.

Siemens' work scope includes:

- Supply of 130 2.3MW DD-113 WTGs.
- WTG Switchgear (shipped loose for mounting by Sponsor).
- WTG SCADA System.
- WTG delivery to the staging harbor.
- WTG erection (transport to offshore wind site and crane vessel by Sponsor).
- WTG commissioning and test.

4.2 Selected Wind Turbine Generator Model and Technology

Windstream has selected the Siemens 2.3MW direct drive WTG with a 113m diameter rotor (Siemens 2.3ME DD-113). The general characteristics of this model are identified in Table 4-1 below.

Table 4-1 : Turbine Specification Assessment

WTG	Rotor Weight (t)	Nacelle Weight (t)	Blade Length (m)	Power Train Design	IEC Class	Tower Design and Height (m)	Generator Transformer Design and Position
Siemens SWT-2.3 Rotor Ø: 113m	66.7	73	55	PCVS DD	II_B	Cylindrical or tapered tubular steel tower, ~160t tower sections for 90 m height	Synchronous PMG Transformer at bottom of tower

PCVS – Pitch Control Variable Speed

DD – Direct drive, where rotor hub is directly fixed to the generator, usually of permanent magnet design.

The SWT-2.3-113 selected for the Project is a direct drive machine and is derived from the SWT-3.0-101 direct drive design. This direct drive design is a different design than the traditional gearbox drive train SWT-2.3 model. The first prototype SWT-2.3-113 was installed in March of 2011, and as of April 2014 approximately 100 SWT-2.3-113 WTGs are planned for installation.

The Design Climactic Conditions of the wind turbine generator appear to be well suited for the observed site conditions. Additional site specific metocean and wind resource assessment data will be required to complete the engineering design for the WTG tower and to re-confirm that the WTG is suitable for the site.

4.3 Siemens WTG Operations and Maintenance

It is anticipated that Siemens would operate the Project under a long-term O&M agreement. This contract has yet to be negotiated; however, Siemens commonly enters into contracts with service terms of 5 to 15 years. An O&M agreement typically includes planned and unplanned maintenance of the WTG and SCADA system in some cases the contract includes balance of plant operations and maintenance service.

The final operations and maintenance agreement will be negotiated as a component of the final contract negotiations. Important considerations in the development of the O&M strategy include:

- Final location of onshore and offshore O&M base.
- The metocean and ice studies provide the environmental parameters for selection of the service vessels.
- Major component repair strategies and vessel supply.

4.4 Wind Turbine Generator Summary

No fatal flaws have been observed with the proposed WTG selection for the Project. Siemens is a reputable and bankable supplier with significant experience in the offshore wind industry. Additionally it appears that Siemens could support a significant portion of the domestic content requirement. Negotiations with Siemens will continue as the project continues to develop and after the provincial moratorium is lifted. Major topics will include:

- Final terms of the TSA.
- Interfaces between contractors to ensure appropriate scope assignment between contractors.
- Final selection of the WTG model. Based on site specific wind resource and metocean data and potential improved model offerings at time of notice to proceed.
- Review of TSA technical schedules
- Integration of WTG loads with the foundation design.
- Responsibility for offshore transport and installation vessels. The division of responsibility for these areas should be appropriately assigned to avoid gaps in the project scope.
- The scope and duration of the O&M contract.

Siemens is the largest offshore wind turbine supplier in the world with 60% of total installed capacity totalling 3,937MW. Siemens was also the leading supplier of offshore wind turbines for 2013 with 69% of the market totalling 1,082 MW installed in 2013. The company has an established North American organization and has invested significant resources to secure their market position. Siemens has the TSA for the 468MW Cape Wind project. Overall, Siemens has the experience to execute the TSA and O&M agreement as required and its participation is considered a material benefit to the Project. SgurrEnergy recommends that alternative WTG options are investigated and considered in order to ensure that the combined balance of capital cost, operating cost and Project performance is analysed in order to maximise overall Project returns.

5 Wind Data Collection and Analysis

Windstream has undertaken a significant number of energy yield predictions and wind analysis reports for the Project outlined in Table 5-1. SgurrEnergy conducted a review of the energy yield predictions in the 3rd quarter of 2013 and focused the review on the three most recent energy yield reports from ORTECH, GLGH and AWS. These reports include data analysis from meteorological (met) mast 2504 installed by Windstream at Long Point on Wolfe Island northeast of the Project area.

Table 5-1: Energy Yield and Site Suitability Reports Produced

Report Title	Author	Date Issued
Meteorological and Energy Yield Report, Wolfe Island, Ontario	Helimax Energy	15 October 2009
Wolfe Island Shoals Wind Energy Project Report: Offshore Wind Speeds from Boundary Layer Modelling	Zephyr North	13 May 2010
Report # 70347-1: Wolfe Island Shoals Offshore Wind Report	ORTECH Power (ORTECH)	30 July 2010
Report # 70347-2: Updated Wolfe Island Shoals Offshore Wind Report	ORTECH	08 March 2011
Report # 70347-3: Updated Wolfe Island Shoals Offshore Wind Report – 2012	ORTECH	24 October 2012
800450-CAVA-T-01-C: Wolfe Island Shoals Wind Farm Preliminary Energy Assessment	GL Garrad Hassan (GLGH)	30 Sept 2013
Wind Resource and Energy Production Summary for the Wolfe Island Shoals Wind Project	AWS Truepower (AWS)	06 June 2013

5.1 Measurement Campaigns

The collection of data from nine met recording stations near the Project site have been on-going from as early as 1995, and are available and considered for synthesis, validation and energy yield estimations. These stations consist of seven met masts, one SoDAR remote sensing unit and one offshore buoy. All of the met masts and the SoDAR unit are located on Wolfe Island, roughly 5 km north-east of the proposed wind farm site, while the buoy is located south-west of the site in Lake Ontario.

The measurement locations summarized in Table 5-2 were used to inform energy yield analyses for the Project. Note that the GLGH and AWS report reference a number of other met masts outside of the area.

Table 5-2: Site Meteorological Recording Stations

Station name	Top height	Coordinates (Easting, Northing)[1]	Dates of data used	Proximity to Project site
Mast 2504 - Long Point	78m	381367, 4885011	21 December 2011 to 16 December 2012	11km
SoDAR - Long Point	200m	381333, 4884915	December 2011 to (not specified)	11km
Merry Farm Mast 1	50m[2]	385216, 4886335	01 September 1995 to 31 August 1998	14km
Mast 500	48.2m	380053, 4891448	09 June 2006 to 17 May 2009	16km
Pikes	58.7m	387837, 4888335	June 2006 to October 2008	17km
Hulton	58.2m	386662, 4892991	June 2006 to July 2008	20km
EC Buoy 45135	4. m	349571, 4851359	June 2006 to (not specified)	36km

[1] Coordinates are in UTM, WGS84 Zone 18T.

In SgurrEnergy's review of the met mast information, the met mast setups are broadly in line with industry practice and suitable for wind resource assessment for the Project.

5.1.1 Wind Analysis

Long Point, where Mast 2504 is located, protrudes into Lake Ontario at the south-western tip of Wolfe Island. The measured seasonally balanced wind roses at Mast 2504 show prevailing winds from the west, southwest and south directions, which are all exposed to open waters for at least 6km from the mast's location. The met mast locations are illustrated in Figure 5-1.

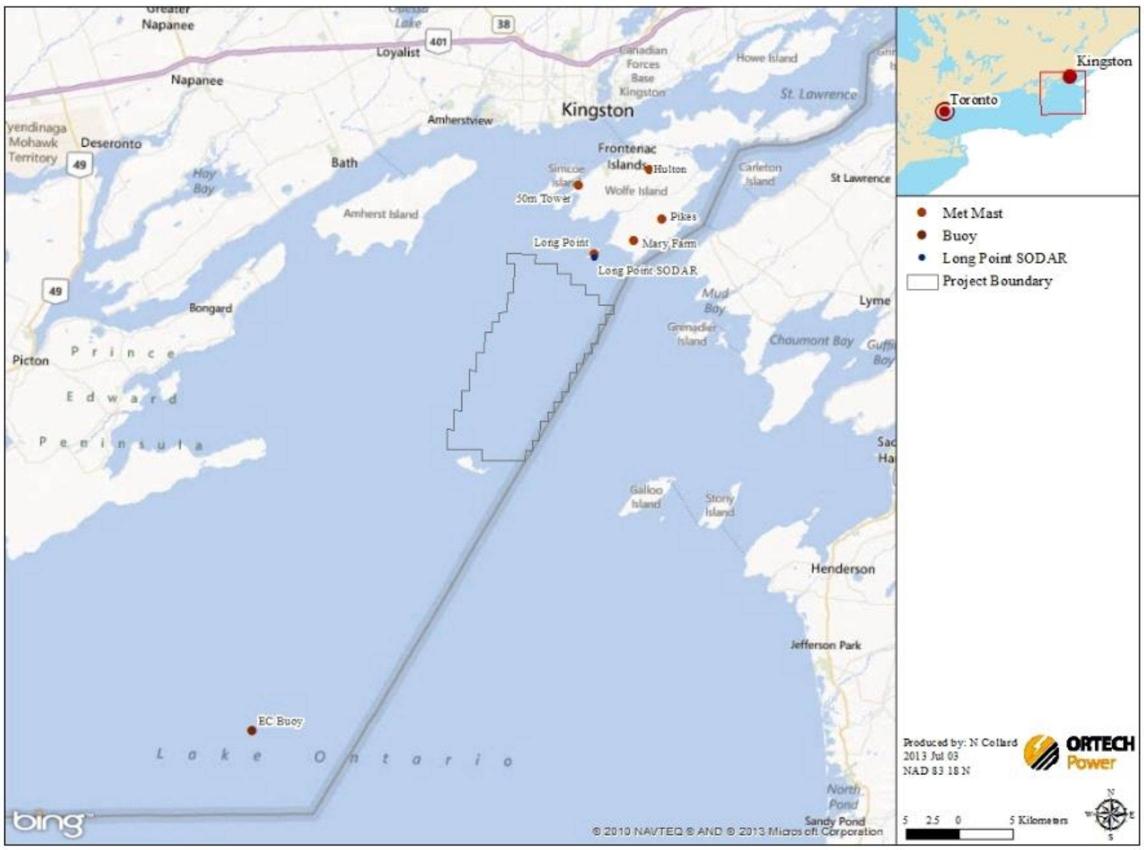

Figure 5-1: Met Mast Locations

ORTECH, AWS and GLGH used Mast 2504 as the basis for their energy yield analyses. Given the masts proximity to the Project and open exposure to Lake Ontario, it provides the best representation of the offshore wind characteristics at the Project location. In SgurrEnergy's opinion this is a well-reasoned approach and makes use of the best available data.

The AWS and GLGH analyses of the data collected from Mast 2504 over collection periods of approximately 12 and 16 months respectively. ORTECH's 8.5 month Mast 2504 data collection period available at the time the analysis was commissioned is considered informative but due to its shorter data collection period it does not suitably represent the seasonal variations at site. Accordingly SgurrEnergy's considers the AWS and GLGH analyses as more representative of the site's predicted seasonal wind regimes.

Table 5-3 below shows the observed and reported 78m wind speeds at Mast 2504, as well as measured wind shear across the mast.

Table 5-3 Mast 2504 78 m Measured Wind Speeds

Consultant	Measurement period 78 m wind speed	Seasonally balanced 78 m wind speed	Measured wind shear exponent	Data Period (months)
ORTECH	7.7m/s	N/A	0.11	8.5
AWS	7.9m/s	7.9m/s	0.12	12
GLGH	Not reported	Not reported	0.09	16

SgurrEnergy has the following comments based on information provided to date:

- All three consultants, as well as SgurrEnergy, agree that Mast 2504 offers the most suitable representation of the Project location's wind resource at this time. This analysis indicates a measured 78m wind speed of between 7.7 and 7.9m/s.
- The AWS and GLGH analyses are inclusive of the site's predicted seasonal wind regime as they both considered at least 12 months of Mast 2504 data. ORTECH's analysis of only 8.5 months of data has been included for comparison purposes.
- To obtain an ideal project location seasonally balanced data set an offshore (Project location) measurement campaign should be implemented. Our recommendations include a minimum 12 month data collection period from a met mast with a height of at least 60m above water level. The data set collected from this campaign would best inform energy yield and WTG loading conditions.

It should be noted that the Project has made efforts to install a met mast offshore, at the project site. A site specific met mast is considered a project requirement for both onshore and offshore wind farms. This typical project activity was not allowed to proceed due to the provincial moratorium.

5.1.2 Long Term Wind Speed Predictions

Long-term reference station selection is an important part of energy yield prediction, as it helps to add certainty to a project's long-term wind resource. Inaccurate evaluation of a site's long-term wind resource can have significant impact on a project's energy assessment. Each consultant has implemented a different approach to long-term wind resource prediction, as discussed below.

5.1.2.1 ORTECH

Mast 2504 had collected 8.5 months of data at the time of ORTECH's latest wind report issued in October 2012. This is less than the industry recommended one year minimum for on-site measurement. ORTECH considered many long-term reference stations and selected the Environment Canada Point Petre station, with monthly linear regression coefficient R^2 of 0.80. This is suitable for long-term prediction, but there is greater ambiguity due to the short-term nature of the correlation. (ORTECH Power, October 24, 2012)

5.1.2.2 AWS

AWS' latest report included analysis of roughly 12 months of data from Mast 2504. AWS reviewed potential reference stations operated by the National Weather Service and Environment Canada, but chose to employ their own WindTrends database as the preferred reference station for long-term prediction at Mast 2504.

WindTrends is a simulated hourly time series created by AWS using an atmospheric model. It is similar to reanalysis data, but is computed at a finer spatial resolution (20 km) and relies on a fixed set of rawinsonde[8] observational data. The model output can be interpolated to the location of a met mast for comparison. SgurrEnergy considers the WindTrends reference dataset to be suitable for long-term analysis.

The achieved daily linear regression coefficient R^2 for the WindTrends (seasonally balanced) reference data interpolated to the three site met mast locations considered by AWS, were all greater than 0.80. This level of correlation, on a daily basis, is suitable to undertake a long-term wind speed prediction with approximately 12 months of site Mast 2504 data. (AWS Truepower, 06 June 2013)

[8] Typically, a rawinsonde is a hydrogen balloon carrying meteorological instruments and a radar target, enabling the velocity of winds in the atmosphere to be measured.

5.1.2.3 GLGH

The GLGH report included analysis of roughly 16 months of data from Mast 2504. GLGH reviewed potential reference stations operated by Environment Canada, the National Weather Service (NWS) and Modern Era Retrospective-analysis for Research and Applications (MERRA). The points selected by GLGH for long term prediction and comparison were the four MERRA nodes closest to the Project and Environment Canada's Point Petre reference station. The range of correlations achieved between Mast 2504 and the selected stations are, between 0.70 and 0.82 on a daily basis. These values are considered suitable for long-term prediction. SgurrEnergy considers the approach employed by GLGH to be appropriate. (GL Garrad Hassan, 29 May 2013)

5.1.3 Long-term Wind Speed Comparison

The linear regression coefficient R^2 derived from the comparison of the selected reference stations to Mast 2504 data is shown below in Table 5-4Table 5-4: . The table also includes the 78 m long-term wind speed prediction, measured wind shear coefficient and the long-term wind speed prediction extrapolated to a 90 m wind turbine hub height.

Table 5-4: Long-term Wind Speed and Hub Height Extrapolation

Consultant	Mast 2504 R^2 correlation with selected reference station	Predicted 78 m long-term wind speed	Mast 2504 Measured wind shear	Extrapolated 90 m long-term wind speed
ORTECH	0.80 (monthly)	8.1m/s	0.11	8.2m/s
AWS	0.86 (daily)	8.1m/s	0.12	8.3m/s
GLGH	0.70 – 0.82 (daily)	8.1m/s	0.09	8.2m/s

SgurrEnergy has the following comments and recommendations for the Project's long-term wind resource prediction:

- At least 12 months of data measured at Mast 2504 has been considered in AWS' and GLGH's analyses. The correlation of daily wind speeds between Mast 2504 and the selected regional reference stations was found to be suitable for long-term resource prediction.

- The measured wind shear at the 78m Mast 2504 was used to extrapolate the long-term predicted wind speeds to the project wind turbine hub height of 90m. The wind shear values calculated varied between 0.09 and 0.12.
- The 90m long-term wind speed predictions at Mast 2504 calculated by all three consultants return a 90m predicted wind speed of, between 8.2 and 8.3m/s. The consistency in results of three independent long-term prediction methodologies increases the wind resource credibility for the Project.

5.2 Wind Flow Modelling and Wakes

SgurrEnergy's review of the energy yields indicates that the same layout of 130 Siemens SWT-2.3 WTGs was used by all three consultants. ORTECH's wind flow modelling approach using WAsP appears reasonable and standard to the wind industry. However, the analysis performed by ORTECH employed a wind turbine with a smaller rotor diameter. To insure an accurate comparison SgurrEnergy has not included ORTECH's energy yield prediction in this review.

5.2.1 AWS – 130 Siemens SWT-2.3-113

AWS used its wind flow modeling software OpenWind, with a wind resource grid generated from its SiteWind software. The SiteWind software employs both mesoscale and micro scale models to simulate wind climate. Two wind resource scenarios were considered and modeled: The first scenario used only Mast 2504 to adjust the model's wind resource grid. The second scenario employed Mast 2504, Mast 1 and Mast 500 to adjust the model's wind resource grid.

Two separate wake models were considered and modeled: A deep array wake model (DAWM) and an eddy-viscosity (EV) model. The deep array wake model includes eddy viscosity and deep array approximation. The deep array approximation employs a growing internal boundary layer to represent "array" roughness instead of ambient roughness. In shallow zones the eddy viscosity model dominates, while in deep zones the growing boundary layer employed in the deep array wake model has an increasing effect.

The modeling approach employed by AWS including use of the deep array wake model is considered a suitable approach in the wind industry.

It should be noted that wakes from the operational Wolfe Island onshore wind farm were accounted for in AWS' energy yield analysis issued 06 June 2013.

The AWS energy yield values in Table 5-5 lists the outputs of the four different AWS models. The different modeling approaches employed produce different but comparable values. The modeling scenario selected for comparison is the most conservative of the four AWS models.

Table 5-5: AWS Modelling Scenarios

Wake model	Met masts used	Average free WTG wind speed	Wake effect	Net capacity factor
DAWM	2504, 500, 1	8.26m/s	12.1 %	42.1 %
EV	2504, 500, 1	8.26m/s	7.4 %	44.3 %
DAWM	2504 (Long Point)	8.38m/s	11.8 %	42.6 %
EV	2504 (Long Point)	8.38m/s	7.2 %	44.8 %

5.2.2 GLGH – 130 Siemens SWT-2.3-113

A Mesoscale Compressible Community atmospheric model was conducted by GLGH using the AnemoScope user-environment. The model estimated the hub height wind speed variations over the site relative to Mast 2504. AnemoScope combines Environment Canada's WEST (Wind Energy Simulation Toolkit) system with the Canadian Hydraulics Centre's EnSim simulation environment. In SgurrEnergy’s opinion this is a suitable approach for modelling at the Project’s off-shore location.

The predicted long-term mean wind speed averaged over all proposed wind turbine generator locations is 8.5m/s at 90m hub height.

It is unclear whether GLGH considered the wakes of the existing wind farm on Wolfe Island in their modeling, but external wake effects have been considered in the analysis. As the Wolfe Island onshore wind farm is down-wind of the prevailing wind direction and at least 6 km away, it is expected that actual wake losses would be minimal. The GLGH report estimated Project wake loss at 10%.

5.2.3 Wind Flow Modelling Conclusions

SgurrEnergy has the following comments and recommendations on the Project modelling approach:

- The modeling approaches employed by AWS and GLGH are reasonable and well considered.
- The average 90m wind speeds predicted across the wind farm by AWS and GLGH are 8.3m/s and 8.5m/s, respectively.
- The wind farm wake losses calculated by AWS and GLGH are in the range of 10% to 12%. The AWS study specifically includes the wakes of the existing Wolfe Island wind farm. Their most conservative approach calculates wake loss at 12.1%.
- It is considered beneficial to have two independently produced energy yield assessments. The assessments employed different modeling techniques and returned comparable results.
- Once data is available from a site (offshore) Metmast, the impacts (if any) of atmospheric stability and wakes should be investigated in further detail.

5.3 P50 Energy Yield

SgurrEnergy's review of the AWS and GLGH values is provided in the following sections.

AWS modelled four scenarios, and SgurrEnergy has compared the most conservative of these scenarios which uses Mast 2504, Mast 1 and Mast 500 wind data along with the DAWM deep array wake model.

Preliminary information was reviewed including the coincidence of wave heights and lake ice with high wind resource periods. This information is employed to determine site accessibility and develop the O&M strategy and operational parameters throughout an operational year. This information is particularly relevant when unplanned on-site maintenance is required. It is customary for this process to be continually refined and updated as more detailed metocean data becomes available and wind turbine maintenance requirements are confirmed.

SgurrEnergy recommends that loss considerations for wake loss and site access be developed further once additional site information becomes available. The P50 energy yield provided by AWS and GLGH are believed by SgurrEnergy to be representative of the 130 wind turbine layout proposed for the site, these values are presented in Table 5-6.

Table 5-6: Wind Farm P50 Energy Yield Prediction and Losses

Consultant	AWS[1]	GLGH[2]
Gross EY (GWh/annum)	**1,472.3**	**1,487.4**
Corrections & Losses		
Wake Loss	0.879	0.900
Electrical transmission efficiency	0.964	0.970
Substation availability	0.998	0.990
Grid availability and disruption	0.998	0.998
WTG availability	0.950	0.949
Power curve density correction	1.000	1.000
WTG power curve performance	0.965	0.975
High Wind Speed Hysteresis	1.000	0.993
Environmental (icing, temperature and lightning)	0.968	0.990
Wind Speed Inter-Annual Variability	1.000	1.000
Blade contamination, degradation & off design	1.000	0.993
Site Accessibility	1.000	1.000
Ancillary systems	1.000	1.000
Grid compliance	1.000	1.000
Overall Conversion Efficiency (%)	**74.9**	**77.9**
Wind Farm Energy Yield (GWh/annum)	**1,102.2**	**1,159.3**
Capacity Factor (%)	**42.1**	**44.2**

[1] AWS Windstream Wolfe Island Shoals Energy Production Summary 6 June 2013 (most conservative of 4 scenarios evaluated)

[2] GLGH 800450-CAVA-T-01-C Wolfe Island Shoals Preliminary Energy Assessment

The independent views on energy production indicate Project capacity factors greater than 40%, which is in line with capacity factors achieved by many offshore wind power projects. This value may be improved when a further offshore site data is available to perform an accessibility analysis. Consideration of other WTG models may also provide an opportunity for further optimisation.

6 Site Suitability and WTG Selection

It is essential to define a site's wind regime, failure to do so could result in WTG underperformance and/or the WTG failing to operate for its design life. WTGs are typically certified or at least designed to IEC 61400-1 Wind Turbine Generator Systems – Part 1 Design Requirements (2005) which specifies WTG classes as listed in Table 6-1.

Table 6-1: Basic Parameters for IEC 61400-1 (2005) WTG Classes

Parameter	Class I	Class II	Class III	Class S
V_{ref} (m/s)[1]	50	42.5	37.5	Defined by Manufacturer
Annual Average Wind Speed (m/s)	10	8.5	7.5	
V_{e50} (m/s)[2]	70	59.5	52.5	
Subclass A I_{ref}[3]	0.16			
Subclass B I_{ref}[3]	0.14			
Subclass C I_{ref}[3]	0.12			
Upflow Angle	8°			
Wind Shear Coefficient	0.2			
Air Density (kg/m^3)	1.225			

[1] V_{ref} is the maximum average 10 minute 50 year wind speed
[2] V_{e50} is the maximum three second gust wind speed
[3] I_{ref} is the expected level of turbulence intensity at 15 m/s

IEC design parameters are not independent functions and a WTG may be suitable for a site even when some operating conditions are above their design value if other conditions are more benign, such as a high wind speed site which has a low turbulence value. The site conditions are not absolute values and they should be presented to the WTG manufacturer for discussion.

The SWT-2.3 WTG is designed to IEC Class II_A specification. The predicted site long-term hub height average wind speeds of 8.3m/s to 8.5m/s meets the values listed in the IEC Class II_A specification. The site suitability for a particular turbine and site is provided by the manufacturer, Siemens has turbine supply agreement with Windstream is for the SWT-2.3-113 the site suitability recommendation is based on the wind data provided by Windstream.

The measured wind shear coefficients reported at Mast 2504 were in the range of 0.09 to 0.12 which is a reasonable approximation as typical offshore wind shear values range between 0.09 and 0.13. These values are well below the IEC wind shear coefficient design value of 0.2.

The mean turbulence intensity (TI) measured by ORTECH at Mast 2504 at a 15m/s wind speed is 5%, the TI value at a 10m/s wind speed is 6%. AWS' modeling for a 15m/s wind speed returns a TI value in the range of 6.2% to 7.2%. These TI values are relatively low and do not pose a concern from a WTG loading perspective. The class IIA wind turbine subclass "design value is 16% at a wind speed of 15 m/s.

Wake-induced TI and extreme wind speeds should be modelled at the WTG locations using industry standard approaches. These wind flow aspects are employed to optimize the WTG selection and layout to achieve the highest energy yield to capital cost ratio. This structured approach is also employed to minimize the mechanical loading of the WTGs. Based on the predicted 90m wind conditions at Mast 2504 and the historical storm information for the area, the predicted TI and extreme winds appear to be within the design parameters of the selected WTG.

In conducting their energy yield studies, it is understood that AWS and GLGH used the same site layout for the Siemens SWT-2.3-113 WTG with a spacing of 4.9 rotor diameters within the row and an inter row spacing of 8.9 rotor diameters. Project WTG layouts are commonly adjusted through follow on stages of design.

6.1 Summary and Recommendations

SgurrEnergy's has reviewed the AWS and GLGH energy yield studies and found that they have been conducted in accordance with normal industry practice. The following points provide a summary of SgurrEnergy's review;

- The predicted long-term 90m wind speeds at Mast 2504 reported by the consultants agree well and are in the range of 8.2 to 8.3m/s.
- The Project has taken the appropriate steps to determine energy yield, including initiating the process to permit and construct an offshore met mast at the Project site.

- The Project has indicated that the met mast proposed will have a minimum height of 60m above the water and is intended to provide detailed site measurements for a minimum of 12 months to support design and project financing.
- The two independent energy yield predictions reviewed by SgurrEnergy have reported Project capacity factors in excess of 40%. This compares favorably to capacity factors achieved on existing offshore wind projects.
- IEC Class II_A WTGs appear to be suitable for the predicted site long-term hub height wind speeds and anticipated levels of TI. There are numerous WTGs designed for IEC Class II_A, including the Siemens SWT-2.3-113.

7 Site Characteristics

The site is located at the Northeastern end of Lake Ontario, approximately 30Km east of Kingston and southwest of Wolfe Island. The areas geologic and climatological make up has been well categorized by studies performed by governmental and private entities. The efforts have compiled a significant data base of geologic, meteorological, and metocean conditions of the surrounding area and by default the project site.

In an effort to validate the site conditions, Windstream has commissioned significant additional studies to gather the supporting information to conduct further project design and to confirm that the site specific conditions are consistent with those observed throughout the wider area. Studies conducted to date include:

- Wind resource assessment campaign.
- Geotechnical survey.
- Geophysical and Bathymetric survey.
- Metocean study.
- Ice Study.

Additional information is provided on the studies and surveys conducted in the following sections.

7.1 Wind Resource

A detailed wind resource assessment campaign has been conducted in support of the project by a host of well-respected firms including, AWS and GLGH. Additional detail on the wind resource assessment campaign is provided in section 5 Wind Data Collection and Analysis.

7.2 Geotechnical

Windstream has commissioned several geotechnical investigations in support of met tower installation for Project. The surveys conducted indicate that the site conditions consist of limestone bedrock with an overburden layer ranging from 0 to 3m in depth. These observed conditions compare favorably of those documented in the Wolfe Island geotechnical engineer report and those documented in the US and Canadian geologic surveys. Windstream commissioned InspecSol to conduct a desktop study of geologic conditions in the Project area. The InspecSol study completed in February 2013, confirmed that soil and bedrock conditions observed in the Project area compare closely with those documented in earlier studies.

SgurrEnergy's review of the documents provided and those available through public sources indicates that the geologic make up in the area consists of limestone bedrock overlain by a thin layer of overburden.

7.3 Geophysical and Bathymetric

A geophysical and bathymetric survey was conducted of the project site by Canadian Seabed Research in late 2010. The site report was issued in March 2011.

The bathymetric survey documented water depths on site ranged from a depth of 6meters to 41m, with some areas on the cable route reaching a depth of 60m. The survey identified objects on the bottom where appropriate and highlighted the static nature of the lake bottom.

The geophysical survey indicated that the cable route and lake bottom consist of primarily unconsolidated sediments overlying bedrock, with bedrock outcroppings and occasional sediment filled channels, and depressions. This compares favourably to conditions documented in the studies cited earlier in this section. The geophysical survey will be confirmed with a site geotechnical (physical) survey campaign, this is a common practice conducted in support of construction projects whether land based or offshore. The geotechnical campaign has not been allowed to progress due to the Provincial moratorium.

A further bathymetric survey was conducted in cooperation with the Canadian Hydrographic Services (CHS) in areas of common interest specifically Charity Shoal and the Upper gap of Adolphus Reach (between Amherst Island and the main land). The survey was conducted by CHS in October 2010 and results provided to Windstream under a data sharing agreement.

7.4 Metocean

Windstream commissioned ORTECH to conduct a metocean study in 2013. The metocean study was compiled from data collected by Environment Canada and NOAA weather buoys in proximity to the site. In SgurrEnergy's experience the metocean conditions identified in the metocean study are within the operational limits of typical offshore construction vessels for a large portion of the ice free season. This study supports the assumption that Metocean conditions at the Project site are significantly better than those experienced on the majority of offshore wind projects.

Windstream also engaged Baird Coastal Engineering to conduct a comparison of metocean and marine specific conditions of Lake Ontario with the Baltic Sea. This report was issued in October 2013.

7.5 Ice Study

Windstream engaged Baird Coastal Engineering to conduct an Ice Study of the area. This study was completed in 2012 and provides detailed ice conditions and foundation design parameters for the Project site. The information provided will support the ongoing development of the Project design, construction and O&M strategies.

The study results indicated that the site experiences winter icing with annual variation in thickness and persistence. Ice formation typically starts between mid-December and early January and spreads from the bays and shore into the open portions of the lake. Ice commonly persists into March. The interannual variation is highlighted by years where no ice forms and others were ice persists into April.

The Baird study provided detailed information regarding the movement of ice and the loading of ice on typical offshore wind foundations including, monopile, jacket and gravity structures.

7.6 Conclusions and Recommendations

Windstream has conducted appropriate studies in support of the Project. The efforts to categorize the site to date indicate that site conditions are consistent with those observed in the surrounding area. Windstream continues to consider lake icing in its engineering development scope. SgurrEnergy agrees with this approach and considers the effects of lake icing to be a design and operational factor that has been designed and planned for on numerous fresh water projects including offshore wind installations. Windstream has informed SgurrEnergy that they intends to carry out additional site specific investigations once they are permitted to do so. Based on a review of the currently available data, it is Sgurr Energy's opinion, that the construction and operation of an offshore wind farm at the Project site is feasible.

8 WTG Foundations

The selection of an appropriate foundation for an offshore project is a process driven by a host of factors including metocean environment, water depth, WTG selection and geologic conditions. SgurrEnergy was engaged by Windstream to conduct a foundation parametric study for the Project. The SgurrEnergy study analyzed the available information on site conditions area supply chain and likely fabrication and installation methods and compared this information with our database of European offshore projects. This process is detailed in the foundation parametric study completed in November 2013.

8.1 Foundation Design Selection Process

Five foundation concepts were assessed in the study: steel monopile, concrete monopile, gravity base, jacket and tripod foundation. These concepts were analysed in terms of geotechnical conditions, lakebed bathymetry, ice effects, noise and vibration, transportation and installation and previous experience in similar conditions, mainly in the Baltic Sea.

- The drilled steel and drilled concrete monopile are considered to be feasible options for all foundation locations, however they are expected to require extensive drilling operations and heavy lift vessels support for installation.
- The jacket type foundation is a feasible option in water depths of over 15m. Jacket installation will require piling and associated drilling operations to support their installation. Jacket structures experience the highest ice loading of any foundation type. Jacket foundations also require heavy lift vessel support for installation.
- The tripod foundation is not considered a realistic option for the Project because of the geotechnical conditions, potential design issues and fabrication costs.
- The gravity base foundation is considered the most likely solution for the Project. This is based on several factors including, the avoidance of drilling operations the site geologic make up, availability of raw materials and the avoidance of heavy lift vessels if a floating or semi-floating foundation design is employed.

The parametric study provided the required information to allow Windstream to select Gravity foundations as the most appropriate foundation design for the site. Windstream's decision was based on the following factors:

- Site investigations indicate that bed rock is in close proximity to the lake.
- Readily available raw materials and supply chain to support construction.
- Avoidance of extensive lake bed drilling and associated reduction of construction risk.
- Reduced requirements for specialized construction vessels to support foundation installation.

The following sections provide a more detailed description of the gravity foundation selection process, the project participants and the foundation design.

8.2 Gravity Type Foundation

Gravity base structures have proven an effective solution for large structures on projects throughout the world and are commonly employed in areas where significant icing is a consideration. Gravity structures have been employed on offshore wind farms in Sweden, Belgium and Denmark and in support of oil and gas projects worldwide including the Hibernia platform off the Newfoundland coast.

Concrete fabrication techniques for large concrete structures are well understood and have been successfully employed to construct gravity structures. Foundations are typically constructed using a typical slip forming methodology, a pre-cast and post tensioning methodology or some combination of the two.

A significant component of the engineering effort expended on gravity base structures is related to their size and weight. Typical of most large offshore construction projects the installation requirements and fabrication methodology inform the design process from the earliest stages of development and design. Gravity structure installation techniques are driven by quantity, size, cost and availability of appropriate equipment, while the fabrication methodology is governed by the site, construction techniques and facility logistics.

Gravity foundations for offshore wind projects have typically been constructed at a land level facility or on a barge. The foundations are then transported to the site via the heavy lift vessel or barge and lowered into position with a heavy lift vessel. Larger gravity structures like those employed in support of offshore oil and gas projects are often constructed in a floodable basin or large dry-dock. When the foundation is completed the basin is flooded or dry-dock lowered and the foundation is floated to site where it is ballasted into position.

Floating and semi floating foundation designs are becoming more prevalent as they avoid the cost and limitations associated with large installation vessels and permit the construction of larger structures.

8.3 Project Foundation Design Development

To continue the foundation and project execution development process SgurrEnergy was tasked with developing requests for proposals to engage suitably qualified engineers and contractors to develop preliminary designs and plans for the project. Proposals were issued for preliminary design of a foundation, foundation fabrication facility and foundation installation methodology.

As a result of this process COWI and Weeks Marine were selected and engaged to develop a project specific foundation design and installation strategy. Both companies are well respected in their field and bring years of experience in the design and installation of coastal and offshore structures.

8.3.1 Design Process

COWI employed a typical developmental design process that incorporated their design experience with site specific studies to develop a site specific foundation. Relevant site investigations that informed the design include; site geophysical surveys, bathymetric surveys, ice studies and metocean studies.

Gravity foundations employ a mix of their own weight and supplemental ballast to provide the solid foundation required for offshore structures. The foundations are named and differentiated by their respective designs and installation processes. The three major types of gravity foundations are depicted in Figure 8-1 with the solid cone type on the left, a fully floating style in the middle, and the semi-floating on the right.

Figure 8-1: Gravity Base Foundation Designs

COWI and Weeks Marine reviewed the potential gravity foundation types and their associated installation methodologies and determined that the semi floating gravity foundation was the most appropriate foundation for the site. Foundation installation methodology was the primary driver in the selection of the foundation design and the design of the fabrication facility.

8.3.2 Project Foundation Design

The semi-floating foundation was designed to accommodate a 2.3 to 4.0MW WTG with a 100 to 113m diameter rotor and a water depth of 25m. The foundation has a maximum base diameter of 22m and an overall height of 35.5m. This design requires approximately 1450m³ of concrete and 319t of reinforcing steel per foundation.

The design utilizes an inverted conical ring at the waterline to reduce ice loading. The conical ring is a common design feature that is installed on the majority of gravity based offshore wind foundations. The cone is employed to counteract the effects of a moving ice sheet by breaking it and forcing it downward. The ice cone is positioned such that it is centered at the water line with 2m of cone located above and below the waterline. The foundation as designed is depicted in Figure 8-2.

Figure 8-2: Cross Section of Semi-Floating Gravity Base Foundation

Typical of offshore wind foundations the foundation requires an access system with a boat landing, ladders and service platforms. In addition the foundation is designed to accommodate array cables and other platform equipment. For clarity, details of cable routing, equipment placement, service platforms and access systems were not considered in this phase of the design.

COWI's semi floating foundation design employs a supplemental floatation barge system for transportation and installation of the foundation. Employing a supplemental floatation system reduces the size of the foundation floatation chambers (when compared to a fully floating solution) thereby reducing the size of the foundation. The project foundation with the supplemental buoyancy barge installed is shown in Figure 8-3.

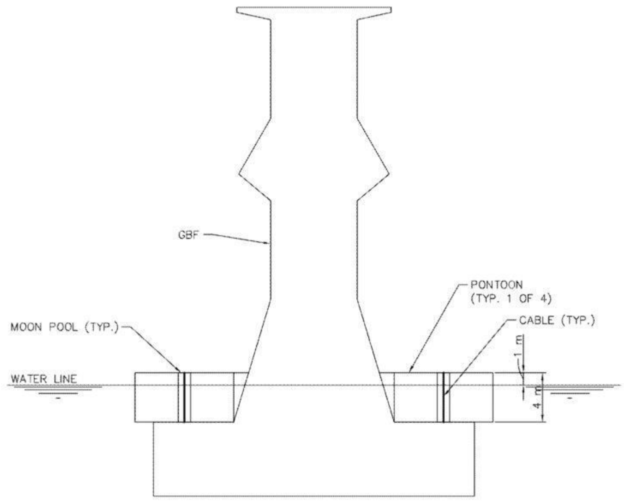

Figure 8-3: Gravity Foundation with Supplemental Flotation System installed

When the foundation is installed in its final position on site the hollow chambers of the foundation are filled with sand to achieve the design weight. Higher density sands can impact the level of sand fill required. A cross section of a fully ballasted foundation is shown in Figure 8-4.

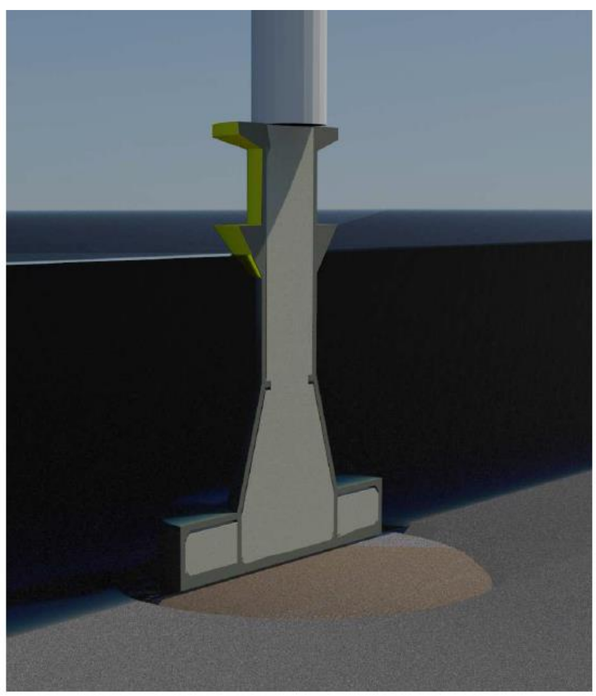

Figure 8-4: Installed Semi Floating Gravity Base Foundation

8.4 Foundation Fabrication Facility

Windstream had identified numerous potential fabrication facility sites on Lake Ontario. The fabrication sites were reviewed to determine if they had the required, fabrication space, water depth, and access to construction materials to support project requirements. The effort indicated that several potential fabrication sites were available and suitable to support project activities. This is considered a significant benefit to the Project as the execution of the project is not contingent on a specific location for fabrication of the foundations.

The requirements of the foundation fabrication and staging facility were identified by COWI the facility parameters include;

- Direct lake access.
- Proximity to aggregate and concrete supplies.
- 15 hectares for upland fabrication and staging area.
- 100 tonnes per square meter concrete skidding rail line bearing capacity.
- 8.2m navigable water depth with 13.2m depth below elevator platform.
- 40m air draft above the ground surface.

There are several existing facilities on Lake Ontario that meet all of the facility requirements. Windstream considered these port and industrial facilities and selected land adjacent to the St. Mary's cement facility in Bowmanville, Ontario as the representative fabrication yard location. The selection of the St Mary's cement facility was based on several factors including, existing infrastructure, proximity to a cement facility, access to deep water, and proximity to the project site. The Bowmanville site with a proposed facility layout superimposed are depicted in Figure 8-5.

Figure 8-5: St Mary's Cement Facility Bowmanville, Ontario

The facility design was developed to allow its use for construction of foundations capable of supporting a range of WTGs. The COWI fabrication facility design capitalizes on existing facilities and resources and incorporates the installation strategy in the design of the fabrication facility. The fabrication facility is designed to support the serial construction and launch of the foundations. To accomplish this facility employs two major systems, a series of concrete building ways or rails and the foundation elevator platform.

The concrete rails provide a level surface of the required bearing capacity and are arranged in a grid pattern to facilitate the movement of the foundations through the facility. The foundation elevator is used to lower the foundation from the land level fabrication facility into the water.

The fabrication facility design allows the foundations to be completed in a staged or serial approach. As the foundations complete a specific construction stage they are moved on the concrete rails to the next construction station. This serial construction approach allows for the optimization of processes, equipment and services to support specific construction stages. Once a foundation is complete it is moved to its storage location until it is required on site.

The serial construction process permits year round foundation fabrication providing the required quantity of foundations to support the project installation cycle. Figure 8-6 illustrates the sequential foundation construction process employed in support of a European offshore wind project.

Figure 8-6: Gravity Foundation Production Facility

When the foundations are complete and ready for installation they are lowered into the water on an elevator platform. Large elevator platforms are used throughout the world to move ships and large fabrications to and from the water. Elevator platforms are often used in place of a dry-dock. Elevator platforms can be more easily configured to support specific project requirements and can be delivered to a project site at a component level.

The Rolls Royce Naval Marine Inc. (RRNMI) Syncrolift is an example of an elevator platform. An example of a syncrolift employed in support of a civil construction project is provided in Figure 8-7.

Figure 8-7: Syncrolift Launching Concrete Caisson (Photo courtesy of RRNMI)

A proposed facility layout with fabrication rails and foundation elevator lift is shown in Figure 8-8. The diagram provides an overview of the serial foundation fabrication process and depicts a foundation loaded on the elevator platform ready for launch.

Figure 8-9 depicts the foundation in the lowered position ready for the installation of the supplemental floatation system.

Figure 8-10 provides additional detail on the foundation elevator system.

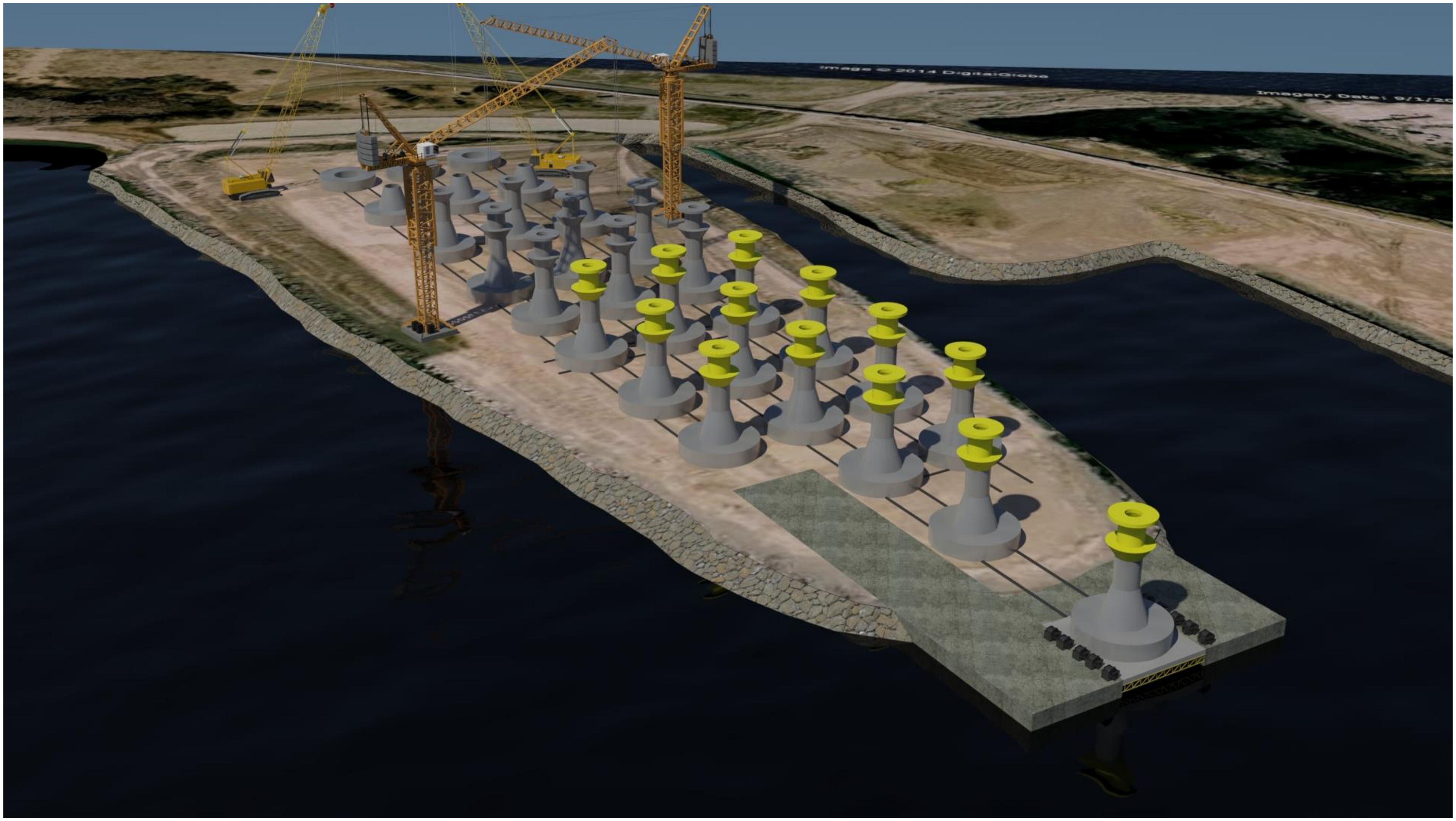

Figure 8-8: Fabrication Facility Layout with Foundation on Elevator

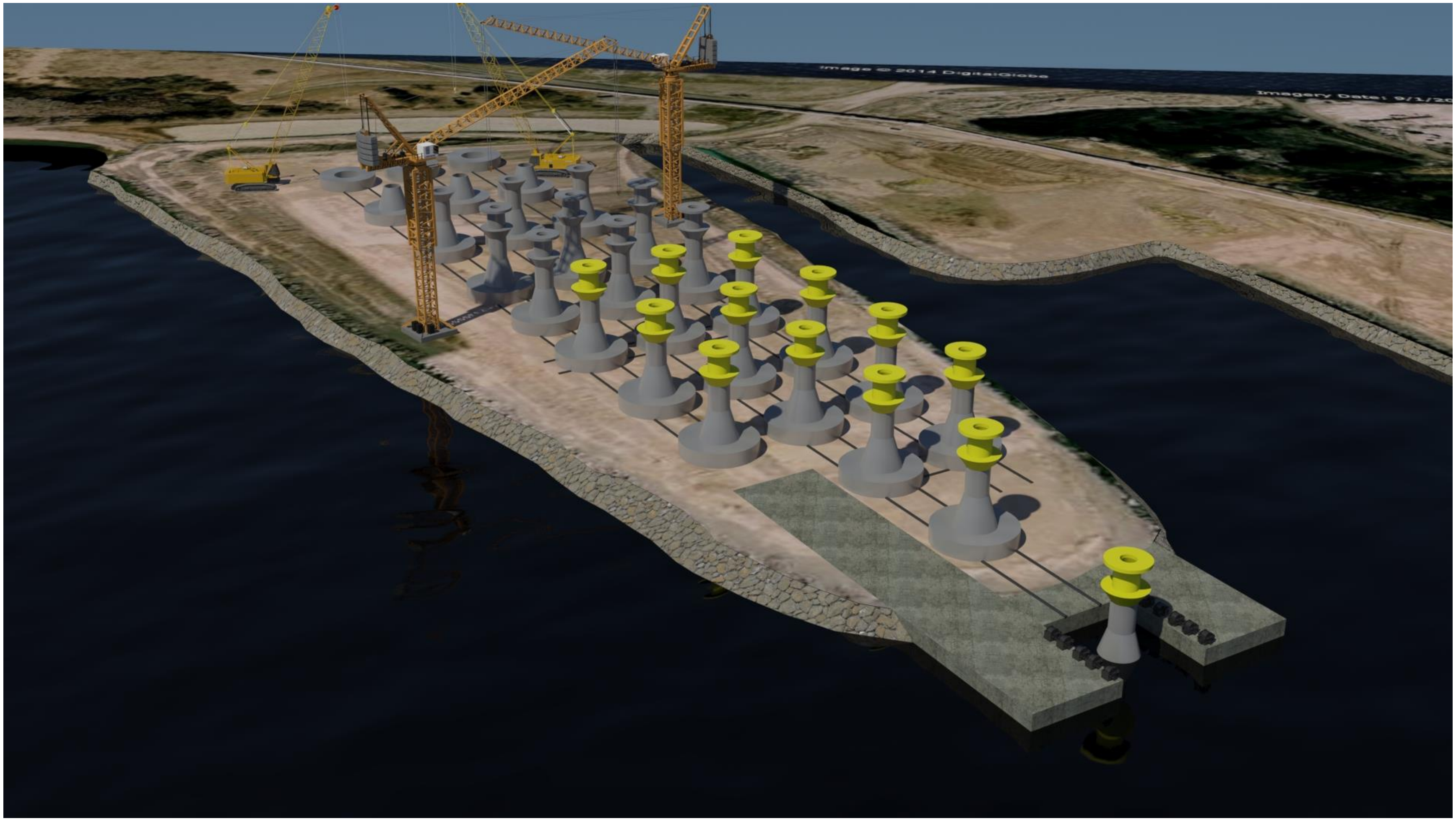

Figure 8-9: Fabrication Facility with Foundation in Launch Position

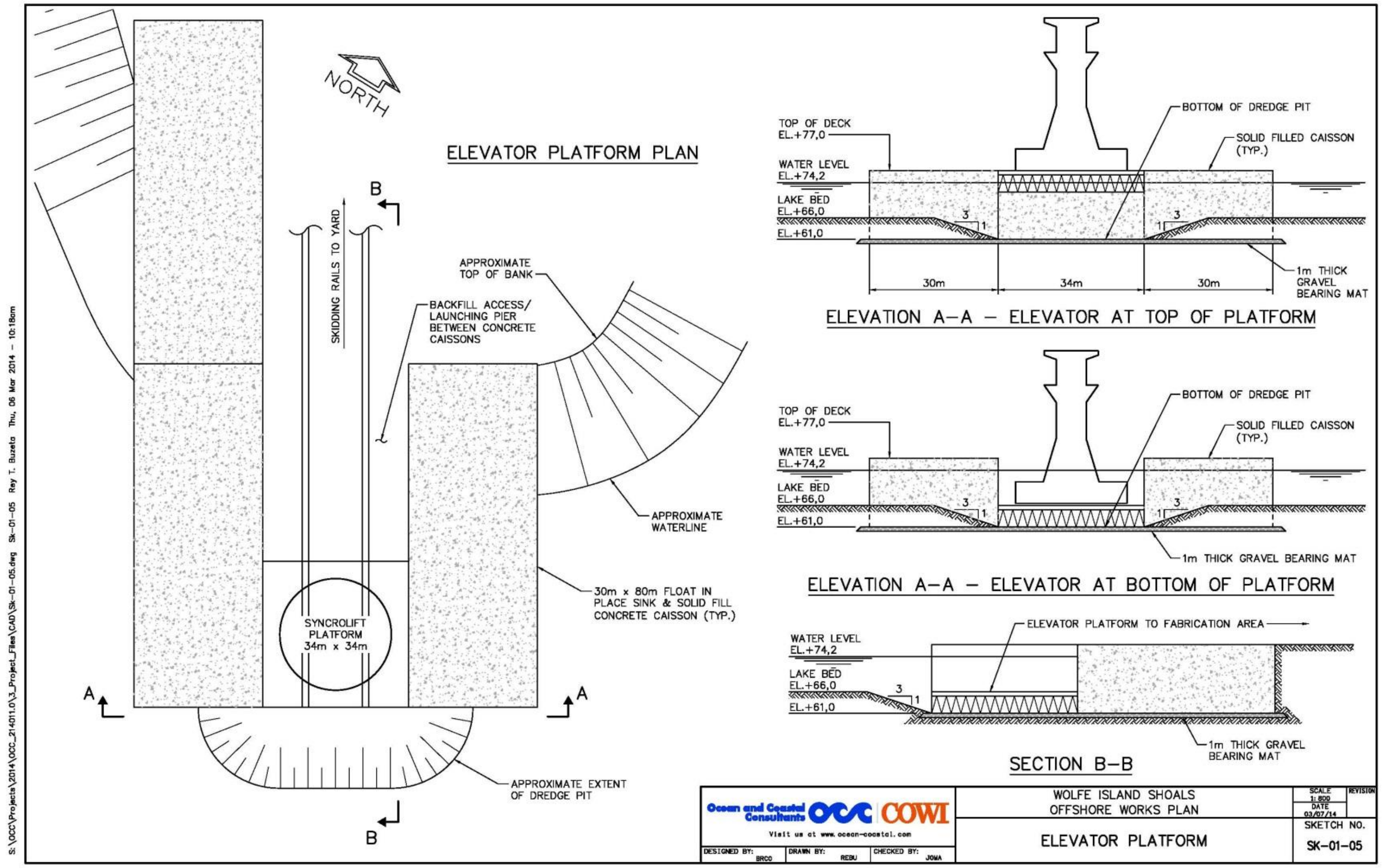

Figure 8-10: Foundation Elevator Detail

In SgurrEnergy's opinion the foundation fabrication and launch strategy is realistic and is well suited to the Project. This proposed construction and launch methodology has been employed to support projects world-wide including the ongoing flood protection project. The foundation launch methodology was recently included in the US Department of Energy report, Freshwater Wind I, Shallow Water Offshore Wind Optimization for the Great Lakes.

8.5 Foundation Installation

The transport and installation of foundations for any offshore project is a significant cost and schedule consideration. A general rule of thumb is that all efforts should be made to reduce offshore activities and vessel time required for installation at the offshore site. The ability to simplify and shorten the offshore process is an important factor in reducing project cost and risk by reducing vessel spread on hire durations and exposure to weather delays.

These fundamental assumptions were employed by OCC/COWI and Weeks Marine in their development of the Project installation strategy. A detailed means and method statement was developed to support the transport and installation of the semi floating gravity foundation design for the Project. The means and method statement evaluated all major phases of the foundation installation process and includes the following topics:

- Site Preparation.
- Foundation transport.
- Foundation installation.
- Ballasting.
- Installation of scour protection.

The means and method statement assumed that the foundations would be fabricated, launched and transported to the Project site from the St. Mary's cement facility in Bowmanville, Ontario. The installation methodologies planned for the Project are discussed in the following sections. Additional detail can be found in the Weeks Marine Installation Means and Methods Report[9].

[9] Weeks Marine Report – Wolfe Island Shoals Gravity Based Foundation and Wind Turbine Generator Installation, Offshore Installation Means and Methods, March 2014.

8.5.1 Foundation Site Preparation

The majority offshore foundations require some preparation of the seabed or lake floor to provide a level surface for foundation installation and to remove obstructions. Site preparation activities consist of excavating/dredging of loose or weak soils until sub grade is reached, that meets the required foundation loading requirements.

The site is then prepared and levelled by installing a layer of bedding material. The bedding material typically stone, fills in the natural variations in the sub grade to provide a consistent and level surface to support the foundation.

Geophysical surveys of the project site indicate that the lake bottom at site consist primarily of a bedrock layer overlain by 1-2m of overburden and sediment. The observed site conditions are consistent with those documented in the surrounding area.

Based on the site data, Weeks Marine assumed that approximately 1-2m of overburden removal would be dredged from each foundation site to expose the underlying bedrock. Upon completion of dredging activities the site is prepared and levelled with an approximately 1meter layer of bedding stone.

The Weeks plan employs the floating derrick Weeks 571, to support both dredging and bedding stone placement activities. The derrick is equipped with a clam shell bucket and is supported by a series of barges to store and transport both dredge spoils and bedding stone.

When dredging the derrick removes material from the lake bottom and deposits it into a waiting barge. When the barge is filled, it is moved to the designated dredge spoil storage or disposal location where the barge is unloaded. Dredge material of good structural quality may be employed to support site construction activities, while material that is of low structural value may be deposited at a designated dump site. The dredge depth and positioning of the derrick are monitored continuously throughout the dredging operation through a combination of onboard sensors and in water surveys.

The foundation bedding material installation process can begin after the dredging operation is complete. An inspection of the excavated area is performed as required to verify the site is properly prepared.

The bedding material installation process is very similar to the dredging process and is planned to utilize the same equipment. A derrick barge will place the bedding material at the site and level the material. Bedding material is supplied from a material barge moored alongside the derrick barge. The placement and levelling of the bedding material is controlled by the derricks onboard positioning system and verified by survey. Weeks Marine has assumed that the bedding materials will be approximately 1m deep.

Upon completion of the foundation site preparation scope, the foundations can be transported and installed at site. Weeks has proposed derrick barge Weeks 571 to support the dredging and bedding material installation scopes the barge is shown in Figure 8-11. The arrangement of the derrick and a supporting material barge is depicted in Figure 8-12.

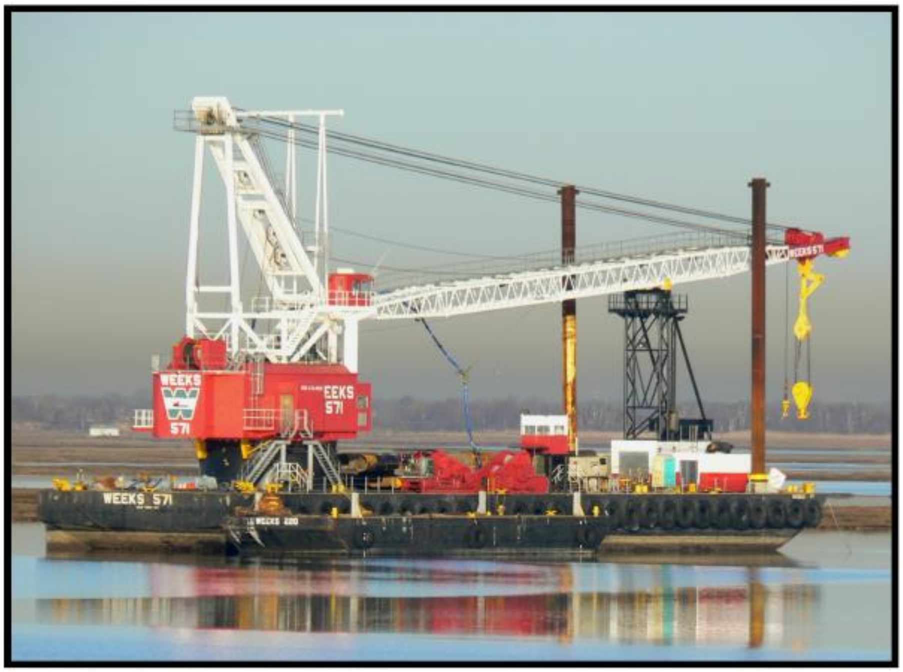

Figure 8-11: Weeks 571 Barge for Dredging and Bedding Stone Placement

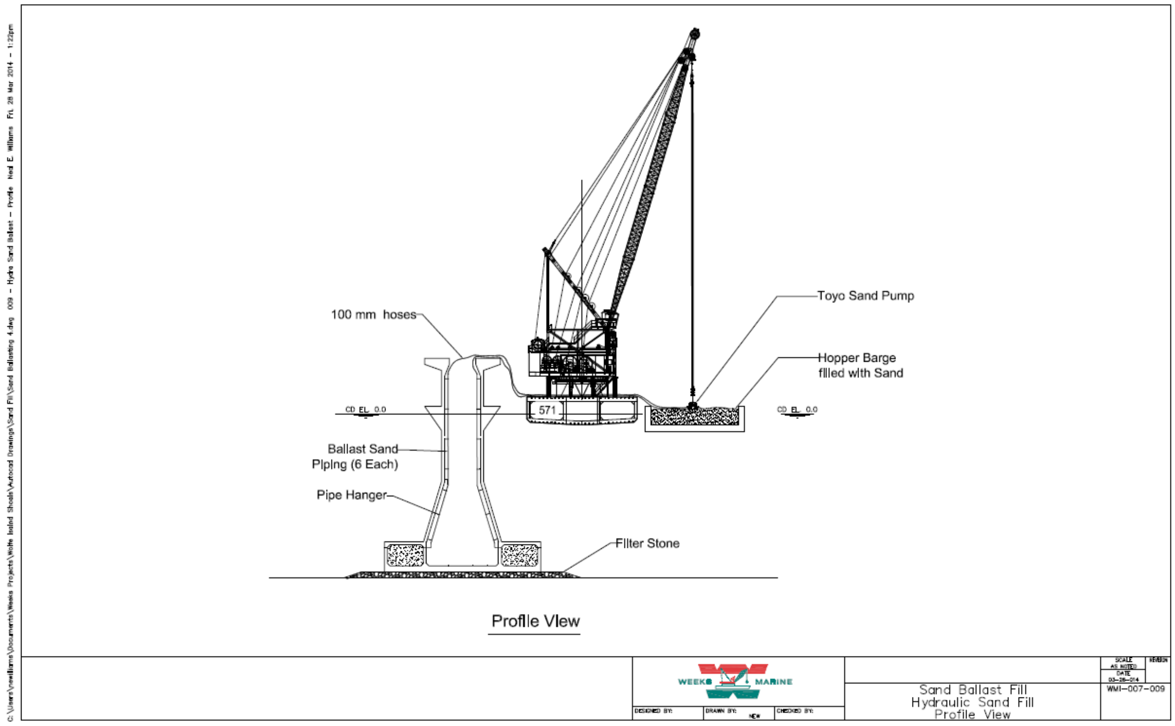

Figure 8-12: Derrick Barge with Material Barge alongside

8.5.2 Foundation Transit and Installation

The foundations are transported from the fabrication yard to the site with a supplementary flotation system. The supplementary flotation system carries the foundation from the fabrication facility and installs it at the wind farm site.

The supplementary floatation system consists of a system of barges designed and equipped with the equipment required to lift the foundation from the fabrication facility elevator platform, transport the foundation and install it on site. A foundation in transit mode with the supplemental flotation installed is shown inFigure 8-13.

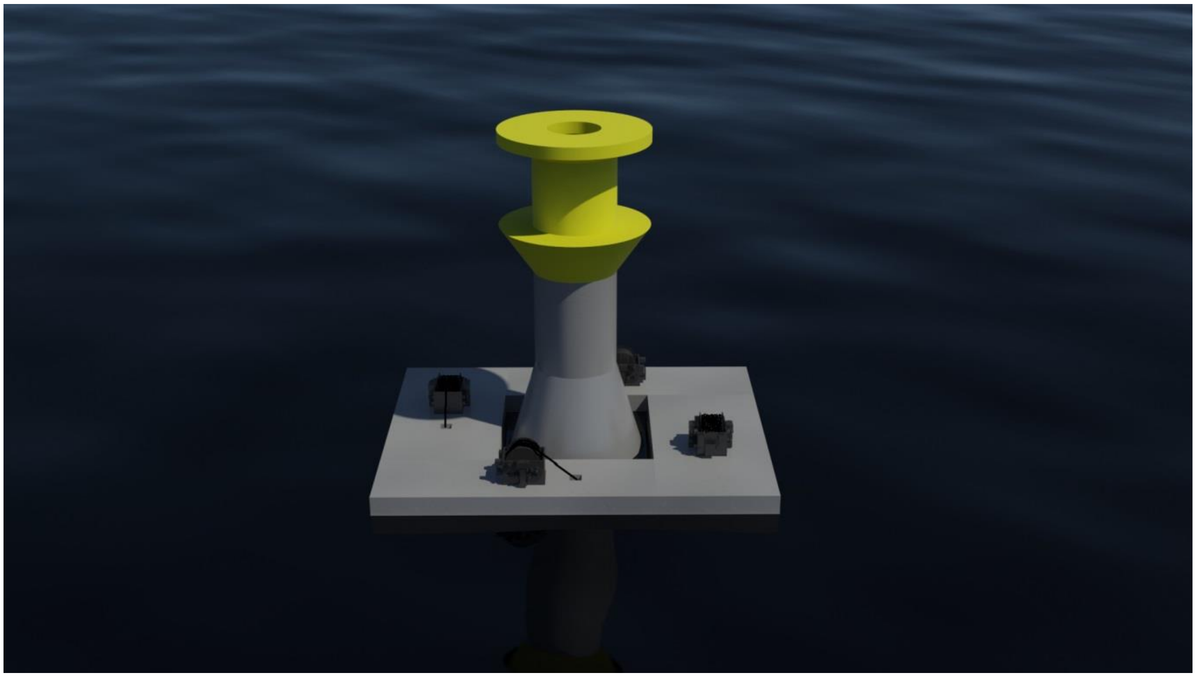

Figure 8-13: Semi Floating Gravity Foundation with Supplemental Floatation

The supplemental floatation system is designed to have an end section of the barge removed. This allows the system to be installed and removed from the foundation at the fabrication facility and upon foundation installation.

The foundation lifting system consists of a series of jacks that are connected to the foundation with a series of steel rods/strands. The lifting system is connected to the foundation lifting points and passed through the barges and into the jacks.

To remove the foundation from the elevator the flotation system is installed and the jacking system connected. The jacking system is actuated and the foundation is lifted into position below the floatation barges. This process lifts the foundation approximately one meter and locks the foundation and floatation barges together into a single unit. The foundation and floatation system are then removed from the elevator and towed to the project site.

Figure 8-14 show the lifting system in two modes the lowering/lifting mode is depicted in "Barge & Lift Device". The transit mode is shown in "GBF & Barge in Tow Configuration".

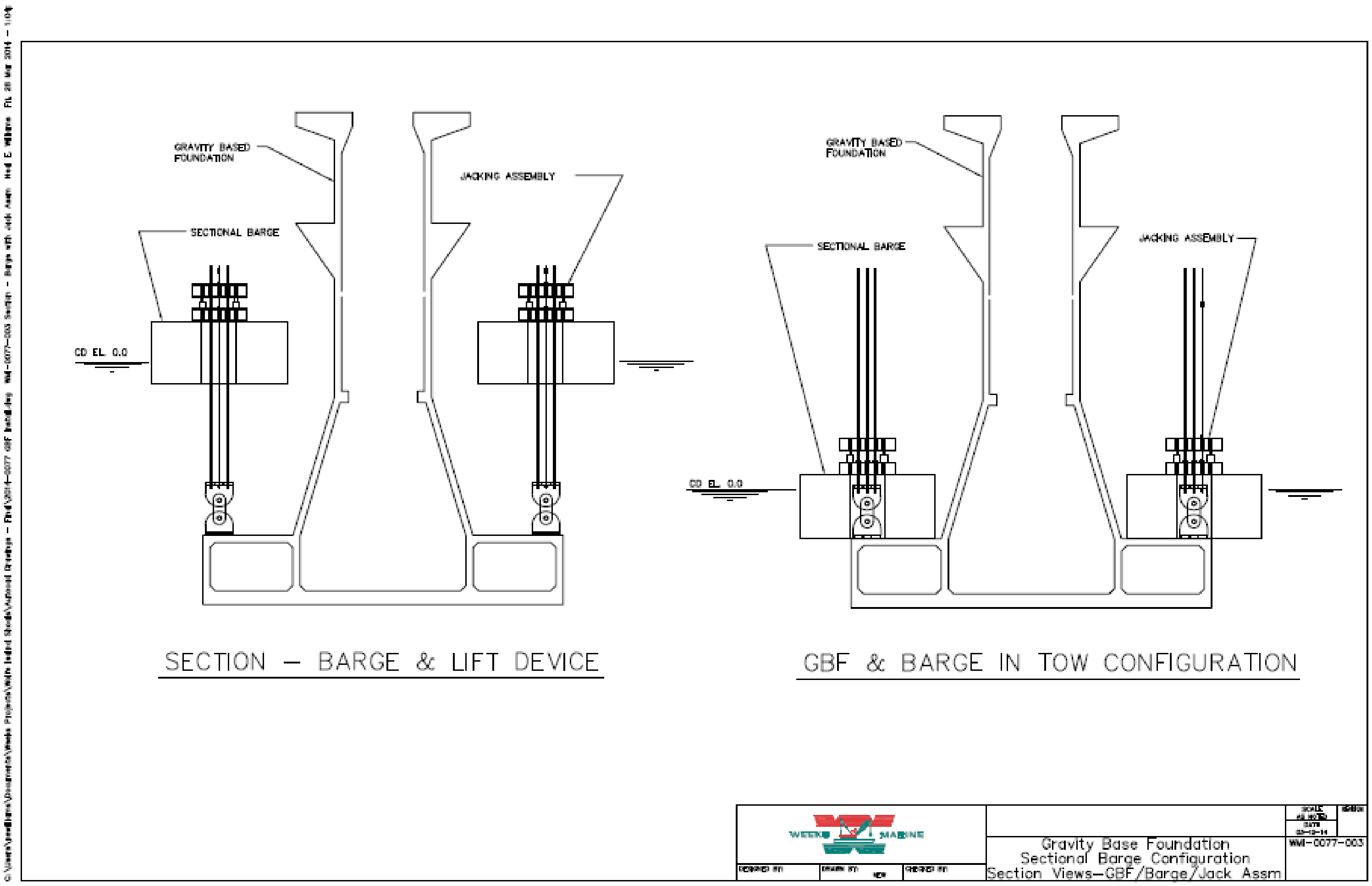

Figure 8-14: Gravity Foundation with Supplemental Floatation System

At the project site the foundation is delivered to its prescribed location. The installation process is a tightly controlled process that combines the addition of water ballast, operation of the lifting/lowering equipment and verification of installation position.

As the foundation is submerged it becomes more buoyant generating an upward force that tends to float the foundation back to the surface. To counteract this effect water ballast is added to the foundation to overcome the increased buoyancy. Water ballast is continually added to the foundation throughout the lowering and final positioning activities.

Once the foundation is in position on the lake bottom, its position and orientation are verified and additional water ballast is added to insure the foundation remains in position until the permanent foundation ballast is installed.

Upon confirmation of the installation position the supplementary floatation barge removal process commences with the removal of the foundation lifting system. The lifting system is disconnected from the foundation via a remote release system and the lifting rod/strands are recovered. The appropriate barge is removed from the supplementary flotation and the entire system is removed from the foundation. The supplementary flotation is then towed back to the fabrication yard to commence the installation process again.

8.5.3 Foundation Ballasting and Scour Protection Installation

The final steps in the foundation installation process include the installation of permanent ballast and scour protection. Permanent ballast installation provides the additional mass required for the foundation to maintain position and develop its full overturning moment resistance. Scour protection is installed to counteract the potential undermining of the foundation due to the combined effects of strong currents and wave action.

8.5.3.1 Foundation Ballast Installation

The installation of the permanent sand ballast is a multistage process. The initial phase involves the installation of a sand-slurry into the lower chambers of the gravity foundation. The sand slurry is pumped from a material barge via a series of hoses to a piping system installed on the foundation. The piping system delivers the sand-slurry into the ballast chambers per an established sequence and displaces water installed during the installation process. This process is illustrated in Figure 8-15.

After the lower chambers of the foundation are filled the ballasting operation shifts to filling the central column. The central column ballasting procedure is accomplished by a derrick barge which picks sand from a material barge and places it in the central column. This process displaces the temporary water ballast (if any) that was installed during installation. The process is illustrated in Figure 8-16.

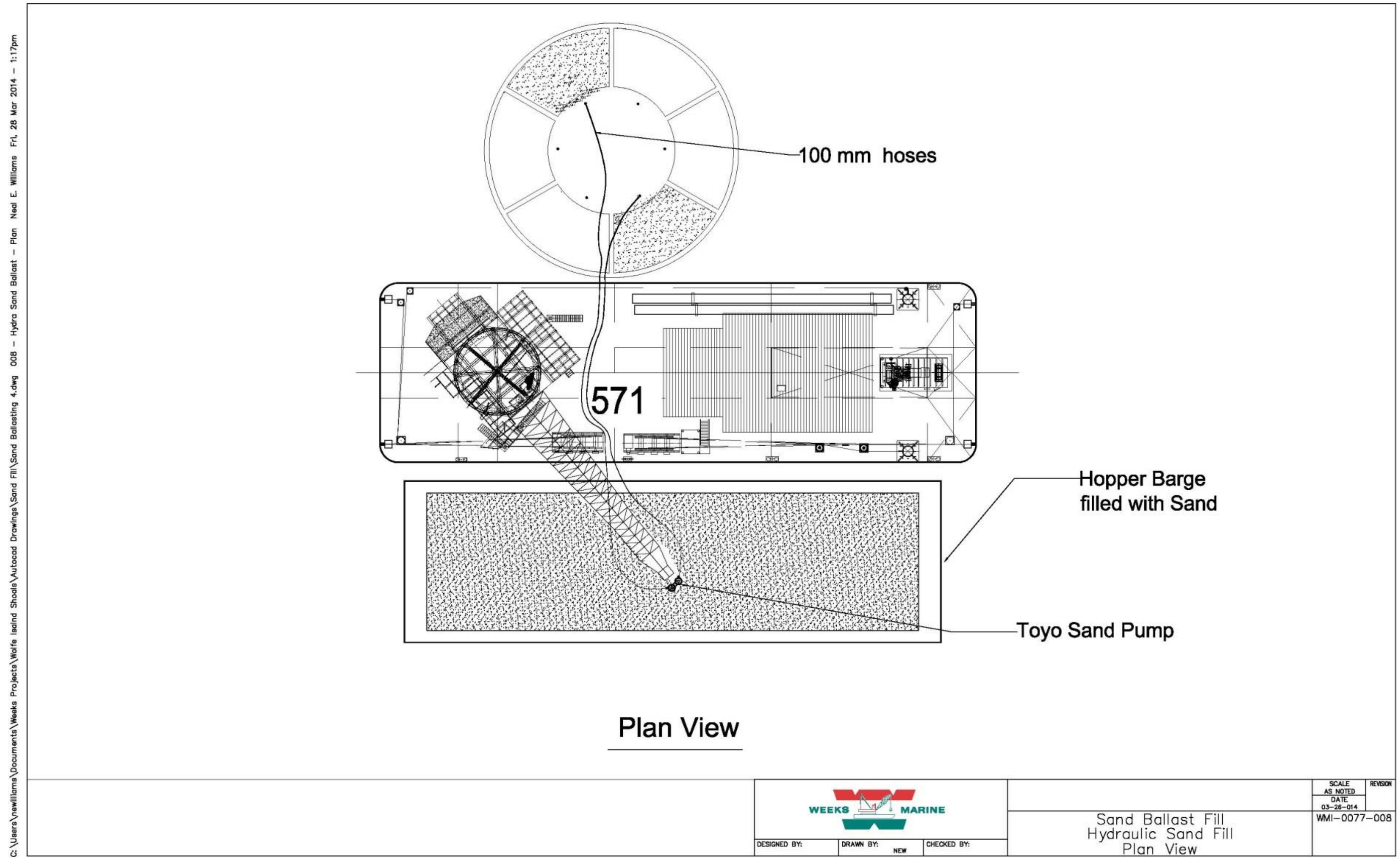

Figure 8-15: Sand Slurry Ballast Installation

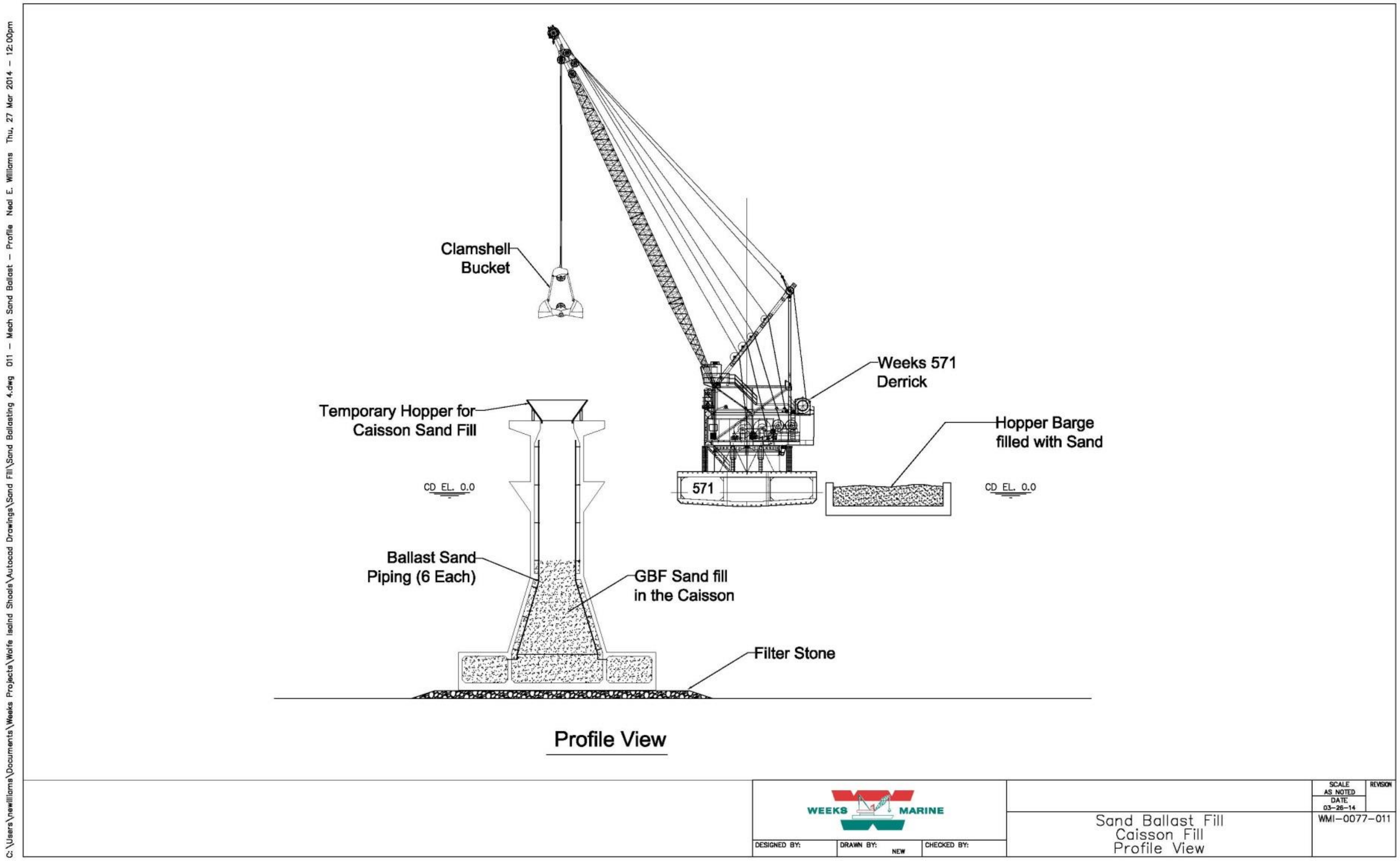

Figure 8-16: Ballasting of Gravity Foundation Central Column

8.5.4 Foundation Scour Protection

Scour protection is often required on offshore projects to prevent the undermining of the foundation by the effects of waves and currents. The level of scour protection required at each foundation is determined from a variety of factors including; geologic conditions, water depth, currents and wave action. In general more scour protection is required in shallower water and at sites with strong currents and wave action. Preliminary observations from site survey reports indicate that lake bottom at the site is relatively static without the bathymetric variation witnessed on many ocean offshore sites. If this is confirmed in future studies it has the potential to reduce the amount of scour protection required.

Scour protection is typically stone and is installed with a derrick barge and material barge methodology similar to those employed on previous foundation installation stages. The proposed installation methodology and equipment is illustrated in Figure 8-17.

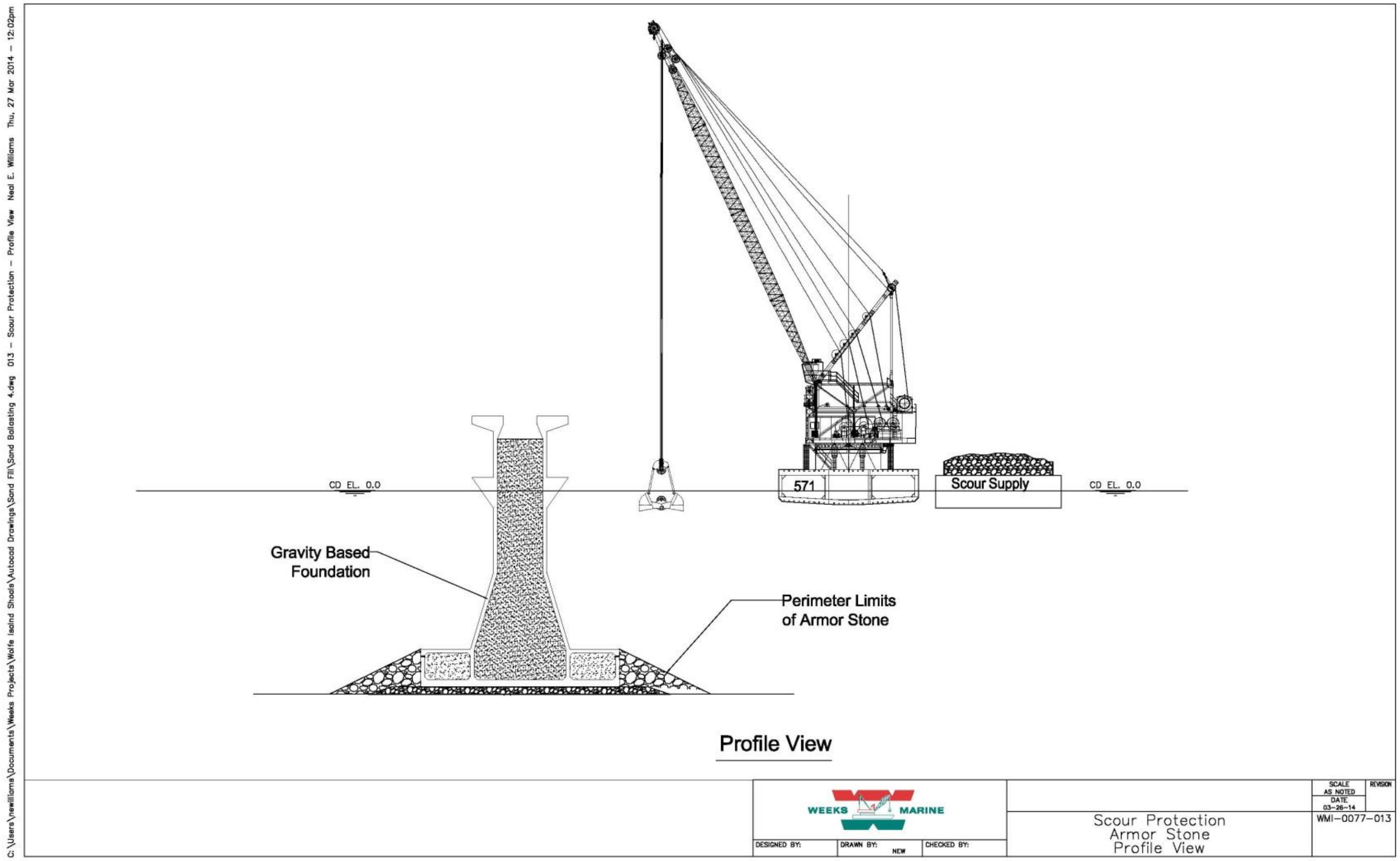

Figure 8-17: Scour Protection Installation

8.6 Foundation Summary

The semi floating gravity foundation and installation strategy proposed is reasonable and is believed to be the most appropriate foundation solution. It is understood by SgurrEnergy that Windstream will perform the additional studies and site investigations required to support the foundation design process, when they are allowed to do so. The following observations have contributed to the selection of the foundation type and installation strategy:

- Metocean (wind, wave, ice, including extreme conditions) and geological conditions of the site support the selection of the gravity foundation option. Additional data will help to refine the design and thus the cost estimates, but the existing data is sufficient to demonstrate that the selected foundation option is feasible.
- The foundation selection process employed provided the basis to develop more detailed foundation design. The studies completed by COWI and Weeks Marine are evidence of this. These studies illustrate the feasibility of the gravity foundation for the Project.
- The installation process proposed is based on construction activities that are commonly employed in support of projects in both the salt and fresh water environments. Additional expertise is readily available from the established European market.
- Construction equipment to support foundation installation activities is readily available in the Great Lakes system.
- There are several potential fabrication facilities that could support the construction of gravity foundations.
- The major components in a gravity foundation are concrete and stone, these can be readily supplied by the significant existing concrete and aggregate industry.
- Environmental restrictions for installation activities must be defined and understood to define design parameters and understand operational restrictions. The current design requires dredging at site, but has eliminated the need for piling and grouting operations.

Windstream should continue its engagement with designers, facility operators and contractors to complete as much early stage design work as possible. When the moratorium on offshore activities is rescinded it is expected Windstream will execute a detailed geologic and metocean campaign to provide the required parameters to progress foundation design.

9 WTG Supply and Installation

The WTG installation scope encompasses a broad spectrum of activities and requires coordination with the foundation and cable installation contractors. The installation scope of a WTG is well understood with physical installation typically supervised and conducted by the WTG supplier. The staging and logistics scope of the WTG installation scope varies significantly from project to project and influences the selection of installation vessels. Siemens has developed detailed installation, transport and storage procedures for its WTGs that will be employed throughout the Project. Selection and operation of the Project's WTG staging facility will be a joint effort between Windstream, the WTG supplier, the installation contractor and the port facility operator.

9.1 WTG Delivery and Storage

Siemens will responsible for the delivery of the WTGs to the Project staging facility as their well as their care and custody prior to installation. Siemens will coordinate with the staging/port facility to manage the logistics associated with offloading, and storing WTG components delivered from ocean going vessels, rail and truck transport as required. This will include the supply of appropriate cranes, yard transport equipment and supporting services.

It is expected that the majority of components will be delivered by ship, however depending on the manufacturing location of components some components such as tower sections or blades may delivered by rail or truck. The staging facility will support preassembly tasks and will be managed to effectively support the load out of the installation vessels.

There are several port facilities in close proximity to the project that can and have served as WTG staging facilities. These facilities are handling WTG cargo these include Ogdensburg NY, Hamilton ON, Toronto ON, and Oswego NY.

The port of Ogdensburg has successfully handled a large volume of WTG components. Ogdensburg served as the receiving and transhipment point for the Wolfe Island Wind farm and has been assumed as the staging facility for the Project.

9.2 WTG Installation

The installation contractor is responsible for the supply of the WTG installation vessels and associated support equipment including barges, tugs and crew transport vessels. The WTG supplier typically supplies the crew to complete the installation tasks with the vessel operator responsible for operating the vessel equipment including cranes.

The offshore installation contractor works with the WTG supplier to clarify the vessel operating requirements including weather operational limits, crane capacities, installation crew accommodations, and sea fastening equipment.

In order to further develop the WTG installation plans for the Project Windstream engaged Weeks Marine to develop a WTG installation means and method plan. Weeks Marine developed a detailed installation strategy to support the installation of the Project WTGs that involves a jack up installation vessel supplied by a series of feeder barges. The feeder vessel strategy has been employed in support of European projects and is a common strategy in marine construction projects. This strategy minimizes installation vessel transit time, allowing it to stay on site and maximize suitable installation weather windows.

Weeks Marine has assumed that its jack-up vessel the RD MacDonald will be employed in support of the Project. The RD MacDonald is a St Lawrence Seaway capable vessel that is in the final stages of construction. The vessel is slated to conduct WTG installation work in support of the Cape Wind Project. The vessel is depicted in Figure 9-1.

The crane for the RD MacDonald is a Manitowoc 750 ton main crane and is equipped with appropriate support equipment to conduct WTG installation operations. The drawings in Figure 9-2 and Figure 9-3 illustrate the installation sequence for the WTG tower sections, nacelle and blades.

The Weeks Marine proposal for project WTG installation is feasible as proposed and is similar to those they have employed in support of offshore construction projects throughout the Americas. The installation vessels employed in support of the WTG installation scope will ultimately be determined based on the project schedule and will likely employ additional vessels from the existing WTG installation fleet.

Figure 9-1: Weeks Marine Jack-Up Vessel RD MacDonald

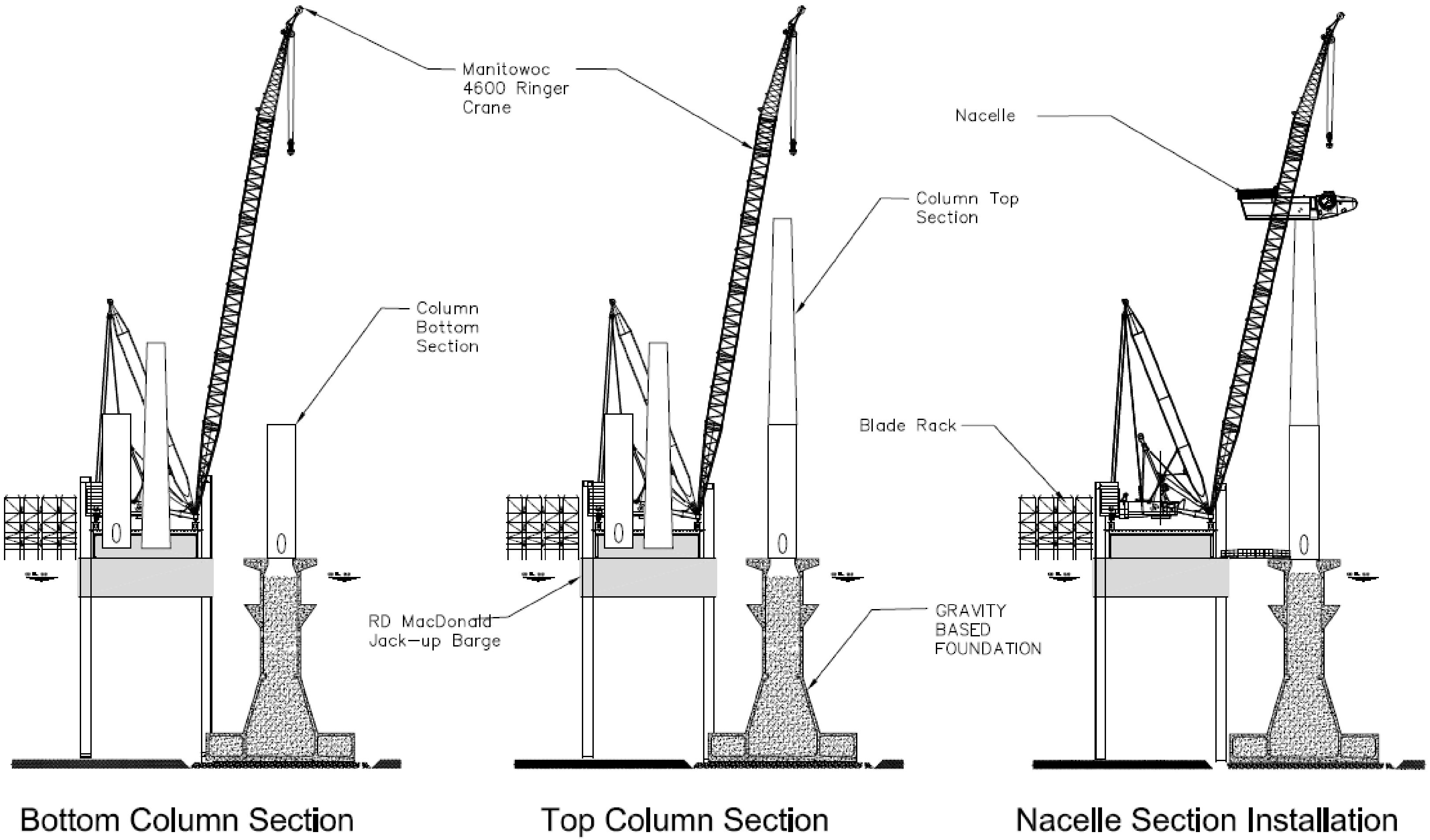

Figure 9-2: WTG Tower and Nacelle Installation

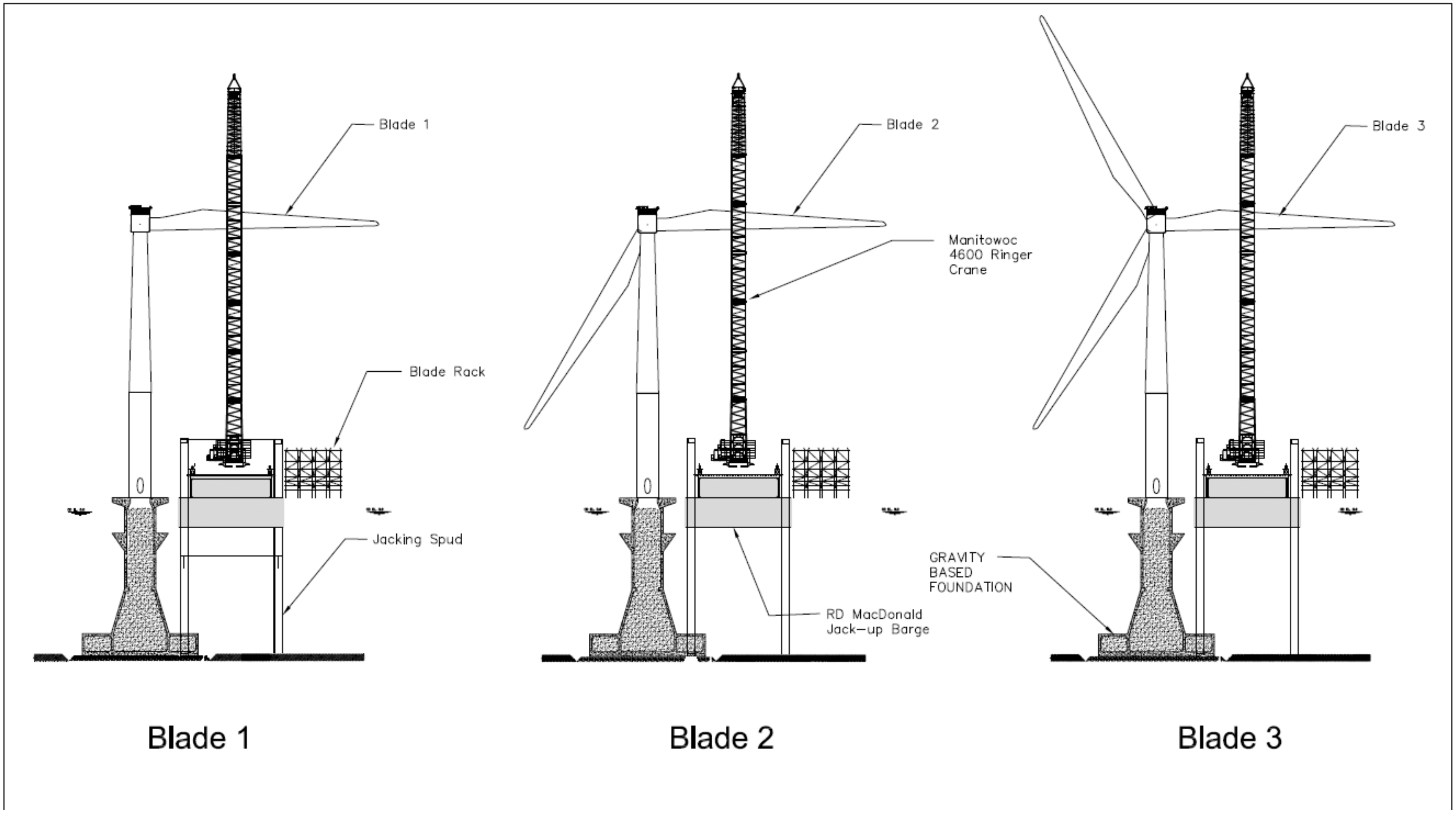

Figure 9-3: WTG Single Blade Erection Method

10 Electrical Interconnection

The Project electrical system is a typical electrical collection and transmission system seen on existing offshore wind farms. The system consists of a series of array cables that collect the power from the individual WTGs and deliver it to an offshore substation. At the offshore substation the voltage is increased to 230kV and transmitted to shore via a 30km 230kV submarine AC export cable. The cable makes land fall approximately 1 km from the Lennox Thermal Generating Station substation, where it is connected to the electrical grid.

The Project as proposed has been reviewed by the grid operation authority, Independent Electricity System Operator (IESO). IESO conducted a System Impact Assessment in conjunction with a Connection Impact Assessment by Hydro One; this review concluded that the project as proposed "will not result in a material adverse effect on the reliability of the IESO-controlled grid".

As further engineering is completed and project specific details become available it is understood that Windstream intends to partner with selected strategic suppliers. There focus is on the procurement of typical offshore wind project long lead items including, submarine cabling and main transformers.

A review of the electrical systems main components is provided in the following sections. The review covers areas associated with interconnection, system impact and technical details of the Project transmission and collection system

10.1 IESO System Impact Assessment Report Findings

The document '*System Impact Assessment Report, November 8 2010* produced by IESO, assesses the acceptability of the Project to the local grid code requirements. Specifically, according to the following criteria:

- Connection arrangement.
- The effect on existing grid circuit reliability/protection.
- Reactive power capacity.
- Thermal overload.
- Voltage maintenance.
- Transient performance.
- Fault ride-through.

In general, the Project adheres to the grid code requirements and does not cause undue stress to other aspects of the local grid, and thus has been granted a '*Notification of Conditional Approval*'. This is subject to standard requirements outlined within the report, none of which are considered unusual.

During the 09 November 2012 meeting with the IESO, OTRECH and Genivar, the following points were noted:

- The Ontario government has imposed a moratorium on off shore wind farms; however, the OPA's FIT contract with the Project is still in effect.
- The System Impact Assessment for the Project is still valid with no expiry, but if the existing conditions were to change significantly, the SIA would be amended.
- As long as the WIS FIT contract is in effect, the IESO considers the Project as committed.
- The System Impact Assessment for any new project connecting at Lennox will be done with the Project represented in the study model.
- SIAs for any other projects will not change the connection requirements for the Project.
- The IESO needs to be notified of any changes to the data and information that were submitted with the System Impact Assessment application. This may include a change of WTG or a change in the collector system.
- If the changes are material, the IESO will review the SIA and issue an addendum.
- The IESO report was conducted assuming ten strings of ten 3 MW WTGs, and will need to be updated to reflect the final WTG selected for the project. IESO will be notified of the final WTG selection and any changes in the collector system design to determine if the changes are material and if an update to the system impact study is required.

10.2 Substations

The Project is situated to capitalize on the existing Lennox Thermal Generating Station Substation. Lennox station is approximately 25km from the project site and is indicated in the system impact study it provides a robust interconnection point. A substation for the Project will be constructed at the project site. This is a typical arrangement for a generating facility.

10.2.1 Offshore Substation

The Project substation will be located at the offshore site and will serve to collect the 35KV power generated by the individual WTGs and step the voltage up to the 230KV submarine cable transmission voltage.

Offshore wind project substations are either island based or platform based. Island based structures provide a significant potential to reduce substation cost by allowing the construction of the substation using typical land based construction methods. Platform based structures are considerably more complex and typically require the use of specialized marine construction vessels to support installation. Platform based structures are typically employed on sites that are further from shore.

The Project offshore substation will be island based and is arranged as a typical land based substation. The substation is configured with typical equipment including two main transformers, 35kV and 230KV switchgear, dis-connectors and capacitor banks. The offshore substation footprint is currently designed as an extension to Pigeon Island. This approach capitalizes on the existing island and will also serve to support offshore operations and maintenance.

The sizing and spacing of equipment has been determined employing conservative assumptions. It is assumed that the currently proposed 130m by 93m footprint of the substation can be modified or reduced as design is finalized. The proposed layout for the substation is depicted in Figure 10-1.

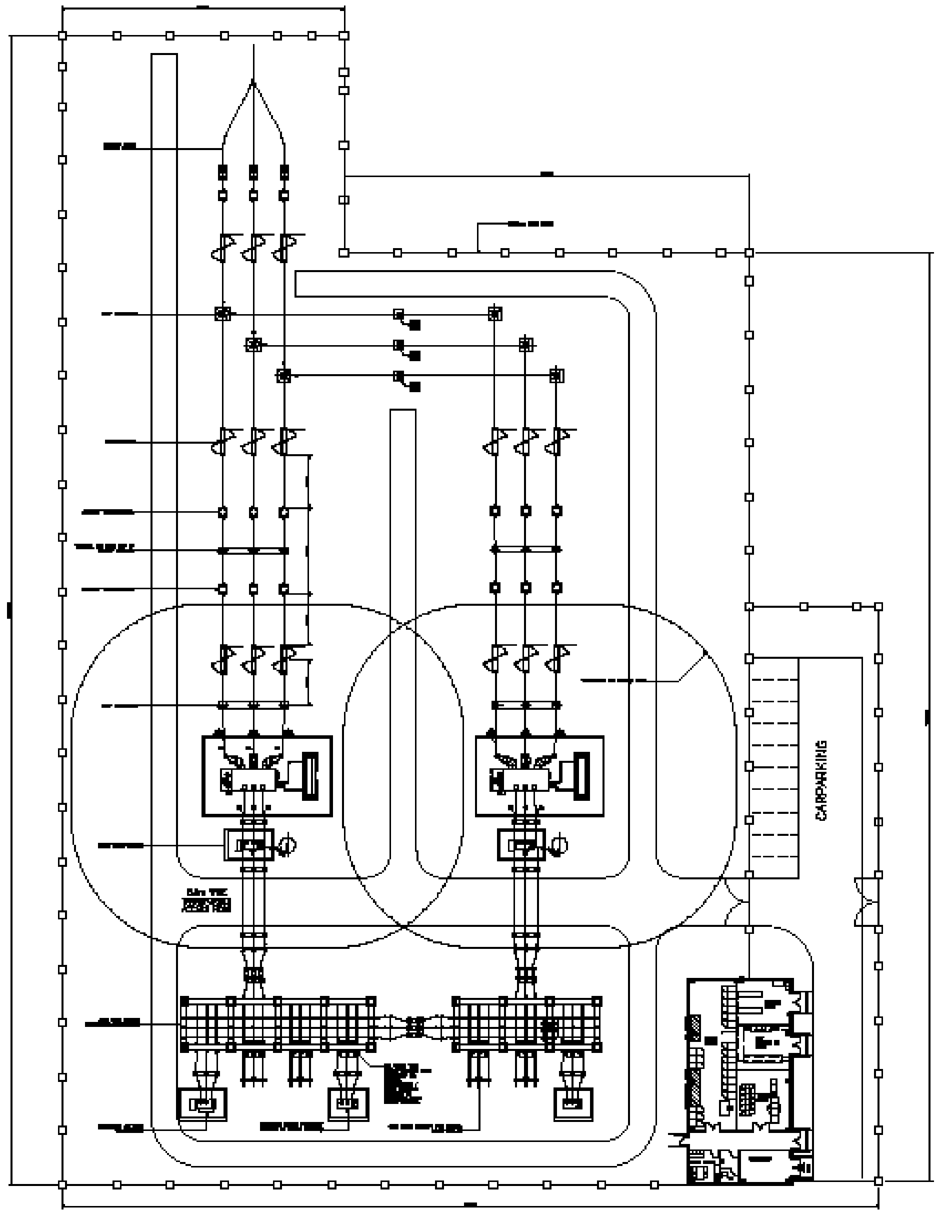

Figure 10-1: Offshore Substation General Arrangement

To support the substation and to preclude interference with the existing Pigeon Island light house the substation location is proposed on the North end of the island. The substation foot print will require the extension of the island. This common marine construction practice has been employed throughout the great lakes in support of marine terminal, waterfront structure construction and dredging operations. The impoundments or retaining structures for the islands are constructed and are commonly filled with the spoils from dredging operations conducted in support of the projects. The island substation provides the project with significant advantages including:

- Allows for the use of lower cost land substation construction techniques.
- Provides a space to deposit site dredge spoils.
- Provides for a year round offshore operations site.
- Avoids the significant cost of a platform style substation.

A conceptual drawing depicting the extension to Pigeon Island with a proposed substation layout is provided in Figure 10-2. The green area in the drawing is the existing island; the lighter colored area represents the extension to the island.

Figure 10-2: Pigeon Island Substation

10.2.2 Onshore Substation

The Project will interconnect in the Lennox Thermal Generating Station Switchyard. The planned arrangement consists of an offshore to onshore junction station that will be situated approximately a kilometer from the Lennox Station. The junction station serves as the landing point for the project submarine export cable and is the connection point to the upland export cable. The upland export cable will run underground from the junction station to the Lennox Switchyard and will be terminated at two 230KV breakers installed adjacent to lines X21 and X22. The projects interconnection rights were established in the interconnection agreement with IESO.

10.3 Submarine Cabling

The export cable and array cable will be laid on the lake bed (not buried) and protected through burial and appropriate armoring at shore landing zones. Submarine transmission cables throughout the great lakes are commonly installed employing this methodology with a successful record of operation as outlined in a study commissioned by Windstream and conducted by Genivar (Genivar, December 2012). This is in contrast to the methods employed in support of offshore wind and transmission projects located in ocean environments. There are several factors based on the projects location that avoid the requirement for cable burial, they are as follows:

- There is a proven history of operation of power transmission cables in the great lakes.
- The geologic conditions of the lake bottom preclude burial with bed rock either exposed or close to the lake bottom in many areas.
- The metocean environment is less severe and the sites do not typically experience the same level of currents experienced at salt water sites.
- The level and size of marine traffic in the cable areas is reduced when compared to ocean sites.
- Commercial fishing means and methods employed on the great lakes do not commonly involve trawling or dredging.

The ability to surface lay cable throughout the majority of the project site is a significant advantage for the project. Figure 10-3 depicts the submarine cables currently installed in the area and includes the proposed Project export cable.

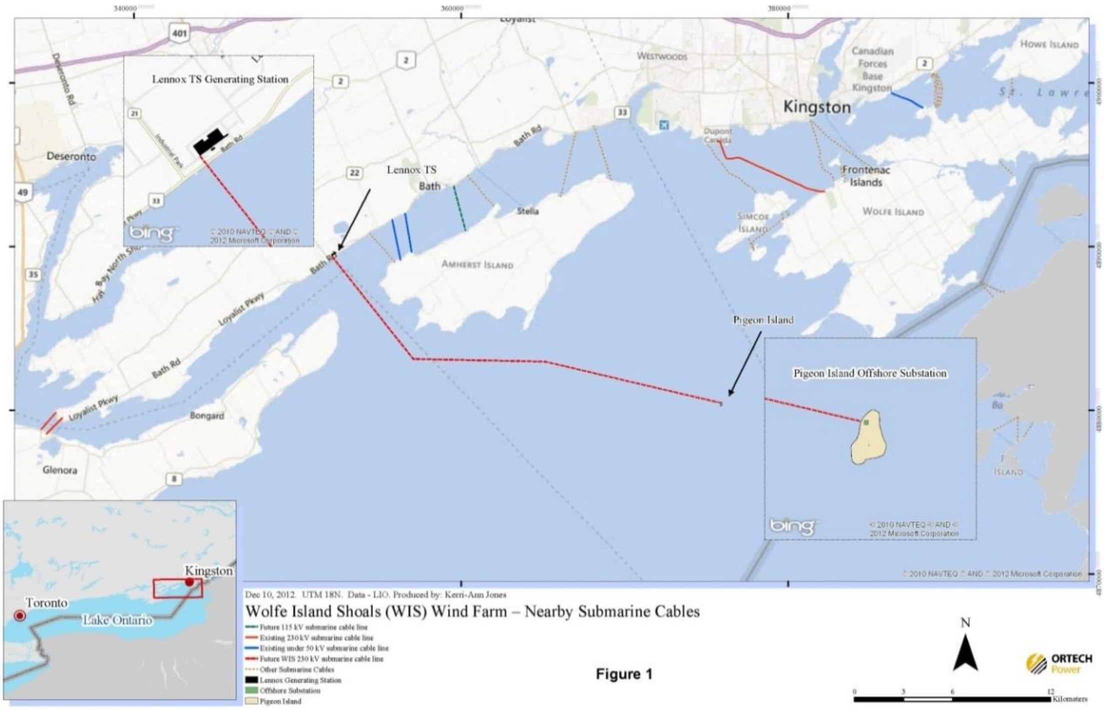

Figure 10-3: Kingston area Submarine Cable Installations

SgurrEnergy has been informed by Windstream that initial talks regarding array and submarine export cabling have been conducted with General Cable, Nexans, Mitsubishi, Pharos, Prysmian Power Cable Systems, Mallin Consultants and Roxtec. It is understood that detailed cable design will be provided when it becomes available.

The submarine cable array to support the 130 2.3MW WTGs consists of thirteen strings with ten WTGs each. This array of cables operates at 35kV and collects the power generated by the WTGs and feeds to the substation. The array cables connect individual WTGs in sequence with the array cable size increasing as the cable approaches the substation and the number of WTGs on the string increases. The strings are routed to the offshore substation where they will run through an underground conduit system into the island substation. A conceptual Project array cable layout is provided in Figure 10-4.

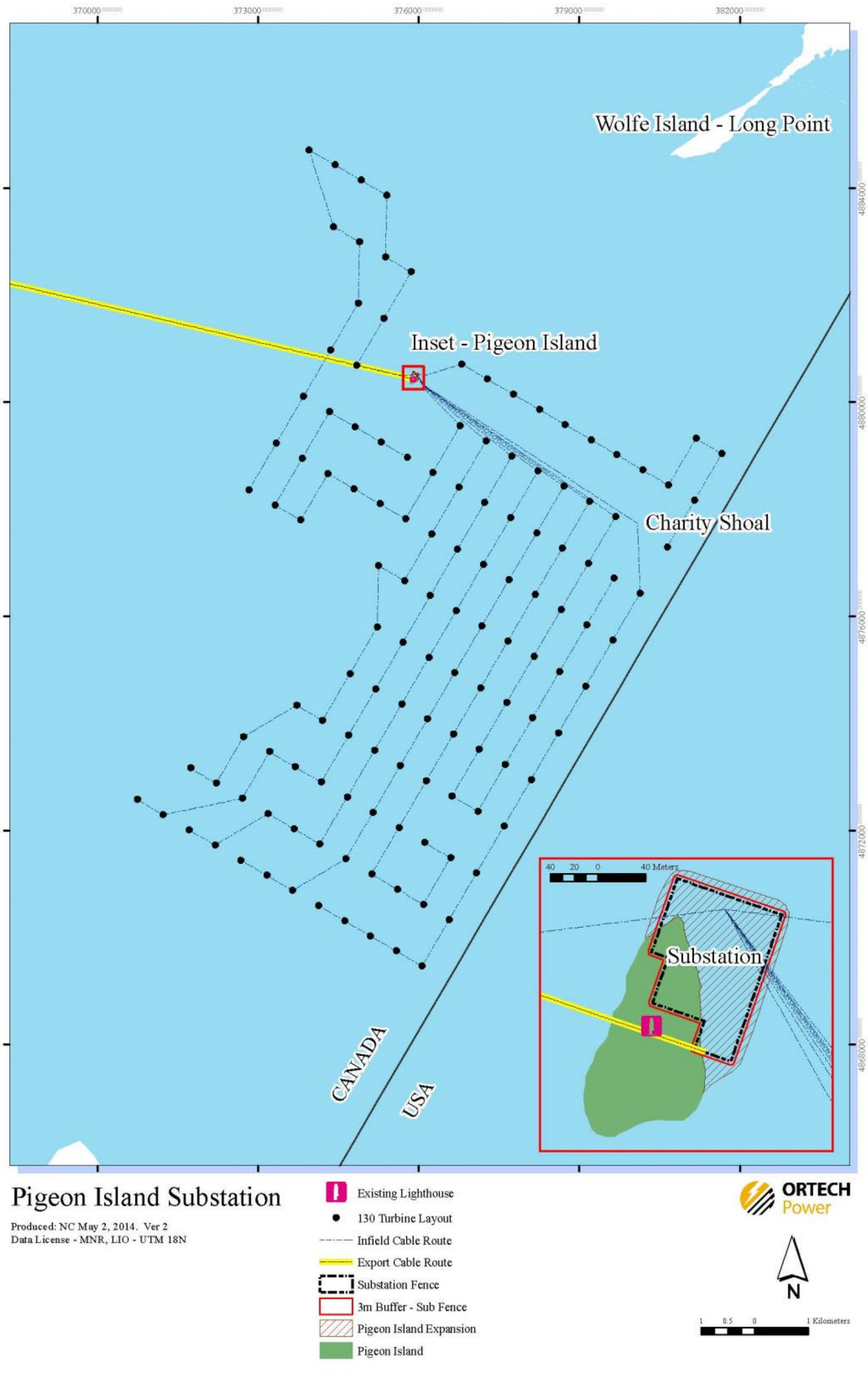

Figure 10-4: Array Cable Layout

The export cabling is currently planned as a single 230kV cable approximately 1,000kcmil in size with a length of 30km. SgurrEnergy reviewed the export cable calculations and our opinion is the cable size as proposed is adequate to carry the full 300MW output of the Project. SgurrEnergy assumes that the export cable sizing will be reviewed upon completion of further electrical system design work. Additionally we recommend that Windstream investigate the option of a second export cable, this would reduce the size of the export cable and could have an impact on project cost with the added benefit of providing redundancy.

SgurrEnergy has reviewed the documentation provided on submarine cabling. The array and export cabling scenario proposed are reasonable and in keeping with practice on European projects and with existing submarine cable installations on the Great Lakes.

10.4 Cable Installation

There are several well established cable installation contractors in North America that can support the Project. Cable installation activities in the Great Lakes have typically been completed employing barge based cable equipment. Durocher Marine, a Michigan based company and Caldwell Marine a New Jersey based company have experience with the installation of submarine cabling in North, Central and South America.

Durocher marine recently completed the installation of the 138kV export cable in support of the McLane mountain wind farm in Lake Huron. Caldwell Marine recently completed the cable installation scope for the 87.5km 242kV Vancouver Island Transmission Reinforcement project. Caldwell Marine has also been contracted to conduct the cable installation scope for the Cape Wind project.

Barge based cable installation systems are expected to be employed in support of the project cable installation scope. Barge cable installation systems are modular in nature and can be mobilized onto a locally available barge. The cable installation equipment consists of a barge positioning system, cable carousel or tank, loading arm, cable engines, cable reels, ploughs and remote operated vehicles. The arrangement of the barge is modified to suit the installation tasks. A vessel installing short runs of array cable will be configured differently than a vessel that is tasked with installing a large diameter export cable that is in excess of 20 Kilometers in length.

A typical cable installation barge configured to support the installation of an export or long distance transmission cable is pictured in Figure 10-5. The cable carousel and loading arm located above the carousel can be seen clearly in the picture. Figure 10-6 shows a cable installation barge conducting a cable shore landing. It should be noted that both barges depicted are supporting Canadian projects.

Figure 10-5: Cable Installation Barge[10]

Figure 10-6: Cable Installation Barge Shore Landing[11]

[10] Courtesy of Caldwell Marine

[11] Courtesy of ITB Subsea Equipment

The cable installation vessel fleet is growing rapidly with the fleet moving toward the use of offshore construction vessel designs modified for purpose. Maersk the world's largest shipping company has built numerous vessels in the past years that are currently under long term charter to European companies specializing in cable installation. Many of these vessels such as the Maersk Responder in Figure 10-7 are Great Lakes capable and are operated in support of export and array cable installation scopes.

Figure 10-7: Cable Installation Vessel[12]

Much of the shore landing preparation and support work required to create the shore landing zones and to protect the cable from ice will be conducted with land based equipment installed on construction barges. These activities consist of trenching, conduit installation and concrete placement. This equipment is readily sourced from local marine construction contractors.

[12] Courtesy of Maersk

The final cable installation strategy including the selection of installation vessels will be developed in conjunction with the selected cable supplier. The location of the export cable supplier, the export cable length and size may heavily influence the installation vessel for this portion of the work. The array cable due to its smaller size and shorter lengths likewise impacts the installation vessel decision. It may be determined that employing two separate installation vessels may be the most appropriate installation strategy.

SgurrEnergy understands that Windstream intends to work with a cable supplier and installation contractor to develop the overall installation strategy. In SgurrEnergy's experience this strategy provides the most realistic and achievable cable installation strategy. Accordingly until the design activities to support this planning can be completed additional details regarding this scope of work will be difficult to develop.

10.5 Electrical Interconnection Summary

The following observations are made regarding electrical systems and grid interconnection

- The grid operator has confirmed the electrical interconnection at the Lennox Thermal Generating Station for 300MW is feasible for the Project.
- It is assumed that the additional electrical design work will progress once the project is permitted to move forward.
- The advantage to the project of constructing the offshore substation on an island is significant and should be considered as a primary design assumption for the electrical transmission and collector system.
- Installation of submarine cabling directly on the lake bottom is a significant advantage and is the typical construction method performed in support of great lakes transmission cables. Upon completion of further engineering an economic study may be prudent to compare the Capex of a larger export cable with that of dual export cables to determine if they would allow the Project to the benefit from lower transmission losses and hence greater energy sales.
- Windstream intends to develop the submarine cabling supply and installation plan in conjunction with a suitably qualified cable supplier and installation contractor.

In SgurrEnergy's opinion the electrical interconnection system as currently proposed is in keeping with offshore wind installations of similar size in Europe. It has been designed to an appropriate level and has the potential to avoid significant costs when compared to offshore projects of a similar size and arrangement.

11 Project implementation

Project implementation of large scale projects is a complex process. Successful projects identify challenges early on and implement systems to identify and manage them. The Project has made progress toward this goal and has assembled a team to continue the development of this process. SgurrEnergy's believes Windstream should continue in this direction and continue the development of a comprehensive project implementation strategy, the components of this are:

- Project management and contract strategy.
- Schedule.
- Permitting and environmental restrictions.
- Engineering and technical considerations.
- Identification of fabrication and staging facilities.
- Vessels.
- Submarine cable.
- Offshore substation.
- Onshore control centre.

11.1 Project Management

As with all project management efforts the goal is to ensure the smooth execution of the project. Accordingly the ongoing development of the organization to manage the project is progressing. A key consideration in the development of the project team is the incorporation of experience from European offshore wind projects.

As the project develops further the approach to contract and project management will be decided from a variety of inputs. Factors effecting this decision will include; available development capital, project schedule, financing requirements, financial risk and the vendors and contractors selected for the Project. It is expected that the project will continue to develop along its current path with the major contracts for the project broken into balance of plant (BoP), TSA and submarine cable installation and supply.

There are different project implementation contact methodologies that have been employed to implement offshore wind projects in Europe ranging from a typical Engineer, Procure, Construct (EPC) model, to a multi contract strategy managed by the developer.

A large EPC contractor can be an attractive option because of the resources and experience that they bring to a complex project. However, this strategy, brings significant cost and could prove to be more expensive over the long periods of time associated with developing an emerging market project.

Similarly, continued discussions with Siemens as WTG supplier need to continue to progress the TSA in conjunction with the others phases of the Project.

In SgurrEnergy's opinion Windstream has proceeded in a prudent manager employing a smaller project team to advance the Project. The wisdom of this decision is further reinforced by the constraints placed on the Project by the current provincial moratorium.

In SgurrEnergy's opinion the Project must progress further through the development pipeline before a final contract execution strategy is selected. To this end SgurrEnergy and ORTECH provided recommendations to Windstream to continue to progress the Project's early stage design. Significant activities included in the plan included

- Develop the most likely foundation solution for the Project.
- Determining likely installation vessels.
- Identify and confirm likely foundation fabrication and staging sites.
- Update electrical interconnection and offshore substation design.
- Refine electrical equipment requirements and sizing.
- Developing the environmental and site impact investigations required to support project permitting.
- Develop requirements for additional engineering studies.

Windstream has been able to act on many of the recommendations in the proposed strategy. SgurrEnergy and Ortech have assisted Windstream in these efforts and it is apparent that significant progress has been made.

Windstream has not been allowed to proceed on many of the supporting activities required to support continued project development. This has in turn restricted their ability to execute much of the design scope required for the Project.

11.2 Schedule

As with all projects a detailed project schedule is required. The project schedule is a living document used to provide an overview of progress on the project as well as highlighting schedule impacts and project risk. The master schedule summarizes the more detailed subsidiary schedules for each phase of the Project. Major focus areas of the schedule will include;

- Permitting and regulatory activities.
- Engineering development and design.
- Data gathering including environmental, geotechnical and wind resource data.
- Financing and commercial obligation timelines.
- Contractual negotiations with equipment suppliers and contractors.

- Equipment and facility fabrication efforts.
- Project Installation activities.

Each of these major activities will be significant schedules on their own and will require a significant effort to develop and manage to insure that they are useful and appropriate tools.

The Project has already experienced the schedule consequences associated with the dynamics of a new market, as is evident by Ontario's moratorium on offshore wind in 2011. The schedule reviewed by SgurrEnergy provides timescales for the various Project tasks with the assumption that the initial tasks would commence when the provincial moratorium is lifted. Overall the schedule is in line with other offshore wind farm schedules for projects of this size. The schedule includes a three year development, design and fabrication period followed by a typical two year installation window.

The development, design and fabrication period allows time to conduct required environmental and site characterization studies. These studies then inform the design, contracting, fabrication and financing phases. The time lines associated with these activities are achievable but are contingent on a permitting process that is both timely and effective.

The offshore installation schedule is similar to those seen on other projects. The first installation season consists primarily of foundation preparation and installation followed by the installation of submarine cabling and the offshore substation. Project activities are suspended in the winter months and commence in April of the following year. In the second installation season remaining foundations are installed and all WTGs are installed by two WTG installation vessels. The second installation season also sees the final substation and submarine cable installation and the commissioning of electrical systems and WTGs.

Windstream has continued efforts to ensure the Project schedule is achieved and the activities that have supported this are discussed throughout the report. These efforts have allowed for the continued development of the Project in areas such as site characterization, foundation design and identification of installation contractors.

The Project schedule based on the award of the FIT contract is included as Appendix B.

11.3 Permitting

Project permitting requirements and progress are not addressed in this report as we have been informed that Windstream and ORTECH are addressing this topic in a separate report. Initial studies have been completed and further studies will be needed for permitting and to inform the final design. Of note, Windstream engaged MK Ince to conduct a study of projects, including renewable energy projects that are located in the same geographic region as the Project and that have achieved the required environmental permits (MK Ince, September 2013). Much of these further studies must take place offshore when allowed considering the current moratorium.

11.4 Engineering and Technical Considerations

There has been significant engineering and studies performed to date to support the feasibility of the Project. Additional engineering activities are needed to finalize the design, issue construction tender packages and achieve financial close. At this point in time the critical technical studies required to support project design include a detailed metocean study and geotechnical/geophysical campaign.

The development of the electrical collector, substation, and transmission system interconnection design is ongoing. These efforts will inform design decisions and will be employed to affect equipment procurement decisions.

11.5 Fabrication and Staging Facilities

At this stage in the project development it is envisioned that the foundation fabrication facilities and WTG staging facility will be separate sites. The selection of the facility required will be decided based on the negotiated commercial terms and the facilities proximity to the project site.

The foundation fabrication facility is discussed in detail in section *8.4 Foundation Fabrication Facility.* It is expected that this facility will be primarily employed to support foundation fabrication and installation activities including supply of stone and aggregate in support of offshore construction activities.

A more traditional port staging facility will be required to support the WTG installation and submarine cable installation scopes.

A smaller local staging facility will be required to support project operations including personnel transfer, support vessel loading and smaller construction operations.

11.5.1 Staging Facilities

Staging facilities are important considerations throughout the project implementation phase. Due to the complexity, limited construction seasons and sheer size of the project components the Project will require large project staging areas. The staging areas would optimally be located in close proximity to the site with ready access to rail, road and marine transport options. It is unlikely that all the project components will be able to be cost effectively stored in the immediate area of the Project. With this reality in mind Windstream has conducted preliminary investigations into the availability of existing storage and staging areas to support the project. It is expected that an integrated project logistics plan will be developed and include the following components;

- Shipping and delivery options for project components including durations and seasonal limitations.
- Component storage and maintenance requirements.
- Potential staging and storage areas including delivery and shipment option considering the proximity to the project site.
- Cost effectiveness and timeliness of shipping options from storage/staging areas to the Project site.
- Ability to perform secondary fit out preparatory works at storage/staging area.
- Size and weight of components.

Several established area facilities have been actively engaged in the transhipment of WTG components, these include the nearby ports of Oswego and Ogdensburg. Both facilities have direct rail access and can serves as transhipment facilities if components were to be delivered via oceangoing vessel. The port of Ogdensburg is an established WTG component transport port with approximately 70 acres of laydown.

Table 11-1 lists approximate distances from Lake Ontario ports with facilities that have or could support WTG staging activities.

Table 11-1: Distances Project Site to Area Ports (statute miles)

Port	Distance
Kingston, Ontario	15
Ogdensburg, New York	65
Oswego, New York	45
Oshawa, Ontario	120
Hamilton, Ontario	170

Staging areas for foundations are expected to be located at or in close proximity to the foundation fabrication yard and will be determined by the eventual foundation design.

Ogdensburg New York is the most likely WTG staging area. The harbor and slip depths at the Port of Ogdensburg are 27 feet (8.2m), which is standard Seaway depth. The marine terminal has a 1,250 foot (381m) wharf. There is over 70 acres of laydown area at the Port of Ogdensburg, much of which is located in a Foreign Trade Zone. The facility has a history of handling WTG components, including offloading in excess of 20 vessels and reloading 100 barges for delivery to projects in New York and Canada.

Another potential staging area is Pier 26 in Hamilton Figure 11-1.The facility is operated by Great Lakes Stevedoring Company and has approximately 30,000m^2 of exterior laydown area with 927m of seaway draft bulkhead. The facility has a history of handling break bulk cargo including modular constructions as well as WTG components.

Figure 11-1: Pier 26 Hamilton Ontario

11.6 Vessels

The selection of appropriate and cost effective installation vessels is a challenge for any offshore project. The physical limitations of the St Lawrence Seaway system preclude access to Lake Ontario for the majority of the existing offshore wind farm installation vessel fleet. However the more moderate “sea” conditions on the lake however are expected to allow for the use of vessels that could not be employed in the more severe weather conditions encountered on many European projects. Furthermore, the Project location and chosen foundation option lend themselves to using vessels already available in the region, thus improving both vessel availability and overall Project costs.

Completion of a detailed Metocean study is a critical component that will provide the operational parameters to inform the vessel selection process.

The project team must consider installation vessels as a fundamental component in the foundation selection and design process evaluate the installation vessel requirements to determine if there is an opportunity for vessels to support multiple stages of the project. This project focus could provide cost savings in the form of longer term charters and the potential for a “custom” vessel to be utilized for multiple project phases.

11.6.1 WTG Installation Vessels

As with other vessel selections the choice of WTG installation vessels will depend largely on the Metocean conditions. In addition to the installation vessels proposed by Weeks Marine there are existing European WTG installation vessels that could be employed on the project. SgurrEnergy recommends early engagement with the vessel operator to confirm suitability of the vessel.

The relatively benign conditions in Lake Ontario may allow for the use of vessel solutions not typically employed in support of ocean based offshore wind projects. However this cannot be confirmed or effectively investigated until the detailed metocean study is completed.

As Siemens is expected to be performing the WTG erection scope, their requirements identified in the TSA will inform the installation vessel selection process.

11.6.2 Additional Vessel Considerations

The geology of the lake bottom suggests that traditional anchoring methods may be ineffective on the project site. To explore options a mooring study will be required once approximate vessel sizes and metocean conditions are available. The potential for an alternate mooring/anchoring system should be considered.

Lodging and crew transportation requirements will have to be considered for all marine operations. If at all possible the installation crews should be housed at the offshore installation site to avoid lost time due to work hour restrictions and crew transit time.

Crew boats, tugs, material and service barges were not discussed, however these vessels are required for the support of any offshore project, and are considered to be readily available.

11.7 Submarine Cable

SgurrEnergy has reviewed the documentation provided on submarine cabling. The array and export cabling scenario proposed are reasonable and in keeping with practice on European projects and with existing submarine cable installations on the Great Lakes.

There are numerous cables currently installed throughout the Great Lakes. The cabling installation practice in the Great Lakes is for the cable to be laid directly on the lake bed with protection where the cable makes landfall. The export and array cable proposed for the Project are installed in this manner and it is considered to be a significant advantage for the Project as it avoids the cost and difficulty often associated with cable burial. With these facts in mind the installation of the array and transmission cable while a challenging activity is considered to be routine.

There are numerous vessels of opportunity and marine construction vessels capable of accessing the Great Lakes System that can support the installation of the Project submarine cabling. There are several vessels of opportunity that have been employed on European offshore wind projects that would be suitable for use on the project, additionally, an area barge can be outfitted to accomplish this work scope.

As stated earlier coordination with the vessel operator will be required, additionally the cable manufacturer should also have significant input to the selected installation vessel.

11.8 Offshore Substation

The offshore substation is an integral portion of the Project. The Project plans to locate the offshore substation on reclaimed land adjacent to Pigeon Island. This is the most logical location for the substation and is a significant advantage to the Project. This option allows for more traditional civil focused construction means and methods when compared to the construction of a typical offshore wind electrical service platform. The fill required to add the required area to Pigeon Island will likely come from dredged material used to prepare the lake bottom for the gravity based foundation.

11.9 Onshore Control Center

An onshore control center for the Project will be required. Typically these facilities are incorporated with the operations and maintenance facility. Preliminary information suggests that this facility would be located in the Kingston area. Potential locations for the onshore control center are depicted in Figure 11-2.

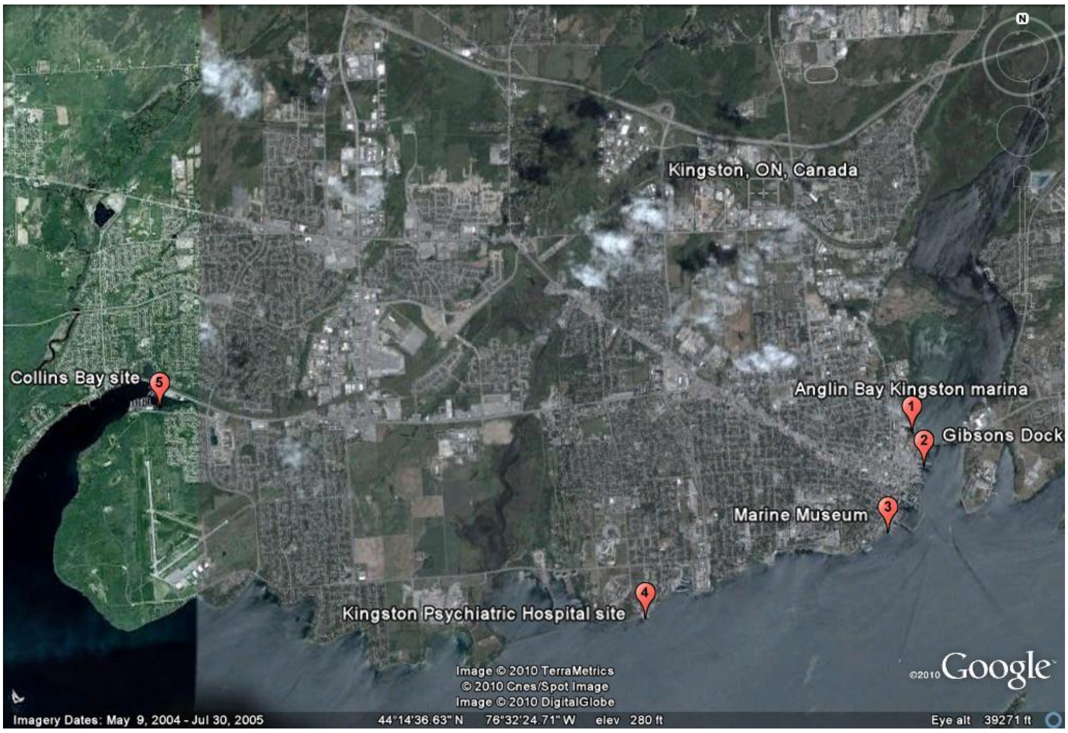

Figure 11-2: Potential Locations for Project Operation and Control Center

11.10 Project Implementation Summary

The implementation of Project as proposed is feasible and in several areas is considered less technically challenging than existing European projects of a similar size. The Project's primary advantages are listed below.

- Well established regional supply chain for raw and finished steel and concrete products.
- Established multi-mode transportation system with a history of supporting wind projects in immediate vicinity.
- Regional manufacturing of WTG components.
- Proximity to robust grid connection point.
- Comparatively benign weather conditions.
- Island based offshore substation.
- Submarine cable installation directly on lake bed.
- Geologic conditions suitable for gravity foundation installation.

In addition, it will be relatively straight forward to expand the existing team with staff who have existing direct experience of offshore wind farm construction from Europe. SgurrEnergy is also well placed to provide expert assistance with developing and assessing the Project's risk register and using this to optimise the cost assumptions.

12 Operations and Maintenance Phase

12.1 Onshore Facilities

The onshore facilities for the Project are expected to be located in the vicinity of Kingston the largest town in the area with a population of approximately 120,000. This population base and its business community will likely provide a diversified and suitable base of support for the Project. The location of the operations and maintenance facility has not been selected by the Sponsor at this time; however, most proposed locations are within an approximately 25km radius of the Project. This is a relatively short distance that will provide quick access to the Project via service vessel for the majority of the year. There are several sites that have been identified that provide ample room for the operations and warehouse facility as well as potential staging areas required to support major component repair.

The ideal project site would capitalize on an existing deep water facility with ample lay down area and proximity to the TransCanada highway system; there appear to be several sites in the area that could fulfil this requirement.

An alternate facility access method will need to be explored to provide access to the Project site during the winter months when ice is present. Access to the site during the winter ice season may be accomplished using an ice breaking vessel or potentially via an air cushion vehicle or helicopter as required. Access to offshore sites via helicopter or vessel with ice breaking capability is a common occurrence in many parts of the world.

12.2 Wind Turbine Generator Operations and Maintenance

The WTG operations and maintenance agreement has not been negotiated with Siemens. It is expected that Siemens will manage the wind turbine generator operations and maintenance through the warranty defects period and for an as yet defined period of time thereafter. SgurrEnergy's experience recommends that an operations and maintenance agreement be negotiated to insure that Siemens is responsible for the maintenance and availability of the wind turbine generators. Incentives for increased availability and capacity should also be negotiated as part of the agreement.

An operations and maintenance agreement with the wind turbine generator manufacturer is typical on most offshore wind projects and provides a level of comfort that the manufacturer will be actively involved in supporting repairs and upgrades.

Site conditions are expected to restrict accessibility to the wind turbine generators during the winter ice season. Accordingly it is expected that the majority of wind turbine generator maintenance work will be scheduled and completed in the approximately 9 month ice free period from April to December.

Non routine repairs and maintenance events during the limited accessibility season of January to April will likely be evaluated and addressed with a larger project view in mind. It is expected that the determination to perform non-scheduled WTG maintenance will be based on an analysis of accessibility, risk to personnel and equipment as well as energy loss. It is recommended that a year-long access strategy is developed as a priority, so that the most economical solution for the Project can be incorporated into current planning and cost estimations.

12.3 Balance of Plant Operations and Maintenance

Balance of plant operations and maintenance activities are coordinated with the wind turbine generator maintenance program and will likely be conducted almost exclusively from April to December. Balance of plant repairs and unscheduled maintenance in the January to April time frame are expected to be evaluated and conducted using the same risk based strategy identified in the WTG operations and maintenance section.

12.4 Offshore Substation Operations and Maintenance

Major operations and maintenance work on the offshore substation is expected to be planned and executed during the April to December window as well with routine maintenance and troubleshooting proceeding year round. It is assumed that the offshore substation will be readily accessible by either vessel or helicopter year round. It is important to the operation of the entire project that safe and secure access is designed into and provided for the offshore substation on a year round basis.

12.5 Service Vessel Plan and Accessibility

The overall predicted accessibility for the project will be developed after completion of the metocean study. The data from the metocean and ice study will be analyzed to determine access strategies and develop the operating requirements of the service vessels. It is expected that several service vessels will be required and it would be reasonable to investigate the inclusion of a vessel or vessels with some degree of ice hardening. A suitable vessel could increase the accessibility for the project and potentially reduce downtime and energy loss. Novel approaches such as small hovercraft may offer opportunities. Helicopters are also a tried and tested method for improving offshore wind farm availability, and therefore production revenues.

12.6 Operations and Maintenance Plan summary

It is expected that all maintenance and repair activities conducted on the Project will be evaluated using a risk based approach and evaluated over the life of the Project. Accordingly the risk assessment process will heavily influence the operations and maintenance program throughout the life of the Project.

13 Decommissioning Phase

A decommissioning phase for the Project is assumed and accordingly adequate funding to support this activity should be considered in the financial model from the early stages of the Project. The plan will address how the project will remove and recycle the Project components, returning the area to pre-existing conditions. In general, a decommissioning plan must address the removal of onshore cables, submarine export cables, array cables, WTGs and foundations as well as the electrical substation.

It is assumed that the Project will continue operation, perhaps with upgraded turbines beyond the current twenty year power purchase agreement. Note that renewable energy plants in Ontario often run for close to a century as the civil infrastructure lasts for many decades, while the generating equipment is upgraded or replaced as required.

14 Overall Conclusions

The implementation of the Project as proposed is feasible and in several areas is considered less technically challenging than existing European projects of a similar size. The Project's primary advantages are listed below:

- Use of proven technology and installation methods, with ongoing support and expertise being provided by a number of partied with extensive experience of the development, construction and operational phases of a large number of offshore wind farms.
- Sufficient site information exists to demonstrate that the selected technology and installation methods are feasible for the site-specific conditions.
- Sufficient analysis has been undertaken on the Project's energy yield to provide a good level of confidence in the Project's performance, subject to ongoing planning for year-round access for WTG maintenance.
- Realistic foundation fabrication and launch strategy well suited to the Project.
- Well established regional supply chain for raw and finished steel and concrete products.
- Established multi-mode transportation system with a history of supporting wind projects in immediate vicinity.
- Regional manufacturing of WTG components.
- Proximity to robust grid connection point.
- Comparatively benign weather conditions, reducing weather risk and therefore construction contingencies.
- Island based offshore substation, avoiding the high capital costs typically seen for offshore substation platforms in Europe.

- Submarine cable installation directly on lake bed.

In addition, it will be relatively straight forward to expand the existing team with staff who have existing direct experience of offshore wind farm construction from Europe. SgurrEnergy is also well placed to provide expert assistance with developing and assessing the Project's risk register and using this to optimise the cost assumptions.

Appendix A: Studies and Engineering Completed to Date

Wolfe Island Shoals Document Control, 14 November 2013.

Appendix B: Project Schedule

WIS Gantt Chart 17 February 2011

Prepared for WINDSTREAM ENERGY INC. ORTECH

Wolfe Island Shoals Development Programme

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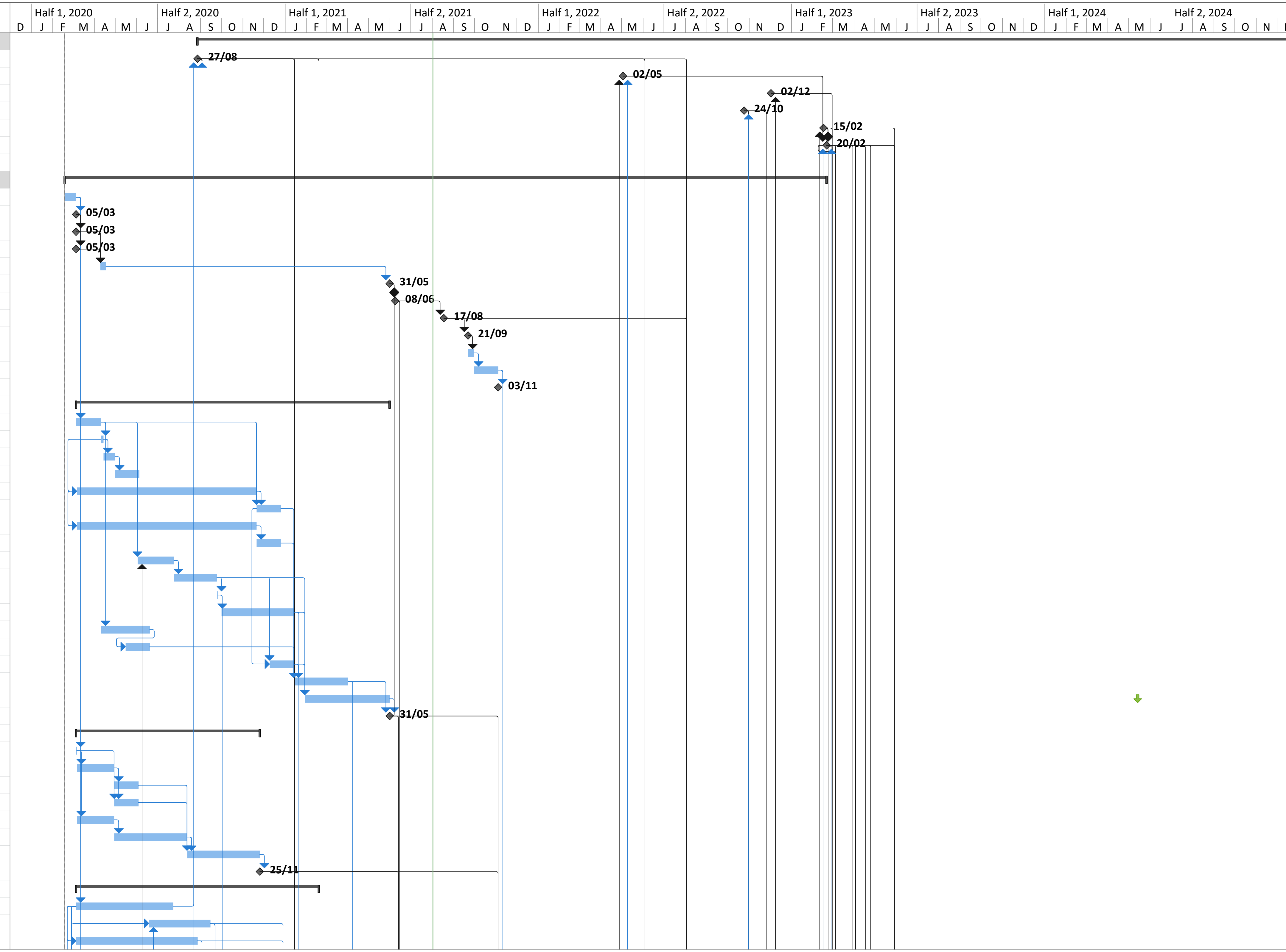
ID	Task Name	Start	Finish
1	**Summary**	**Thu 27/08/20**	**Fri 20/12/24**
2	Finalise Layout - Number and Location	Thu 27/08/20	Thu 27/08/20
3	Permits to Operate Wind Farm	Mon 02/05/22	Mon 02/05/22
4	Permits to Build Substation / Onshore Cabling	Fri 02/12/22	Fri 02/12/22
5	Permits to Build Fabrication Facility	Mon 24/10/22	Mon 24/10/22
6	Permits to Build Offshore Facilities	Wed 15/02/23	Wed 15/02/23
7	Financial Close	Mon 20/02/23	Mon 20/02/23
8	Commercial Operations Date (COD)	Fri 20/12/24	Fri 20/12/24
9	**Renewable Energy Approval**	**Tue 18/02/20**	**Mon 20/02/23**
10	Draft Project Description Report	Tue 18/02/20	Thu 05/03/20
11	Notice of Project to MECP	Thu 05/03/20	Thu 05/03/20
12	Notice of Project to Public	Thu 05/03/20	Thu 05/03/20
13	Notice of First Public Meeting	Thu 05/03/20	Thu 05/03/20
14	First Public Meeting	Thu 09/04/20	Fri 17/04/20
15	Draft Reports to Aboriginal Groups	Mon 31/05/21	Mon 31/05/21
16	Draft Reports to Municipalities	Tue 08/06/21	Tue 08/06/21
17	Draft Reports to Public	Tue 17/08/21	Tue 17/08/21
18	Notice of Final Public Meeting	Tue 21/09/21	Tue 21/09/21
19	Final Public Meeting	Tue 21/09/21	Wed 29/09/21
20	Consultation Report	Thu 30/09/21	Wed 03/11/21
21	Complete Consultation	Wed 03/11/21	Wed 03/11/21
22	**Natural Heritage**	**Thu 05/03/20**	**Mon 31/05/21**
23	Records Review and Reporting	Thu 05/03/20	Fri 10/04/20
24	Scoping Meeting with MNRF, DFO, CWS	Fri 10/04/20	Mon 13/04/20
25	Work Plan Development	Tue 14/04/20	Thu 30/04/20
26	Work Plan Review and Approval	Thu 30/04/20	Thu 04/06/20
27	Avian Field Surveys (Category 4)	Fri 06/03/20	Fri 20/11/20
28	Avian Reporting	Fri 20/11/20	Fri 25/12/20
29	Bat Field Surveys	Fri 06/03/20	Fri 20/11/20
30	Bat Reporting	Fri 20/11/20	Fri 25/12/20
31	Aquatic Field Surveys	Tue 02/06/20	Fri 24/07/20
32	Aquatic Reporting	Fri 24/07/20	Thu 24/09/20
33	Submission of Aquatic Report to DFO, CRCA	Thu 24/09/20	Fri 25/09/20
34	Review of Aquatic Reports	Thu 01/10/20	Wed 13/01/21
35	Terrestrial Field Work	Fri 10/04/20	Fri 19/06/20
36	Terrestrial Reporting	Fri 15/05/20	Fri 19/06/20
37	Development of Environmental Impact Statement	Wed 09/12/20	Wed 13/01/21
38	Submission of Reports and Review by MNRF and EC	Wed 13/01/21	Thu 01/04/21
39	Submission of Reports and Review by DFO, CRCA	Fri 29/01/21	Mon 31/05/21
40	Completion of Natural Heritage Reporting and	Mon 31/05/21	Mon 31/05/21
41	**Archaeology & Cultural Heritage**	**Thu 05/03/20**	**Wed 25/11/20**
42	Scoping Meeting with MHSTCI	Thu 05/03/20	Fri 06/03/20
43	Terrestrial Stage 1	Fri 06/03/20	Wed 29/04/20
44	Terrestrial Stage 2	Wed 29/04/20	Wed 03/06/20
45	Built/Cultural Heritage Study	Wed 29/04/20	Wed 03/06/20
46	Marine Archaeology Stage 1	Fri 06/03/20	Wed 29/04/20
47	Marine Archaeology Stage 2	Wed 29/04/20	Wed 12/08/20
48	Submission of Reports to MHSTCI	Wed 12/08/20	Wed 25/11/20
49	Completion of Archaeology / Heritage and MHSTCI	Wed 25/11/20	Wed 25/11/20
50	**Technical Studies**	**Thu 05/03/20**	**Thu 18/02/21**
51	Scoping	Thu 05/03/20	Thu 23/07/20
52	Hydrodynamic Water Quality and Sediment	Thu 18/06/20	Mon 14/09/20
53	Icing Studies	Thu 05/03/20	Thu 27/08/20



Project:Wolfe Island Shoals Development Pro
Date: Mon 02/08/21

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Progress	
Milestone		External Milestone		Manual Task		Start-only		Manual Progress	
Summary		Inactive Task		Duration-only		Finish-only			

Wolfe Island Shoals Development Programme

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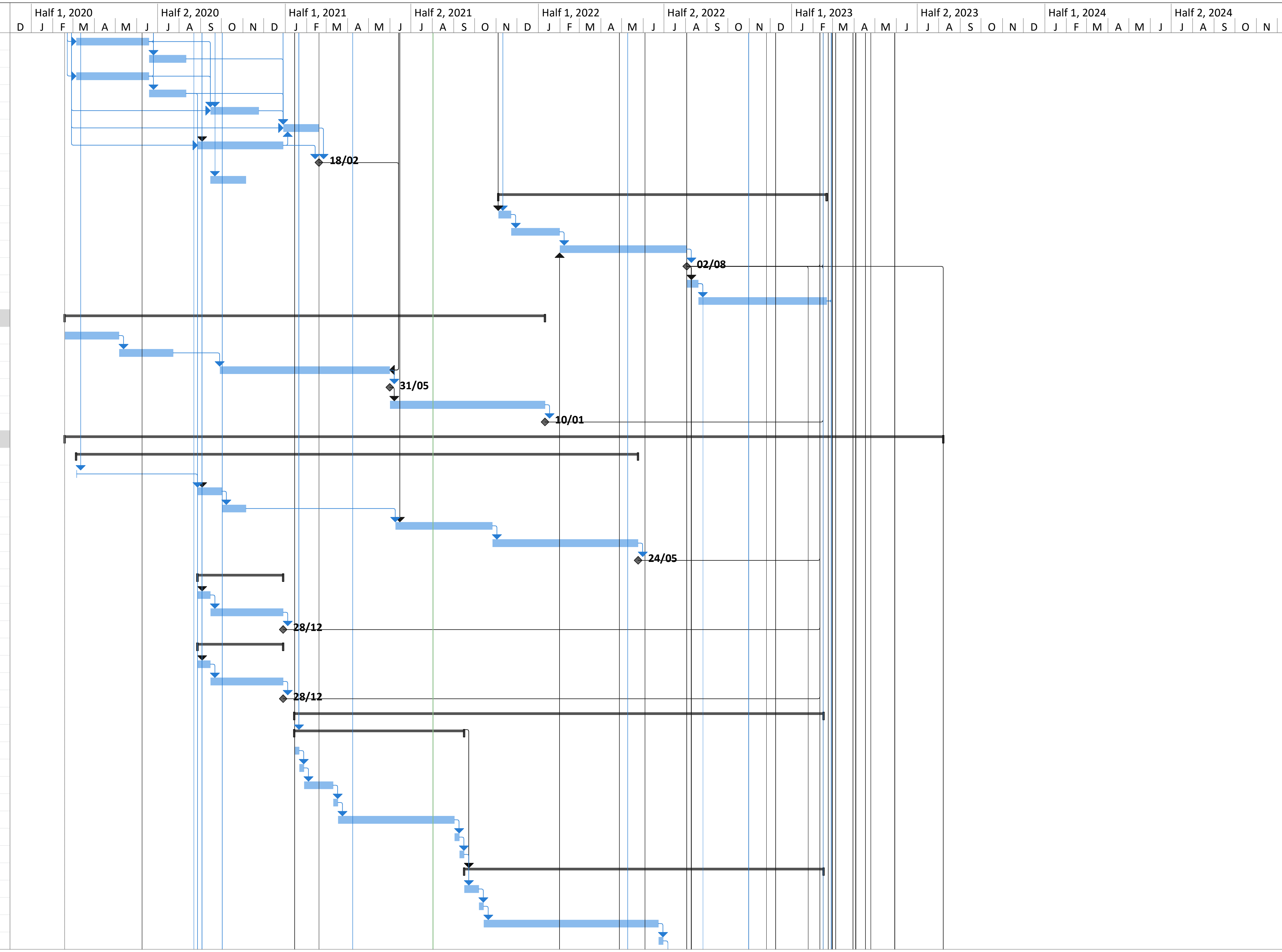
ID	Task Name	Start	Finish
54	Coastal Hydraulics Data Collection	Thu 05/03/20	Thu 18/06/20
55	Coastal Hydraulics Reporting	Thu 18/06/20	Mon 10/08/20
56	Wind, Wave and Water Level Data Collection	Thu 05/03/20	Thu 18/06/20
57	Wind, Wave and Water Level Reporting	Thu 18/06/20	Mon 10/08/20
58	Coastal Processes and Engineering Studies	Tue 15/09/20	Mon 23/11/20
59	Peer Review and Revisions	Tue 29/12/20	Thu 18/02/21
60	Acoustic Study, Review and Reporting	Thu 27/08/20	Mon 28/12/20
61	Complete Technical Studies	Thu 18/02/21	Thu 18/02/21
62	Spill Response Plan	Tue 15/09/20	Thu 05/11/20
63	**Renewable Energy Application (REA) & Review**	**Thu 04/11/21**	**Mon 20/02/23**
64	Final Reports & Submission of REA	Thu 04/11/21	Mon 22/11/21
65	MECP Review of Completeness	Mon 22/11/21	Mon 31/01/22
66	MECP Technical Review	Mon 31/01/22	Tue 02/08/22
67	REA Issued	Tue 02/08/22	Tue 02/08/22
68	REA Appeal Period	Tue 02/08/22	Fri 19/08/22
69	REA Environmental Review Tribunal Process (if	Fri 19/08/22	Mon 20/02/23
70	**Impact Assessment Act (Federal)**	**Tue 18/02/20**	**Mon 10/01/22**
71	Identify Responsible Authority (RA)	Tue 18/02/20	Wed 06/05/20
72	Establish Study Timelines	Wed 06/05/20	Thu 23/07/20
73	Reporting per Interim Guidance on Sections 81 to 91	Mon 28/09/20	Mon 31/05/21
74	Submit Report per Interim Guidance on Sections 81 to	Mon 31/05/21	Mon 31/05/21
75	Review of Environmental Assessment by RA	Mon 31/05/21	Mon 10/01/22
76	Decision of RA	Mon 10/01/22	Mon 10/01/22
77	**Other Permits and Approvals**	**Tue 18/02/20**	**Mon 07/08/23**
78	**Navigable Waters Act Permit**	**Thu 05/03/20**	**Tue 24/05/22**
79	Meeting with Transport Canada / NPP	Thu 05/03/20	Fri 06/03/20
80	Develop Navigable Waters / NPP Work Plan	Thu 27/08/20	Thu 01/10/20
81	Transport Canada / NPP Review of Work Plan	Thu 01/10/20	Thu 05/11/20
82	Prepare Application / Navigation Risk Assessment	Tue 08/06/21	Tue 26/10/21
83	Review and Negotiation with Transport Canada /	Tue 26/10/21	Tue 24/05/22
84	NPP Permit	Tue 24/05/22	Tue 24/05/22
85	**Aeronautical Obstruction Clearance Form (TC)**	**Thu 27/08/20**	**Mon 28/12/20**
86	Prepare	Thu 27/08/20	Mon 14/09/20
87	TC Review	Tue 15/09/20	Mon 28/12/20
88	Clearance	Mon 28/12/20	Mon 28/12/20
89	**NAV Canada Land Use Form**	**Thu 27/08/20**	**Mon 28/12/20**
90	Application Preparation	Thu 27/08/20	Mon 14/09/20
91	NAV Canada Review	Tue 15/09/20	Mon 28/12/20
92	Land Use Form Complete	Mon 28/12/20	Mon 28/12/20
93	**Fisheries Act Authorisation (DFO)**	**Thu 14/01/21**	**Wed 15/02/23**
94	**DFO Request for Review (Federal)**	**Thu 14/01/21**	**Wed 15/09/21**
95	Design Inputs (60%)	Thu 14/01/21	Wed 20/01/21
96	Pre-Application Meeting	Thu 21/01/21	Wed 27/01/21
97	Background Document Preparation	Thu 28/01/21	Wed 10/03/21
98	Application Compilation & Submission	Thu 11/03/21	Wed 17/03/21
99	Agency Review	Thu 18/03/21	Wed 01/09/21
100	Application Revisions/Resubmission	Thu 02/09/21	Wed 08/09/21
101	Advice Issued	Thu 09/09/21	Wed 15/09/21
102	**DFO Authorisation (Federal)**	**Thu 16/09/21**	**Wed 15/02/23**
103	Design Inputs (60%-90%)	Thu 16/09/21	Wed 06/10/21
104	Pre-Application Meeting	Thu 07/10/21	Wed 13/10/21
105	Background Document Preparation	Thu 14/10/21	Wed 22/06/22
106	Draft Submission	Thu 23/06/22	Wed 29/06/22



Project:Wolfe Island Shoals Development Pro
Date: Mon 02/08/21

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Progress	
Milestone		External Milestone		Manual Task		Start-only		Manual Progress	
Summary		Inactive Task		Duration-only		Finish-only			

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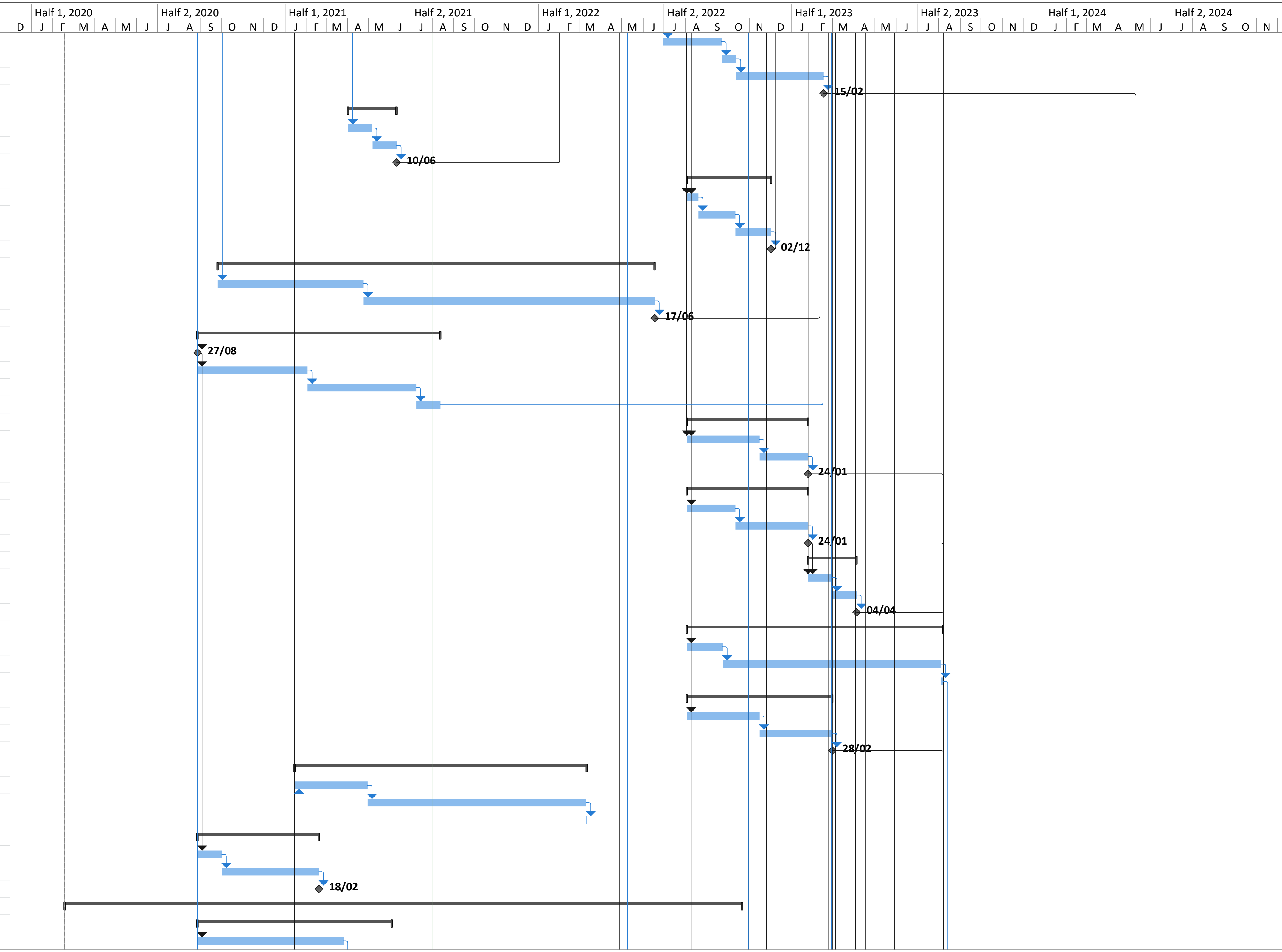
ID	Task Name	Start	Finish
107	Initial Agency Review	Thu 30/06/22	Wed 21/09/22
108	Final Application Submission	Thu 22/09/22	Wed 12/10/22
109	Final Agency Review/Authorisation Issued	Thu 13/10/22	Wed 15/02/23
110	Authorization	Wed 15/02/23	Wed 15/02/23
111	**SARA Permit (DFO / CWS)**	**Thu 01/04/21**	**Thu 10/06/21**
112	Application	Thu 01/04/21	Thu 06/05/21
113	Review by DFO / CWS	Thu 06/05/21	Thu 10/06/21
114	Authorization	Thu 10/06/21	Thu 10/06/21
115	**Shoreline, Wetland or Water Crossing Alteration**	**Tue 02/08/22**	**Fri 02/12/22**
116	Consultation Report	Tue 02/08/22	Fri 19/08/22
117	Design	Fri 19/08/22	Tue 11/10/22
118	Submission and Review	Tue 11/10/22	Fri 02/12/22
119	Permit Received	Fri 02/12/22	Fri 02/12/22
120	**Species At Risk Permit (MNRF) (if required)**	Fri 25/09/20	Fri 17/06/22
121	Scoping and Field Work (Concurrent with REA	Fri 25/09/20	Fri 23/04/21
122	Negotiation and Review	Fri 23/04/21	Fri 17/06/22
123	SAR Permit	Fri 17/06/22	Fri 17/06/22
124	**Crown Land Site Release (MNRF) for Project**	**Thu 27/08/20**	**Thu 12/08/21**
125	Applicant of Record Status	Thu 27/08/20	Thu 27/08/20
126	Crown Land Surveys	Thu 27/08/20	Mon 01/02/21
127	Lease / Easement (LGC process)	Tue 02/02/21	Thu 08/07/21
128	Execute Crown Land lease (MNRF)	Thu 08/07/21	Thu 12/08/21
129	**MNRF Works Permit for Project**	**Tue 02/08/22**	**Tue 24/01/23**
130	Detail Design	Tue 02/08/22	Tue 15/11/22
131	MNRF Review	Tue 15/11/22	Tue 24/01/23
132	Approval	Tue 24/01/23	Tue 24/01/23
133	**Municipal Zoning / Site Plan Approval (O&M)**	**Tue 02/08/22**	**Tue 24/01/23**
134	Prepare Plans	Tue 02/08/22	Tue 11/10/22
135	Site Plan Committee / Council Decision	Tue 11/10/22	Tue 24/01/23
136	Approval Received	Tue 24/01/23	Tue 24/01/23
137	**Building Permit (O&M building)**	**Tue 24/01/23**	**Tue 04/04/23**
138	Detail Design	Tue 24/01/23	Tue 28/02/23
139	Municipal Review	Tue 28/02/23	Tue 04/04/23
140	Approval	Tue 04/04/23	Tue 04/04/23
141	**Environmental Compliance Approval (ECA) (O&M**	**Tue 02/08/22**	**Mon 07/08/23**
142	Prepare Application	Tue 02/08/22	Fri 23/09/22
143	Review by MECP	Fri 23/09/22	Fri 04/08/23
144	Approval	Fri 04/08/23	Mon 07/08/23
145	**Road Use / ROW Agreement (O&M building)**	**Tue 02/08/22**	**Tue 28/02/23**
146	Prepare Plan	Tue 02/08/22	Tue 15/11/22
147	Municipal Review of Plan	Tue 15/11/22	Tue 28/02/23
148	Approval	Tue 28/02/23	Tue 28/02/23
149	**Environmental Compliance Approval (ECA) (Offshore**	**Thu 14/01/21**	**Fri 11/03/22**
150	Prepare Application	Thu 14/01/21	Thu 29/04/21
151	Review by MECP	Thu 29/04/21	Thu 10/03/22
152	Approval	Thu 10/03/22	Fri 11/03/22
153	**Permit to Drill Lakebed for Project**	**Thu 27/08/20**	**Thu 18/02/21**
154	Prepare Plan / Application	Thu 27/08/20	Thu 01/10/20
155	Review by MNRF	Thu 01/10/20	Thu 18/02/21
156	Permit Received	Thu 18/02/21	Thu 18/02/21
157	**Onshore Foundation Fabrication Facility**	**Tue 18/02/20**	**Fri 21/10/22**
158	**MNRF Land Use Permit (Fabrication Facility)**	**Thu 27/08/20**	**Thu 03/06/21**
159	Prepare Application (Fabrication)	Thu 27/08/20	Thu 25/03/21



Project:Wolfe Island Shoals Development Pro
Date: Mon 02/08/21

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
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Wolfe Island Shoals Development Programme

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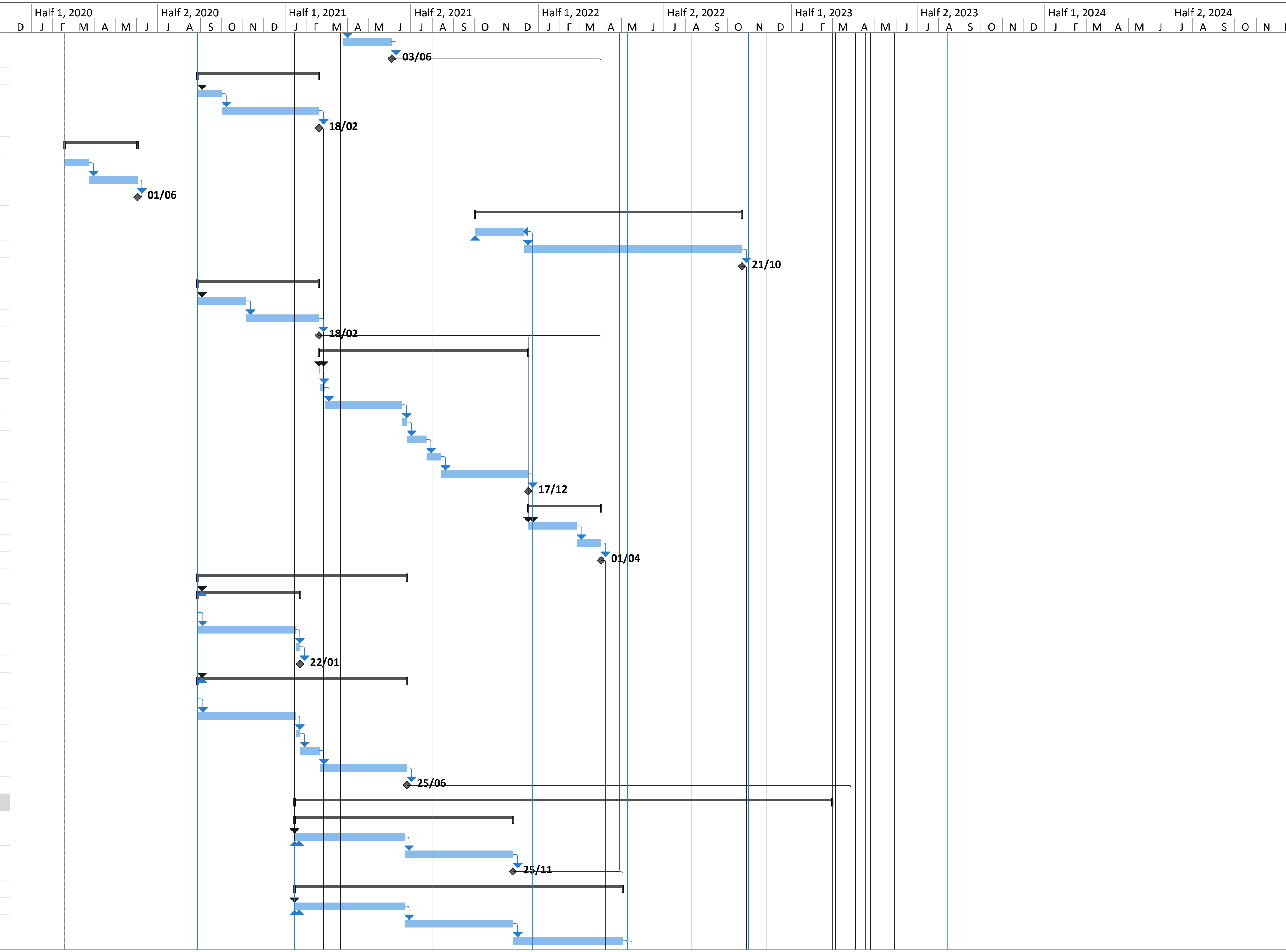
ID	Task Name	Start	Finish
160	Review by MNRF (Fabrication)	Thu 25/03/21	Thu 03/06/21
161	Permit Received (Fabrication)	Thu 03/06/21	Thu 03/06/21
162	**Permit to Drill Lakebed (Fabrication Facility)**	**Thu 27/08/20**	**Thu 18/02/21**
163	Prepare Plan / Application (Fabrication)	Thu 27/08/20	Thu 01/10/20
164	Review by MNRF (Fabrication Facility)	Thu 01/10/20	Thu 18/02/21
165	Permit Received (Fabrication Facility)	Thu 18/02/21	Thu 18/02/21
166	**Scientific Collectors Permit**	**Tue 18/02/20**	**Mon 01/06/20**
167	Prepare Application	Tue 18/02/20	Mon 23/03/20
168	Review by MNRF	Tue 24/03/20	Mon 01/06/20
169	Permit Received	Mon 01/06/20	Mon 01/06/20
170	**Environmental Compliance Act (ECA) Amendment**	**Fri 01/10/21**	**Fri 21/10/22**
171	Prepare Amendment	Fri 01/10/21	Fri 10/12/21
172	Review by MECP	Fri 10/12/21	Fri 21/10/22
173	Receipt of Amended ECA (Fabrication Yard)	Fri 21/10/22	Fri 21/10/22
174	**Municipal Zoning/Site Plan Approval**	**Thu 27/08/20**	**Thu 18/02/21**
175	Prepare Plans	Thu 27/08/20	Thu 05/11/20
176	Site Plan Committee / Council Decision	Thu 05/11/20	Thu 18/02/21
177	Approval Received	Thu 18/02/21	Thu 18/02/21
178	**Regional Conservation Authority Permit**	**Thu 18/02/21**	**Fri 17/12/21**
179	Design Inputs (60%)	Thu 18/02/21	Fri 19/02/21
180	Pre-Application Meeting	Fri 19/02/21	Fri 26/02/21
181	Background Document Preparation (inc. 90%	Fri 26/02/21	Fri 18/06/21
182	Application Compilation Submission	Fri 18/06/21	Fri 25/06/21
183	Initial Agency Review	Fri 25/06/21	Fri 23/07/21
184	Application Revisions / Resubmission	Fri 23/07/21	Fri 13/08/21
185	Final Agency Review	Fri 13/08/21	Fri 17/12/21
186	Authorisation Issued	Fri 17/12/21	Fri 17/12/21
187	**Building Permit (Municipal) for Fabrication Facility**	**Fri 17/12/21**	**Fri 01/04/22**
188	Prepare Plans	Fri 17/12/21	Fri 25/02/22
189	Municipal Review	Fri 25/02/22	Fri 01/04/22
190	Permit Received (Fabrication Facility)	Fri 01/04/22	Fri 01/04/22
191	**Permit to Take Water**	**Thu 27/08/20**	**Fri 25/06/21**
192	**EASR for Water Tanking Taking > 50,000 <**	**Thu 27/08/20**	**Fri 22/01/21**
193	Design Inputs (30%-60%)	Thu 27/08/20	Fri 28/08/20
194	Hydrogeological Testing and Reporting	Fri 28/08/20	Fri 15/01/21
195	Registration Preparation and Submission	Fri 15/01/21	Fri 22/01/21
196	Registration Confirmed	Fri 22/01/21	Fri 22/01/21
197	**Permit to Take Water > 400,000 lpd**	**Thu 27/08/20**	**Fri 25/06/21**
198	Design Inputs (30%-60%)	Thu 27/08/20	Fri 28/08/20
199	Hydrogeological Testing and Reporting	Fri 28/08/20	Fri 15/01/21
200	Pre-Application Meeting	Fri 15/01/21	Fri 22/01/21
201	Application Preparation and Submission	Fri 22/01/21	Fri 19/02/21
202	Agency Review	Fri 19/02/21	Fri 25/06/21
203	PTTW Issued	Fri 25/06/21	Fri 25/06/21
204	**Connection Studies and Agreements**	**Thu 14/01/21**	**Tue 28/02/23**
205	**SIA/CIA Update**	Thu 14/01/21	Thu 25/11/21
206	Prepare Update	Thu 14/01/21	Mon 21/06/21
207	IESO / HONI Review	Tue 22/06/21	Thu 25/11/21
208	SIA / CIA Complete	Thu 25/11/21	Thu 25/11/21
209	**CCRA Agreement**	**Thu 14/01/21**	**Mon 02/05/22**
210	Prepare Application	Thu 14/01/21	Mon 21/06/21
211	HONI Review	Tue 22/06/21	Thu 25/11/21
212	CCRA and HONI engineering Complete	Thu 25/11/21	Mon 02/05/22



Project:Wolfe Island Shoals Development Pro
Date: Mon 02/08/21

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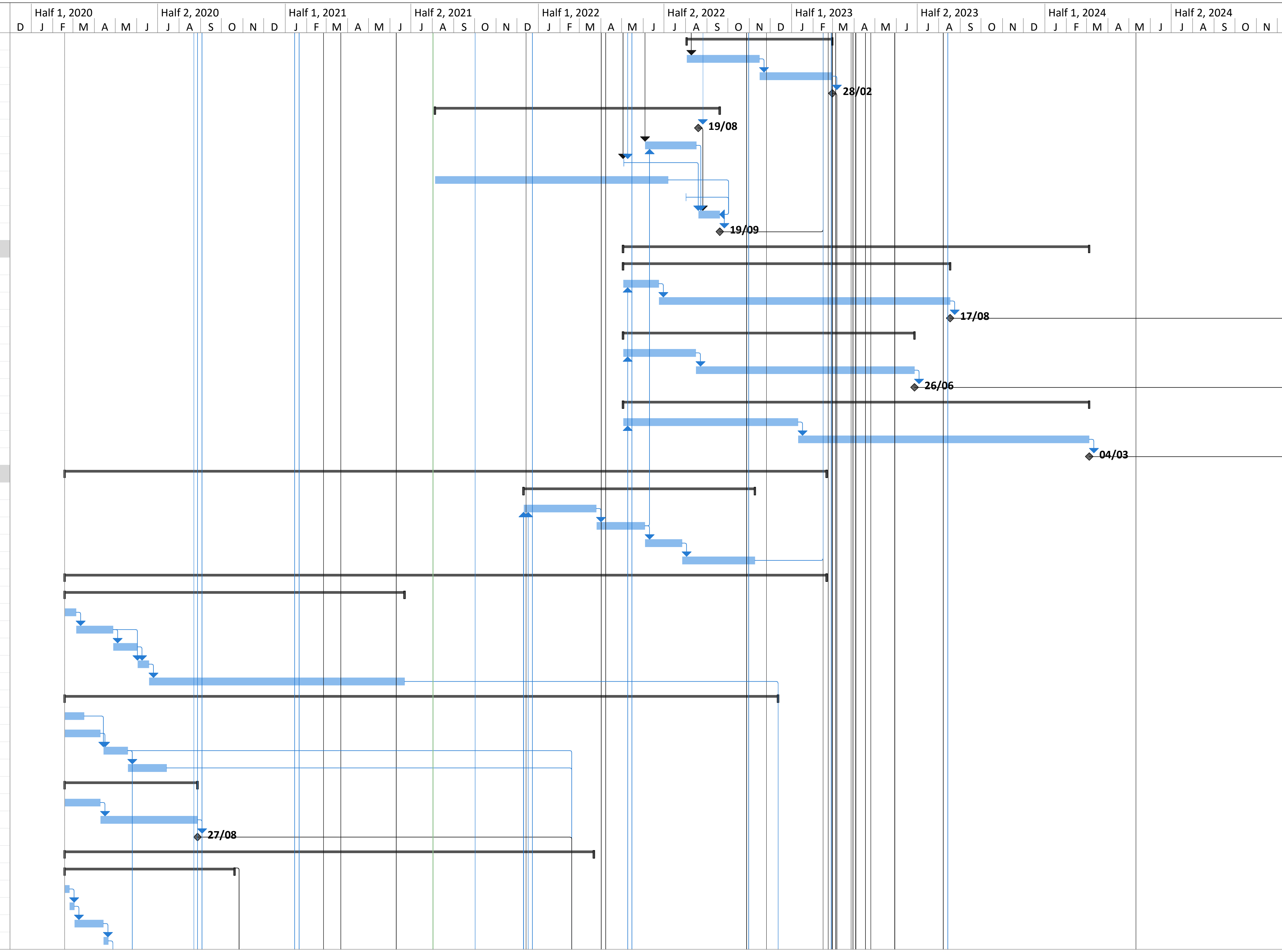
ID	Task Name	Start	Finish
213	**ROW and Land Use Agreement (Onshore Substation)**	**Tue 02/08/22**	**Tue 28/02/23**
214	Prepare Draft Agreement	Tue 02/08/22	Tue 15/11/22
215	Sign Agreement with Parties	Tue 15/11/22	Tue 28/02/23
216	Agreement Complete	Tue 28/02/23	Tue 28/02/23
217	**Notice to Proceed (NTP)**	**Thu 05/08/21**	**Mon 19/09/22**
218	REA Approval	Fri 19/08/22	Fri 19/08/22
219	Domestic Content Plan	Fri 03/06/22	Tue 16/08/22
220	Impact Assessments (CIA / SIA)	Tue 03/05/22	Wed 04/05/22
221	Financing Plan	Thu 05/08/21	Wed 06/07/22
222	Security Deposit	Mon 01/08/22	Mon 01/08/22
223	Submit NTP for Review	Fri 19/08/22	Mon 19/09/22
224	Receive NTP	Mon 19/09/22	Mon 19/09/22
225	**Operational Approvals**	Tue 03/05/22	Mon 04/03/24
226	**Market Entry Process**	**Tue 03/05/22**	**Thu 17/08/23**
227	Prepare Submission	Tue 03/05/22	Thu 23/06/22
228	IESO Review	Thu 23/06/22	Thu 17/08/23
229	IESO Approval	Thu 17/08/23	Thu 17/08/23
230	**Generator License Application**	**Tue 03/05/22**	**Mon 26/06/23**
231	Prepare Application	Tue 03/05/22	Mon 15/08/22
232	OEB Review	Tue 16/08/22	Mon 26/06/23
233	OEB Approval	Mon 26/06/23	Mon 26/06/23
234	**OEB Leave to Construct for Transmission**	**Tue 03/05/22**	**Mon 04/03/24**
235	Prepare Application	Tue 03/05/22	Mon 09/01/23
236	OEB Review	Tue 10/01/23	Mon 04/03/24
237	OEB Approval	Mon 04/03/24	Mon 04/03/24
238	**Legal / Land**	Tue 18/02/20	Mon 20/02/23
239	**Ontario Content Plan**	**Fri 10/12/21**	**Tue 08/11/22**
240	Evaluate Ontario Content Issues	Fri 10/12/21	Fri 25/03/22
241	Develop Ontario Content Plan	Fri 25/03/22	Fri 03/06/22
242	Submit Ontario Content Application to IESO	Fri 03/06/22	Tue 26/07/22
243	IESO Review / Acceptance of Ontario Content	Wed 27/07/22	Tue 08/11/22
244	**Wind Resource:**	**Tue 18/02/20**	**Mon 20/02/23**
245	**Long Point:**	**Tue 18/02/20**	**Mon 21/06/21**
246	Finalise Lease Agreement	Tue 18/02/20	Thu 05/03/20
247	Procure / Manufacture Tower	Thu 05/03/20	Mon 27/04/20
248	Submit and Secure Transport Canada, NAV	Tue 28/04/20	Mon 01/06/20
249	Install Tower	Tue 02/06/20	Thu 18/06/20
250	Tower Wind Data Collection	Thu 18/06/20	Mon 21/06/21
251	**Charity Shoals (Optional)**	**Tue 18/02/20**	**Mon 12/12/22**
252	Submit Project Description and Application	Tue 18/02/20	Mon 16/03/20
253	Project Evaluation Report	Tue 18/02/20	Thu 09/04/20
254	MNRF to Review Application and Issue Land Use	Tue 14/04/20	Mon 18/05/20
255	Submit and Secure Transport Canada, NAV	Tue 19/05/20	Mon 13/07/20
256	**Navigable Waters Protection Act permit**	**Tue 18/02/20**	**Thu 27/08/20**
257	Prepare Application	Tue 18/02/20	Thu 09/04/20
258	Review and Negotiaition with NWP	Thu 09/04/20	Thu 27/08/20
259	Authorisation NWP permit	Thu 27/08/20	Thu 27/08/20
260	**Fisheries Screening Act (DFO / CRCA) (Charity**	**Tue 18/02/20**	**Mon 21/03/22**
261	**DFO Request for Review (Federal)**	**Tue 18/02/20**	**Mon 19/10/20**
262	Design Inputs (60%)	Tue 18/02/20	Mon 24/02/20
263	Pre-Application Meeting	Tue 25/02/20	Mon 02/03/20
264	Background Document Preparation	Tue 03/03/20	Mon 13/04/20
265	Application Compilation & Submission	Tue 14/04/20	Mon 20/04/20



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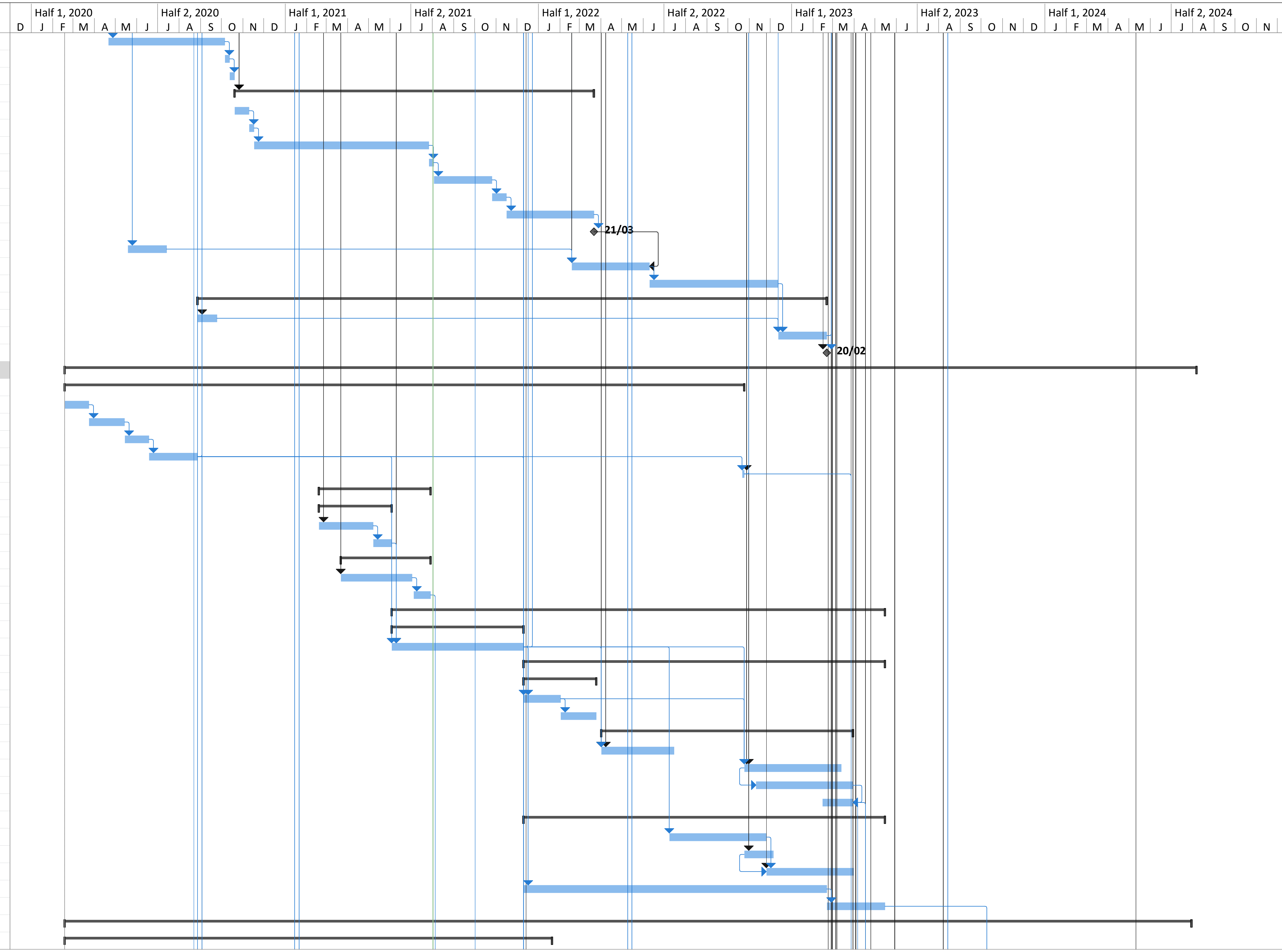
ID	Task Name	Start	Finish
266	Agency Review	Tue 21/04/20	Mon 05/10/20
267	Application Revisions/Resubmission	Tue 06/10/20	Mon 12/10/20
268	Advice Issued	Tue 13/10/20	Mon 19/10/20
269	**DFO Authorisation (Federal)**	**Tue 20/10/20**	**Mon 21/03/22**
270	Design Inputs (60%-90%)	Tue 20/10/20	Mon 09/11/20
271	Pre-Application Meeting	Tue 10/11/20	Mon 16/11/20
272	Background Document Preparation	Tue 17/11/20	Mon 26/07/21
273	Draft Submission	Tue 27/07/21	Mon 02/08/21
274	Initial Agency Review	Tue 03/08/21	Mon 25/10/21
275	Final Application Submission	Tue 26/10/21	Mon 15/11/21
276	Final Agency Review/Authorisation Issued	Tue 16/11/21	Mon 21/03/22
277	Authorisation	Mon 21/03/22	Mon 21/03/22
278	Procure and Design Platform (Charity Shoals)	Tue 19/05/20	Mon 13/07/20
279	Manufacture and Install Platform (Charity Shoals)	Fri 18/02/22	Thu 09/06/22
280	Wind Data Collection (Charity Shoals)	Fri 10/06/22	Mon 12/12/22
281	**Other:**	Thu 27/08/20	Mon 20/02/23
282	Update Layout	Thu 27/08/20	Thu 24/09/20
283	Bankable Wind Resource Modelling and Energy	Mon 12/12/22	Mon 20/02/23
284	**Financial Close**	Mon 20/02/23	Mon 20/02/23
285	**Design, Procurement and Construction**	Tue 18/02/20	Tue 06/08/24
286	**Logistics:**	Tue 18/02/20	Mon 24/10/22
287	Call for Expression on Interest from Key Service	Tue 18/02/20	Mon 23/03/20
288	Preliminary Meeting / Visit Port Facilities	Tue 24/03/20	Thu 14/05/20
289	Conduct Logistics Study (Evaluate Supply Chain	Thu 14/05/20	Thu 18/06/20
290	Port(s) Selection and Establish Agreement	Thu 18/06/20	Thu 27/08/20
291	Receipt of CofA for Fabrication Facility	Fri 21/10/22	Mon 24/10/22
292	**Ground Investigations (GI)**	Thu 18/02/21	Thu 29/07/21
293	**Preliminary GI (GBF Facility)**	Thu 18/02/21	Thu 03/06/21
294	Procure and Execute Geotechnical Drilling	Thu 18/02/21	Fri 07/05/21
295	Prepare Report for Geotechnical Drilling	Fri 07/05/21	Thu 03/06/21
296	**Comprehensive GI:**	Mon 22/03/21	Thu 29/07/21
297	Procure and Execute Comprehensive GI (Drilling	Mon 22/03/21	Fri 02/07/21
298	Prepare Report for Comprehensive Geophysical /	Mon 05/07/21	Thu 29/07/21
299	**Gravity Base Foundation Fabrication Facility**	Thu 03/06/21	Mon 15/05/23
300	**Facility Design**	Thu 03/06/21	Fri 10/12/21
301	Facility Design	Thu 03/06/21	Fri 10/12/21
302	**Facility Construction**	Fri 10/12/21	Mon 15/05/23
303	**Site Preparation**	Fri 10/12/21	Fri 25/03/22
304	Clearing and Grading	Fri 10/12/21	Tue 01/02/22
305	Provide Utilities	Wed 02/02/22	Fri 25/03/22
306	**Assembly Rails**	Fri 01/04/22	Thu 30/03/23
307	Welfare Building	Fri 01/04/22	Fri 15/07/22
308	Drive Piles	Mon 24/10/22	Mon 13/03/23
309	Concrete Pile Caps	Thu 10/11/22	Thu 30/03/23
310	Low Friction Surface	Tue 14/02/23	Thu 30/03/23
311	**Launching Pier**	**Fri 10/12/21**	**Mon 15/05/23**
312	Pier - Prefabrication	Fri 08/07/22	Fri 25/11/22
313	Launch Pit Dredging	Mon 24/10/22	Mon 05/12/22
314	Pier Install	Fri 25/11/22	Fri 31/03/23
315	Elevator Platform - Procure	Fri 10/12/21	Mon 20/02/23
316	Elevator Platform - Install	Mon 20/02/23	Mon 15/05/23
317	**Design and Fabricate Gravity Base Foundations**	Tue 18/02/20	Tue 30/07/24
318	**Design Gravity Base Foundations (GBF)**	Tue 18/02/20	Thu 20/01/22



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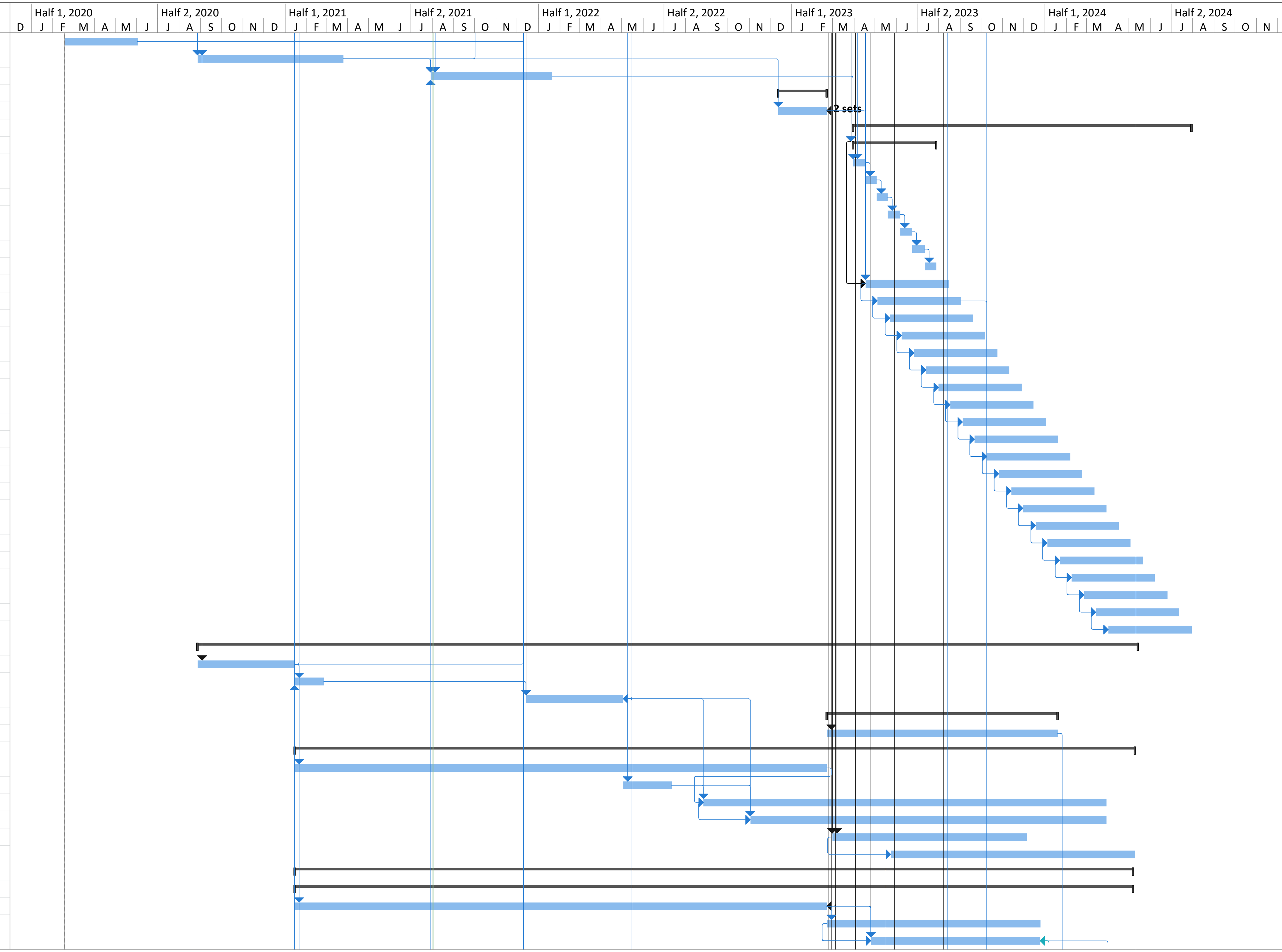
ID	Task Name	Start	Finish
319	GBF Front End Engineering and Design	Tue 18/02/20	Mon 01/06/20
320	GBF Basic Design	Thu 27/08/20	Thu 25/03/21
321	GBF Detailed Design	Thu 29/07/21	Thu 20/01/22
322	**Pre-Fab GBF**	Mon 12/12/22	Mon 20/02/23
323	Prepare Re-Useable Formwork & Slip Forms.	Mon 12/12/22	Mon 20/02/23
324	**Fabricate GBF**	Thu 30/03/23	Tue 30/07/24
325	**Fabricate GBF No. 1-3**	**Thu 30/03/23**	**Fri 28/07/23**
326	Baseplate	Thu 30/03/23	Mon 17/04/23
327	Buoyancy Chamber	Mon 17/04/23	Wed 03/05/23
328	Conical Frustrum	Wed 03/05/23	Fri 19/05/23
329	Stem (Cyclindrical Section)	Fri 19/05/23	Tue 06/06/23
330	Ice Cone	Tue 06/06/23	Fri 23/06/23
331	Service Platform	Fri 23/06/23	Tue 11/07/23
332	Final Outfit	Tue 11/07/23	Fri 28/07/23
333	Fabricate GBF No. 4-6	Mon 17/04/23	Tue 15/08/23
334	Fabricate GBF No. 7-9	Thu 04/05/23	Fri 01/09/23
335	Fabricate GBF No. 10-12	Mon 22/05/23	Tue 19/09/23
336	Fabricate GBF No. 13-15	Thu 08/06/23	Fri 06/10/23
337	Fabricate GBF No. 16-18	Mon 26/06/23	Tue 24/10/23
338	Fabricate GBF No. 19-21	Thu 13/07/23	Fri 10/11/23
339	Fabricate GBF No. 22-24	Mon 31/07/23	Tue 28/11/23
340	Fabricate GBF No. 25-27	Thu 17/08/23	Fri 15/12/23
341	Fabricate GBF No. 28-30	Mon 04/09/23	Tue 02/01/24
342	Fabricate GBF No. 31-33	Thu 21/09/23	Fri 19/01/24
343	Fabricate GBF No. 34-36	Mon 09/10/23	Tue 06/02/24
344	Fabricate GBF No. 37-39	Thu 26/10/23	Fri 23/02/24
345	Fabricate GBF No. 40-42	Mon 13/11/23	Tue 12/03/24
346	Fabricate GBF No. 43-45	Thu 30/11/23	Fri 29/03/24
347	Fabricate GBF No. 46-48	Mon 18/12/23	Tue 16/04/24
348	Fabricate GBF No. 49-51	Thu 04/01/24	Fri 03/05/24
349	Fabricate GBF No. 52-54	Mon 22/01/24	Tue 21/05/24
350	Fabricate GBF No. 55-57	Thu 08/02/24	Fri 07/06/24
351	Fabricate GBF No. 58-60	Mon 26/02/24	Tue 25/06/24
352	Fabricate GBF No. 61-63	Thu 14/03/24	Fri 12/07/24
353	Fabricate GBF No. 64-66	Mon 01/04/24	Tue 30/07/24
354	**Electrical Infrastructure**	Thu 27/08/20	Tue 14/05/24
355	Preliminary Design Substation and Cable System	Thu 27/08/20	Thu 14/01/21
356	Incorporate WTG into Design	Thu 14/01/21	Thu 25/02/21
357	Final Design of Substation and Cable System	Tue 14/12/21	Mon 02/05/22
358	**Grid Connection**	**Mon 20/02/23**	**Fri 19/01/24**
359	Onshore Works	Mon 20/02/23	Fri 19/01/24
360	**Onshore Substation**	Thu 14/01/21	Thu 09/05/24
361	Design	Thu 14/01/21	Mon 20/02/23
362	Onshore Surveys (Topographical, Ground	Tue 03/05/22	Mon 11/07/22
363	Primary Equipment Procurement	Fri 26/08/22	Fri 29/03/24
364	Secondary Equipment Procurement	Wed 02/11/22	Fri 29/03/24
365	Site Mobilisation (Access Roads, Earthworks etc.)	Tue 28/02/23	Tue 05/12/23
366	Civil Works (Foundations, Drainage etc.)	Tue 23/05/23	Thu 09/05/24
367	**Offshore Substation**	Thu 14/01/21	Mon 06/05/24
368	**Offshore Substation Foundations**	**Thu 14/01/21**	**Mon 06/05/24**
369	Foundation Design	Thu 14/01/21	Mon 20/02/23
370	Foundation Material Procurement	Mon 20/02/23	Mon 25/12/23
371	Island Foundation Construction Campaign 1	Tue 25/04/23	Mon 25/12/23



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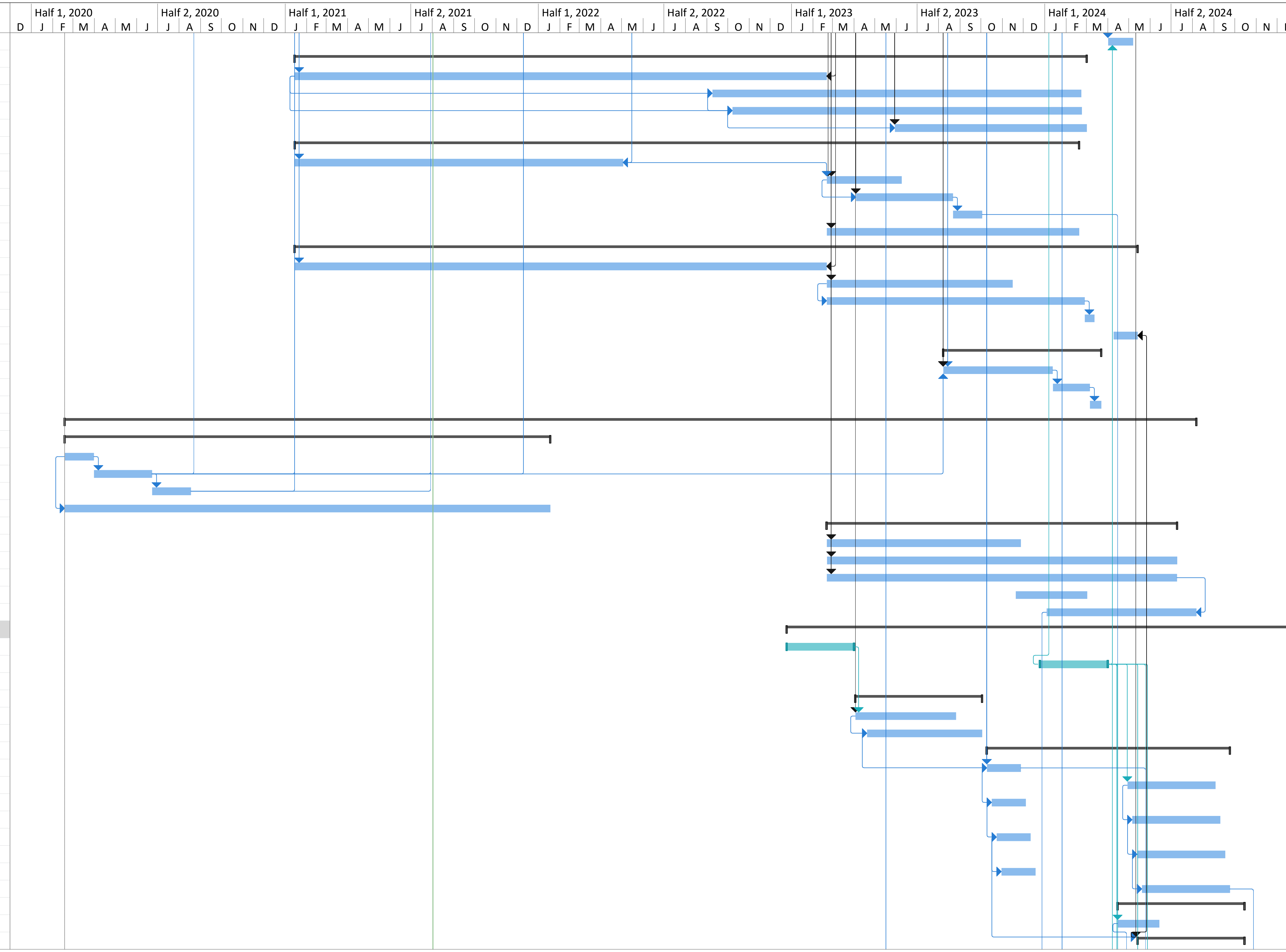
ID	Task Name	Start	Finish
372	Island Foundation Construction Campaign 2	Mon 01/04/24	Mon 06/05/24
373	**Offshore Substation Platform**	**Thu 14/01/21**	**Fri 01/03/24**
374	Platform Design	Thu 14/01/21	Mon 20/02/23
375	Primary Equipment Procurement	Thu 08/09/22	Thu 22/02/24
376	Secondary Equipment Procurement	Fri 07/10/22	Fri 23/02/24
377	Pre-Fabrication	Mon 29/05/23	Fri 01/03/24
378	**Export Cable**	Fri 15/01/21	Mon 19/02/24
379	Design	Fri 15/01/21	Mon 02/05/22
380	Material Procurement	Mon 20/02/23	Thu 08/06/23
381	Export Cable Fabrication	Mon 03/04/23	Mon 21/08/23
382	Export Cable Delivery	Mon 21/08/23	Mon 02/10/23
383	Landfall Works	Mon 20/02/23	Mon 19/02/24
384	**Array Cable**	Thu 14/01/21	Tue 14/05/24
385	Design	Thu 14/01/21	Mon 20/02/23
386	Material Procurement	Mon 20/02/23	Wed 15/11/23
387	Array Cable Fabrication	Mon 20/02/23	Tue 27/02/24
388	Array Cable Delivery	Tue 27/02/24	Tue 12/03/24
389	Install Vessel Prep and Mob	Tue 09/04/24	Tue 14/05/24
390	**Operations and Maintenance (O&M) Building**	**Mon 07/08/23**	**Fri 22/03/24**
391	Building Construction	Mon 07/08/23	Fri 12/01/24
392	Internal Fittings	Fri 12/01/24	Tue 05/03/24
393	Commissioning and Handover	Wed 06/03/24	Fri 22/03/24
394	**Wind Turbine Generators (WTG)**	Tue 18/02/20	Tue 06/08/24
395	**Selectection and Design**	Tue 18/02/20	Mon 17/01/22
396	Site Suitability Preliminary WTG Selection	Tue 18/02/20	Mon 30/03/20
397	WTG Selection and Turbine Supply Agreement	Tue 31/03/20	Mon 22/06/20
398	Design Interface	Tue 23/06/20	Mon 17/08/20
399	Design	Tue 18/02/20	Mon 17/01/22
400	**Fabrication and Procurement**	**Mon 20/02/23**	**Tue 09/07/24**
401	Equipment Procurement	Mon 20/02/23	Mon 27/11/23
402	Tower Section	Tue 21/02/23	Tue 09/07/24
403	WTG Components	Mon 20/02/23	Tue 09/07/24
404	Insatllation Port Preparatory Works	Mon 20/11/23	Fri 01/03/24
405	**Transportation**	Wed 03/01/24	Tue 06/08/24
406	**Installation**	Sun 25/12/22	Mon 31/03/25
407	2023 winter	Sun 25/12/22	Fri 31/03/23
408	2024 winter	Mon 25/12/23	Sun 31/03/24
409	2025 Winter	Wed 25/12/24	Mon 31/03/25
410	**Prepare Lakebed**	**Mon 03/04/23**	**Mon 02/10/23**
411	Mechanical Dredge	Mon 03/04/23	Fri 25/08/23
412	Bedding Stone	Wed 19/04/23	Mon 02/10/23
413	**Installation of GBF**	**Mon 09/10/23**	**Mon 23/09/24**
414	Install GBF Season 1	Mon 09/10/23	Mon 27/11/23
415	Install GBF Season 2	Mon 29/04/24	Mon 02/09/24
416	Install Sand Ballast - Hydraulic Season 1	Mon 16/10/23	Mon 04/12/23
417	Install Sand Ballast - Hydraulic Season 2	Mon 06/05/24	Mon 09/09/24
418	Install Sand Ballast - Mechanical Season 1	Mon 23/10/23	Mon 11/12/23
419	Install Sand Ballast - Mechanical Season 2	Mon 13/05/24	Mon 16/09/24
420	Install Armor Stone Season 1	Mon 30/10/23	Mon 18/12/23
421	Install Armor Stone Season 2	Mon 20/05/24	Mon 23/09/24
422	**IAC Installation**	**Mon 15/04/24**	**Mon 14/10/24**
423	Pre Lay Grapnel Run	Mon 15/04/24	Thu 13/06/24
424	**Inter Array Cable Installation**	**Tue 14/05/24**	**Mon 14/10/24**



Project:Wolfe Island Shoals Development Pro
Date: Mon 02/08/21

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	Manual Progress
Summary	Inactive Task	Duration-only	Finish-only	

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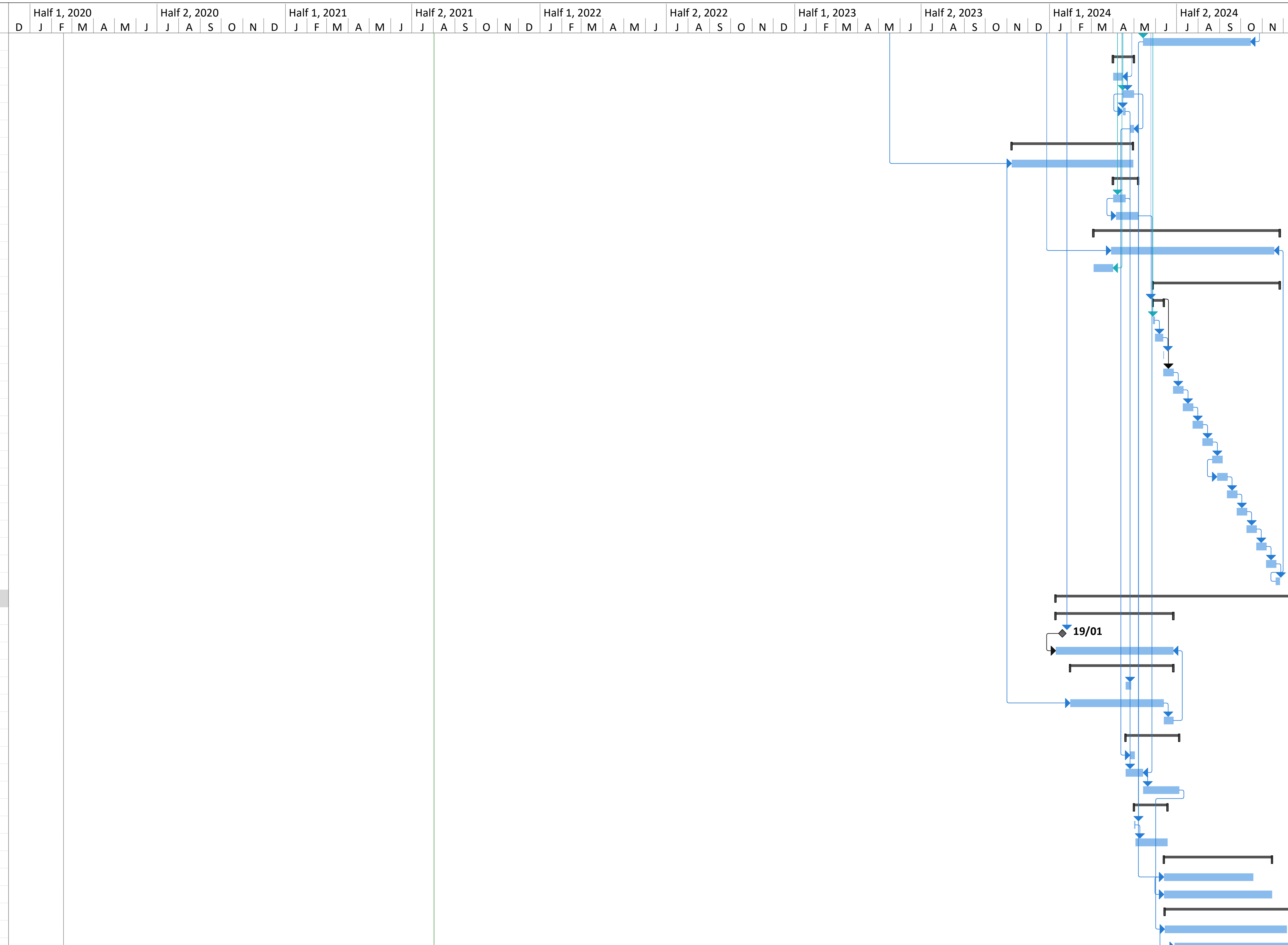
ID	Task Name	Start	Finish
425	Cable Lay	Tue 14/05/24	Mon 14/10/24
426	**Export Cable Installation**	**Mon 01/04/24**	**Tue 30/04/24**
427	Pre Lay Grapnel Run	Mon 01/04/24	Mon 15/04/24
428	Cable Lay	Mon 15/04/24	Tue 30/04/24
429	Cable Pull-In at Landfall	Mon 15/04/24	Thu 18/04/24
430	Cable Pull-In at OSS	Thu 25/04/24	Tue 30/04/24
431	**Onshore Substation (OnSS)**	**Tue 07/11/23**	**Mon 29/04/24**
432	Equipment Installation	Tue 07/11/23	Mon 29/04/24
433	**Offshore Substation (OSS)**	**Mon 01/04/24**	**Mon 06/05/24**
434	Load Out and Transfer to Site	Mon 01/04/24	Thu 18/04/24
435	M&E Equipment Installation	Fri 05/04/24	Mon 06/05/24
436	**WTG Installation**	**Mon 04/03/24**	**Mon 25/11/24**
437	Pre-Assembly of WTGs	Fri 29/03/24	Mon 18/11/24
438	Vessel Preparation and Mobilisation	Mon 04/03/24	Sun 31/03/24
439	**WTG Installation**	**Tue 28/05/24**	**Mon 25/11/24**
440	**WTG Installation WTG No. 1-5**	**Tue 28/05/24**	**Wed 12/06/24**
441	Load Out and Transfer to Site	Tue 28/05/24	Thu 30/05/24
442	Install WTGs	Fri 31/05/24	Tue 11/06/24
443	Return to Port	Wed 12/06/24	Wed 12/06/24
444	WTG Installation WTG No. 6-10	Wed 12/06/24	Wed 26/06/24
445	WTG Installation WTG No. 11-15	Wed 26/06/24	Wed 10/07/24
446	WTG Installation WTG No. 16-20	Wed 10/07/24	Wed 24/07/24
447	WTG Installation WTG No. 21-25	Wed 24/07/24	Wed 07/08/24
448	WTG Installation WTG No. 26-30	Wed 07/08/24	Wed 21/08/24
449	WTG Installation WTG No. 31-35	Wed 21/08/24	Wed 04/09/24
450	WTG Installation WTG No. 36-40	Wed 28/08/24	Wed 11/09/24
451	WTG Installation WTG No. 41-45	Wed 11/09/24	Wed 25/09/24
452	WTG Installation WTG No. 46-50	Wed 25/09/24	Wed 09/10/24
453	WTG Installation WTG No. 51-55	Wed 09/10/24	Wed 23/10/24
454	WTG Installation WTG No. 56-60	Wed 23/10/24	Wed 06/11/24
455	WTG Installation WTG No. 61-65	Wed 06/11/24	Wed 20/11/24
456	WTG Installation WTG No. 66	Wed 20/11/24	Mon 25/11/24
457	**Commissioning**	**Tue 09/01/24**	**Fri 20/12/24**
458	**Grid Connection**	**Tue 09/01/24**	**Wed 26/06/24**
459	Backfeed	Fri 19/01/24	Fri 19/01/24
460	Commisioning	Tue 09/01/24	Wed 26/06/24
461	**Onshore Substation**	**Tue 30/01/24**	**Wed 26/06/24**
462	Cable Pull-In and Termination	Fri 19/04/24	Fri 26/04/24
463	Pre Commissioning and Testing	Tue 30/01/24	Wed 12/06/24
464	Onshore Substation Energisation	Wed 12/06/24	Wed 26/06/24
465	**Offshore Substation**	**Fri 19/04/24**	**Thu 04/07/24**
466	Cable Pull-In and Termination	Thu 25/04/24	Wed 01/05/24
467	Pre Commissioning and Testing	Fri 19/04/24	Mon 13/05/24
468	Offshore Substation Commissioning	Tue 14/05/24	Thu 04/07/24
469	**Export Cable Commissioning**	**Wed 01/05/24**	**Mon 17/06/24**
470	Export Cable Testing (Soak Test)	Wed 01/05/24	Thu 02/05/24
471	Export Cable Commissioning	Fri 03/05/24	Mon 17/06/24
472	**IAC Commissioning**	**Thu 13/06/24**	**Thu 14/11/24**
473	Termination and Testing	Thu 13/06/24	Fri 18/10/24
474	Commissioning	Thu 13/06/24	Thu 14/11/24
475	**WTG Commissioning**	**Fri 14/06/24**	**Fri 20/12/24**
476	WTG Commissioning	Fri 14/06/24	Thu 05/12/24
477	WTG Reliability Run	Fri 28/06/24	Thu 19/12/24



Project:Wolfe Island Shoals Development Pro
Date: Mon 02/08/21

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Progress	
Milestone		External Milestone		Manual Task		Start-only		Manual Progress	
Summary		Inactive Task		Duration-only		Finish-only			

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wood.

ID	Task Name	Start	Finish
478	Taking-Over Certificate	Mon 01/07/24	Fri 20/12/24
479	**Submit Commercial Operations Date (COD)**	Fri 20/12/24	Fri 20/12/24
480	**Commercial Operations Date (COD)**	Fri 20/12/24	Fri 20/12/24

Timeline: Half 1, 2020 · Half 2, 2020 · Half 1, 2021 · Half 2, 2021 · Half 1, 2022 · Half 2, 2022 · Half 1, 2023 · Half 2, 2023 · Half 1, 2024 · Half 2, 2024

Project:Wolfe Island Shoals Development Pro
Date: Mon 02/08/21

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	Manual Progress
Summary	Inactive Task	Duration-only	Finish-only	

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B4

Windstream Energy Inc.

Wolfe Island Shoals Wind Farm

Energy Yield Assessment

04 June 2021

Technical Report

Report Summary

Wood was appointed by (the Client) to conduct an independent energy yield assessment for (the Project), located southwest off the coastline of Wolfe Island in Ontario, Canada.

Wood had previously reviewed third party energy yield assessment reports completed by DNV GL and AWS Truewind as a part of an independent engineer's report[1] in 2014.

The wind distribution at the Project site was based on measured data recorded at an offsite onshore 80 m lattice meteorological (met) mast, Long Point, located approximately 2.8 km northeast from the Project site. The met data considered for the analysis span the period December 2011 to July 2015. The short term measured data were corrected to the long term based on 20 years of ERA5 reanalysis data (node 43.98°N, -76.5°W).

The mast location wind distribution was extrapolated to the Project area using the Vortex (FARM) mesoscale model, which has been evaluated and validated in comparison with reanalysis data from additional reanalysis models.

The energy yield assessment was carried out for a single layout scenario that consists of 66 Siemens Gamesa SG 4.5 - 145 WTGs operating at 100 m hub height with a total installed capacity of 297.0 MW.

The average long term mean wind speed as predicted across proposed WTG locations is 8.47 m/s at 100 m hub height.

The Project's probability of exceedance (P50, P90 and P99) energy yield estimates, including 20 years of interannual variation in wind speed, are summarised in .

1 Sgurrenergy Wolfe Island Shoals Offshore Wind Farm, Engineering Report, Document number: 14/7017/001/USA/0/ER/001 Revision: B1; Dated: July 2014

Table RS-0-1: Energy Yield Summary

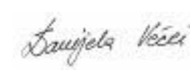
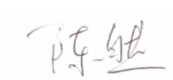
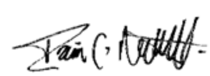
Energy Yield Summary (20 Year Probability of Exceedance)	
P50 Energy Yield [GWh/annum]	1159.9
P50 Capacity Factor [%]	44.6
P90 Energy Yield [GWh/annum]	1069.3
P90 Capacity Factor [%]	41.1
P99 Energy Yield [GWh/annum]	995.5
P99 Capacity Factor [%]	38.3

This report provides details of the Project, the general methodology followed and a summary of the key results.

Report Details

Prepared for:	Windstream Energy Inc.
Client Contact:	Ian Baines
Report Distribution:	
:	Ian Baines
Wood:	Neil Koronka, Iain Nisbet, Danijela Vecei, Ran Chen
Report Classification:	Confidential

Approval Record

	Name	Job Title	Signature
Prepared by:	Danijela Vecei	Principal Renewable Energy Consultant	
Reviewed by:	Ran Chen	Senior Renewable Energy Consultant	
Authorised by:	Iain Nisbet	Director of Analysis, Renewables	
Date of issue:	04 June 2021		

Amendment Record

Revision Number	Date	Summary of Amendments	Purpose of Revision
A1	04 Nov 2020	n/a	Internal authorization
B1	16 Feb 2021	Minor amendments following review	External issue
B2	17 Feb 2021	Minor amendments following Client review	External issue
B3	29 Apr 2021	Layout update and wind regime at WTG locations	External issue
B4	4 Jun 2021	Minor amendments following Client review	External issue

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   c. any omission or inaccuracy arising directly or indirectly from an omission, or error, in the data supplied by the Client, or any other party, to conduct the scope of work.
4. Other than where specifically agreed in writing, data has not been independently verified and is assumed to be accurate and complete at the time of data provision. This applies to any data used in conducting the scope of work, whether or not specifically referenced in this document.
5. Wind speed and energy yield estimations presented in this document are based on the data provided and assumptions made at the time of writing. Wind speed and energy yield estimations are subject to a level of uncertainty and as such actual wind speed and energy yield values may differ from those detailed in this document. A party must use its own skill and judgement in deciding the applicability and appropriateness of the estimation in any given situation.
6. The Consultant accepts no liability in relation to its opinion on construction schedules, financial contingency or predicted operational expenditure, due to inherent uncertainty and unforeseen factors.
7. Any technology and technical design reviews are non-exhaustive. Unless expressly agreed, no design calculations have been checked.
8. Assessment of financial model technical inputs does not include review of any financial statements, either for accuracy or for conformance with relevant accounting standards. Furthermore, the integrity of the computations of the financial model have not been verified

Contents

Figures

Tables

1 Site Information

No site visit was conducted by Wood personnel in relation to this scope of work. Wood had previously reviewed third party energy yield assessment reports completed by DNV GL and AWS Truewind as part of an independent engineer's report[3].

Maps illustrating the location of the Project, the proposed WTG layout and Long Island met mast location are presented in Figure 1. The Project extends over an area of approximately 2 km by 4 km. The Long Island met mast is located onshore at Long Point, a peninsula that protrudes into Lake Ontario at the south-western tip of Wolfe Island.

The elevation of the Long Point met mast is 77 m above mean sea level (amsl) at the base while the elevation at the surface of Lake Ontario, where the Project is situated, is 74 m. While elevation at the mast location is close to those at the bases of the WTGs, wind conditions at the Project site are expected to be less influenced by coastal effects relative to the Long Point met mast. Nevertheless, the measured data from the Long Point met mast is considered reasonably representative of the wind conditions in the Project area. Wood has procured Vortex FARM wind resource grid for the Project area (Section 4) to inform the spatial extrapolation. The horizontal separation between the met mast and WTG locations have been considered in the uncertainty analysis (Section 6).

In addition, common industry good practice recommends undertaking wind measurement campaigns at a height which is at least three quarters of the proposed WTG hub height. The 81.5 m Long Point met mast meets this guideline considering the proposed 100 m hub height at the Project.

[3] Sgurrenergy Wolfe Island Shoals Offshore Wind Farm, Engineering Report, Document number: 14/7017/001/USA/0/ER/001 Revision: B1; Dated: July 2014

2 Measurement Information

Measured wind data from five met masts and one sodar unit near the Project site were provided by the Client, with datasets covering a range of periods between 1995 and 2015. All of the met masts and the sodar unit were located on Wolfe Island, between 10 and 20 km northeast of the Project area. The measurement locations are summarized in Table 2-1.

Table 2-1: Near Site Meteorological Recording Stations

Station Name	Top Measurement Height	Location (UTM Easting, Northing)	Dataset Period	Distance to Project Site (km)
Long Point (2504)	81 m	381367, 4885011	21 December 2011 to 05 July 2015	10
Sodar – Long Point	200 m	381333, 4884915	21 December 2011 to 24 January 2012	11
Merry Farm Mast 1	50 m	385216, 4886335	01 September 1995 to 31 August 1997	14
Mast 500	48.2 m	380053, 4891448	09 June 2006 to 17 May 2009	16
Pikes	58.7 m	387837, 4888335	29 May 2006 to 10 October 2008	17
Hulton	58.2 m	386662, 4892991	26 May 2006 to 16 May 2008	20

[1] Coordinates are in UTM, WGS84 Zone 18T.

The raw data were provided at 10-minute temporal resolution for Long Point and Pikes masts. In addition, a partially screened 10-minute data for Hulton, Mast 500, Merry Farm Mast 1 and sodar were provided by the Client. The datasets for all masts and sodar have been screened by Wood for any gaps and anomalies.

Mast 500, Merry Farm Mast 1, Pikes and Hulton masts are located further from the Project and further inland from the shoreline. Based on the met masts' exposure wind measurements at these four masts are found to be less representative of the site, which is located offshore. Including these masts in the analysis would have limited benefit to the accuracy of the model.

The Long Point mast is located on narrow strip of land that protrudes approximately 2 km into Lake Ontario with good exposure in the predominant wind direction of south-southwest and closest to the Project area among all of the measurement locations. The measured data from the Long Point mast provided are the most up to date and were considered to be generally of good quality, as commented in Section 2.1.

As a result, Wood has elected to use measurements from the Long Point onshore met mast as the basis of this energy yield assessment and data from the adjacent sodar unit for wind shear validation.

2.1 Review of Long Point Met Mast Data

The installation report[4] with equipment set up details was reviewed, and details of the Long Point met mast's configurations are provided in Table 2-2. The mast configuration was assessed to determine compliance of the mast with respect to anemometry mounting guidelines detailed in the IEC 61400-12-1 (2017)[5] standard. The mast configuration is considered to be broadly compliant with the mounting guidelines set forth by IEC.

---

[4] Ontario Windsmith Inc., Installation report - Long Point. Rev.3; Dated: 21/12/2011

[5] International Electrotechnical Commission, Wind power generation systems - Part 12-1: Power performance measurement of electricity producing wind turbines, 2017, Annex G: Mounting of instruments on the meteorological mast, Document No: IEC 61400 – 12- 1: 2017.

Table 2-2: Long Point Met Mast Configuration

Parameter	Value
Height	80 m
Elevation (a.m.s.l)	77 m
Location (UTM WGS 84 Zone 18)	381366 m E, 4885015 m N
Location (Lat / Lon)	44.108670,-76.482395
Anemometer Heights, Boom Orientation and Type	81.5 m, Heated Vector A100LM, Top Mounted 77.0 m, NRG #40C, 266° 77.0 m, NRG #40C, 146° 67.0 m, NRG #40C, 266° 67.0 m, NRG #40C, 146° 60.0 m, NRG #40C, 266° 60.0 m, NRG #40C, 146° 40.0 m, NRG #40C, 266° 40.0 m, NRG #40C, 146°
Wind Vane Heights, Boom Orientation and Type	79.0 m, Heated Vector W200P, 266° 58.0 m, NRG #200P, 266° 38.8 m, NRG #200P, 266°
Other Sensors	Temperature, NRG #110 S, 80.0 m Temperature, NRG #110 S, 3.0 m Pressure, NRG #BP20, 2.0 m
Logger	NRG SymphoniePlus, 2.0 m

The anemometer calibrations for the Vector A100LM anemometer, provided by Client, and calibrations for NRG #40C anemometers, were sourced by Wood based on instrument serial numbers. A review of the installation reports and logger program at the mast confirmed that the correct calibrations were applied to the anemometer data.

The Vector A100LM anemometer is calibrated by Svend Ole Hansen ApS, a MEASNET accredited institution, and it is considered to be a class one sensor. The NRG #40C cup anemometers installed on the met mast at lower levels, were individually calibrated by OTECH Engineering, which was not a MEASNET accredited institution, but was accredited in accordance with the International Standard ISO/IEC 17025:2005 at the time the NRG #40C anemometers were calibrated. Wood elected to apply consensus calibrations to NRG #40C anemometers that were calibrated by OTECH[6].

The mast dataset was screened and reviewed by Wood to identify any potential anomalies. Some periods of scattered icing and partial icing throughout winter months were removed from the lower anemometers. In addition, the heated Vector A100LM anemometer at 81.5 m level malfunctioned between 17 April 2012 and 28 September 2012. After screening, the short term mean wind speed at the top anemometer was 8.29 m/s with data coverage of 86.3%, which is considered to be a reasonable level of data coverage. Missing data at the top anemometer were synthesised using measurements from the lower level with final mean wind speed at the top anemometer of 8.20 m/s and data coverage of 99.3%.

Mast shadow effects for the lower anemometer pairs were found to be consistent with the reported boom orientations. All anemometer pairs were selectively averaged to remove mast shadowing effects. No signs of anemometer drift due to sensor degradation was found to be present in the measurement dataset.

The Wolfe Island Wind Farm, located approximately 3.6 km northeast of the Long Point mast, became operational in 2009. The wake impact of the operational WTGs on the measured data collected at the Long Point met mast was assessed by Wood and was found to be negligible.

2.2 Measured Wind Shear at the Mast Location

Wind shear defines the variation in wind speed with height. The wind shear exponents at the mast location were calculated using the variation in wind speed between anemometers at different heights. With respect to each 30° direction sector, a wind shear exponent (α) was calculated. A larger wind shear exponent indicates a higher rate of increase in wind speed with height and vice versa. Wind shear is important when considering the fatigue life of WTGs (see Section 7. for

[6] Lockhart, T.J., Bailey, B.H. *The Maximum Type 40 Anemometer Calibration Project.* Windpower '98 Proceedings of the Annual Conference & Exhibition of the American Wind Energy Association, 27 April – 01 May 1998, Bakersfield, California. 1998: 361-368.

discussion of WTG suitability).

Wind shear at the met mast is calculated using the variation in wind speed between anemometer pairs at different heights using a seasonally balanced dataset. Based on the mast configuration, the 77 and 67 m balanced and selectively averaged wind speed data were considered appropriate for assessing wind shear at the Long Point met mast location.

Table 2-3 shows the sectorwise wind shear exponents corresponding to this anemometer pair at the met mast. The average wind shear at the mast location was found to be 0.12, which is less than the IEC design value of 0.2. Sectors between 60 and 180 degrees have wind shear exponents that are above the IEC design value.

Table 2-3: Measured Wind Shear Exponents at the Met Mast

Direction (Centre of 30° Sector)	Wind Shear Exponent (α) 77 / 67 m	Frequency (%)
0	0.11	5.4
30	0.11	9.0
60	0.20	6.4
90	0.22	3.3
120	0.19	2.8
150	0.22	9.2
180	0.17	10.8
210	0.09	12.9
240	0.07	14.1
270	0.07	12.6
300	0.10	7.3
330	0.09	6.2
Average	**0.12**	**100**

In addition to the Long Point met mast data, one month of data provided for the co-located Long Point Triton sodar deployment was assessed and used for wind shear validation.

The sodar measured wind shear across the proposed rotor plane (between 40 to 160 m measurement heights) indicates a generally consistent wind shear across these heights. Based on the comparison of concurrent data, the measured wind shear at the mast is a reasonable representation of the wind shear profile that will be experienced across the WTG rotor plane at the mast location.

2.3 Vertical Extrapolation of Wind Speeds

The short term wind speed previously obtained at 81.5 m height were vertically extrapolated to the proposed hub height of 100 m based on measured sectorwise wind shear exponents at the mast location. The resulting measured short term wind speed after seasonally balancing the data is 8.41 m/s.

3 Long Term Wind Speed Predictions

Several potential long term reference datasets based on reanalysis products (MERRA-2[7] and ERA-5[8]) and nearby weather stations have been examined. A comparison of key parameters relating to the reference data were investigated, including the quality of correlation between the onsite mast wind speed data and the concurrent period wind speed data of each reference dataset. Long term trending of the datasets was examined and consistent periods of long term data were selected.

Following the review of concurrent reference and mast data, 20-year ERA-5 dataset at node 43.98°N, -76.5°W was determined to be the most suitable long term reference dataset, considering that it displayed the highest quality of correlation (hourly R2 = 0.78) with concurrent Long Point met mast data along with a sufficient period of long term data with good consistency, validated against other sources.

A Measure-Correlate-Predict procedure was conducted using concurrent hourly wind speed and direction data from the mast using the ERA-5 dataset at node 43.98°N, -76.5°W. The long term mean wind speed at the Long Point mast location is predicted to be 8.21 m/s at a 100 m hub height. The MCP summary results are presented below in Table 3-1. The wind rose and wind distribution at the mast location are presented in Appendix A.

[7] MERRA-2 is a reanalysis dataset which originates from the Global Modelling and Assimilation Office of NASA / Goddard Space Flight Centre. The model grid is 0.5° latitude and 0.625° longitude (approximately 55 x 43 km).

[8] ERA-5 is a reanalysis dataset developed through the Copernicus Climate Change Service (C3S) and processed by the European Centre for Medium-Range Weather Forecasts (ECMWF). The model grid is 0.25° latitude and 0.25° longitude (approximately 28 x 28 km).

Table 3-1: MCP Data Summary

Short Term Dataset	Details
Concurrent Period	21 December 2011 to 02 June 2015
Seasonal Balance (Summer/Winter) [%]	50 / 50
Height [m]	100.0 m
Short Term Wind Speed [m/s]	8.41
Long Term Dataset	
Selected Long Term Period	31 October 2000 to 31 October 2020
Seasonal Balance (Summer/Winter) [%]	50 / 50
Short Term Wind Speed [m/s]	7.52
Long Term Wind Speed [m/s]	7.36
MCP Output (Hourly)	**100.0 m**
Predicted Long Term Wind Speed [m/s]	8.21
Directional Weighted Average (R^2)	0.78

4 Wind Flow Modelling

In the absence of measured onsite data, there are a variety of sources of modelled wind data that may be used to extrapolate the wind resource from the mast location to the Project area. It is generally recognised that wind flow in the offshore environment is driven by mesoscale rather than microscale effects. Therefore, mesoscale models are typically used to investigate horizontal wind variation for offshore sites. Wood procured a Vortex FARM wind resource grid (WRG) for the Project and its extended area.

The Vortex model uses the Weather Research and Forecasting (WRF) Numerical Weather Prediction model with initial and boundary conditions based on reanalysis data. The modelling system uses grids down to a horizontal resolution of 100 m and takes into consideration local terrain, land cover, and roughness features. Data were provided for heights from 50 to 200 m above ground level (agl).

In addition, Wood reviewed other regional wind maps, including the following:

- Modelled reanalysis data from Modern Era Retrospective-Analysis for Research and Applications Version 2, available at a spatial resolution of approximately 51 by 55 km.
- Modelled reanalysis data from ECMWF Reanalysis Version 5 in triangular grid, available at a spatial resolution of approximately 20 by 28 km.
- Modelled mesoscale data from DTU Global Wind Atlas, available at a spatial resolution of approximately 200 by 278 m.

All wind maps reviewed showed reasonable consistency. Wood has used the Vortex FARM WRG as the basis for WTG layout optimisation considering it offers the highest level of spatial resolution.

4.1 Layout Design

Wood has optimized WTG layout for the project area using the OpenWind software package[9]. The layouts were designed based on the following considerations:

- The Vortex FARM WRG procured for the extended Project area.
- Predicted long term wind distribution at the Long Point met mast location.
- A layout consisting of 66 Siemens Gamesa SG 4.5-145 WTG at 100 m.
- A maximum total installed capacity of 300 MW provided by the Client.
- A minimum inter-WTG spacing of nine RD parallel to the high frequency wind direction sectors and six RD perpendicular to the high frequency wind direction sectors.
- Buildable area is limited to sites where the water depth is between 10 and 30 m, based on the bathymetric data provided by the Client[10].
- WTG siting constraints, considering the Project boundaries, the Canada-U.S. border, shoreline, receptors, and shipping channels. The setback distances assumed, as presented in Table 2 1, were provided by the Client.

Table 4-1: Siting Constraints and Setbacks

Feature	Setback (m)
Canada-U.S. Border	500
Shoreline	5,000
Receptors	5,000
Shipping Channel	750

Wood notes that the WTG layout spacing assumptions for the Project were based on Wood's industry experience and considering Project specific footprint and wind characteristics.

The proposed WTG locations and their predicted hub height wind speeds are shown in Figure 1 and in Appendix C. .

[9] OpenWind Basic, version 01.04.00.1097, ReCode Inc. and AWS Truepower, LLC.

[10] SimpleBathymetry.tif provided by the Client via dataroom.

The average modelled wind speeds at the proposed WTG locations at 100 m hub height is predicted to be 8. 47m/s.

4.2 Wake Model Configuration

As no single wake model is currently considered to provide a robust estimation of wake losses at offshore projects under all conditions, an ensemble wake modelling approach was adopted. The wake models and respective parametrisation were advised by industry research, including the Offshore Wind Accelerator wake benchmarking[11], and the LTA's experience.

A wake loss calculation was undertaken using several different wake models:

- WAsP Park 1 model with a wake decay constant (WDC) of 0.03.
- WindFarmer modified Park Model with a WDC of 0.04 and large wind farm correction (LWFC) applied.
- WindFarmer Eddy Viscosity Model with LWFC applied. Ambient turbulence intensity of 5.3%, as measured at the mast top measurement height, was considered.

The final wake loss prediction was determined as the mean of the wake losses from each of the wake models outlined above.

Table 4-2: Wake Model Predictions

Wake Model	Wake Loss (%)
WAsP Park 1 with WDC 0.03	8.26
WindFarmer Park Model with a WDC of 0.04 and LWFC	8.76
WindFarmer Eddy Viscosity Model LWFC	8.88
Ensemble Average Wake Loss [%]:	**8.63**

[11] https://www.carbontrust.com/offshore-wind/owa/wakes/

5 Energy Yield Prediction

The hub height wind speeds at the proposed WTG locations and the gross energy production at individual WTG location were calculated using WindFarmer software by associating the long term hub height wind distributions at the Long Point met mast to the Vortex FARM WRG.

Wake losses were calculated according to an ensemble approach using the wake models discussed in Section 4.2. The topographic, roughness and wake losses, in addition to an air density correction, were applied to the ideal energy yield and these results modified by the application of a series of calculated and nominal effects and losses to produce a final net central (P50) energy yield for the Project.

The losses which have been applied to the energy yield reflect a combination of nominal losses based on Wood's experience of operational wind farms and losses informed by site-specific values.

The results of this exercise are listed in Table 5-1. The three output values for the WTG layout considered are:

- **Overall Conversion Efficiency:** The product of all losses/effects listed in Table 6 1.
- **P50 Energy Yield:** The final predicted P50 energy yield estimate for the Project after all losses have been applied.
- **P50 Capacity Factor:** The final output of the wind farm, as a proportion of the gross yield if all WTGs were working at rated capacity all the time and no losses occurred.

The predicted long term hub height wind speeds at proposed WTG locations along with individual WTG outputs are presented in Appendix C. The losses applied in terms of energy in Table 5-1 are described below.

5.1 Correction and Losses

WTG Availability: A nominal long term WTG availability of 96.0%, inclusive of accessibility, has been considered at the Project, based on the Wood's experience of market offerings of offshore wind projects of similar scale and other site characteristics.

Substation and Balance of Plant (BoP) Availability: This loss includes all infrastructure from the WTG foundations to the Offshore Substation Platforms (OSPs) inclusive, encompassing all inter-array cabling. It is estimated that in any one year approximately 24 hours of average production corresponding to 0.3% in energy, will be lost due to unavailability of BoP equipment such as inter-array cabling and switchgear at the offshore substation and that this will occur during periods of average production. This loss value is based on the Wood's experience of offshore operational wind farms and is noted to include foundation structures.

Grid Availability and Disruption: This loss assumes that the local grid and/or offshore transmission owner (OFTO) assets will be down for 48 hours in any one year and that this will occur during periods of average production, giving a loss of 0.5%.

Wake Losses: A number of models can be used to calculate wakes; although validation of these models, particularly in offshore environments where limited suitable operational data are available, is problematic. To minimize the level of uncertainty associated with the wake modelling, an ensemble wake modelling methodology, using both WAsP and WindFarmer models, was adopted as described in Section 4.2. The estimated internal wake loss is 8.63%.

Cumulative Induction Zone Effect (Blockage Effect): Knowledge and understanding regarding wind flow are evolving as concurrent measured datasets and wind farm performance at operational assets are used to investigate and validate assumptions commonly made at the pre-construction energy yield assessment stage. Once constructed, the influence of the wind farm itself on the incident wind flow causes a flow deceleration directly upstream, termed the cumulative induction zone effect (CIZE) - also commonly referred to as blockage effect. CIZE is manifested as a slowdown of wind speed in both upwind and lateral directions with respect to the WTG location due to the resistance caused by the WTG structures themselves on the freestream wind flow. The magnitude of CIZE is primarily influenced by the characteristics of the wind farm, in particular inter WTG spacing, rotor size, hub height and prevailing meteorological conditions. Wood has undertaken extensive CFD simulations to characterise CIZE and has developed a site-specific adjustment methodology. As a result of this work, Wood has developed a parametrised model suitable for estimating the wind speed deficit and corresponding energy loss based on Project specific WTG configuration and wind conditions.

Wood calculated a CIZE loss of 0.5% for the layout.

Power Curve Performance (Test Conditions): Measured power curves are typically obtained at test sites using a reference met mast located at 2 to 4 RD, typically 2.5 RD, upwind of the nominated/test WTG (as advised by IEC 61400-12-1). Based on Wood's experience and research, the induction zone of a single WTG is relevant at this distance range. Therefore, a power curve performance loss relevant under test conditions of 0.5% is applied.

Power Curve Performance (Site Specific): Measured power curves are typically obtained at test sites characterised by simple terrain and low roughness complexity. In Wood's experience, where WTGs are located in offshore environment operational assets have been observed to underperform with respect to the warranted power curve. Based on power performance testing experience, operational experience, the characterisation of the wind regime at the Project, Wood has applied a power curve performance loss of 0.5%. A power curve performance uncertainty has also been considered, as detailed in Section 6.

Wind Hysteresis (Start up and shut down): When wind speeds exceed the WTG maximum operational speed for a predefined period of time the WTG shuts down and does not start up again until the wind speed drops to a lower level, again for a predefined period of time. Exact cut-in and cut-out protocols vary from WTG to WTG and are based on wind speed data measured at a higher time resolution than the 10-minute averages recorded for energy yield assessments.

The wind hysteresis loss calculation is based on a power curve cut-out wind speed of 27 m/s and re-cut-in of 25 m/s. It is recognized that for wind speeds within this range the WTG will not be operational for a portion of the time within this window (only when the wind speed is dropping from above the cut-out). A hysteresis loss of 0.1% was calculated.

Power Curve – Suboptimal Performance Loss: Wind farms typically do not always operate optimally due to instrumentation and/or control system issues. These issues result in production losses relative to conditions whereby the WTGs were operating in an optimal configuration. In the Wood's experience assessing operational wind farm performance, a typical level of sub-optimal performance of approximately 0.5% has been observed. This loss can potentially be minimized through detailed monitoring and assessment of Project performance on an individual WTG basis and rectification of any errors that are identified. A loss of 0.5% is adopted at the Project to account for this factor.

Electrical Transmission Efficiency (Cables, WTG and Grid Transformers): A nominal electrical transmission efficiency loss of 2.0% is estimated for the Project.

Ancillary Systems: The WTG power curve supplied by a manufacturer gives the power output which can be expected to be measured at a given reference point on the WTG. An additional system loss must be taken into account where a site production measurement point varies from this manufacturer's reference point. This loss accounts for electrical and system losses between the site measurement point and the warranted reference point. Normally these points coincide, and no additional loss is required. No loss has been applied at the Project.

It is assumed that WTG self-consumption, resulting in energy import to the Project during periods of low wind speed, will be treated as an operating cost, rather than a loss. Therefore, no calculation of wind farm self-consumption losses has been conducted.

Blade Contamination, Degradation and Off-Design: During operation, a WTG can become contaminated by particles or insects in the air. Degradation and off-design are considered more of an issue than contamination, and degradation may have a greater effect towards the end of Project life. The magnitude of the loss will, to some extent, be dependent upon the diligence of the maintenance personnel. This loss can be mitigated through maintenance programs that assess power curve condition and that are designed to maximize wind farm power production.

A nominal loss of 0.5% has been applied at this stage assuming factory fitted Leading Edge Protection (LEP) is applied and a robust maintenance regime is conducted.

Icing Effects: Based on the offshore location of the Project it is considered that icing losses are not applicable at the Project.

Extreme Temperature Effects: This subcategory reflects periods where WTGs are required to shut down due to extreme temperatures. The proposed WTG model has an operational temperature range between -20°C and 35°C, however it is expected the WTG would be equipped with a cold temperature package that would extend the temperature range to -30°C. A temperature de-rating calculation based on the WTG operational temperature range and the temperature sensor at the met mast suggests that the energy loss due to low temperatures is expected to be negligible. No other site specific temperature de-rating calculation was considered.

Curtailment: Curtailment associated with grid export restrictions, or any other operational or environmental factors, has not been considered for the Project at this time.

Wind Speed Interannual Variability: This loss results from the fact the energy in the wind is not linear. Hence, a low wind speed year tends to result in a reduction in energy yield that is greater than the increase in yield resulting from a high wind speed year, and vice versa. This loss/gain can be calculated from the long term estimated Project wind speed distribution and the WTG power curve. The effect of interannual variability at the Project is estimated to be a loss of 0.1%.

Table 5-1: Indicative Energy Yield Assessment Summary

Parameter	Value
WTG Type	SG 4.5-145
Wind Rose	Long Term Adjusted Long Island Mast (ERA-5: 43.98°N, -76.5°W)
Number of WTGs	66
Hub Height [m]	100
Total Site Capacity [MW]	297.0
Mast (Weighted Statistics)	
Long Term Wind Speed at Mast at Hub Height [m/s]	8.21
Weibull A (at Mast Location and Hub Height) [m/s]	9.27
Weibull k (at Mast Location and Hub Height)	1.97
Weibull c (at Mast Location and Hub Height)	1.13
Ideal Mast Location Energy Yield [GWh/annum]	20.5
Gross Wind Farm Energy Yield [GWh/annum]	1396.8
Corrections and Losses	
WTG Availability[2]	0.960
Substation/BoP Availability[2]	0.997
Grid Availability and Disruption[2]	0.995
Wake Loss Internal[1]	0.914
Wake Loss External[1]	1.000
Cumulative Induction Zone (Blockage) Effect[1]	0.995
Power Curve Performance (Test Conditions) [1]	0.995
Power Curve Performance (Site Specific) [2]	0.995
Wind Hysteresis (in Shut-Down and Start-Up)[1]	0.999
Sub-Optimal Performance Loss[2]	0.995
Electrical Efficiency (Cables, WTG / Grid Transformers)[2]	0.980
Ancillary Systems[2]	1.000
Blade Contamination, Degradation and Off-Design[2]	0.995
Icing Effects on WTG[2]	1.000
Extreme Temperature Effect [1]	1.000
Curtailment	Not considered
Wind Speed Interannual Variability[1]	0.999
Overall Conversion Efficiency [%]	**83.0**
P50 Energy Yield [GWh/annum]	**1159.9**
P50 Capacity Factor [%]	**44.6**

[1] Calculated correction/loss.

[2] Nominal loss.

6 Uncertainties Assessment

The accuracy of a prediction comes down to the approach taken during the measurement phase and the quality of the correlation and the resolution of the wind flow model.

Site Measurement Accuracy: The uncertainties associated with the wind speed measurement accuracy take account of the onsite met mast being instrumented with one Class One anemometer at the top and NRG #40C anemometers at lower heights, and that the mast mounting arrangements are generally in line with IEC guidelines, as discussed in Section 2.1.

Historical Wind Variability: The level of uncertainty associated with the long term wind speed prediction takes account of the long term reference period, the accuracy and consistency of the reference source (in this case the ERA-5 reanalysis dataset), and quality of correlation to the Project wind data.

Vertical Extrapolation: The uncertainty associated with the vertical extrapolation at the mast is informed by the methodology of extrapolation, which in this case is based on measured directional wind shear, and the extrapolation distance (18.5 m for the proposed hub height).

Future Wind Variability: An uncertainty of 0.6% in wind speed was included to account for potential impacts of climate change based on analysis of historical data and climate change models.

Spatial Variation: Spatial variation uncertainty primarily relates to the uncertainty in wind flow modelling, which in this case depends on the accuracy of the mesoscale Vortex FARM WRG used for horizontal extrapolation. The uncertainty was advised by the Vortex FARM WRG's consistency with other regional wind maps, distance between the Long Point mast location to Project site, and the predicted spatial variation in wind resource between the measurement location and Project site.

Plant Performance and Losses: The level of uncertainty in plant performance losses has been assessed in consideration of all losses applied at the Project. The most significant contributions relate to a power curve uncertainty and wake modelling uncertainty.

The relationship between uncertainty in wind speed and uncertainty energy yield is calculated based on the gradient of the WTG power curve at wind speeds immediately surrounding the mean hub height wind speed for those WTGs. At the Project, the wind speed to energy gradient was found to be 1.11.

Applying the uncertainties in energy yield and wind speed interannual variation uncertainty to the energy yield estimate gives the probability of exceedance energy yield estimates presented in Table 6-1. The uncertainties are given considering no interannual variation in wind speed and considering interannual variation in wind speed over 1 and 20 years.

Table 6-1: Wind Farm Uncertainty Assessment

Description	Value
P50 Energy Yield [GWh/annum]	1159.9
P50 Capacity Factor [%]	44.6
Uncertainty, excluding Interannual Wind Speed Variation	
Standard Error in Energy Yield [%]	5.9
Standard Error in Energy Yield [GWh/annum]	68.9
P75 Energy Yield [GWh/annum]	1113.4
P75 Capacity Factor [%]	42.8
P90 Energy Yield [GWh/annum]	1071.5
P90 Capacity Factor [%]	41.2
P95 Energy Yield [GWh/annum]	1046.5
P95 Capacity Factor [%]	40.2
P99 Energy Yield [GWh/annum]	999.5
P99 Capacity Factor [%]	38.4
Uncertainty Over 1 Year, including Interannual Wind Speed Variation	
Standard Error in Energy Yield [%]	8.4
Standard Error in Energy Yield [GWh/annum]	97.9
P75 Energy Yield [GWh/annum]	1093.9
P75 Capacity Factor [%]	42.0
P90 Energy Yield [GWh/annum]	1034.4
P90 Capacity Factor [%]	39.8
P95 Energy Yield [GWh/annum]	998.9
P95 Capacity Factor [%]	38.4
P99 Energy Yield [GWh/annum]	932.2
P99 Capacity Factor [%]	35.8
Uncertainty Over 20 Years, including Interannual Wind Speed Variation	
Standard Error in Energy Yield [%]	6.1
Standard Error in Energy Yield [GWh/annum]	70.6
P75 Energy Yield [GWh/annum]	1112.2
P75 Capacity Factor [%]	42.7
P90 Energy Yield [GWh/annum]	1069.3
P90 Capacity Factor [%]	41.1
P95 Energy Yield [GWh/annum]	1043.7
P95 Capacity Factor [%]	40.1
P99 Energy Yield (GWh/annum)	995.5
P99 Capacity Factor [%]	38.3

7 Site Suitability Assessment

The wind regime assessment at the mast and proposed WTG locations is conducted for comparison with the International Electrotechnical Commission (IEC) 61400-1 Wind turbine generator systems – Part 1 Design Requirements (2005), which specifies three wind regime classes as listed in Table 7-1.

The SG 4.5-145 WTG is part of SGRE 4.X platform which includes SG 4.5- 145, SG 5.0-145 and SG 5.0 -132 WTGs with capacities rating ranging from 4.2 to 5.0 MW. The SG 4.5-145 WTG has two configurations, Mk1 and Mk2, with variable ratings between 4.2 and 4.8 MW for Mk1 and between 4.5 and 5.0 MW for Mk2. Note that the application mode of the WTG are determined by SGRE during suitability analysis conducted based on WTG location specific wind, climate, and topographical characteristics. Typical application modes[12] for Mk1 and Mk2 variants are shown in Table 7-2. Since no site suitability assessment has been completed by SGRE for the Project, the default application mode (AM-0) of Mk1 with a rated capacity of 4.5 MW is assumed in this energy yield estimate. However, it should be noted that the optimised application mode of the WTG would be determined by SGRE based on site conditions. This is an industry standard approach.

The SG 4.5-145 WTG (Mk1, AM-0) is considered in Wood's analysis, classified as an IEC Class II_B based on provisional type certificate[14] issued by TUV Sud. It is noted that IEC design parameters are not independent functions. Therefore, a WTG may be suitable for a site even when some operating conditions are above their design value if other conditions are more benign, for example, a high wind speed site that has low turbulence intensity.

[12] Siemens Gamesa Renewable Energy, "Developer Package SG 4.5-145: GD372187 R0," 18 May 2018.

[14] Provisional Type Certificate, Wind Turbine SG 4.5-145 50/60 Hz (Rated Power 4.0-5.0 MW, Rotor Blade Type SG 4.5-145, Hub Heights 90m/107.5m/127.5m, IEC Class II_B) . 023.11.2.01.91.00, Issued 30 September 2019.

Table 7-1: Basic Parameters for IEC 61400-1 (2005) WTG Classes

Parameter	Class I	Class II	Class III
V_{ref} (m/s)[1]	50.0	42.5	37.5
Annual Average Wind Speed (m/s)	10.0	8.5	7.5
V_{e50} (m/s)[2]	70.0	59.5	52.5
Subclass A I_{ref}[3]	16.0%		
Subclass B I_{ref}[3]	14.0%		
Subclass C I_{ref}[3]	12.0%		
Inflow Angle	± 8°		
Wind Shear Coefficient	0.2		
Air Density (kg/m^3)	1.225		

[1] V_{ref} is the maximum average 10-minute 50-year wind speed

[2] V_{e50} is the maximum three-second gust wind speed

[3] I_{ref} is the expected level of turbulence intensity at 15 m/s.

Table 7-2: SG 4.5 – 145 Variable Rating Control Modes

Application Mode	Rated Power	Site Conditions	Max Operating Temperature (°C)
Mk1			
AM-3	4.2	More demanding wind conditions	+35
AM-2	4.3		+35
AM-1	4.4		+35
AM-0	4.5	II_B	+35
AM+1	4.6	Less demanding wind conditions	+30
AM+2	4.7		+25
AM+3	4.8		+20
Mk2			
AM-0	5.0	II_B	+20
AM-1	4.9	More demanding wind conditions	+30
AM-2	4.8		+35
AM-3	4.7		+35
AM-4	4.6		+35
AM-5	4.5		+35

7.1 Air Density

If the air density is above the design value 1.225 kg/m^3, the loading at the site is increased and the WTG may not be able to operate to its standard classification. If the density is below the design value the WTG may be able to operate in more onerous conditions. However, if air density is too low, overheating of the WTGs can occur, but this is typically only an issue at warm sites above 2,000 m altitude.

The estimated air density at the Project mast location is 1.227 kg/m^3, which is based on the Project's average hub height altitude of 173 m amsl, a regional sea level mean temperature of 8.8˚C and a mean sea level air pressure of 1010.5 mbar. The air density is very close the design specification value of 1.225 kg/m^3. Considering the WTGs are not located at high altitudes and air density is marginally above normal design operating conditions, air density is not a concern for site suitability.

7.2 Site Temperature

The operating temperature range considered for the SG 4.5-145 WTG is –20°C to +35 °C. Using temperature sensor data from the Project masts, the seasonally balanced site average temperature was calculated to be 7.8°C at the Project elevation. The site period temperature dataset at the on-site mast at 80 m show extremes of -26.1°C and 31.5°C, which is within the operating temperature limits of the WTG assuming it is installed with a cold weather package. WTGs with cold temperature packages typically can operate down to ambient temperature of - 30°C. The associated production loss due to temperature effects were negligible as described in Section 5.1. If additional documentation is provided, it is recommended that extreme temperature losses be reassessed.

7.3 Site Layout

Wood has designed the layout with a minimum spacing of 6 rotor diameters (RD) in the cross wind direction and 9 RD in the high frequency wind direction with a bearing axis of 220°. Wood considers the spacing of 9 RD to be suitable for an offshore environment. The WTG layout is generally orientated in rows northwest to southeast. The average WTG spacing between adjacent WTG pairs is 6.9 RD and the minimum spacing is 6 RD.

7.4 Mean Wind Speed and Distribution

The predicted long term mean wind speeds at the Project mast and across all proposed WTG locations are within the 8.50 m/s upper threshold of the IEC design at 100 m hub height, reaching a maximum mean wind speed of 8.61 m/s at WTG 33. Individual WTG location wind speeds are presented Appendix C.

The distribution of 10-minute wind speeds must also be considered when assessing WTG suitability. The IEC design standard assumes a Weibull shape value (k) of 2 (a Rayleigh distribution). If the k values at the wind farm site are below 2 then higher wind speeds will be more frequent increasing loading at the wind farm, or if the k values are above 2, higher wind speeds will be less frequent, reducing loading.

The Weibull k values were found to be 1.97 for all proposed WTG locations; the observed value is close to the IEC design value and is not of concern.

7.5 Wind Shear

Wind shear exponents were assessed at the Project mast and proposed WTG locations, as wind shear is important when considering the fatigue loading of WTGs. A wind shear exponent of 0.2 is referred to as the design value in the IEC 61400-1 guidelines[15].

7.5.1 Wind Shear at Mast Location

The measured sectorwise wind shear exponents at the mast location are presented and discussed in Section 2.2. The average wind shear at the mast location was found to be 0.12, which is less than the IEC design value of 0.2. Two low frequency sectors at 90 and 150 degrees have shear exponents of 0.22 that are slightly above the IEC design value, while higher frequency sectors have wind shear well below IEC design value, hence shear is not considered an issue for WTG suitability.

[15] International Electrotechnical Commission, International Standard, Wind Turbine Generator Systems – Part 1: Design Requirements, 2005. Document No: BS EN 61400-1:2005.

7.5.2 Wind Shear at WTG Locations

Wind shear was modelled at the WTG locations using measured wind shear at the mast locations and the Openwind model. Wind shear exponents were calculated across the 145 m WTG rotor diameter, corresponding to the bottom and top tip heights of 27.5 m and 172.5 m respectively. The upper and lower RD mast wind speeds were used as inputs in the Openwind model to estimate the wind shear exponents across the RD at the WTG locations, which were found to be 0.12 at all proposed WTG locations. This wind shear exponent is not considered to be of concern with respect to site suitability.

7.6 Extreme Winds at Mast Location

The method[16,17] selected to predict extreme wind speeds is based on the ESDU methodology and uses the measured wind speed data to predict the 50-year extreme 10-minute mean wind speed, which is then converted to a three-second gust wind speed using a gust factor that is derived from gust wind speed data measured at the mast location.

7.6.1 Extreme Winds at Mast Location

The predicted extreme wind speed values at 100 m hub height at the mast location are summarised in Table 7-3.

[16] Rainbird P. et al, *Prediction of extreme wind speed at wind energy sites in European Union Wind Energy Conference*, Goteborg: H.S. Stephens and Associates, UK, 1996.

[17] Hannah, P. et al, *Prediction of extreme wind speed at wind energy sites*. National Wind Power and Climatic Research Unit of the University of East Anglia, 1996. Document No: ETSUW/11/00427/REP

Table 7-3: ESDU Extreme Wind Values at the Mast Location

Direction Sector [º]	Mean Long Term Wind Speed at 80.5 m [m/s]	50 yr Extreme 10 Minute Wind Speed, V_{ref} [m/s]	50yr Extreme 3-Second Gust Wind Speed, V_{e50} [m/s]
0	6.0	23.1	27.8
30	7.0	27.0	32.9
60	6.2	22.5	28.4
90	5.0	19.2	21.0
120	4.9	22.7	23.1
150	10.8	44.3	45.6
180	9.7	41.4	44.1
210	8.3	34.2	41.9
240	9.8	39.7	50.0
270	9.2	34.3	40.8
300	7.4	26.5	31.8
330	6.4	21.3	25.5
Maximum	10.8	44.3	50.0
All sectors	**8.2**	**36.5**	**40.1**

It is predicted that the average (all sectors) sectorwise 50 year extreme 10-minute wind speed (V_{ref}) is within the IEC Class II upper threshold of 42.5 m/s and with a minor exceedance in the 150° directional sector, which is a low wind frequency direction sector (Appendix A) .

The average (all sectors) 50 year extreme 3 second gust wind speed (V_{e50}) is within the 59.5 m/s upper threshold relevant to IEC Class II and no exceedance is predicted in individual sectors.

7.6.2 Extreme Winds at WTG Locations

The Openwind model and Vortex FARM WRG was used to extrapolate V_{ref} and V_{e50} from the mast location to the proposed WTG locations at 100 m hub height.

The overall 100 m hub height V_{ref} extreme winds at any WTG location was found to be within the 42.5 m/s threshold for IEC Class II_B WTGs, with a maximum V_{ref} of 38.4 m/s estimated at WTG 33. At the majority of WTG locations, there are exceedances in the design V_{ref} in 150° and 180° directional sectors, both of which are low wind frequency sectors, with average V_{ref} values of 45.7 and 42.7 m/s, respectively, across all WTG locations. The exceedance of V_{ref} in these sectors may impact the design life of the WTGs; nevertheless, the relatively low TI observed at the site and the implementation of SGRE recommended WTG application mode are expected to mitigate exceedance at the WTGs. Wood would recommend that site specific assessment is completed by SGRE for optimised operation of the WTGs at the Project.

Wood observed the 100 m hub height V_{e50} was within the upper threshold of 59.5 m/s for an IEC Class II_B WTG at all WTG locations, with the maximum V_{e50} of 42.2 m/s at WTG 33 and with no exceedance of V_{e50} noted in any of the sectors.

The results of the analysis of extreme wind speeds at the individual proposed WTG locations are presented in Appendix B.

7.7 Turbulence Intensity

Turbulence Intensity (TI) can have significant effects on the fatigue loading on a WTG structure. Characterizations of TI at a potential wind farm site enables correct specification of the WTG.

7.7.1 Ambient Turbulence Intensity at Met Mast Location

The TI analysis at the met mast location was based on 10-minute measurements, as specified in IEC 61400 1 (2005) from the met mast dataset. In the IEC 61400-1 standard the reference TI (TI_{15}) is taken from the 15 m/s wind speed bin. Representative turbulence intensity (RTI) is defined as the mean plus 1.28 times standard deviation of random 10-minute measurements and used for safety standards to account for extreme turbulence cases. The results of the TI analysis (and RTI for reference) at a wind speeds of 15 m/s are shown in Table 7-4 at 81.5 m.

It is observed that the overall and sectorwise TI_{15} values are considered to be low, which is typical of offshore conditions, and within the upper threshold specified for Subclass B. Additionally, the overall RTI is 8.0%, which is also within the upper threshold for Subclass B of 14.0%.

Table 7-4: Turbulence Intensity at Mast Location for 15 m/s

Direction (centre of 30° sector)	Values at 15m/s		
	Number of Records at 15 m/s	TI [%]	RTI [%]
0	17	8.4	10.1
30	155	7.3	8.7
60	4	11.3	14.0
90	7	6.0	10.7
120	1	10.4	-
150	770	4.1	6.8
180	742	4.2	7.1
210	444	5.1	8.2
240	908	5.8	8.8
270	537	6.5	9.1
300	106	7.3	9.1
330	5	7.5	10.4
All Sectors	**3,696**	**5.3**	**8.0**

7.7.2 Ambient Turbulence Intensity at WTG Locations

The OpenWind model was validated by comparing the measured TI_{15} at 81.5 m at the mast location with model TI_{15} at same height and location. A scaling was applied at the mast location to calibrate the model in OpenWind such that measured and modelled TI were in agreement. Wood assumed the same turbulence intensity parameters between 81.5 m and 100 m at the mast location. Turbulence intensity generally decreases at higher heights, therefore this approach can be considered conservative. After calibrating the model, OpenWind was used to extrapolate TI_{15} to each WTG location at hub height.

The proposed WTG locations average ambient TI values are within the IEC Class B upper threshold and are not considered to be concern with respect to site suitability.

It should be noted that modelling turbulence intensity is inherently uncertain and that the values shown here are to be considered indicative, particularly given the nature of the site measurements.

Table 7-5: Ambient Turbulence Intensity (TI15) at WTG Locations

WTG ID	TI_{15} [%]	WTG ID	TI_{15} [%]
1	5.3	34	5.3
2	5.3	35	5.3
3	5.2	36	5.3
4	5.2	37	5.4
5	5.3	38	5.3
6	5.2	39	5.2
7	5.3	40	5.2
8	5.1	41	5.3
9	5.2	42	5.3
10	5.3	43	5.2
11	5.3	44	5.3
12	5.1	45	5.3
13	5.0	46	5.3
14	5.3	47	5.2
15	5.2	48	5.2
16	5.2	49	5.3
17	5.3	50	5.3
18	5.2	51	5.3
19	5.3	52	5.3
20	5.2	53	5.3
21	5.3	54	5.1
22	5.2	55	5.3
23	5.3	56	5.2
24	5.2	57	5.3
25	5.3	58	5.1
26	5.3	59	5.3
27	5.3	60	5.3
28	5.3	61	5.4
29	5.3	62	5.2
30	5.2	63	5.1
31	5.2	64	5.3
32	5.3	65	5.3
33	5.1	66	5.2

7.7.3 Effective Turbulence Intensity

Wake-induced turbulence intensity (I_{wake}) has been modelled at each proposed WTG location at 100 m hub height. OpenWind was used to extrapolate modelled turbulence intensity from the mast location to the proposed WTG locations at 100 m hub height and to calculate I_{wake}. The combined wake-induced and ambient turbulence intensity gives rise to an overall effective turbulence intensity (I_{eff}).

It should be noted that the IEC standards do not specify a single wind speed for comparison of I_{eff} with classification values, rather I_{eff} is assessed for wind speeds over a zone of interest.

Comparison of I_{eff} with IEC Class B specifications across a range of wind speeds (8.4 to 27 m/s) was conducted. The turbulence intensity classes specified in the IEC standard relates to the 90th percentile of total turbulence intensity.

This wind speed range is based on the IEC standard, which specifies that I_{eff} should be compared at wind speeds between 0.6 of the rated wind speed of 14 m/s (8.2 m/s) and cut-out wind speed of 27 m/s of the WTG power curve. A plot of I_{eff} showing variation with wind speed is shown for WTG 5 in Figure 2, which has the highest weighted average I_{eff} at the Project. For reference, the IEC Class B turbulence intensity threshold is plotted in Figure 2.

Based on the results obtained, I_{eff} is not considered to be of concern at the Project. It should be noted that the values shown here are indicative due to the inherent uncertainty associated with the initialising measurement as well as the spatial extrapolation of TI.

8 Conclusions

The following key conclusions are drawn from the independent energy yield assessment conducted for the Project:

- The available Long Point wind speed measurements are considered reasonably representative of the wind conditions in the Project area.
- The measurement height of 81.5 m at the Long Point met mast meets the industry guideline of at least three quarters of the proposed 100 m WTG hub height at the Project.
- A long term wind climate at the Project was derived based on measured data form the Long Point met mast, located approximately 10 km northeast of the Project area, adjusted to the long term using ERA-5 reanalysis data at node 43.98°N, -76.5°W. The long term wind distribution was extrapolated to the Project based on Vortex FARM WRG.
- The energy yield assessment was conducted for layout comprising 66 Siemens Gamesa SG 4.5 - 145 WTGs at 100 m hub height, with a total installed capacity of 297.0 MW.
- Windfarmer software was used to calculate the hub height wind speed and gross energy yield at individual WTG locations. The average long term mean wind speed across proposed WTG locations is 8.47 m/s at 100 m hub height.
- Wake losses were assessed with an ensemble approach based on Park and Eddy Viscosity wake models. After applying a series of technical losses, the net central (P50) energy yield estimate is 1159.9 GWh/annum with an associated capacity factor of 44.6%.
- Wind shear was found to be slightly above the IEC Class II design parameter of 0.2 in the 90° and 150° sectors at the mast location. The 90° sector is a low frequency sector whereas the 150° is a moderate frequency sector. Given that the wind shear is found to be 0.12 across the rotor plane at all WTG locations, Wood has little concern for shear at the Project.
- At the met mast location at 100 m hub height, it is predicted that the average (all sectors) sectorwise 50 year extreme 10-minute wind speed (V_{ref}) is within the IEC Class II upper threshold of 42.5 m/s. However, exceedance is predicted in the 150° low frequency direction sector.

- The maximum 100 m hub height V_{ref} extreme winds at any WTG location was found to be 38.4 m/s at WTG 33, which is within the upper threshold of 42.5 m/s for an IEC Class IIB WTG. Some exceedances of V_{ref} is are noted in low frequency sectors (150° and 180°). The exceedance of V_{ref} in these sectors may impact the design life of the WTGs, however the lower TI observed at the site and the implementation of suitable WTG application mode are expected to mitigate loading experienced at the WTGs.
- Wood observed the 100 m hub height V_{e50} was within the upper threshold of 59.5 m/s for an IEC Class II_B WTG at all WTG locations.
- Ambient and effective turbulence were observed to be low at the Project and well within the upper threshold specified for IEC Subclass B.

9 Recommendations / Next Steps

Wood recommends the following actions be taken in regard to the assessment of the long term energy production for the Project:

- Wood recommends deploying floating lidar to collect additional measurements closer to hub height and across the rotor plane, preferably at the central location of proposed layout, to lower uncertainty related to horizontal extrapolation from the onshore met masts to the proposed WTG locations.
- Wood recommends that Siemens Gamesa is consulted regarding a site suitability study and the application mode of the SG 4.5-145 WTGs appropriate for the Project based on site specific conditions.
- A number of the losses applied in Section 5.1 are nominal values. It is recommended that, where possible, Project specific calculations of electrical, WTG availability, grid availability, BoP availability and electrical losses are included to increase the accuracy of the P50 estimate.

10 Figures

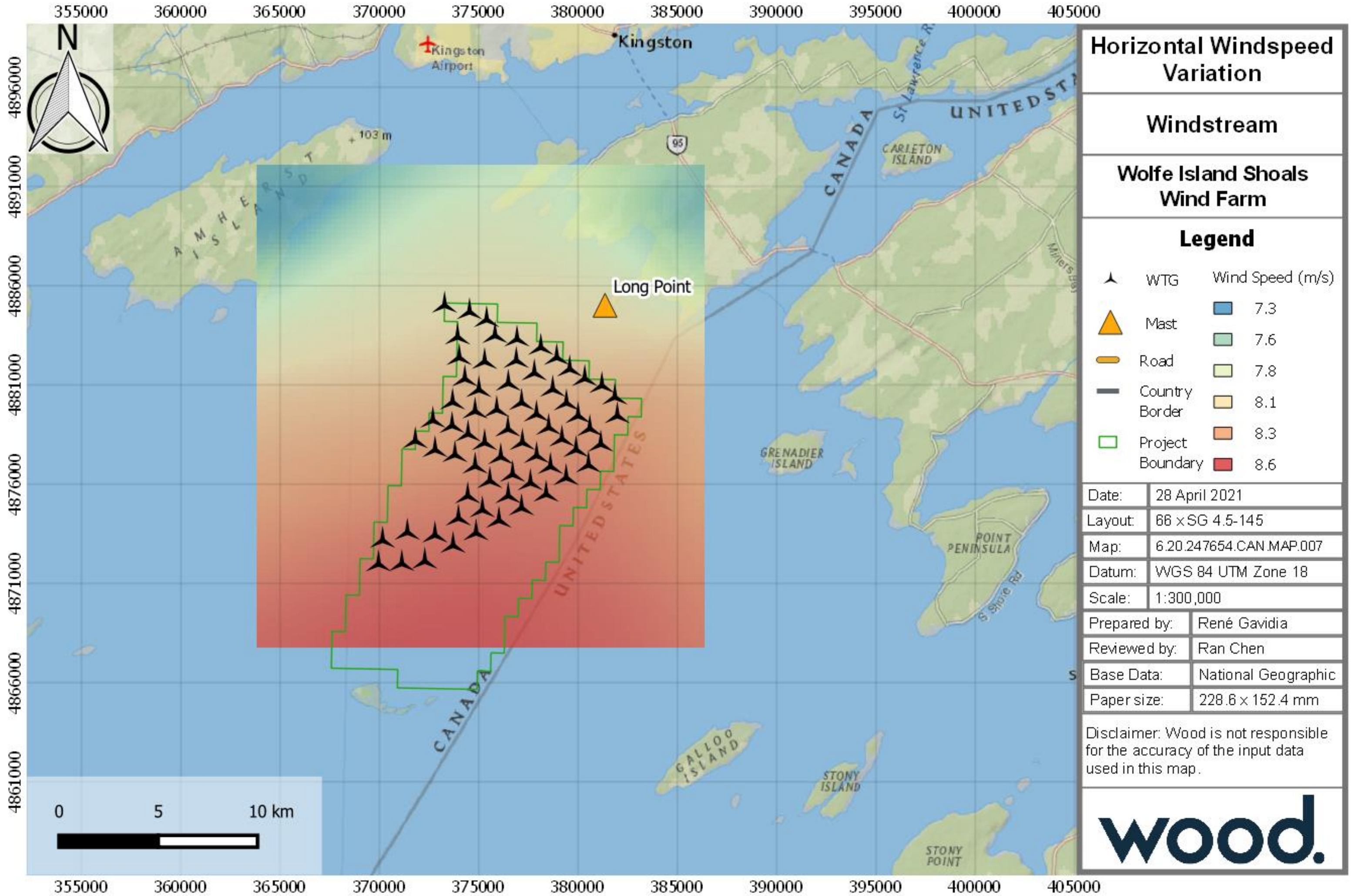

Figure 1: Project Map

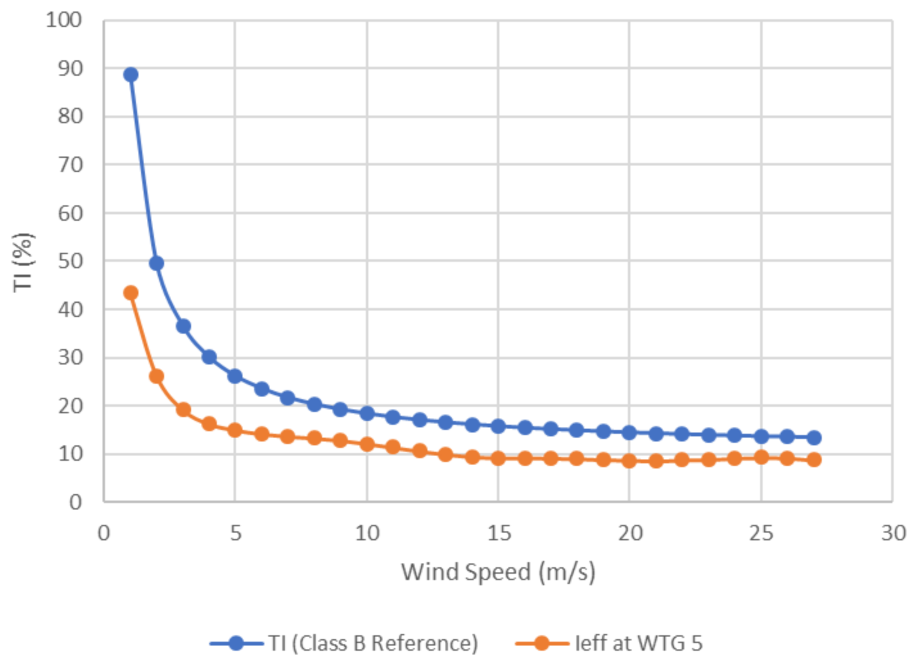

Figure 2: Effective Turbulence Intensity (I_{eff}) at WTG 5 and Reference IEC TI Class B

Appendix A Wind Roses and Wind Distribution

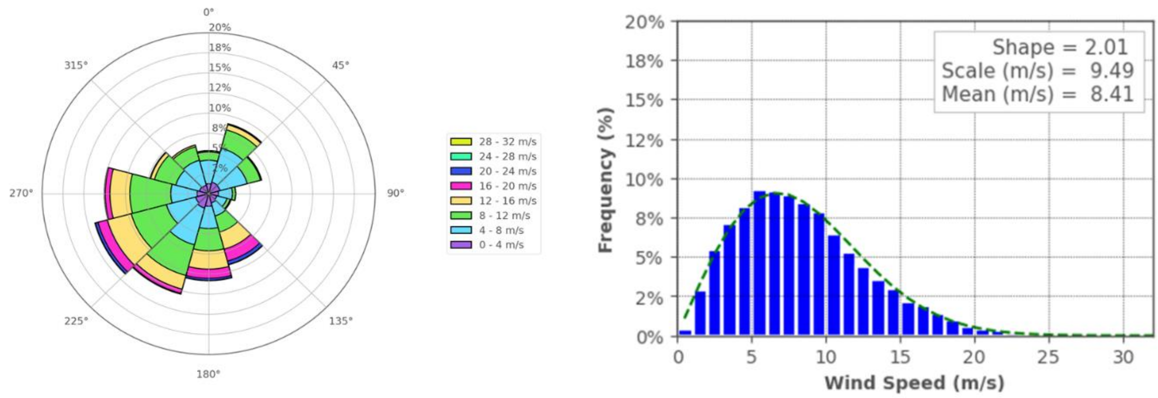

Figure A-1: Short Term Wind Rose and Wind Distribution at Mast Location at 100 m

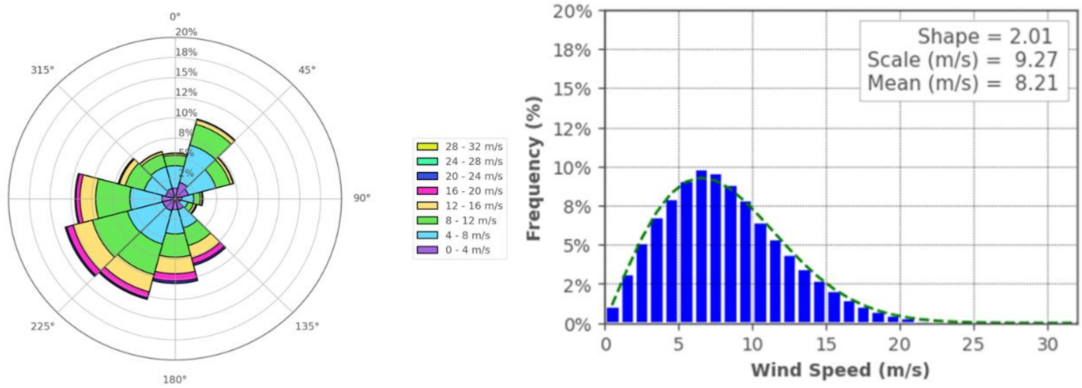

Figure A-2: Long Term Wind Rose and Wind Distribution at Mast Location at 100 m

Appendix B Extreme Winds at WTG Locations

Directional 50-year 10 minute extreme wind speeds (V_{ref}) are shown below. Values highlighted in red below exceed the IEC Class B design value of 42.5 m/s. The highlighted bold text indicate the maximum average (in all sectors) V_{ref} experienced at any of the WTG locations.

Table B-1: Directional 50-Year 10 Minute (V_{ref}) Wind Speeds at WTG Locations

WTG ID	Direction Sector												
	0	30	60	90	120	150	180	210	240	270	300	330	All
1	23.9	28.0	23.3	19.9	23.5	45.8	42.8	35.4	41.1	35.5	27.5	22.1	**37.8**
2	24.1	28.2	23.5	20.1	23.7	46.2	43.2	35.7	41.4	35.8	27.7	22.3	**38.1**
3	23.9	28.0	23.4	19.9	23.5	45.9	42.9	35.5	41.2	35.6	27.5	22.1	**37.8**
4	24.2	28.3	23.6	20.1	23.7	46.3	43.3	35.8	41.5	35.9	27.8	22.3	**38.2**
5	23.5	27.4	22.9	19.5	23.0	44.9	42.0	34.8	40.3	34.9	27.0	21.7	**37.1**
6	24.2	28.3	23.6	20.2	23.8	46.4	43.4	35.9	41.7	36.0	27.8	22.4	**38.3**
7	24.0	28.1	23.4	20.0	23.6	46.0	43.0	35.6	41.3	35.7	27.6	22.2	**37.9**
8	23.9	28.0	23.3	19.9	23.5	45.8	42.8	35.4	41.1	35.5	27.5	22.1	**37.8**
9	24.0	28.0	23.4	20.0	23.5	45.9	42.9	35.5	41.2	35.6	27.5	22.1	**37.9**
10	23.5	27.5	23.0	19.6	23.1	45.1	42.2	34.9	40.5	35.0	27.1	21.8	**37.2**
11	23.9	27.9	23.3	19.9	23.4	45.7	42.7	35.3	41.0	35.4	27.4	22.0	**37.7**
12	24.2	28.4	23.7	20.2	23.8	46.5	43.4	35.9	41.7	36.0	27.9	22.4	**38.3**
13	24.3	28.4	23.7	20.2	23.8	46.5	43.5	35.9	41.7	36.1	27.9	22.4	**38.3**
14	23.6	27.6	23.0	19.6	23.1	45.2	42.2	34.9	40.5	35.0	27.1	21.8	**37.3**
15	24.1	28.2	23.5	20.1	23.6	46.1	43.1	35.7	41.4	35.8	27.7	22.2	**38.0**
16	24.2	28.3	23.6	20.1	23.7	46.3	43.3	35.8	41.6	35.9	27.8	22.3	**38.2**
17	24.1	28.2	23.5	20.1	23.6	46.1	43.1	35.7	41.4	35.8	27.7	22.2	**38.0**
18	23.8	27.9	23.2	19.8	23.4	45.6	42.7	35.3	41.0	35.4	27.4	22.0	**37.6**
19	23.4	27.4	22.8	19.5	23.0	44.9	41.9	34.7	40.3	34.8	26.9	21.6	**37.0**
20	24.2	28.3	23.6	20.2	23.8	46.4	43.3	35.9	41.6	36.0	27.8	22.4	**38.2**
21	24.0	28.1	23.4	20.0	23.6	46.0	43.0	35.6	41.3	35.7	27.6	22.2	**37.9**

WTG ID	Direction Sector												
	0	**30**	**60**	**90**	**120**	**150**	**180**	**210**	**240**	**270**	**300**	**330**	**All**
22	24.2	28.3	23.6	20.1	23.7	46.3	43.3	35.8	41.5	35.9	27.8	22.3	**38.2**
23	23.8	27.8	23.2	19.8	23.3	45.5	42.5	35.2	40.8	35.3	27.3	21.9	**37.5**
24	23.7	27.7	23.1	19.7	23.3	45.4	42.4	35.1	40.7	35.2	27.2	21.9	**37.4**
25	23.3	27.2	22.7	19.4	22.8	44.6	41.7	34.5	40.0	34.6	26.7	21.5	**36.8**
26	24.0	28.1	23.5	20.0	23.6	46.1	43.1	35.6	41.4	35.7	27.6	22.2	**38.0**
27	23.8	27.8	23.2	19.8	23.3	45.6	42.6	35.2	40.9	35.3	27.3	22.0	**37.6**
28	23.8	27.9	23.3	19.9	23.4	45.7	42.7	35.3	41.0	35.4	27.4	22.0	**37.7**
29	24.0	28.0	23.4	20.0	23.5	45.9	42.9	35.5	41.2	35.6	27.5	22.1	**37.9**
30	24.0	28.1	23.4	20.0	23.6	46.0	43.0	35.6	41.3	35.7	27.6	22.2	**38.0**
31	23.7	27.7	23.1	19.7	23.2	45.4	42.4	35.1	40.7	35.2	27.2	21.9	**37.4**
32	23.6	27.6	23.0	19.6	23.1	45.2	42.2	34.9	40.5	35.0	27.1	21.8	**37.3**
33	24.3	28.4	23.7	20.2	23.8	46.5	43.5	36.0	41.8	36.1	27.9	22.4	**38.4**
34	23.8	27.8	23.2	19.8	23.3	45.6	42.6	35.2	40.9	35.3	27.3	22.0	**37.6**
35	23.8	27.9	23.3	19.9	23.4	45.7	42.7	35.3	41.0	35.4	27.4	22.0	**37.7**
36	23.7	27.8	23.2	19.8	23.3	45.5	42.5	35.2	40.8	35.3	27.3	21.9	**37.5**
37	23.7	27.7	23.1	19.7	23.3	45.4	42.4	35.1	40.7	35.2	27.2	21.9	**37.5**
38	23.4	27.4	22.9	19.5	23.0	44.9	42.0	34.7	40.3	34.8	26.9	21.7	**37.1**
39	24.1	28.2	23.5	20.1	23.6	46.2	43.1	35.7	41.4	35.8	27.7	22.3	**38.1**
40	23.6	27.6	23.0	19.7	23.2	45.2	42.3	35.0	40.6	35.1	27.1	21.8	**37.3**
41	23.9	27.9	23.3	19.9	23.4	45.8	42.8	35.4	41.1	35.5	27.4	22.1	**37.7**
42	23.9	28.0	23.3	19.9	23.5	45.8	42.8	35.4	41.1	35.5	27.5	22.1	**37.8**
43	23.9	28.0	23.3	19.9	23.5	45.8	42.8	35.4	41.1	35.5	27.5	22.1	**37.8**
44	24.0	28.1	23.4	20.0	23.6	46.0	43.0	35.6	41.3	35.7	27.6	22.2	**37.9**
45	23.6	27.6	23.0	19.6	23.1	45.2	42.2	34.9	40.5	35.0	27.1	21.8	**37.3**
46	23.9	28.0	23.3	19.9	23.5	45.8	42.8	35.4	41.1	35.5	27.5	22.1	**37.8**
47	23.9	27.9	23.3	19.9	23.4	45.8	42.8	35.4	41.1	35.5	27.4	22.1	**37.8**
48	24.1	28.2	23.5	20.1	23.7	46.2	43.2	35.7	41.4	35.8	27.7	22.3	**38.1**
49	24.0	28.0	23.4	20.0	23.5	45.9	42.9	35.5	41.2	35.6	27.5	22.1	**37.9**
50	23.9	27.9	23.3	19.9	23.4	45.8	42.8	35.4	41.1	35.5	27.4	22.1	**37.7**
51	23.5	27.5	22.9	19.6	23.0	45.0	42.0	34.8	40.4	34.9	27.0	21.7	**37.1**
52	23.7	27.7	23.1	19.7	23.2	45.3	42.4	35.1	40.7	35.2	27.2	21.9	**37.4**
53	23.4	27.3	22.8	19.5	22.9	44.7	41.8	34.6	40.2	34.7	26.8	21.6	**36.9**

WTG ID	Direction Sector												
	0	**30**	**60**	**90**	**120**	**150**	**180**	**210**	**240**	**270**	**300**	**330**	**All**
54	24.2	28.3	23.6	20.1	23.7	46.3	43.3	35.8	41.6	35.9	27.8	22.3	**38.2**
55	23.9	27.9	23.3	19.9	23.4	45.8	42.8	35.4	41.1	35.5	27.4	22.1	**37.8**
56	23.5	27.4	22.9	19.5	23.0	44.9	42.0	34.8	40.3	34.9	26.9	21.7	**37.1**
57	23.6	27.6	23.1	19.7	23.2	45.3	42.3	35.0	40.6	35.1	27.2	21.8	**37.3**
58	24.2	28.3	23.6	20.2	23.8	46.4	43.4	35.9	41.6	36.0	27.8	22.4	**38.3**
59	23.9	27.9	23.3	19.9	23.4	45.7	42.7	35.4	41.0	35.5	27.4	22.0	**37.7**
60	23.5	27.5	22.9	19.6	23.1	45.1	42.1	34.8	40.4	34.9	27.0	21.7	**37.2**
61	23.6	27.7	23.1	19.7	23.2	45.3	42.3	35.0	40.6	35.1	27.2	21.8	**37.4**
62	24.1	28.1	23.5	20.0	23.6	46.1	43.1	35.6	41.4	35.8	27.6	22.2	**38.0**
63	24.2	28.3	23.6	20.2	23.8	46.4	43.4	35.9	41.7	36.0	27.8	22.4	**38.3**
64	23.8	27.9	23.2	19.8	23.4	45.7	42.7	35.3	41.0	35.4	27.4	22.0	**37.7**
65	23.2	27.2	22.7	19.4	22.8	44.5	41.6	34.4	40.0	34.5	26.7	21.5	**36.7**
66	23.6	27.6	23.1	19.7	23.2	45.3	42.3	35.0	40.6	35.1	27.2	21.8	**37.4**

Table B-2: Directional V_{e50} at all WTG Locations

WTG ID	Direction Sector												
	0	30	60	90	120	150	180	210	240	270	300	330	All
1	28.8	34.0	29.4	21.8	23.9	47.2	45.6	43.4	51.8	42.3	32.9	26.4	**41.5**
2	29.0	34.3	29.6	22.0	24.1	47.6	46.0	43.7	52.2	42.6	33.2	26.6	**41.8**
3	28.8	34.1	29.4	21.8	24.0	47.3	45.7	43.5	51.8	42.3	33.0	26.4	**41.6**
4	29.1	34.4	29.7	22.0	24.2	47.7	46.1	43.9	52.3	42.7	33.3	26.7	**42.0**
5	28.2	33.4	28.8	21.4	23.5	46.3	44.8	42.6	50.8	41.5	32.3	25.9	**40.7**
6	29.2	34.5	29.7	22.1	24.2	47.8	46.2	44.0	52.4	42.8	33.4	26.7	**42.1**
7	28.9	34.1	29.5	21.9	24.0	47.4	45.8	43.6	52.0	42.4	33.1	26.5	**41.7**
8	28.8	34.0	29.3	21.8	23.9	47.2	45.6	43.4	51.7	42.3	32.9	26.4	**41.5**
9	28.9	34.1	29.4	21.8	24.0	47.3	45.7	43.5	51.9	42.4	33.0	26.4	**41.6**
10	28.3	33.5	28.9	21.5	23.5	46.5	44.9	42.7	51.0	41.6	32.4	26.0	**40.9**
11	28.7	33.9	29.3	21.7	23.9	47.1	45.5	43.3	51.6	42.2	32.8	26.3	**41.4**
12	29.2	34.5	29.8	22.1	24.3	47.9	46.3	44.0	52.5	42.9	33.4	26.8	**42.1**
13	29.2	34.5	29.8	22.1	24.3	47.9	46.3	44.0	52.5	42.9	33.4	26.8	**42.1**
14	28.4	33.5	28.9	21.5	23.6	46.5	45.0	42.8	51.0	41.7	32.5	26.0	**40.9**
15	29.0	34.2	29.6	21.9	24.1	47.5	46.0	43.7	52.1	42.6	33.2	26.6	**41.8**
16	29.1	34.4	29.7	22.0	24.2	47.7	46.2	43.9	52.4	42.8	33.3	26.7	**42.0**
17	29.0	34.2	29.5	21.9	24.1	47.5	46.0	43.7	52.1	42.6	33.1	26.6	**41.8**
18	28.7	33.9	29.2	21.7	23.8	47.0	45.5	43.2	51.6	42.1	32.8	26.3	**41.4**
19	28.2	33.3	28.7	21.3	23.4	46.2	44.7	42.5	50.7	41.4	32.2	25.8	**40.7**
20	29.1	34.4	29.7	22.1	24.2	47.8	46.2	43.9	52.4	42.8	33.3	26.7	**42.0**
21	28.9	34.1	29.5	21.9	24.0	47.4	45.8	43.6	52.0	42.5	33.1	26.5	**41.7**
22	29.1	34.4	29.7	22.0	24.2	47.7	46.1	43.9	52.3	42.7	33.3	26.7	**42.0**
23	28.6	33.8	29.2	21.6	23.8	46.9	45.3	43.1	51.4	42.0	32.7	26.2	**41.2**
24	28.5	33.7	29.1	21.6	23.7	46.8	45.2	43.0	51.3	41.9	32.6	26.1	**41.1**
25	28.0	33.1	28.6	21.2	23.3	45.9	44.4	42.2	50.4	41.1	32.0	25.7	**40.4**
26	29.0	34.2	29.5	21.9	24.1	47.5	45.9	43.7	52.1	42.5	33.1	26.5	**41.8**
27	28.6	33.8	29.2	21.7	23.8	46.9	45.4	43.2	51.5	42.0	32.7	26.2	**41.3**
28	28.7	33.9	29.3	21.7	23.9	47.1	45.5	43.3	51.6	42.2	32.8	26.3	**41.4**
29	28.8	34.1	29.4	21.8	24.0	47.3	45.7	43.5	51.9	42.4	33.0	26.4	**41.6**
30	28.9	34.2	29.5	21.9	24.0	47.4	45.8	43.6	52.0	42.5	33.1	26.5	**41.7**

WTG ID	Direction Sector												
	0	30	60	90	120	150	180	210	240	270	300	330	All
31	28.5	33.7	29.1	21.6	23.7	46.7	45.2	43.0	51.3	41.9	32.6	26.1	**41.1**
32	28.4	33.5	28.9	21.5	23.6	46.5	45.0	42.8	51.0	41.7	32.5	26.0	**40.9**
33	29.2	34.5	29.8	22.1	24.3	47.9	46.4	44.1	52.6	42.9	33.4	26.8	**42.2**
34	28.6	33.8	29.2	21.7	23.8	46.9	45.4	43.2	51.5	42.1	32.8	26.2	**41.3**
35	28.7	33.9	29.3	21.7	23.8	47.0	45.5	43.3	51.6	42.1	32.8	26.3	**41.4**
36	28.6	33.8	29.1	21.6	23.7	46.9	45.3	43.1	51.4	42.0	32.7	26.2	**41.2**
37	28.5	33.7	29.1	21.6	23.7	46.8	45.2	43.0	51.3	41.9	32.6	26.1	**41.1**
38	28.2	33.4	28.8	21.4	23.5	46.3	44.8	42.6	50.8	41.5	32.3	25.9	**40.7**
39	29.0	34.3	29.6	21.9	24.1	47.5	46.0	43.7	52.1	42.6	33.2	26.6	**41.8**
40	28.4	33.6	29.0	21.5	23.6	46.6	45.1	42.9	51.1	41.7	32.5	26.0	**41.0**
41	28.8	34.0	29.3	21.8	23.9	47.1	45.6	43.3	51.7	42.2	32.9	26.3	**41.5**
42	28.8	34.0	29.3	21.8	23.9	47.2	45.6	43.4	51.7	42.3	32.9	26.4	**41.5**
43	28.8	34.0	29.3	21.8	23.9	47.2	45.6	43.4	51.7	42.3	32.9	26.4	**41.5**
44	28.9	34.1	29.5	21.9	24.0	47.4	45.8	43.6	52.0	42.4	33.1	26.5	**41.7**
45	28.4	33.5	28.9	21.5	23.6	46.5	45.0	42.8	51.0	41.7	32.5	26.0	**40.9**
46	28.8	34.0	29.4	21.8	23.9	47.2	45.7	43.4	51.8	42.3	32.9	26.4	**41.5**
47	28.8	34.0	29.3	21.8	23.9	47.1	45.6	43.4	51.7	42.2	32.9	26.4	**41.5**
48	29.0	34.3	29.6	22.0	24.1	47.6	46.0	43.8	52.2	42.6	33.2	26.6	**41.9**
49	28.8	34.1	29.4	21.8	24.0	47.3	45.7	43.5	51.9	42.4	33.0	26.4	**41.6**
50	28.8	34.0	29.3	21.8	23.9	47.1	45.6	43.4	51.7	42.2	32.9	26.3	**41.5**
51	28.3	33.4	28.8	21.4	23.5	46.3	44.8	42.6	50.8	41.5	32.3	25.9	**40.8**
52	28.5	33.7	29.1	21.6	23.7	46.7	45.2	43.0	51.2	41.8	32.6	26.1	**41.1**
53	28.1	33.2	28.7	21.3	23.4	46.1	44.6	42.4	50.6	41.3	32.2	25.8	**40.5**
54	29.1	34.4	29.7	22.0	24.2	47.7	46.2	43.9	52.4	42.8	33.3	26.7	**42.0**
55	28.8	34.0	29.3	21.8	23.9	47.1	45.6	43.4	51.7	42.2	32.9	26.4	**41.5**
56	28.2	33.4	28.8	21.4	23.5	46.3	44.8	42.6	50.8	41.5	32.3	25.9	**40.7**
57	28.5	33.6	29.0	21.5	23.6	46.6	45.1	42.9	51.2	41.8	32.5	26.1	**41.0**
58	29.2	34.5	29.7	22.1	24.2	47.8	46.2	44.0	52.4	42.8	33.4	26.7	**42.1**
59	28.7	33.9	29.3	21.7	23.9	47.1	45.6	43.3	51.7	42.2	32.9	26.3	**41.4**
60	28.3	33.5	28.9	21.4	23.5	46.4	44.9	42.7	50.9	41.6	32.4	25.9	**40.8**
61	28.5	33.6	29.0	21.5	23.6	46.6	45.1	42.9	51.2	41.8	32.5	26.1	**41.0**
62	29.0	34.2	29.5	21.9	24.1	47.5	45.9	43.7	52.1	42.5	33.1	26.5	**41.8**

WTG ID	Direction Sector												
	0	30	60	90	120	150	180	210	240	270	300	330	All
63	29.2	34.5	29.7	22.1	24.2	47.8	46.2	44.0	52.4	42.8	33.4	26.7	**42.1**
64	28.7	33.9	29.2	21.7	23.8	47.0	45.5	43.3	51.6	42.1	32.8	26.3	**41.4**
65	28.0	33.1	28.5	21.2	23.2	45.9	44.4	42.2	50.3	41.1	32.0	25.6	**40.4**
66	28.5	33.6	29.0	21.5	23.6	46.6	45.1	42.9	51.2	41.8	32.5	26.1	**41.0**

Appendix C Individual WTG Outputs

Table C-1: Individual WTG Outputs (66 x Siemens Gamesa SG 4.5 - 145 at 100 m Hub Height)

Site	Location[1]		Water Depth [m amsl][2]	Elevation [m amsl][2]	Hub Height [m amsl]	Weibull A [m/s]	Weibull k	Wind Speed [m/s]	Gross [GWh][3]	Net [GWh][4]	Wake Loss [%]
	E	N									
1	373675	4879010	22.0	74	100	9.27	1.97	8.49	21.21	19.41	8.48
2	376500	4875470	15.8	74	100	9.27	1.97	8.56	21.42	19.22	10.28
3	379420	4876382	10.1	74	100	9.27	1.97	8.52	21.28	19.24	9.59
4	375201	4874760	13.5	74	100	9.27	1.97	8.59	21.45	19.51	9.01
5	378946	4882443	16.1	74	100	9.27	1.97	8.34	20.81	18.96	8.87
6	372812	4873490	24.6	74	100	9.27	1.97	8.60	21.50	20.14	6.32
7	378630	4876948	20.2	74	100	9.27	1.97	8.54	21.35	18.90	11.46
8	371823	4878241	29.8	74	100	9.27	1.97	8.48	21.19	20.34	4.00
9	372817	4877790	29.8	74	100	9.27	1.97	8.51	21.26	19.92	6.28
10	379600	4881858	15.5	74	100	9.27	1.97	8.38	20.91	18.87	9.74
11	374833	4879736	10.8	74	100	9.27	1.97	8.48	21.15	19.02	10.04
12	371143	4872053	29.6	74	100	9.27	1.97	8.59	21.50	20.48	4.75
13	369968	4872033	28.1	74	100	9.27	1.97	8.59	21.52	20.84	3.16
14	375314	4882237	24.4	74	100	9.27	1.97	8.37	20.89	19.12	8.47
15	378412	4875548	14.3	74	100	9.27	1.97	8.56	21.40	19.54	8.67
16	376034	4874235	19.4	74	100	9.27	1.97	8.60	21.48	19.70	8.27
17	375576	4876228	22.1	74	100	9.27	1.97	8.56	21.39	19.28	9.85
18	373700	4880193	29.6	74	100	9.27	1.97	8.46	21.11	19.55	7.38
19	376944	4883369	14.8	74	100	9.27	1.97	8.32	20.75	19.07	8.06
20	374882	4873598	25.8	74	100	9.27	1.97	8.60	21.50	19.92	7.32
21	374836	4876965	29.9	74	100	9.27	1.97	8.53	21.31	19.46	8.65
22	373995	4874342	28.0	74	100	9.27	1.97	8.58	21.46	19.92	7.18

Site	Location[1]		Water Depth [m amsl][2]	Elevation [m amsl][2]	Hub Height [m amsl]	Weibull A [m/s]	Weibull k	Wind Speed [m/s]	Gross [GWh][3]	Net [GWh][4]	Wake Loss [%]
	E	N									
23	381163	4878072	13.1	74	100	9.27	1.97	8.45	21.13	19.17	9.27
24	381996	4879500	13.9	74	100	9.27	1.97	8.43	21.09	19.36	8.20
25	373297	4885073	29.5	74	100	9.27	1.97	8.25	20.56	20.01	2.68
26	376722	4876549	21.7	74	100	9.27	1.97	8.55	21.37	19.06	10.82
27	380612	4878859	15.4	74	100	9.27	1.97	8.46	21.16	18.81	11.09
28	377926	4879584	25.1	74	100	9.27	1.97	8.47	21.17	18.61	12.07
29	377933	4877495	26.8	74	100	9.27	1.97	8.52	21.30	18.90	11.24
30	373819	4877540	29.7	74	100	9.27	1.97	8.53	21.31	19.66	7.72
31	374318	4881366	29.8	74	100	9.27	1.97	8.41	20.98	19.40	7.49
32	381221	4881027	21.9	74	100	9.27	1.97	8.39	20.96	19.12	8.75
33	372301	4872170	14.1	74	100	9.27	1.97	8.61	21.54	20.45	5.04
34	380022	4879503	24.5	74	100	9.27	1.97	8.47	21.15	18.70	11.57
35	375923	4879814	10.5	74	100	9.27	1.97	8.47	21.13	18.72	11.39
36	379434	4880149	24.3	74	100	9.27	1.97	8.44	21.09	18.68	11.42
37	375025	4880816	22.1	74	100	9.27	1.97	8.41	20.99	19.02	9.37
38	378144	4882950	14.5	74	100	9.27	1.97	8.33	20.78	18.97	8.69
39	377174	4874860	20.8	74	100	9.27	1.97	8.57	21.41	19.53	8.78
40	374034	4882437	29.8	74	100	9.27	1.97	8.38	20.91	19.63	6.09
41	379919	4877794	10.6	74	100	9.27	1.97	8.50	21.25	18.84	11.34
42	379207	4878331	14.8	74	100	9.27	1.97	8.50	21.24	18.75	11.71
43	372706	4879275	29.0	74	100	9.27	1.97	8.49	21.19	19.90	6.05
44	376126	4877432	28.9	74	100	9.27	1.97	8.53	21.33	18.90	11.40
45	380358	4881381	22.5	74	100	9.27	1.97	8.38	20.91	18.95	9.36
46	375314	4878145	25.1	74	100	9.27	1.97	8.50	21.22	19.05	10.23
47	380544	4877018	16.9	74	100	9.27	1.97	8.50	21.25	19.35	8.93
48	374464	4875463	28.4	74	100	9.27	1.97	8.57	21.41	19.67	8.13

Site	Location[1]		Water Depth [m amsl][2]	Elevation [m amsl][2]	Hub Height [m amsl]	Weibull A [m/s]	Weibull k	Wind Speed [m/s]	Gross [GWh][3]	Net [GWh][4]	Wake Loss [%]
	E	N									
49	377217	4878156	27.2	74	100	9.27	1.97	8.52	21.26	18.76	11.74
50	376487	4878831	17.6	74	100	9.27	1.97	8.48	21.17	18.73	11.53
51	375837	4883543	17.9	74	100	9.27	1.97	8.33	20.78	19.26	7.29
52	378744	4880840	23.8	74	100	9.27	1.97	8.41	21.02	18.70	11.01
53	375416	4884346	24.3	74	100	9.27	1.97	8.29	20.65	19.33	6.35
54	370173	4873226	29.5	74	100	9.27	1.97	8.56	21.46	20.71	3.46
55	374479	4878585	22.7	74	100	9.27	1.97	8.48	21.19	19.12	9.76
56	373951	4883473	29.5	74	100	9.27	1.97	8.33	20.76	19.69	5.13
57	377818	4881660	18.7	74	100	9.27	1.97	8.40	20.97	18.76	10.51
58	373725	4872971	21.2	74	100	9.27	1.97	8.60	21.50	20.14	6.31
59	378540	4878914	25.4	74	100	9.27	1.97	8.49	21.21	18.79	11.38
60	376909	4882290	15.0	74	100	9.27	1.97	8.36	20.85	18.94	9.14
61	376506	4881138	10.1	74	100	9.27	1.97	8.40	20.93	18.67	10.77
62	377620	4876121	21.6	74	100	9.27	1.97	8.56	21.40	19.01	11.17
63	371422	4873629	29.1	74	100	9.27	1.97	8.59	21.51	20.44	4.96
64	377175	4880168	14.5	74	100	9.27	1.97	8.47	21.14	18.88	10.69
65	374553	4884741	24.9	74	100	9.27	1.97	8.25	20.54	19.54	4.85
66	381873	4880442	21.1	74	100	9.27	1.97	8.40	21.03	19.11	9.10

[1] UTM, NAD83, Zone 18.

[2] At base of towers.

[3] Inclusive of topographic/roughness and air density corrections.

[4] Inclusive of topographic/roughness correction, air density correction and wake losses.

TAB 3




Expert Report

Prepared for: Windstream
February 18, 2022

Submitted by:
Jason Chee-Aloy
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POWER ADVISORY

TABLE OF CONTENTS

TABLE OF FIGURES

1. EXECUTIVE SUMMARY

Power Advisory LLC (Power Advisory) was previously retained by Torys LLP on behalf of Windstream Wolfe Island Shoals Inc. (WWIS) to provide an expert report commenting on the Independent Electricity System Operator's (IESO's) analysis related to its decision to terminate the Windstream Feed-in-Tariff (FIT) contract. I provided that report (dated October 17, 2018). That last report was provided in the context of litigation between WWIS and the IESO concerning the termination of the Windstream FIT contract. For the reasons set out in my last report, my conclusion was that the IESO's analysis did not provide a reasonable basis for terminating the Windstream FIT contract.

I have been informed by Torys LLP that WWIS' parent company, Windstream LLC (Windstream), has commenced a NAFTA claim against the Government of Canada relating to the termination of the Windstream FIT contract. In that context, Windstream has retained me to provide this expert report that addresses two issues:

1. To review the assessment and conclusions from my last report relating to Subsection 2 and Subsection 3 of the IESO's analysis and provide any updates based on events or circumstances that have occurred from October 2018 (date of my last report) to present day; and
2. To provide my opinion on Ontario's current electricity supply needs and whether the IESO's current projections are accurate.

My conclusions are summarized below.

1.1 My Background

I have been the Managing Director of Power Advisory since 2010. As a professional consultant specializing in electricity sector matters, I work mostly with generators within Ontario's electricity market. I have extensive experience in the areas of contract negotiations, project development, wholesale electricity market design, and resource procurements relating to the development and operation of electricity generators in Ontario.

From 2005 to 2010, I led the procurement and contracting of nearly all generation projects for the Ontario Power Authority (OPA) (the OPA is now part of the IESO). During that time, I led the contracting for over 15,000 MW of projects, including the renewable generation projects awarded FIT contracts in 2009 (including the Windstream offshore wind generation project).

From 1999 to 2005, I worked in many areas of wholesale electricity market design for the IESO, including completion of design and draft rules for an Ontario Capacity Market that was not implemented. In part because the Capacity Market was not implemented, the OPA contracted for needed supply. Therefore, I have experience in procuring and contracting generation projects and development of mechanisms within wholesale electricity markets to ensure power system reliability and resource adequacy to address Ontario's supply needs.

I have a Masters of Arts, Economics, degree from York University, and an Honours Bachelor of Arts, Economics Specialist, degree from the University of Toronto. My CV is included in Appendix A.

1.2 Issue #1 – To review the assessment and conclusions from my last report relating to Subsection 2 and Subsection 3 of the IESO's analysis and provide any updates based on events or circumstances that have occurred from October 2018 (date of my last report) to present day

The IESO's analysis supporting its decision to terminate the Windstream FIT contract was divided into three subsections.

- Subsection 1 relied on the delays in developing the Windstream offshore wind generation project as a basis for terminating the Windstream FIT contract. In my last report, I concluded that the IESO had not explained why these delays warranted terminating the Windstream FIT contract (i.e., they had not explained what harm, if any, would have resulted if the Windstream FIT contract was allowed to remain in place). No events have occurred since my last report that have changed my opinion on this issue.

- Subsection 2 relied on the IESO's plan to move away from long-term contracts towards "market-based approaches" to procuring electricity supply, such as Incremental Capacity Auctions (i.e., Capacity Market) as a basis for terminating the Windstream FIT contract.

- Subsection 3 reviewed whether there are power system planning or Ontario electricity ratepayer impacts that could inform whether to terminate the Windstream FIT contract.

In my last report, I concluded that the IESO's Subsection 2 and Subsection 3 analysis did not provide a reasonable basis for terminating the Windstream FIT contract. I have been asked to update my assessment on these issues. This updated assessment is set out in this report.

In summary, my conclusions from my last report relating to Subsection 2 and Subsection 3 of the IESO's analysis remain accurate, and in many cases have proven to be substantiated. The events since my last report reinforce my conclusions that the IESO's analysis did not provide an adequate basis for terminating the Windstream FIT contract. There are two key factors underlying this conclusion:

- The IESO was not successful in implementing Incremental Capacity Auctions and has since reverted back to using long-term contracts to meet Ontario's supply needs to address the forecasted electricity supply shortfall; therefore, the IESO's rationale regarding the use of "market-based approaches" was clearly flawed within their Subsection 2 analysis; and

- The IESO has overestimated the level of surplus baseload generation within Ontario. This is due to several factors, including a generator retiring post expiry of their contract, generation projects cancelled resulting from termination of their contracts, and risk of other generators retiring post expiry of their contracts (namely gas-fired generators). Therefore, the IESO overestimated the impacts the Windstream offshore wind generation project would have had on surplus baseload generation and therefore the IESO's Subsection 3 analysis was not accurate.

1.3 Issue #2 – To provide my opinion on Ontario's current electricity supply needs and whether the IESO's current projections are accurate

I have also been asked to provide my opinions on the accuracy of the IESO's forecasted electricity supply shortfall and therefore the supply needs to address this. I render opinions on risks that will most likely impact Ontario's future electricity supply needs.

In summary, my conclusion is that the IESO's current projections likely underestimate Ontario's electricity supply needs. There are likely supply-side and demand-side future changes that have potential to increase the electricity supply shortfall and therefore the supply needs in Ontario to meet this shortfall.

First, the IESO's latest supply need forecast, set out in the 2021 Annual Planning Outlook, predicts an increased need for energy supply. This supply need forecast is greater than the IESO's 2020 Annual Planning Outlook, the Government of Ontario's 2017 Long-Term Energy Plan, and the IESO's 2016 Ontario Planning Outlook. Second, I believe that this most recent IESO forecast still underestimates Ontario's electricity supply needs. This is because there are supply-side risks of generators (namely gas-fired generators) retiring after their contracts expire while at the same time there will be increasing demand for electricity due to the potential for Ontario-wide electrification. I believe this electrification will result in higher than forecasted electricity demand. As a result, there will be an increase in Ontario's electricity shortfall therefore increasing its supply needs.

2. UPDATE ON MY PREVIOUS ASSESSMENT WITH REPECT TO SUBSECTION 2 OF THE IESO'S ANALYSIS: THE IESO'S RELIANCE ON CHANGES TO PROCUREMENT POLICIES

2.1 Introduction

Subsection 2 of the IESO's analysis relied on the IESO's plans to move away from long-term contracts towards "market-based approaches" to procure electricity supply through Incremental Capacity Auctions (i.e., an IESO administered Capacity Market) as a basis for terminating the Windstream FIT contract. In my last report, I concluded that the IESO's planned shift towards Incremental Capacity Auctions was not a reasonable basis for terminating the Windstream FIT contract.

In my last report, I provided three reasons supporting my conclusion:

- Ontario will require additional electricity generation supply in the early to mid-2020s;
- Ontario's plan to fill this supply shortfall was to use Incremental Capacity Auctions, but it was my conclusion that this plan will likely not be successful in meeting all of Ontario's future electricity supply needs and it is unlikely that Ontario will be able to secure the construction of new electricity generation projects; and
- I believed that the IESO would be required to revert back to long-term contracts in order to procure additional electricity supply in Ontario.

In this report, I provide an updated assessment of these conclusions. I address each of the above reasons in the sub-sections below.

2.2 The IESO Continues to Project Electricity Supply Shortfalls in Ontario

In my last report, I concluded that Ontario requires additional electricity generation supply in the early to mid-2020s. This conclusion remains true today.

In my last report, I had assessed the most recent Ontario electricity supply forecasts available at that time, which were included within the 2017 Ontario Government's Long-Term Energy Plan[1] and the IESO's 2016 Ontario Planning Outlook.[2] The forecasts presented in these documents showed an electricity supply shortfall that was projected to emerge in the early to mid-2020s (approximately 2023). At its Technical Conference held with stakeholders on September 13, 2018, the IESO acknowledged that some

[1] C-2063, Government of Ontario Report entitled "Archived – 2017 Long-Term Energy Plan: Delivering Fairness and Choice" (2017), https://www.ontario.ca/document/2017-long-term-energy-plan

[2] C-2035, IESO Ontario Planning Outlook – A technical report on the electricity system (September 1, 2016), https://www.ieso.ca/en/Sector-Participants/IESO-News/2016/09/IESO-releases-an-Ontario-Planning-Outlook

uncertainties could have a "large" impact on available supply "in the coming years"[3] for the following reasons:

- "Generation asset owners may revise when they plan to shutdown a [power] plant. Will depend on condition of asset, cost of continued operation, and revenues generated. Some generation assets due to location and technical capabilities, play an important role in the system beyond providing capacity";[4] and
- "There is limited information on the ongoing availability of generators with expired contracts. Some may participate in the Incremental Capacity Auction, while others may choose to decommission their facilities, mothball or begin operating as merchant capacity exporters".[5]

Therefore, if the above reasons were to materialize, then Ontario could need additional electricity supply compared to what had been forecasted in the 2017 Long-Term Energy Plan and in the 2016 Ontario Planning Outlook.

The IESO's most recent Ontario electricity supply forecast, included within their 2021 Annual Planning Outlook,[6] still forecasts electricity supply shortfalls in Ontario emerging in the early to mid-2020s, as illustrated in the following figures.[7]

[3] C-2173, IESO 2018 Technical Planning Conference Presentation (September 13, 2018), p. 64 in IESO's presentation from the September 13, 2018 Technical Conference meeting held with stakeholders (https://www.ieso.ca/en/Sector-Participants/IESO-News/2018/08/Sept-13-Planning-Technical-Conf-to-focus-on-electricity-planning-and-transmission-procurement)

[4] ibid

[5] ibid

[6] C-2415, IESO Report entitled "Annual Planning Outlook – Ontario's electricity system needs: 2023-2042" (December 2021), IESO's Annual Planning Outlook (December 2021) (i.e., "2021 Annual Planning Outlook") located here on the IESO's website: https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook

[7] C-2415, IESO Report entitled "Annual Planning Outlook – Ontario's electricity system needs: 2023-2042" (December 2021), pp. 45-46 in IESO's 2021 Annual Planning Outlook for summer capacity (i.e., electricity supply) shortfall (i.e., deficit) and winter capacity shortfall

Figure 1: IESO 2021 Annual Planning Outlook – Forecasted Electricity Supply Shortfall

Figure 19 | Summer Capacity Surplus/Deficit

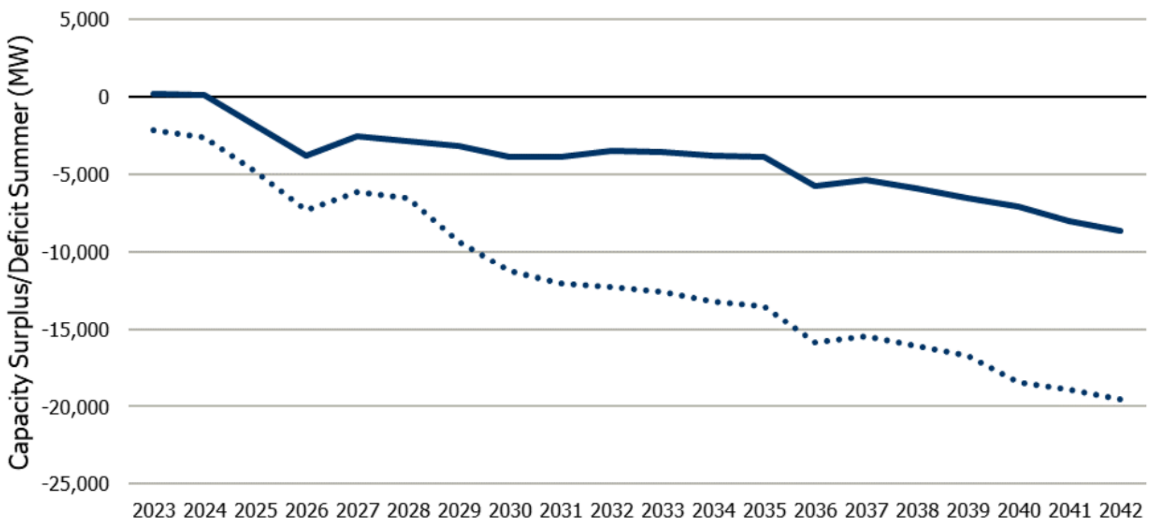
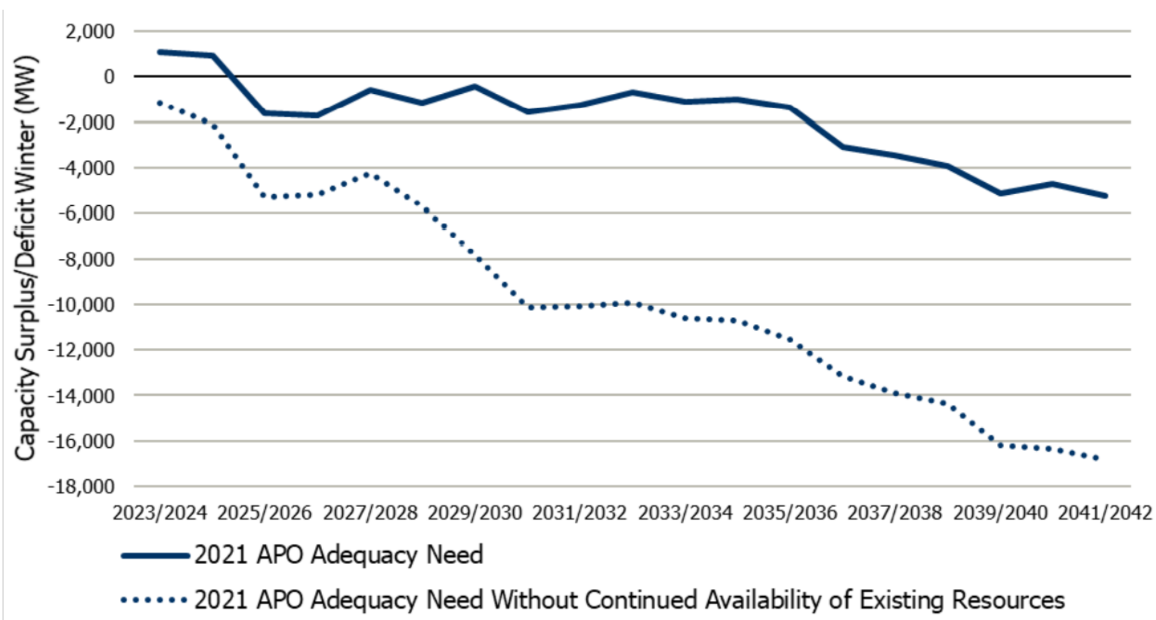


Figure 20 | Winter Capacity Surplus/Deficit

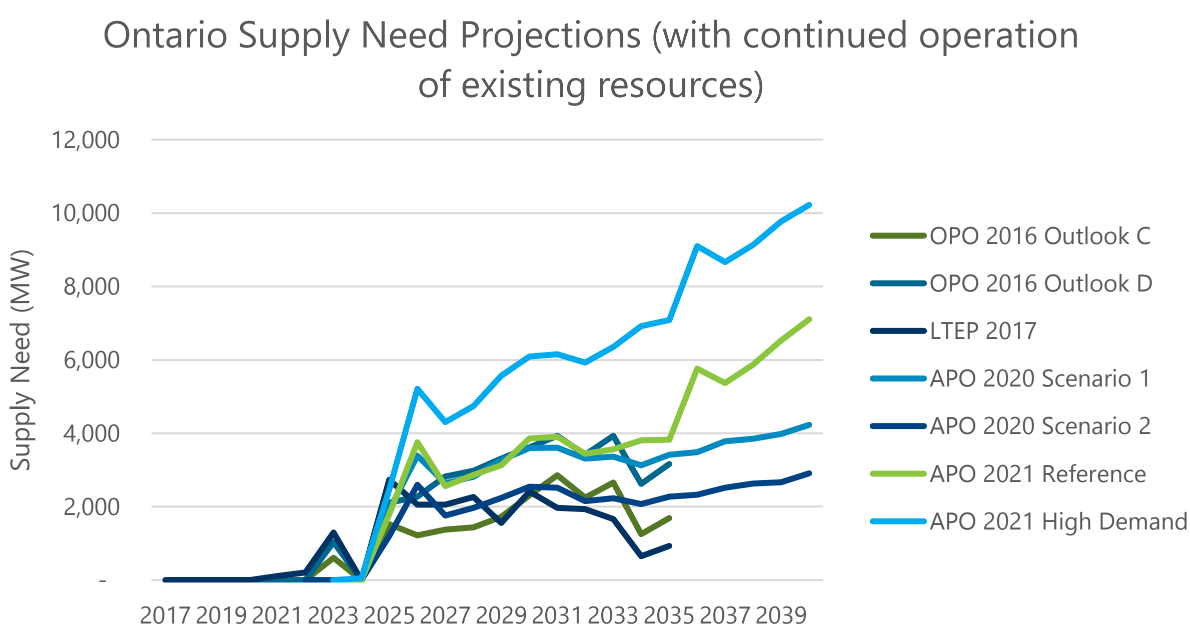


It is clear from the figures above that the IESO continues to forecast electricity supply shortfalls in Ontario starting in the early to mid-2020s – for both scenarios: (1) 2021 APO Adequacy Need; and (2) 2021 APO Adequacy Need Without Continued Availability of Existing Resources.

The figures above also indicate what the forecasted electricity supply shortfall will be without the "continued availability of existing resources" (e.g., generators, etc.). This means that within the IESO's forecasts they are acknowledging risks to electricity generators retiring post expiry of their contracts[8] and the need to procure these operating generators and procure new generation projects to be constructed to meet their forecasted electricity supply shortfall.

Further, the IESO's latest forecast of supply needs as shown in their 2021 Annual Planning Outlook (shown above) have increased relative to the supply needs that were forecasted in the IESO's 2020 Annual Planning Outlook, the 2017 Long-Term Energy Plan, and the 2016 Ontario Planning Outlook (see figure below).[9]

Figure 2: Comparison of Forecasted Electricity Supply Needs – 2021 Annual Planning Outlook, 2020 Annual Planning Outlook, 2017 Long-Term Energy Plan, and 2016 Ontario Planning Outlook



Consistent with the points made above regarding the IESO's comments on available electricity supply uncertainties, some power plant owners have since decided to retire their generators post expiry of their contracts – therefore reinforcing the IESO's forecasted electricity supply shortfall and the materialization of some of the IESO's identified risks to the continued operations of needed electricity supply post expiry of contracts. For example, TransAlta decommissioned their gas-fired cogeneration facility (approximately 122 MW) located in Mississauga, Ontario.[10] This example is important because this generator was located within the highest electricity demand location within Ontario (i.e., the Greater Toronto Area). This suggests

[8] Nearly all operating generators in Ontario have contracts with either the IESO or the Ontario Electricity Financial Corporation (OEFC). Most generators are contracted with the IESO and less so with the OEFC

[9] C-2415, IESO Report entitled "Annual Planning Outlook – Ontario's electricity system needs: 2023-2042" (December 2021), supply needs were calculated by Power Advisory based on data from the 2021 Annual Planning Outlook (APO), 2020 APO, 2017 Long-Term Energy Plan (LTEP), and 2016 Ontario Planning Outlook (OPO)

[10] TransAlta retired and decommissioned the Mississauga cogeneration facility following its December 31, 2018 contract expiry

that the retirement of this generator occurred despite the growing need for electricity supply within that location of Ontario, and clearly shows real risks and uncertainties to generators retiring post expiry of their contracts.

2.3 The IESO Cancelled Development of Incremental Capacity Auctions

At the time I drafted my last report in October 2018, the IESO's plan to meet the electricity supply shortfall was to use Incremental Capacity Auctions. An Incremental Capacity Auction is a Capacity Market that is a distinct market for 'capacity' (i.e., distinct from a wholesale energy market and 'energy'). Incremental Capacity Auctions or Capacity Markets use a series of competitive auctions for capacity resulting in procured resources receiving payments from applicable auctions yielding capacity revenues. The "incremental" description of Incremental Capacity Auctions refers to eligible resources that could participate within these auctions, considering that all contracted resources (e.g., generators, etc.) and Ontario Power Generation's rate-regulated generators would have not been eligible to participate (as revenues from contracts or regulated rates ensures cost recovery and return on investment).

As I described in my last report, within the 2017 Long-Term Energy Plan, the IESO's Market Renewal Program was described as a plan to implement: (1) enhancements to Ontario's wholesale electricity market; (2) new mechanisms to meet Ontario's power system needs; and (3) increases in market efficiencies.[11] The described plan to implement "new mechanisms to meet Ontario's power system needs" was referring to the IESO's plan to implement Incremental Capacity Auctions as part of the Market Renewal Program – as the "market-based approach" to move away from the use of long-term contracts to meet the forecasted electricity shortfall in Ontario.

In my last report, I concluded that Incremental Capacity Auctions are unlikely to effectively procure resources to meet all of Ontario's future electricity supply needs. Particularly, I concluded that: "[T]here are very strong reasons why Incremental Capacity Auctions will likely not be able to meet all of Ontario's electricity supply needs. The change in the Government of Ontario's policies, moving away from contracts to Incremental Capacity Auctions, will not likely be effective in procuring Ontario's supply needs and may not be more cost-effective than use of contracts. If the IESO relies on Incremental Capacity Auctions in the future, in my opinion, Ontario will likely be facing an electricity supply shortfall that will have to be met through other mechanisms (e.g., contracts)."

My conclusion was accurate at the time of my last report and remains accurate today. Ontario has moved away from the development of Incremental Capacity Auctions and has turned again to the use of long-term contracts. Despite plans to implement the first Incremental Capacity Auction in 2023, at their July 16, 2019 stakeholder engagement meeting,[12] the IESO announced no further development of Incremental

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[11] C-2224, IESO Market Renewal Program (MRP) Communication re Market Renewal Update (July 16, 2019), the Market Renewal Program was referenced multiple times in the 2017 Long-Term Energy Plan

[12] C-2224, IESO Market Renewal Program (MRP) Communication re Market Renewal Update (July 16, 2019), refer to Market Renewal Update on the ICA (July 16, 2019) located here on the IESO's website: https://www.ieso.ca/en/Market-Renewal/Stakeholder-Engagements/Market-Renewal-Incremental-Capacity-Auction

Capacity Auctions and therefore its cancellation therefore not implementing this "market-based approach".

I believe that the IESO decided to cancel implementation of Incremental Capacity Auctions for these reasons:

- The majority of the 28 submissions from stakeholders[13] (ranging from generators to electricity customers and ratepayers) that responded to the IESO's draft Incremental Capacity Auction High-Level Design document did not support implementation of Incremental Capacity Auctions mainly for reasons relating to lack of efficacy to procure new generation projects to be constructed, higher costs to customers, issues and problems experienced within the Capacity Markets in the U.S.,[14] etc.; and
- As stated within my last report, the IESO was beginning to acknowledge likely shortcomings of the efficacy of Incremental Capacity Auctions based on a point they expressed during the September 12, 2018 Incremental Capacity Auction meeting with stakeholders[15] – "Until auction [Incremental Capacity Auction] has a proven track record, there is recognition that large capital new build may be less likely to participate." This point was then reinforced during the IESO's Technical Conference with stakeholders held on September 13, 2018.

In my last report, when I provided my opinion that that the IESO's move towards Incremental Capacity Auctions will likely not be effective in procuring Ontario's supply needs, I also concluded that Ontario would need to look to other mechanisms to address Ontario's electricity supply shortfall, including a return to long-term contracts. This has proven to be accurate, as is discussed in more detail in the following section.

2.4 The IESO has Reverted Back to Long-Term Contracts to Procure Electricity Supply in Ontario

In November 2019, the IESO launched a new stakeholder engagement initiative – Resource Adequacy Engagement[16] – resulting from the cancellation of implementing Incremental Capacity Auctions as the "market-based approach" to procure electricity supply to meet the forecasted electricity supply shortfall, and to define a framework to procure electricity supply resources (e.g., generators, etc.).

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[13] C-2220, Stakeholder Feedback referring to deadline for feedback on ICA HLD (May 17, 2019), listed stakeholder feedback referring to deadline for feedback on ICA HLD (May 17, 2019) located here on IESO's website: https://www.ieso.ca/en/Market-Renewal/Stakeholder-Engagements/Market-Renewal-Incremental-Capacity-Auction

[14] New York ISO, ISO New England, and PJM administer Capacity Markets

[15] C-2172, IESO Incremental Capacity Auction (ICA) Presentation (September 12, 2018), referring to September 12, 2018 meeting located here on IESO's website: https://www.ieso.ca/en/Market-Renewal/Stakeholder-Engagements/Market-Renewal-Incremental-Capacity-Auction

[16] C-2345, IESO Presentation entitled "Resource Adequacy Engagement" (January 26, 2021), Resource Adequacy Engagement webpage located here on the IESO's website: https://www.ieso.ca/Sector-Participants/Engagement-Initiatives/Engagements/Resource-Adequacy-Engagement

As stated on the IESO's Resource Adequacy Engagement webpage, "The IESO remains committed to transitioning to the long-term use of competitive mechanisms to meet Ontario's resource adequacy [electricity supply] needs and understands that stakeholder input is critical to inform this transition. To begin this discussion with stakeholders, the IESO has developed a draft resource adequacy strategy based on extensive stakeholder engagement conducted on the Incremental Capacity Auction High-level Design and additional discussions with individual stakeholders to better understand their specific risks. Key feedback themes that emerged through these discussions with stakeholders include:

- Recognition that a "one-size-fits-all" approach won't be sufficient to balance supplier, ratepayer and system operator risks and cost-effectively meet all of our needs;
- Different resource types have different risks, requirements and timelines for development that should be considered;
- Different tools are better suited to different resource types;
- Some resources are not suited to competitive acquisition mechanisms;
- System planning forecasts will have to align with any selected resource adequacy strategy; and
- Increased risk in Ontario markets due to regulatory and political uncertainty.

To facilitate competition, and provide business planning certainty, resource adequacy needs should be planned and acquired for three timeframes: short, mid and long-term. Through this consultation, the IESO will engage stakeholders to further develop a long-term competitive strategy to meet Ontario's resource adequacy needs reliably and cost-effectively while recognizing the unique needs of different resources."

Based on consultations with stakeholders during meetings within the Resource Adequacy Engagement, the IESO Management proposed a Resource Adequacy Framework to their Board of Directors. As presented to stakeholders during the January 26, 2021 Resource Adequacy Engagement meeting, the IESO announced that their Board of Directors approved the Resource Adequacy Framework, depicted below,[17] at their December 2020 meeting.

[17] C-2345, IESO Presentation entitled "Resource Adequacy Engagement" (January 26, 2021), slides 28-29, Resource Adequacy Engagement (January 26, 2021) located here on the IESO website: https://www.ieso.ca/Sector-Participants/Engagement-Initiatives/Engagements/Resource-Adequacy-Engagement

Figure 3: IESO Resource Adequacy Framework

Re-cap: High-level Framework

Timeframe	Competitive Mechanism
Short-term	**Capacity Auction** • Seasonal commitment • Short lead time/forward period (e.g., < 12 months in advance) • Run auction annually on a fixed schedule • Auction acts as a balancing mechanism (e.g., target capacity adjusted to latest forecast) • Acquire unbundled capacity
Mid-term	**RFP/Contract or Enhanced Auction** with focus on existing resources • Multi-year commitment, with longer forward period (up to 3-4 years) • Run as needed based on Planning criteria triggers • Acquire unbundled capacity (typically, although there may be exceptions)

28

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Re-cap: High-level Framework (continued)

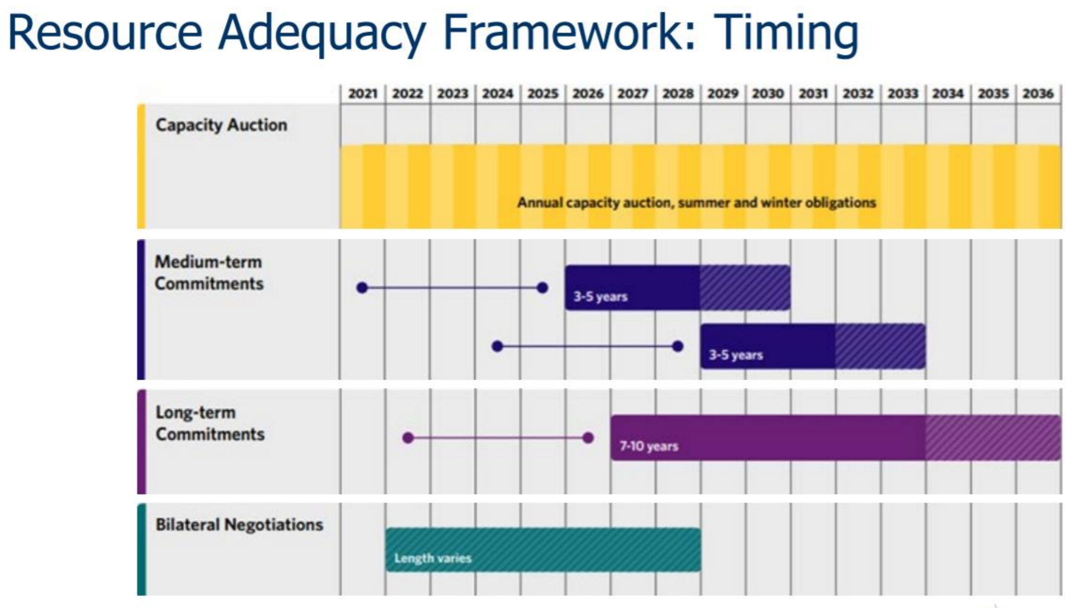
Timeframe	Competitive Mechanism
Long-term	**RFP/Contract** for new resources • Longer term commitments and forward period aligned with financing needs and life of the facility • Run as needed based on Planning criteria triggers and in some cases, policy triggers • Consider forecast confidence when setting target value • Consideration to acquire attributes beyond capacity

It is clear based on the Resource Adequacy Framework described above that the IESO is planning to revert back to the use of long-term contracts (i.e., contracts with "multi-year commitment" and "longer term commitments", as indicated in the figure above) to procure electricity supply resources (e.g., generators, etc.) to meet the forecasted electricity supply shortfall.

Building on the newly adopted Resource Adequacy Framework, the IESO further consulted with stakeholders within the Resource Adequacy Engagement regarding the use of procurement initiatives (e.g., Request for Proposals (RFPs), contracts to be executed from associated RFPs, etc.) towards addressing the forecasted electricity supply shortfall. That is, the IESO has been consulting with stakeholders regarding the timing to administer RFPs and execution of contracts to help meet the forecasted electricity supply shortfall.

The following figure shows the IESO's plan to use RFPs and associated long-term contracts in addition to sole sourced bilateral contracts resulting from one-on-one negotiations – all mapped to years to which electricity supply has been forecasted to be needed to meet the forecasted electricity supply shortfall.[18]

Figure 4: IESO Resource Adequacy Framework – Timing of Administering Capacity Auction, RFPs/Contracts, Bilateral Negotiations/Contracts



Not only has the IESO reverted back to the use of long-term contracts, the IESO is clearly using or planning to use contracts through multiple procurement initiatives (e.g., RFPs, one-on-one negotiations) to re-contract existing generators post expiry of their contracts to ensure their continued operations and to facilitate construction of new generation projects or secure specific supply resources. The result of these procurement initiatives is to address the IESO's forecasted electricity supply shortfall. Some of the procurement initiatives that have resulted or will result in execution of long-term contracts are listed below.

- The IESO has executed a Reliability Must-Run contract with Manitoba Hydro to meet electricity supply needs (up to 100 MW) in the northwest zone within Ontario's power system.[19]

[18] C-2376, "Annual Acquisition Report", Independent Electricity Systems Operator (IESO) (July 2021), slide 7, Annual Acquisition Report Highlights (July 22, 2021) located here on the IESO's website: https://www.ieso.ca/Sector-Participants/Engagement-Initiatives/Engagements/Resource-Adequacy-Engagement

[19] C-2361, IESO News and Updates entitled "Agreement with Manitoba Hydro to Support Temporary Reliability Needs in Northwest Ontario" (April 8, 2021), https://ieso.ca/en/Sector-Participants/IESO-News/2021/04/Agreement-with-Manitoba-Hydro-to-Support-Temporary-Reliability-Needs-in-Northwest-Ontario

- Within the Annual Acquisition Report, the IESO stated plans for a sole sourced one-on-one negotiation with Ontario Power Generation to bilaterally contract for their Lennox generation station (approximately 2,200 MW).[20]
    - On February 3, 2022, the IESO announced "In an effort to secure supply to meet immediate needs in eastern Ontario, the IESO has now completed a transitional contract with Ontario Power Generation for the continued operation of the Lennox Generating Station … The new contract runs from October 1, 2022 to May 1, 2029".[21]

- Within the Annual Acquisition Report, the IESO stated plans for a sole sourced one-on-one negotiation with Atura Power, a company solely owned by Ontario Power Generation, to bilaterally contract for their Brighton Beach generation station (approximately 550 MW).[22]

- The IESO announced plans to administer a series of RFPs (i.e., Medium-Term RFPs) resulting in contracts with terms ranging from three to five years, as shown in the figure below.[23] The objective of the first Medium-Term RFP is to procure up to 750 MW of supply from eligible generators with expired contracts. The new contracts will be set for three-year terms (with an option to extend the terms for an additional two years, effectively locking in five-year terms) to ensure continued operations of the respective generators. Contracts are scheduled to be awarded in Q3/22 to successful proponents of the first Medium-Term RFP (i.e., Medium Term RFP 1 in the figure below).

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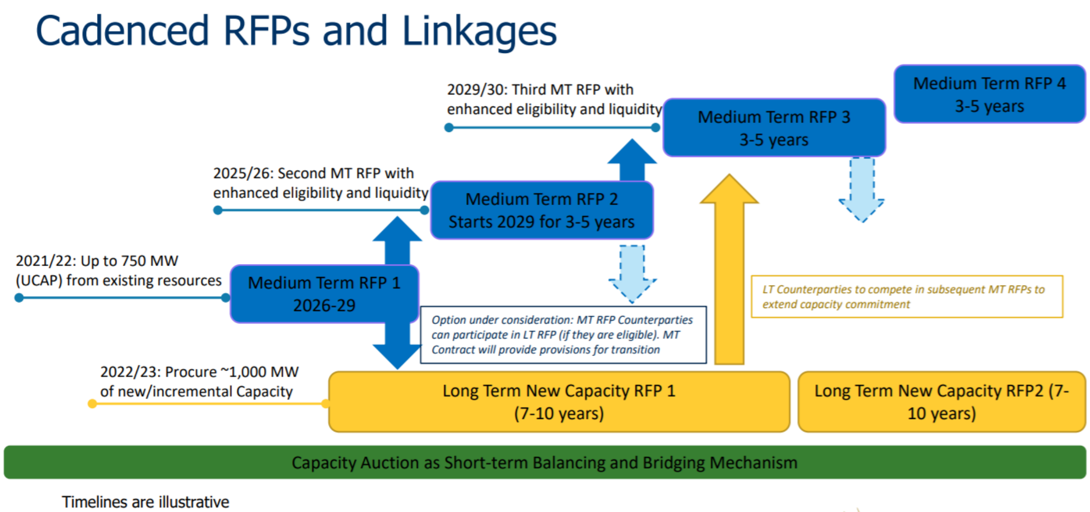
[20] C-2376, "Annual Acquisition Report", Independent Electricity Systems Operator (IESO) (July 2021), p. 24, Annual Acquisition Report (July 2021) located here on the IESO's website: https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Acquisition-Report

[21] C-2459, IESO News and Updates entitled "Lennox GS Contract Extended to 2029" (February 3, 2022), https://ieso.ca/en/Sector-Participants/IESO-News/2022/02/Lennox-GS-Contract-Extended-to-2029

[22] C-2376, "Annual Acquisition Report", Independent Electricity Systems Operator (IESO) (July 2021), pp. 24-25, Annual Acquisition Report (July 2021) located here on the IESO's website: https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Acquisition-Report

[23] C-2390, IESO Presentation entitled "Medium Term RFP Engagement" (September 23, 2021), slide 7, Medium Term RFP Engagement (September 23, 2021) located here on the IESO's website: https://www.ieso.ca/Sector-Participants/Engagement-Initiatives/Engagements/Resource-Adequacy-Engagement

Figure 5: Linkages to IESO Administered Capacity Auction and RFPs/Contracts to Meet Short-Term, Medium-Term, Long-Term Ontario Supply Needs



- The IESO announced plans to administer a series RFPs (i.e., Long-Term RFPs) resulting in contracts with a minimum term of 10-years,[24] and potentially for longer terms (e.g., 15-year, 20-year).[25] The objective of the Long-Term RFPs is to procure supply from eligible resources (e.g., generators, etc.) through new long-term contracts to facilitate construction of new projects. The IESO launched the first Long-Term RFP (i.e., Long Term New Capacity RFP 1 in the figure above) with their February 8, 2022 stakeholder consultation meeting.[26] The objective of LT-RFP 1 is to procure at least 1,000 MW of to be constructed new supply (e.g., generators, etc.) through long-term contracts to be awarded in 2023.

In addition to the procurement initiatives listed above that have resulted in execution of two contracts and will result in executing other long-term contracts, the IESO may execute additional contracts for the following projects (based on direction received from the Minister of Energy).

- The IESO reported on April 1, 2021 that the Ontario Minister of Energy, Northern Development and Mines asked the IESO to enter into contract negotiations with NRStor Inc. and Six Nations of the Grand River Development Corp. to explore a 10-year contract for their Oneida Battery Storage

[24] C-2460, IESO Presentation entitled "Long-Term RFP Engagement" (February 8, 2022), slides 10 and 17, Long-Term RFP Engagement (February 8, 2022) located at https://ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Long-Term-RFP

[25] C-2460, IESO Presentation entitled "Long-Term RFP Engagement" (February 8, 2022), slide 18 for potential contract term length greater than 10-years, Long-Term RFP Engagement (February 8, 2022) located at https://ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Long-Term-RFP

[26] C-2460, IESO Presentation entitled "Long-Term RFP Engagement" (February 8, 2022), https://ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Long-Term-RFP

project (250 MW), to be located in Haldimand County.[27] On September 2, 2021, the IESO reported that the Ontario Minister of Energy asked the IESO to proceed with drafting the 10-year contract.[28]

- The IESO reported on May 20, 2021 that the Ontario Minister of Energy, Northern Development and Mines asked the IESO to enter into contract negotiations with ITC Holdings Corp. (a company owned by Fortis Inc.) regarding its Lake Erie Connector transmission project (1,000 MW) that will connect Ontario's power system and wholesale electricity market administered by the IESO to the PJM power system and wholesale electricity market,[29] representing potential to import up to 1,000 MW of electricity supply from PJM through the transmission connection between Ontario and Pennsylvania.

The above initiatives clearly demonstrate that the IESO has reverted back to the use of long-term contracts.

On November 11, 2021, the IESO posted a letter (dated November 10, 2021) from the Ontario Minister of Energy "that sets out expectations for the IESO in meeting Ontario's reliability [supply] needs".[30] The Minister's letter provides further direction to the IESO regarding some of the contracting initiatives listed above along with new procurement processes to contract for other resources and explore potential to contract for specific resources. The following are the relevant points within the Minister's letter:

- By February 28, 2022, the IESO is to report back to the Minister of Energy on progress made to re-contract the Brighton Beach generation station;
- Regarding biomass generation facilities with expiring contracts, the IESO is to continue discussions with Atlantic Power to re-contract their Calstock generation station (approximately 35 MW) and report back to the Minster of Energy by December 17, 2021 regarding progress on a draft term-sheet, and to begin discussions with Green First to re-contract their Chapleau generation station (approximately 7 MW) and report back to the Minister of Energy by July 1, 2022 regarding potential re-contracting options;
- By December 17, 2021, the IESO is to report back to the Minister of Energy regarding key parameters and a stakeholder engagement plan to design of a procurement program to re-

[27] C-2358, IESO News and Updates Webpage entitled "Minister asks IESO to Explore Agreement for Oneida Battery Park Project" (April 1, 2021), https://www.ieso.ca/en/Sector-Participants/IESO-News/2021/04/Minister-asks-IESO-to-Explore-Agreement-for-Oneida-Battery-Park-Project

[28] C-2388, IESO News and Updates entitled "IESO to Draft a Contract for Oneida Battery Park Project" (September 2, 2021), https://www.ieso.ca/Sector-Participants/IESO-News/2021/09/IESO-to-Draft-a-Contract-for-Oneida-Battery-Park-Project

[29] C-2358, IESO News and Updates Webpage entitled "Minister asks IESO to Explore Agreement for Oneida Battery Park Project" (April 1, 2021), https://www.ieso.ca/en/Sector-Participants/IESO-News/2021/05/Minister-Asks-IESO-to-Pursue-Contract-Negotiations-for-Lake-Erie-Connector-Project

[30] C2408, IESO News and Updates entitled "Minister of Energy Outlines Further IESO Actions to Address Resource Adequacy" (April 8, 2021), https://www.ieso.ca/en/Sector-Participants/IESO-News/2021/11/Minister-of-Energy-Outlines-Further-IESO-Actions-to-Address-Resource-Adequacy

contract small hydroelectric generation facilities (approximately over 500 MW in aggregate located throughout Ontario) to ensure continued operations post expiry of their contracts;

- By January 31, 2023, the IESO is to report back to the Minister of Energy on further analysis regarding potential value of constructing the following hydroelectric pumped storage projects: Marmora (approximately 400 MW) that is jointly owned by Ontario Power Generation and Northland Power; Meaford (approximately 1,000 MW) owned by TC Energy; and Schreiber (approximately 600 MW) owned by Oxford Power; considering the relatively large size and cost of these projects, long-term contracts will be required to ensure their construction and financing; and
- Regarding updates on contract negotiations, the IESO is to report back to the Minister of Energy by November 30, 2021 regarding the Oneida Battery Storage project and by December 31, 2021 regarding the Lake Erie Connector.

On January 28, 2022, the IESO posted a subsequent letter (dated January 27, 2022) from the Ontario Minister of Energy "in regard to procurement of electricity resources to ensure the reliable operation of Ontario's electricity system in response to ongoing and growing electricity needs expected in the future".[31] This letter further directs (i.e., updates regarding most of the initiatives listed above) the IESO regarding the following procurement initiatives that will all result in execution of long-term contracts:

- Medium-Term RFP 1 shall conclude in 2022;
- By November 30, 2022, the IESO is to report back to the Minister of Energy regarding the Long-Term RFP 1;
- The IESO is to enter into a contract with the Calstock generation station for a five-year term;
- The IESO is to enter into a contract with the Oneida Battery Storage project for no greater than a 10-year term;
- By July 1, 2022, the IESO is to report back to the Minister of Energy on final program design and timelines to re-contract small hydroelectric generation facilities; and
- By October 1, 2022, the IESO is to report back to the Minister of Energy on an assessment of a program to re-contract for hydroelectric generation facilities that do not meet the re-contracting program criteria for small hydroelectric generation facilities (i.e., relating to approximately greater than 1,000 MW).

All of the above initiatives clearly demonstrate that the IESO has reverted back to the use of long-term contracts.

Therefore, based on the IESO's newly adopted Resource Adequacy Framework, planned administration of RFPs that will result in execution of long-term contracts with generators and potentially other supply resources (e.g., energy storage, etc.), and planned sole sourced one-on-one negotiations to execute

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[31] C-2439, "Ministerial Directives", IESO (February 2022), https://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives

bilateral contracts for specific operating generators, the IESO has clearly reverted back to the use of long-term contracts to procure electricity supply resources to meet the forecasted electricity supply shortfall.

3. UPDATE ON MY PREVIOUS ASSESSMENT WITH RESPECT TO SUBSECTION 3 OF THE IESO'S ANALYSIS: THE IESO'S RELIANCE ON THE POWER SYSTEM PLANNING GROUP'S ANALYSIS

3.1 Introduction

The Subsection 3 analysis reviewed whether there are power system planning or Ontario electricity ratepayer impacts that could inform whether to terminate the Windstream FIT contract (i.e., "planning analysis"). The IESO concluded that the Subsection 3 analysis did not provide a planning or ratepayer impact rationale to override the Subsection 2 analysis to terminate the Windstream FIT contract.

In my last report, I concluded that the IESO's planning analysis did not support terminating the Windstream FIT contract. This section provides my updated assessment of my previous conclusion. In short, the events that have occurred since my last report have not changed – and in fact reinforce my conclusion that the Subsection 3 analysis did not support terminating the Windstream FIT contract.

3.2 The IESO Recently Forecasted Significant Declining Levels of Surplus Baseload Generation

One of the factors that the IESO used towards determining whether to terminate the Windstream FIT contract was their analysis of the impacts that the Windstream offshore wind generation project would have on the level of surplus baseload generation.[32] Surplus baseload generation is defined by circumstances where energy supply is greater than the demand within the same interval of time. For example, surplus energy will result when supply injected onto the grid is greater than demand being withdrawn from the grid within the same time interval (e.g., hourly). The IESO had concluded that if the Windstream offshore wind generation project had achieved commercial operation that it would have added 16% to Ontario's surplus baseload generation.

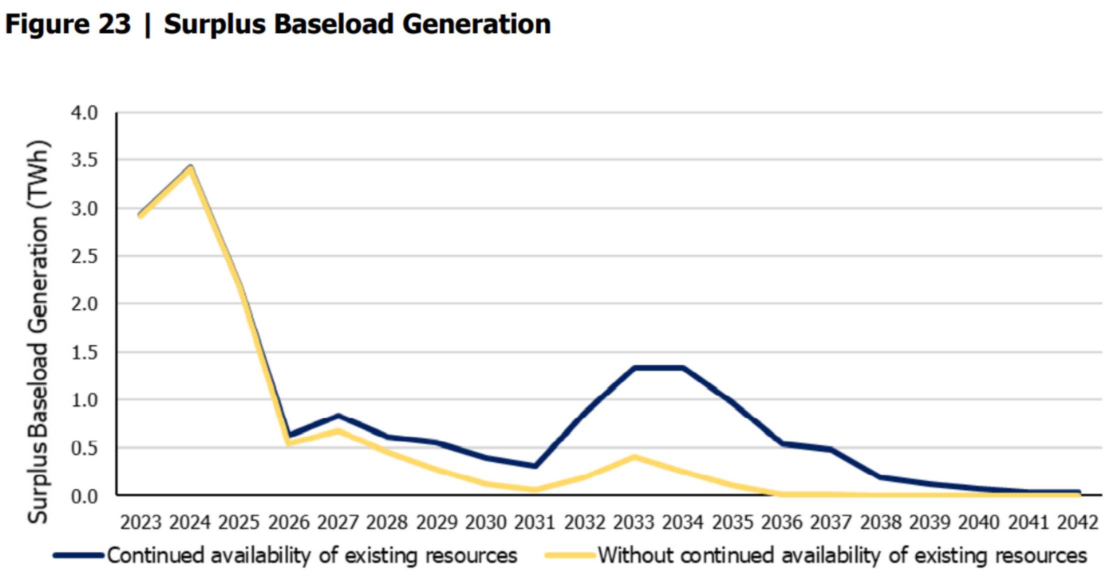
I concluded in my last report that the IESO's analysis was flawed because it overestimated the level of Ontario's surplus baseload generation and therefore overestimated the impacts the Windstream offshore wind generation project would have had on the level of surplus baseload generation. The IESO's analysis assumed: (1) all resources (e.g., generators, etc.) would remain in commercial operation after expiry of their contracts; and (2) that resources in development will reach commercial operation. As I set out in my last report, these assumptions were inaccurate. Regarding the first assumption, I concluded that it was incorrect to assume that all resources (e.g., generators, etc.) will remain in operation after the expiry of their

[32] C-2394, IESO Report entitled "Planning and Forecasting – Reliability Outlook" (October 2021 to March 2023). IESO describes surplus baseload generation within the following context – "Baseload generation comprises nuclear, run-of-the-river hydroelectric and variable generation, such as wind and solar. When baseload supply is expected to exceed Ontario demand, market signals reflect such conditions through lower prices, and resources in Ontario and at the interties respond accordingly. The resulting market outcomes may include higher export volumes, dispatching down of hydroelectric generation and grid-connected renewable resources, and nuclear manoeuvring or shutdowns. For severe surplus conditions that could affect the reliability of the system, the IESO may take out-of-market actions, such as manually curtailing resources and/or imports." For further context and analysis of surplus baseload generation conditions and outcomes, see pp. 31-33 in IESO's Reliability Outlook: An adequacy assessment of Ontario's electricity system (October 2021 to March 2023) located at https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Reliability-Outlook.

contracts. For example, it is clear from my previous references to TransAlta retiring their Mississauga generator, made earlier in this report, that not all resources are remaining in commercial operation post expiry of their contracts. Regarding the second assumption, I concluded based on the July 13, 2018 Ministerial Directive to the IESO (which called for the cancellation of 758 renewable generation project contracts) that not all projects under development will reach commercial operation. Since issuance of that Directive, these contracts were cancelled despite being in various stages of development. As a result, I concluded that the IESO Planning Group overestimated the available supply from generators over the 2018-2043 review period and therefore overestimated the Windstream offshore wind generation project's impact on surplus baseload generation.

This conclusion remains accurate. The figure below shows the IESO's latest forecasted levels of surplus baseload generation in Ontario.[33]

Figure 6: IESO 2021 Annual Planning Outlook – Forecasted Surplus Baseload Generation



The above figure clearly shows a forecasted significant decline in surplus baseload generation by 2026, mainly driven by the planned retirement of the Pickering nuclear generation station (i.e., approximately 3,000 MW).

Despite my conclusion regarding the lack of materiality of the IESO's forecasted levels of surplus baseload generation on power system planning and Ontario's ratepayers, I am still of the opinion that the IESO's most recent surplus baseload generation forecast has still been overestimated. This is because the IESO: (1) continues to assume continued operation of all resources (e.g., generators, etc.) post expiry of their contracts (as clearly specified in the above figure – "with Continued Availability of Existing Resources"); and (2) does not significantly factor in potential for electrification across multiple sectors within Ontario's

[33] C-2415, IESO Report entitled "Annual Planning Outlook – Ontario's electricity system needs: 2023-2042" (December 2021), p. 49 in IESO's 2021 Annual Planning Outlook for their forecast levels of surplus baseload generation that assumes continued operation of resources post expiry of their contracts

economy which, if realized, will result in electricity demand greater than what IESO has forecasted. Therefore, if the Windstream offshore wind generation project had achieved commercial operation, its impacts to the level of surplus baseload generation would not be as high as the IESO's Planning Group estimated.

3.3 The IESO's Reliance on "Other Planning Considerations" as a Basis to Terminating the Windstream FIT Contract Have Not Materialized

My previous report assessed "other planning considerations" that were taken into account within the IESO's Subsection 3 analysis and their relationship to the planned use of Incremental Capacity Auctions as the "market-based approach" to procure electricity supply to meet the forecasted electricity supply shortfall. Those considerations were:

- "opportunities will exist to take advantage of evolving demand/supply conditions, improvements in technology price/performance, and new acquisition tools [Incremental Capacity Auctions] to competitively procure resources";
- "supply resource decisions, such as committing to the Windstream Project, to address potential future needs do not have to be made today";
- "the IESO is looking at new acquisition tools such as capacity auctions [Incremental Capacity Auctions] as a means to competitively provide resources to meet future needs"; and
- "through competition, market forces are expected to yield better prices/technologies as compared to the Windstream Project under the current Windstream FIT Contract terms".

I had concluded in my last report that I did not believe that these "other planning considerations" combined with the IESO's planned use of "market-based approaches" through Incremental Capacity Auctions supported the IESO's decision to terminate the Windstream FIT contract. For the reasons outlined earlier in this report relating to the IESO terminating implementation of Incremental Capacity Auctions and present procurement activities that have resulted in, or will result in, execution of long-term contracts as per the Resource Adequacy Framework, I continue to be of the opinion that these "other planning considerations" do not support the termination of the Windstream FIT contract.

4. MY OPINION ON ONTARIO'S CURRENT ELECTRICITY SUPPLY NEEDS AND WHETHER THE IESO'S CURRENT PROJECTIONS ARE ACCURATE

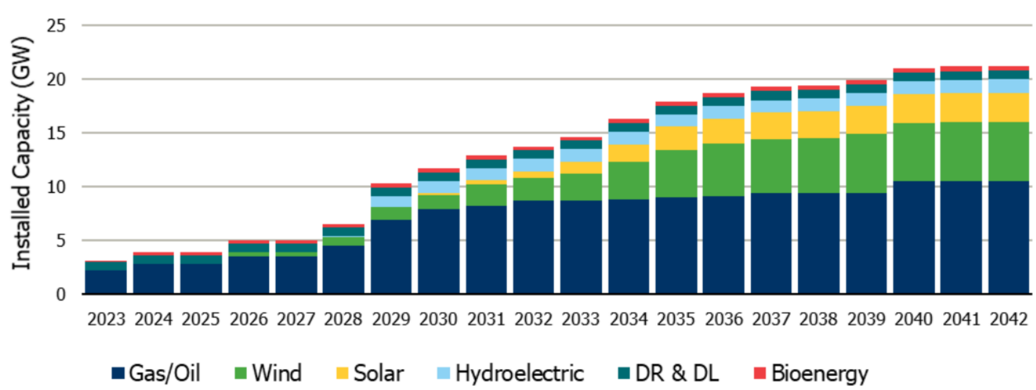
The IESO's 2021 Annual Planning Outlook forecasted electricity supply shortfall and the resulting supply needs into the future have increased compared to the 2020 Annual Planning Outlook. However, I believe there are key risks that will likely result in further increases to the electricity supply shortfall and therefore result in additional supply needs beyond those predicted in the 2021 Annual Planning Outlook. These risks, briefly identified earlier in this report, are: (1) potential retirement of generators post expiry of their contracts; and (2) higher electricity demand growth resulting from electrification. These risks are detailed within the sub-sections below.

4.1 Potential Retirement of Generators Post Expiry of Contracts

The following figure shows the amount of electricity supply from generators corresponding to the years their contracts expire.[34] The figure clearly shows consistent increases year over year of contracts expiring from the early 2020s through the 2030s. For example, the approximate electricity supply from generators with retired contracts in 2029 is about 10,000 MW (10 GW), representing approximately a quarter of all electricity supply in Ontario. Even more strikingly, in the year 2039, the approximate supply from generators with retired contracts is about 20,000 MW (20 GW), representing approximately half of the electricity supply in Ontario. Therefore, if some of these generators retire post expiry of their contracts, the future electricity supply shortfall will increase, thereby increasing supply needs.

Figure 7: Contract Term Expiry Timeline and Supply Quantities for Ontario Generators

Figure 11 | Existing Resources Post-Contract Expiry 2023-2042 by Fuel Type



[34] C-2415, IESO Report entitled "Annual Planning Outlook – Ontario's electricity system needs: 2023-2042" (December 2021), p. 33 in IESO's 2021 Annual Planning Outlook

Figure 7 above also clearly shows the significant amounts of gas-fired generators with contracts consistently expiring year over year. In my opinion, potential retirement of these gas-fired generators poses significant future supply risks for the following reasons.

- Carbon pricing will render gas-fired generators more expensive to operate and therefore their operating costs are projected to increase over time. The Government of Canada introduced carbon pricing through passage of the *Greenhouse Gas Pollution Pricing Act* through two parts: (1) a regulatory charge on fuel (federal fuel charge); and (2) a regulatory trading system for industry – the federal Output-Based Pricing System (OBPS). The OBPS is designed to ensure there is a price incentive to reduce greenhouse gas (GHG) emissions.[35] Further, Canada's carbon pricing must have a minimum carbon price of at least $65/tonne of GHG emissions calculated in CO_2e in 2023 then rising by $15/year to $170/tonne of CO_2e in 2030.[36] As carbon prices rise year over year, the cost of natural gas to fuel these generators will consistently increase accordingly year over year. Therefore, it will increasingly become more expensive to continue operations of all gas-fired generators within Ontario. If gas-fired generators are unable to re-contract with the IESO to ensure cost recovery and return on investment, I believe the risk of these generators retiring will increase due to rising fuel and operating costs.

- There is growing pressure to ensure the retirement of gas-fired generators within Ontario. For example, the Ontario Clean Air Alliance has coordinated a campaign calling for the retirement of Ontario's gas-fired generators by 2030.[37] Resulting from this campaign, through council resolutions, 32 municipalities in Ontario have officially endorsed retirement of gas-fired generators by 2030.[38] While municipal council resolutions have no direct authority on whether gas-fired generators will retire or not, it does send very clear signals regarding the position of various Ontario electricity stakeholders. In my opinion, more municipalities will pass the same resolution over the coming months and years; this will increase the likelihood that gas-fired generators will retire in Ontario.

- In response to the Ontario Clean Air Alliance's campaign described in the above point, on October 7, 2021 the IESO released a report, Decarbonization and Ontario's Electricity System: Assessing the impacts of phasing out natural gas generation by 2030 (i.e., "Gas Phase-Out Impact report"),[39] that

[35] C-2427, Government of Canada Report entitled "Output-Based Pricing System" (January 31, 2022), https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system.html

[36] C-2384, Government of Canada Report entitled "Update to the Pan-Canadian Approach to Carbon Pollution Pricing 2023-2030" (August 5, 2021), https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/carbon-pollution-pricing-federal-benchmark-information/federal-benchmark-2023-2030.html

[37] C-2346, Ontario Clean Air Alliance Report entitled "Phasing-Out Ontario's Gas-Fired Power Plants: A Road Map" (January 29, 2021, https://www.cleanairalliance.org/gas-phasehout/

[38] C-2397, Ontario Clean Air Alliance publication entitled "City of Ottawa tells IESO to go back to the drawing board" (October 13, 2021), https://www.cleanairalliance.org/ottawa-tells-ieso-to-go-back-to-the-drawing-board/

[39] C-2399, Devereaux D., Farmer C., Independent Electricity System Operator Report entitled "Natural Gas Phase-Out Impact Assessment" (October 21, 2021), https://www.ieso.ca/en/Learn/Ontario-Supply-Mix/Natural-Gas-Phase-Out-Study

analysed the potential to retire gas-fired generators in Ontario by 2030. The IESO then received a letter from the Minster of Energy (dated October 7, 2021) that commented on the IESO's report.[40] The Minister of Energy directed the IESO to "… evaluate a moratorium on the procurement of new natural gas generating stations and develop an achievable pathway to zero emissions in the electricity sector" and "… to develop an achievable pathway to phase-out natural gas generation and achieve zero emissions in the electricity system …". In my opinion, this direction from the Minister of Energy to the IESO signals potential Ontario policy direction towards phasing out gas-fired generators over time. Therefore, I believe this direction clearly places future operating risks to gas-fired generators in Ontario post expiry of their contracts.

4.2 Higher Electricity Demand Growth Resulting from Electrification

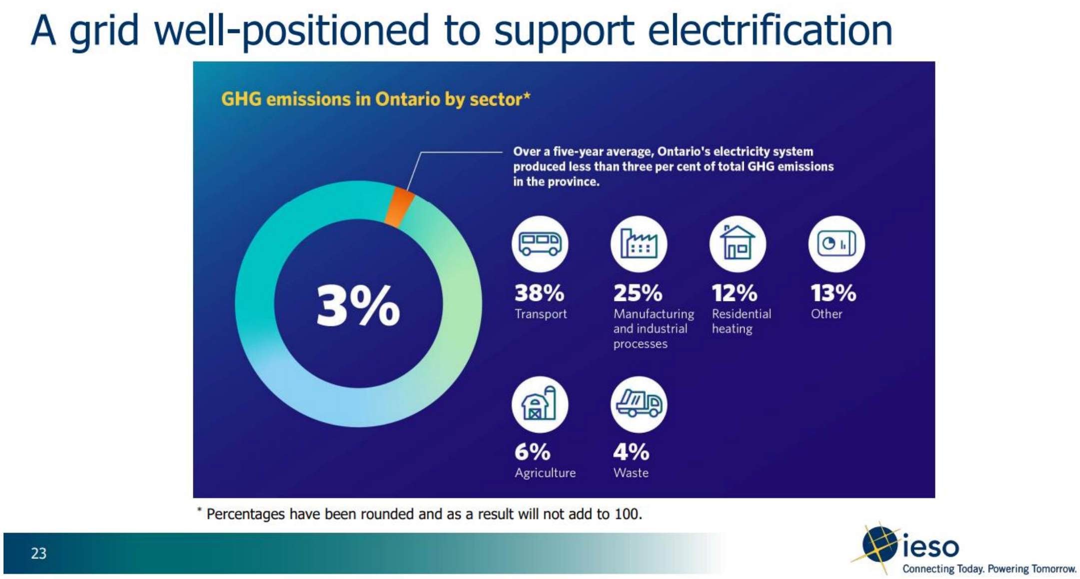
During the IESO's October 21, 2021 stakeholder engagement meeting regarding their Gas Phase-Out Impact report, the IESO clearly stated plans to analyse electrification more robustly within the next edition of the Annual Planning Outlook – "APO [Annual Planning Outlook] will provide a deeper dive into the potential for electrification to increase demand forecasts, taking into account the many variables that influence its growth".[41] The figure below clearly expresses the IESO's views about Ontario's electricity system's capability to support electrification.[42]

[40] ibid

[41] C-2399, Devereaux D., Farmer C., Independent Electricity System Operator Report entitled "Natural Gas Phase-Out Impact Assessment" (October 21, 2021), slide 19 of Natural Gas Phase-Out Impact Assessment presentation located at https://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Gas-Phase-Out-Impact-Assessment

[42] C-2399, Devereaux D., Farmer C., Independent Electricity System Operator Report entitled "Natural Gas Phase-Out Impact Assessment" (October 21, 2021), slide 23 of Natural Gas Phase-Out Impact Assessment presentation located at https://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Gas-Phase-Out-Impact-Assessment

Figure 8: Ontario Power System Ability to Support Economy-Wide Electrification



In the 2021 Annual Planning Outlook there was an increased focus on electrification that has been forecasted to help shift Ontario's electricity system into a period of sustained electricity demand growth. Electrification transit projects are underway, an ongoing shift to electric vehicle offerings from automakers, and specific non-transit electrification initiatives (e.g., steel producer electrification) were factored into electricity demand forecast scenarios resulting in a forecasted increase in demand (rising rapidly in the early 2030s) compared to the 2020 Annual Planning Outlook.

Despite the added emphasis on the impacts that electrification will have on increasing electricity demand (predominantly from the transportation sector), in my opinion the IESO did not account for broader potential of further electrification across more sectors of Ontario's economy (e.g., heating demand, fuel switching, etc.) within the 2021 Annual Planning Outlook. If the IESO had assessed the potential for electrification across more sectors within Ontario's economy, this would have resulted in an even higher forecasted demand that would be higher than all other forecasted demand scenarios contained within the 2021 Annual Planning Outlook. As a result, this would have increased the forecasted supply shortfall and supply needs as well as lowered the forecasted surplus baseload generation.

However, I expect that the IESO will more robustly account for electrification across all of Ontario's economy within future initiatives. For example, the IESO references "upcoming in-depth analysis of electrification in Ontario will help the IESO ensure the province is prepared for the growing need" within the 2021 Annual Planning Outlook.[43]

[43] C-2415, IESO Report entitled "Annual Planning Outlook – Ontario's electricity system needs: 2023-2042" (December 2021), p. 4 in IESO's 2021 Annual Planning Outlook

5. POWER ADVISORY'S SEPTEMBER 2019 PRICE FORECAST

Power Advisory regularly prepares long-term electricity price forecasts which project wholesale energy prices in Ontario over a number of decades. Power Advisory prepared such a forecast, going out to 2060, in September 2019. It is appended to this report as Appendix B. While Power Advisory continues to update its forecasts on a regular basis as more information becomes available, this forecast accurately reflects our thinking in late 2019.

APPENDIX A. JASON CHEE-ALOY CV

JASON CHEE-ALOY

MANAGING DIRECTOR

POWER ADVISORY

PROFESSIONAL OVERVIEW

Mr. Chee-Aloy is a professional with 25 years of expertise in electricity and natural gas market analysis, policy development, market design, contract design and negotiations, project development, resource and infrastructure planning, and stakeholder consultation and engagement. He has worked as an energy economist with a strong analytical foundation and understanding of commodity pricing, market design, contract design, industry restructuring, policy development, business strategy, industry governance, and planning and development of electricity infrastructure.

Mr. Chee-Aloy has acted for multiple generator, transmitter, financial institution, utility, and Government clients regarding numerous areas of, but not limited to: market design; contract design; contract negotiation; project development; market analysis; business strategy; power system planning and resource assessments.

Mr. Chee-Aloy joined Power Advisory after being the Director of Generation Procurement at the Ontario Power Authority, where he was responsible for procuring and contracting for over 15,000 MW of generation. Prior to joining the Ontario Power Authority, he worked for the Independent Electricity System Operator (IESO) where he was actively involved with restructuring Ontario's electricity sector by leading key areas of market design and market surveillance.

PROFESSIONAL HISTORY

Power Advisory
Managing Director
2010 to Present

Ontario Power Authority
Director, Generation Procurement
Manager, Generation Procurement
2005 to 2010

Ontario Independent Electricity System Operator
Manager, Resource Adequacy
Senior Analyst, Market Development
Analyst, Market Assessment Unit
1999 to 2005

Ontario Ministry of Energy, Science and Technology
Economist
1997 to 1999

Canadian Enerdata Ltd.
Analyst
1997 to 1999

EDUCATION

York University
Masters of Arts, Economics
1995 to 1996

University of Toronto, St. Michael's College
Honours Bacheler of Arts, Economics Specialist
1990 to 1995

REPRESENTATIVE PROFESSIONAL EXPERIENCE

Generation Project Development and Operations, and Project Acquisition

- Assisted multiple generation clients regarding their participation in the Ontario and Alberta wholesale electricity markets and resolution of contract issues. Work with these generators includes strategy and solutions regarding analysis of impacts to changes to wholesale market rules and analysis of impacts to changes in the market design, including implications on their long-term contracts.
- Assisted multiple generation developers towards commercial operation of their projects under long-term contracts. Work with these developers includes strategy and solutions regarding analysis of permitting and approvals, provincial content requirements, connection requirements, financing and future operations in the wholesale power market to optimize operations and maximize revenues in the wholesale market and under long-term contracts.
- For multiple renewable generation clients, advised and represented their interests towards developing their generation projects, including work in areas dealing with long-term contracts, connection impact assessments, system impact assessments, and financial plans.
- Worked with lenders and financiers providing market intelligence, market forecasts, and strategic advice regarding investment in generation projects.
- Worked with owners of existing generation facilities, equity providers, and developers to value projects for purposes of acquisitions. This work involves assessment of wholesale electricity markets and valuation of specific generation resources.

Wholesale Electricity Market Design and Development

- Acting for multiple generator, energy storage provider, transmission, Local Distribution Companies (LDCs) regarding the IESO's Market Renewal Program, including planned development of Locational Marginal Prices (LMPs), Day-Ahead Market (DAM), Enhanced Real-Time Unit Commitment (ERUC, and Incremental Capacity Auctions (ICAs)
- Acted for the Ontario IESO as the facilitator/consultant for the IESO's Electricity Market Forum. This work involved identification and sequencing the major initiatives and recommendations required to evolve Ontario's electricity sector. The initiatives and recommendations included: review of wholesale spot pricing, costs to customers and cost allocation; review of long-term contracts to ensure alignment with the wholesale market; review of regulated rate design regarding its effect and integration with the wholesale market; increasing demand-side participation in the wholesale spot market; review and assess the need for new ancillary services in light of Ontario's changing supply mix; review of the two-schedule dispatch system within the wholesale market; and review of the framework for scheduling intertie transactions in the wholesale market.
- For gas-fired generator clients, advised how these facilities can meet power system needs within wholesale electricity markets and operate more efficiently given changes fuel supply, utilization of wholesale market programs, and requirements for day-ahead commitment programs.
- For transmission clients, advised how new regulated or merchant transmission lines may be developed within various electricity markets along with specific regulatory requirements and policies.
- For multiple renewable generation clients, advised and represented their interests regarding the integration of variable (i.e., wind and solar) generation within wholesale electricity markets. The work required intimate and technical knowledge of the operations on wholesale markets and the technical capabilities of generation facilities regarding how generation units are scheduled and dispatched, how prices are set, and the mechanisms for compensation for production of energy output.
- For multiple clients, advised on transmission rights within wholesale electricity markets regarding rules and protocols relating to intertie transactions regarding scheduling transactions and associated risks dealing with congestion rents, failed transactions, etc.
- While at the IESO, was Project Manager of Resource Adequacy and developed and delivered high-level design, detailed design, and draft market rules for a centralized forward Capacity Market, and chaired the Long-Term Resource Adequacy Working Group comprising over 20 electricity sector stakeholders.
- For the IESO, implemented short-term resource adequacy mechanisms through the Hour-Ahead Dispatchable Load program and Replacement Generation to Support Planned Outages in 2003 and 2004.
- Developed and drafted over 50 IESO Market Rule amendments, including applicable quantitative assessments, mainly regarding market surveillance, compliance, reliability, scheduling, dispatch and pricing rules, and settlements, therefore having a very strong understanding and knowledge on how the IESO-Administered Markets operate and in particular how the dispatch and pricing algorithms work.
- Developed business processes, developed data requirements, and reviewed applicable Market Rules (e.g., local market power rules) for the Market Assessment Unit.

Generation and Transmission Procurement and Contracting

- Acted for the Government of Alberta in development and administration of the Solar Procurement
- Acted for multiple gas-fired generators regarding contract amendments resulting from the forthcoming Ontario cap-and-trade system.
- Acted for variable generators through market analysis, contract analysis, financial analysis, and led contract negotiations before the Ontario Power Authority and IESO to amend long-term contracts to address potential IESO economic curtailment of energy production from these generators resulting from the integration of these generators into the real-time scheduling and dispatch process within Ontario's wholesale energy market.
- Acted for multiple Non-Utility Generator facilities and other generator clients through market analysis, contract analysis, and financial analysis, and successfully led contract negotiations for existing and new generation facilities resulting from the expiration of existing Contracts towards execution of new long-term contracts with the IESO.
- Responsible for the delivery of the design, management and execution of all generation procurement processes and contracts for development of electricity supply resources while at the Ontario Power Authority. This included contracting for over 15,000 MW of generation capacity (including some demand-response), including combined cycle gas turbine facilities, simple cycle gas turbine facilities, combined heat and power facilities, waterpower facilities, bio-energy facilities, wind power (on- and off-shore) facilities, solar PV facilities and energy-from-waste facilities ranging in size from under 10 kW to over 900 MW through competitive and standard offer procurements and sole source negotiations. The development of procurement processes and long-term contracts needed to necessarily consider the integration of these generation projects into the wholesale market.
- Managed over 80 staff, developed and successfully implemented North America's first large Feed-in Tariff (FIT) procurement program for renewable electricity supply resources. To date, over 20,000 applications totaling over 18,000 MW from prospective generation projects have been submitted to the Ontario Power Authority, with over 2,500 MW successfully contracted. In addition, chaired the Renewable Energy Supply Integration Team (RESIT) comprising of Ontario agencies and Government. This Team also held responsibility to implementing the FIT Program.
- Chaired the RESIT that delivered recommendations to the Minister of Energy for development of the Green Energy Act and the FIT Program. Delivered a consensus document assessed and recommended changes to Ontario Energy Board (OEB) Transmission and Distribution System Codes, regulations and legislation, in addition to the roles and responsibilities of the Ontario Power Authority, IESO, transmitters, OEB and utilities towards ensuring timely development of renewable generation. Senior staff from the IESO, Ontario Power Authority, Hydro One, OEB and the Ministry of Energy comprised the RESIT while Executives from IESO, Ontario Power Authority, OEB and Hydro One frequently attended these meetings.
- Advised multiple clients regarding transmission development opportunities and power system needs within various electricity markets across North America.
- Acted for a U.S. transmission developer and operator regarding the development of a merchant transmission project that will connect Ontario to Pennsylvania through market analysis, regulatory support, business strategy, and contract development support.

- Advised the Alberta Electricity System Operator (AESO) regarding development of their present transmission procurement process by researching and reviewing transmission procurement processes from Ontario and Texas.
- Advised multiple renewable generation developers regarding forthcoming participation within the AESO's renewable generation procuring and contracting initiatives under the Renewable Electricity Program.

Power System Planning and Infrastructure Assessment

- For multiple generator and trade associations, assessed and optimized generation resource options and likely solutions to be developed to meet future power system needs, and developed business strategies and strategic plans for these clients to execute towards increasing their market share by increasing their development pipeline of projects.
- While at the Ontario Power Authority, was a member of the Ontario Power Authority's Integrated Power System Plan (IPSP) Steering Committee that was responsible for the development and review the 20-year IPSP, developed strategy for the regulatory filing and OEB proceeding, was an expert witness for the interfaces between the generation and conservation and demand management (CDM) resource requirements specified within the IPSP and the applicable procurement processes that would be used to contract for these generation and CDM resources.

Expert Testimony

- Retailed by Stikeman Elliott LLP on behalf of three Quebec-based hydroelectric generators regarding renegotiation of Power Purchase Agreements (PPAs) with Hydro-Quebec, including development of two expert reports filed within the arbitration proceedings, including expert testimony and cross-examination (2016)
- Before the OEB, began testimony for Ontario Power Authority regarding scope of Procurement Process within OEB proceeding to render decision on Ontario Power Authority's IPSP and Procurement Process – proceeding terminated in late 2008 (2008)
- Before the OEB, for Ontario Power Authority, testified to sections of the Ontario Power Authority Business Plan regarding organization and management of generation procurement and contract management business units (2006)

Speaking Engagements

- Davies Ward Phillips & Vineberg LLP, Davies Academy, Is Canada's Electricity Sector Ready for a Zero-Carbon Future?, Toronto, January 2022
- Independent Power Producers Society of Alberta, Annual Conference, Banff, November 2021, March 2019 and March 2017
- Association of Power Producers of Ontario, Annual Conference, Toronto, November 2021, December 2020, November 2019, November 2018, November 2017, November 2016, November 2015, November 2014, November 2013, November 2012, November 2011, November 2010, November 2009, November 2008, November 2007, November 2006, November 2003
- Canadian Renewable Energy Association – Electricity Transformation Canada, Toronto, October 2021
- Canadian Power Finance Conference, Toronto, September 2021, January 2020, January 2019, January 2018, January 2015, January 2012, January 2011

- Ontario Waterpower Association, Annual Conference, Niagara Falls, May 2021, October 2019, October 2018, October 2017, October 2013, October 2013, December 2012, December 2011
- Canadian Bar Association, May 2021, web conference – Environmental, Energy & Resources Law Summit, The Ins and Outs of Climate Change, Carbon and Renewables, State of Play in Renewable and Distributed Energy Across Canada
- Bank of America Securities, April 2021, web conference – Canadian Power and Utilities Conference
- Canadian Renewable Energy Association, February 2021, web conference – What's Next for Corporate Power Purchase Agreements and Renewables in Canada?
- Maritimes Energy Association AGM, January 2021, web conference – Canadian Energy Transition
- Electricity Invitational Forum, Cambridge, January 2021, January 2020, January 2019, January 2018, January 2011
- EUCI, web conference – Capacity Markets Pricing and Policy Summit, December 2020
- Canadian Renewable Energy Association, Toronto, November 2020, Canadian Renewable Energy Forum: Wind. Solar. Storage.
- Ontario Energy Association, Toronto, October 2020, Corporate PPAs – Potential Opportunities for Energy Buyers/Sellers in Canada
- Business Renewables Centre Canada, October 2020, web conference – Understanding the Corporate PPA Landscape Across Canada: A Jurisdictional Review
- DeMarco Allen LLP, Strategy Session, October 2020
- Ontario Energy Association, October 2020, web conference – Corporate PPAs: Potential Opportunities for Energy Buyers/Sellers in Canada
- Business Renewables Centre Canada, June 2020, web conference – Outlook for Alberta's Electricity Market Focusing on PPAs
- Canadian Wind Energy Association, Annual Conference, Calgary, October 2019, October 2018, Toronto, October 2017, October 2016, October 2015
- Ontario Energy Association, Annual Conference, Toronto, September 2019, September 2018, September 2017, September 2016, September 2015, September 2014, September 2013, Niagara Falls, September 2012
- Proximo, Canadian Power and Renewables Exchange, Toronto, June 2019
- Ontario Energy Association, Speaker Series, Toronto, May 2019
- Canadian Wind Energy Association, Spring Forum, Banff, April 2019
- Bank of America Merrill Lynch, 2019 Canadian Utilities Day, New York, April 2019
- AQPER 2019 Symposium, Quebec City, February 2019
- Canadian Solar Industry Association, Solar Ontario, Toronto, October 2018, Ottawa, May 2014, Niagara Falls, May 2013
- Energy Storage Canada, Annual Conference, Toronto, September 2018, September 2017
- Ontario Energy Association, Conversations That Matter, Toronto, June 2018
- Canadian Electricity Association, Transmission and Distribution Council, Calgary, May 2018
- Canadian Electricity Association, Pre-CAMPUT Workshop, Toronto, May 2018
- Electricity Distributors Association, ENERCOM, Toronto, March 2018
- Energy Law Forum, Vancouver, May 2017
- U.S./Canada Cross-Border Power Summit, Boston, April 2016, April 2015
- UBS, Canadian Power Markets, New York, July 2015
- UBS, Canadian Power Markets, Toronto, June 2015
- Aird & Berlis LLP, The Impact of Capacity Market on LDCs, Toronto, May 2015

- Mindfirst Lunch Seminar: Ontario Capacity Auction - Analysis of Feasibility and Criteria for Design Elements, Toronto, May 2015
- Ontario FIT and Renewable Energy Forum, Toronto, March 2015
- Canadian Wind Energy Association Operations & Maintenance Summit, Toronto, February 2015
- Canadian Solar Industry Association, Annual Conference, Toronto, December 2014, December 2013, December 2012, December 2011, December 2010 and December 2009
- EUCI, Canada Energy Storage Summit, Toronto, November 2014
- UBS, Ontario Power Markets, New York, November 2014
- Ontario Power, Examining the Future Structure of Ontario's Electricity Market: Should Ontario Incorporate a Capacity Market or Alternative Structure Framework, Toronto, April 2014
- EUCI, Securing Ontario's Distribution Grid of the Future, Toronto, September 2013
- TD Securities, Canadian Clean Power Forum, Toronto, September 2013
- TREC Education, Toronto, June 2013
- FIT Forum, Toronto, April 2013, April 2012
- Nuclear Symposium, Toronto, May 2012
- TD Securities, The Future of Ontario's Power Sector, Toronto, April 2012
- Ontario Power Perspectives, Toronto, April 2012
- Ontario Energy Association Speaker Series - FIT and the Provincial Budget: What do they mean for Ontario's Electricity Sector, Toronto, April 2012
- Energy Contracts, Calgary, March 2012
- Environmental Law Forum, Cambridge, January 2012
- Capstone Infrastructure Corporation, Investor Day, Toronto, December 2011
- Canadian Projects and Money, Toronto, June 2011
- Ontario's Feed-in Tariff, Toronto, June 2011
- Photon's Solar Electric Utility Conference, San Francisco, February 2011
- Ontario Solar Network, Solar Summit, Toronto, February 2011
- Credit Suisse Alternative Energy Conference, Washington, June 2010
- Transmission and Integrating New Power into the Grid, Calgary, April 2010
- Feed-in Tariff: Another Tool for Meeting RPS, San Francisco, February 2010
- BC Power, Vancouver, January 2010
- Infrastructure Renewal, Toronto, October 2009
- Green Energy Week, Toronto, September 2009
- Ontario Waterpower Association Executive Dialogue, May 2009, May 2008, October 2008
- GasFair and PowerFair, Toronto, April 2008, May 2007, April 2006
- Eastern Canadian Power and Renewables Finance Forum, Toronto, February 2008
- Quebec Forum on Electricity, Montreal, April 2007
- Energy Contracts, Toronto, March 2007, November 2003
- Power On, Toronto, October 2006
- Generation Adequacy in Ontario, Toronto, April 2006, March 2005, April 2004
- Installed Capacity Markets - Designing and Implementing Installed Capacity Markets, Boston, May 2004
- Ontario Electricity Conservation and Supply Task Force, September 2003, July 2003

APPENDIX B. SEPTEMBER 2019 ONTARIO WHOLESALE PRICE FORECAST

	Simple Average HOEP $/MWh	System Weighted HOEP $/MWh	Capacity Based Recovery $/MWh	Global Adjustment Costs $/MWh	Wholesale Electricity Cost $/MWh
2013	$24.98	$26.43	$0.00	$52.61	$79.04
2014	$32.39	$35.79	$0.00	$47.65	$83.45
2015	$21.66	$23.48	$0.00	$70.98	$94.47
2016	$14.94	$16.61	$0.17	$87.81	$104.59
2017	$14.14	$15.73	$0.26	$86.77	$102.76
2018	$22.44	$24.20	$0.29	$79.23	$103.72
2019	$15.72	$17.17	$0.33	$94.75	$112.25
2020	$19.02	$20.46	$0.29	$89.84	$110.59
2021	$19.57	$21.04	$0.28	$89.48	$110.80
2022	$21.82	$23.41	$0.38	$89.54	$113.33
2023	$23.61	$25.27	$0.66	$89.63	$115.55
2024	$20.44	$22.08	$1.45	$100.64	$124.17
2025	$33.57	$35.47	$2.70	$82.02	$120.20
2026	$35.37	$37.35	$3.55	$79.61	$120.50
2027	$35.64	$37.65	$3.03	$78.75	$119.44
2028	$34.46	$36.47	$2.65	$85.85	$124.97
2029	$35.72	$37.77	$3.12	$83.39	$124.28
2030	$36.52	$38.57	$3.16	$79.33	$121.06
2031	$39.17	$41.39	$2.95	$74.07	$118.40
2032	$38.77	$41.00	$3.24	$75.48	$119.72
2033	$39.96	$42.31	$3.37	$74.28	$119.95
2034	$39.50	$41.86	$3.62	$74.99	$120.48
2035	$42.07	$44.56	$3.71	$67.84	$116.12
2036	$44.41	$47.01	$3.67	$63.84	$114.52
2037	$46.81	$49.53	$3.74	$62.31	$115.59
2038	$49.28	$52.12	$3.69	$61.46	$117.28
2039	$51.88	$54.84	$3.61	$61.01	$119.46
2040	$54.64	$57.72	$3.89	$59.78	$121.39
2041	$57.59	$60.80	$3.83	$59.04	$123.66
2042	$60.71	$64.04	$3.70	$58.49	$126.23
2043	$64.05	$67.51	$3.56	$57.71	$128.78
2044	$67.45	$71.05	$3.43	$57.00	$131.47
2045	$70.96	$74.68	$3.40	$55.95	$134.03
2046	$74.62	$78.46	$3.48	$54.76	$136.69
2047	$78.56	$82.53	$3.56	$53.27	$139.36
2048	$82.82	$86.93	$3.64	$51.68	$142.24

2049	$86.11	$90.32	$3.79	$50.68	$144.80
2050	$89.41	$93.72	$3.94	$49.84	$147.50
2051	$91.84	$96.30	$4.15	$49.51	$149.96
2052	$93.88	$98.50	$4.33	$49.68	$152.51
2053	$94.83	$99.60	$4.58	$50.68	$154.85
2054	$95.62	$100.48	$5.04	$51.78	$157.29
2055	$96.56	$101.57	$5.57	$52.81	$159.96
2056	$97.64	$102.77	$6.14	$53.91	$162.82
2057	$98.78	$104.08	$6.63	$55.01	$165.72
2058	$99.92	$105.36	$7.14	$56.19	$168.69
2059	$101.17	$106.80	$7.67	$57.19	$171.66
2060	$102.61	$108.41	$8.37	$57.51	$174.29

TAB 4

IN THE MATTER OF AN ARBITRATION UNDER THE UNITED NATIONS COMMISSION ON INTERNATIONAL TRADE LAW (AS REVISED IN 2010 AND 2013) AND THE NORTH AMERICAN FREE TRADE AGREEMENT

BETWEEN:

Windstream Energy LLC

Claimant

and

Government of Canada

Respondent

EXPERT REPORT
of
SARAH POWELL

February 18, 2022

Davies Ward Phillips & Vineberg LLP

155 Wellington Street West

Toronto, ON M5V 3J7, Canada

416.367.6931

TABLE OF CONTENTS

PART I ~ INTRODUCTION AND SUMMARY

1. I have been asked by Torys LLP, counsel to Windstream Energy LLC ("**Windstream**"), to provide this Expert Report (the "**Report**"). I previously provided an Expert Report dated August 19, 2014 (the "**2014 Report**", **CER – Powell)** and a Supplementary Expert Report dated June 19, 2015 (the "**2015 Supplementary Report**", **CER – Powell 2**) during an earlier arbitration between Windstream and the Government of Canada ("**NAFTA 1**"). In particular, in this Report I have been asked to provide my opinion on three issues:

(a) Issue One: the level of formal and informal control the Government of Ontario ("**Ontario**"), and in particular the Ministry of Energy ("**Energy**"), has over the Independent Electricity System Operator (the "**IESO**") in administering the Feed-in Tariff ("**FIT**") program. In particular, the ability of Ontario to direct the IESO to amend: a FIT contract with respect to key contractual milestone dates; and the termination clauses of Windstream Wolfe Island Shoals Inc.'s ("**WWIS**") FIT contract for offshore wind dated May 4, 2010 (the "**FIT Contract**");

(b) Issue Two: Ontario's current policy and approach to renewable energy projects, and in particular wind projects, and policy with respect to terminating FIT contracts, including any key changes under the current provincial government with respect to the regulatory framework (including timing expectations) for Ontario's permitting, development and operation of renewable energy projects (the "**Regulatory Framework**"); and

(c) Issue Three: assuming that Ontario's 2011 moratorium on offshore wind development (the "**Moratorium**") had been lifted in February 2020, the likelihood that a Renewable Energy Approval ("**REA**") could have been issued for the proposed 300 MW WWIS Project (the "**Project**") within a three-year time period.

2. I have also included at the end of my Report a general update on the development of offshore wind resources outside of Ontario.

3. As explained more fully below in Part II, I am a partner at Davies Ward Phillips & Vineberg LLP and have practiced in the area of environmental law for 29 years. This includes regularly advising developers and lenders with respect to a wide range of permitting matters regarding the siting, construction, operation and decommissioning of large-scale energy,

infrastructure and resource projects. My experience includes advising developers and lenders about the Regulatory Framework generally and the IESO's FIT program more specifically.

4. It is my opinion with respect to Issue One that Ontario had both formal and informal tools available to it to direct the IESO to amend WWIS's FIT Contract, including the provisions relating to key contractual milestone dates and the IESO's termination rights, and that Energy is the key governmental actor that drives Ontario's energy policy, including the administration of the FIT program.

5. It is my opinion with respect to Issue Two that, though the current political environment in Ontario towards renewable energy may be more challenging, the Regulatory Framework still exists under the current Ontario government in largely the same form that it did in August 2010, when WWIS entered into the FIT Contract.

6. Lastly, it is my opinion with respect to Issue Three that, assuming the Moratorium had been lifted in February 2020 (and Ontario had amended the FIT Contract), the permitting of the Project could have reasonably been completed in approximately three years.

7. I note also that the offshore wind sector has seen significant growth and investment around the world, including in the United States, in recent years. Several governments have cited development of offshore wind projects as critical to their achievement of climate goals. Recent developments in Canada at both the federal and provincial level suggest governments with access to offshore marine resources are gearing up to progress offshore wind.

8. Additionally, I note that my general comments included in Part I of the 2015 Supplementary Report still stand and, in my opinion, are still applicable today. Those comments included that, when WWIS entered into the FIT Contract in 2010, it was commercially reasonable for a developer to assume that the REA timelines would be met in all material respects and that any knowledge gaps regarding offshore wind power projects would have been addressed in the context of an adaptive management approach (*i.e.*, not by way of the Moratorium).

PART II ~ EXPERIENCE AND QUALIFICATIONS

9. I am a partner at Davies Ward Phillips & Vineberg LLP. I have been practising in the area of environmental law since my call to the Ontario Bar in 1993 and am a certified

Specialist in Environmental Law by the Law Society of Ontario. I have extensive experience in the permitting, construction, financing and operations of projects involving the wind, hydroelectric, solar and nuclear energy sectors.

10. Since 2009, I have regularly advised developers and lenders with respect to the IESO's FIT program, the IESO's FIT standard-form contract and the development of renewable energy projects under the IESO's FIT program including providing and reviewing permitting opinions with respect to the permits required under applicable laws to site, construct, operate and decommission wind, waterpower and solar projects in Ontario. My work in this area includes successfully obtaining approvals and ultimately developing some of the largest wind power projects ever undertaken in Canada. I continue to represent these developers with respect to permitting matters regarding the ongoing operation of these wind projects.

11. I am regularly recognized/ranked as a leading practitioner in environmental law including by *Chambers Global*, *Chambers Canada*, *The Canadian Legal Lexpert Directory*, *The Legal 500: Canada* and *The Best Lawyers in Canada*.

12. I have held numerous positions with law-related environmental organizations, including as a Past Chair of the National Environmental, Energy and Resource Law Section of the Canadian Bar Association and a Past Chair of the Environmental Law Section of the Ontario Bar Association.

13. A copy of my curriculum vitae is attached to this Report as Appendix A.

14. My opinions are based on the Documentation listed in Appendix B. My opinions are also limited to the applicable laws of the Province of Ontario and the federal laws of Canada applicable therein and based on legislation and regulations in effect on the relevant dates, drafts of legislation and regulations obtained through public records and then current administrative practices of governmental authorities.

15. I am independent of the Parties to this arbitration, their legal advisors and the Tribunal. I believe that the facts and opinions set out in this report are true.

PART III ~ OPINION AND ANALYSIS

A. ISSUE ONE: ONTARIO HAS FORMAL AND INFORMAL TOOLS TO DIRECT IESO TO AMEND FIT CONTRACT

(i) Role of IESO in Ontario's Electricity Sector

16. The IESO is a not-for-profit corporate entity established under the *Electricity Act, 1998* ("***Electricity Act***"), which is under the jurisdiction of Energy.[1]

17. The IESO is responsible for, among other matters, administering Ontario's electricity procurement programs, including the FIT program.

18. The purposes of the *Electricity Act* and the objects of the IESO related to renewable energy in particular include:

(a) with regards to the *Electricity Act*, to promote the use of cleaner energy sources (including alternative and renewable energy) in a manner consistent with Ontario's policies;[2] and

(b) to facilitate the diversification of sources of electricity supply by promoting cleaner energy sources (including alternative and renewable energy).[3]

19. These purposes and objectives were in place when the current Ontario government came to power in June 2018 and, as of January 2022, have not been changed since.

20. Notwithstanding these broad statutory goals to promote renewable energy, Energy is ultimately responsible for creating the public policy framework within which the IESO operates. Although the IESO has various powers under the *Electricity Act*, the IESO itself does not have a broad public policy mandate.[4] Instead, it must operate and fulfill its purposes and

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1 The IESO is the product of a merger with the Ontario Power Authority ("**OPA**"). The OPA, established in 2005 under the *Electricity Act*, was previously responsible for energy assessment and province-wide procurement, while the then IESO was primarily responsible for the management and operation of Ontario's grid. Since 2015, the IESO has fulfilled both of these roles.

2 *Electricity Act, 1998*, S.O. 1993, c. 15, Sched. A, s. 1(d) [*Electricity Act*] – purposes of the Act.

3 *Electricity Act*, s. 6(1)(m) – purposes of the IESO.

4 *Grasshopper Solar Corp. v Independent Electricity System Operator*, 2019 ONSC 6397 at paras. 2-3 [*Grasshopper I*].

objectives in a manner that is consistent with Ontario's energy policy, including its approach to the procurement of electricity from renewable energy resources.[5] Up until June 2018, the IESO used the FIT Program as the key tool to broaden renewable energy participation in Ontario's energy sector.

(ii) Role of Energy in Ontario's Electricity Sector

21. As noted above, the IESO is ultimately under the jurisdiction of Energy, which among other things: oversees the regulatory framework for electricity pricing and policies; supports energy efficiency and conservation; and supports the growth of clean technology and innovation in the electricity sector.[6] These responsibilities, and others, are articulated in section 7 the *Ministry of Energy Act, 2011* (the "***Ministry Act***"). In particular, section 7(1)(e) of the *Ministry Act* states that the Minister of Energy shall "do any one or more of encouraging, promoting, developing or participating in such activities, projects and programs as the Minister considers appropriate,

(a) to provide for the availability of energy, including renewable energy, in Ontario,

(b) to stimulate the search for and development of course of energy, including those that utilize waste and those that are renewable, as alternatives to the sources of energy available for use in Ontario,

(c) to stimulate energy conservation, through the establishment of programs and policies within the Ministry or such agencies as may be prescribed, load management and the use of renewable energy sources through Ontario, and

(d) to encourage prudence in the use of energy in Ontario."[7]

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5 *Ibid*.

6 **Exhibit C-2423**, Ontario, "Ministry of Energy" (7 January 2022), online: <https://www.ontario.ca/page/ministry-energy>. According to this website, Energy sets and implements Ontario's energy plan.

7 *Ministry of Energy Act, 2011*, S.O. 2011, c. 9, Sched. 25, s. 7(1)(e) [*Ministry Act*]. As of January 2022, the Minister's responsibilities under section 7 of the *Ministry Act* have not been amended since 2014.

22. To fulfill its responsibilities set out under the *Ministry Act*, the Minister of Energy is authorized to undertake research, establish policies, develop programs and enter into agreements for and in the name of the Crown, among other things.

23. Energy sets and implements Ontario's energy plan.

24. When Premier Ford and the current Ontario government came to power in 2018, the statutory powers of Energy under the *Electricity Act*, in particular the ability of the Minister of Energy to issue directives to the IESO under section 25.30, were not changed. However, three sets of legislative provisions in the *Electricity Act* and the *Ontario Energy Board Act, 1998* (the "***OEBA***") that promote and prioritize renewable energy generation projects were repealed on June 3, 2021, as part of Bill 276 (or the *SRCA*, defined below, which I discuss further under "Ford Impact on Energy Legislation, including the Regulatory Framework").

25. Additionally, the Minister of Energy receives mandate letters directly from the Premier. Generally speaking, mandate letters are directed to individual ministers outlining the Premier's policy priorities and directions for implementation by each minister. Mandate letters have become common place and these letters are frequently publicly disclosed (including, for example, by the current Canadian federal government).[8] Ontario Ministers' mandate letters from 2014-2015 and 2016 are publicly available online.[9]

26. The 2014-2015 mandate letter to the Minister of Energy included, among other things, a direction that Energy's specific priorities related to "Championing Renewable Energy" include: "[c]ontinuing to work with the ministry's agencies to implement a new competitive procurement process for renewable energy projects larger than 500 kilowatts that will take into account local needs and considerations" and "[c]ontinuing to respect the contracts that have been signed with energy producers, while always ensuring that these contracts enable the delivery of sustainable, affordable energy to Ontario's ratepayers."[10] The 2016 mandate letter to the Minister of Energy included a direction to "[work] with the IESO, based on the province's

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8 **Exhibit C-2233**, Brian Beamish, "Why I ordered the Government of Ontario to share its mandate letters" (21 August 2019), online (blog): *Information and Privacy Commissioner of Ontario* <https://www.ipc.on.ca/why-i-ordered-the-government-of-ontario-to-share-its-mandate-letters/>.

9 Ontario, "All minister mandate letters" (2 June 2021), online: <https://www.ontario.ca/page/all-minister-mandate-letters>.

10 **Exhibit C-2006**, Ontario, Office of the Premier, *Archived – 2014 Mandate letter: Energy* (Mandate letter), online: <https://www.ontario.ca/page/2014-mandate-letter-energy#section-4>.

new Long-Term Energy Plan, to source affordable, clean and reliable electricity, including renewables."[11]

27. Since 2018, the current Ontario government has not publicly released its Ministers' mandate letters on the basis that the mandate letters attract Cabinet privilege under section 12(1) of the *Freedom of Information and Protection of Privacy Act*, R.S.O. 1990, c. F.31 ("***FIPPA***").[12]

28. Although I cannot be certain, it is likely that Premier Ford's 2018 mandate letter to the Minister of Energy directed Energy to, among other matters, wind down certain FIT and large renewable procurement contracts, consistent with Energy's Directive to the IESO dated July 13, 2018, which is discussed below.

(iii) Relationship between IESO and Energy

29. In my view, it is clear from the *Electricity Act*, and as I discuss further below under "Formal Directions from Energy to the IESO", that Energy has broad powers to require the IESO to take the actions that are enumerated in the *Electricity Act*. Moreover, Energy is responsible for setting and implementing the overall energy policy framework within which the IESO operates.

30. For example, in *Major Partner Wind Energy Corp. v. Ontario (Premier)*, a decision dealing with a judicial review application of the OPA's decision to not award Major Partner Wind Energy Corp. ("**Major**") a FIT contract, in describing the FIT application process, the Divisional Court stated that: Major's counsel had submitted that "the Minister of Energy had, and continued to have, the authority to direct Ontario Power [Authority] to process Major's original application. Negotiations between FIT applicants and the Minister were commonplace,

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11 **Exhibit C-2039**, Ontario, Office of the Premier, *Archived – September 2016 Mandate letter: Energy* (Mandate letter), online: <https://www.ontario.ca/page/september-2016-mandate-letter-energy#section-2>.

12 In May 2020, the Divisional Court dismissed Ontario's application for judicial review and upheld the Information and Privacy Commission of Ontario's decision that this section of *FIPPA* did not apply to the mandate letters and ordered that the mandate letters be disclosed (see *Attorney General for Ontario v. Information and Privacy Commission*, 2020 ONSC 5085). This decision was then appealed by Ontario to the Ontario Court of Appeal ("**ONCA**"). On January 26, 2022, ONCA released its decision finding 2-1 that the decisions of the Information and Privacy Commissioner and Divisional Court were reasonable and Ontario's appeal was therefore dismissed (see *Ontario (Attorney General) v. Ontario (Information and Privacy Commissioner)*, 2022 ONCA 74). Ontario has not publicly confirmed whether it intends to appeal the ONCA ruling to the Supreme Court of Canada.

before and after awards of FIT contracts had been made."[13] This suggests Energy can have direct involvement in the IESO procurement process throughout the lifetime of a Power Purchase Agreement.[14] While not determinative, it is my view that Major's submission is generally consistent with the understanding that most market participants would have of the legal regime governing the FIT program.

31. In addition, it was noted in *Alliance to Protect Prince Edward County v. Independent Electricity System Operator*, 2018 ONSC 4107, that "[t]he FIT program and OPA's role were mandated by the Minister of Energy in a directive issued pursuant to ss. 25.32 and 25.35 of the Electricity Act."[15] However, as stated in the *Electricity Act*, the IESO is not an agent of the Crown for any purpose.[16] The Minister of Energy has the power to formally direct the IESO to undertake, or refrain from undertaking, the courses of action specified in sections 18(2), 25.30(1), 25.32(5), 25.32(7), 25.32(8) and 39(4) of the *Electricity Act*.[17]

32. In my opinion, the relationship between Energy and the IESO has been designed so that Energy maintains *de facto* control over many aspects of the IESO's operations. At times, this is explicit, such as the ability of the Minister of Energy to issue directives to the IESO. However, it is also implicit through several core operational checks Energy maintains over the IESO.

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[13] *Major Partner Wind Energy Corp. v. Ontario (Premier)*, 2015 O.J. No. 6642, 2015 ONSC 6902 at para 32. I note that this decision resulted from an application by the OPA to dismiss Major's application for delay, which was adjourned until it could be heard by a full panel of the Divisional Court. In that decision, the Court ultimately dismissed Major's application for delay. As a result, the substance of Major's submission was not considered and the Court did not further describe Energy's involvement in the FIT application process.

[14] In this Report, I use the term "Power Purchase Agreement" to refer to any agreement entered into by the OPA/IESO with respect to the procurement of energy. I will specify where I intend to refer to a contract entered into under a particular procurement (*e.g.*, a FIT contract).

[15] *Alliance to Protect Prince Edward County v. Independent Electricity System Operator*, 2018 ONSC 4107 at para 9 [*APPEC*].

[16] *Electricity Act*, *supra* note 2, s. 8.

[17] *Grasshopper I*, *supra* note 4 at para. 3. *Electricity Act*, *supra* note 2, ss. 18(2) 25.30(1), 24.32(5), 25.32(7), 25.32(8) and 39(4). These sections relate to: 18(2) (stakeholder input); 25.30(1) (long-term energy plan implementation); 25.32(5) (procurement); 25.32(7) (Indigenous consultation); 25.32(8) (programs or funding for Indigenous participation); and 39(4) (emergency plan). Note that sections 25.32(9) (transition, directions) and (10) (transition, feed-in tariff programs) also contain transition periods related to directions issued prior to the coming into force of certain provisions of the *Energy Statute Law Amendment Act, 2016*, S.O. 2016, c. 10.

33. For example, each fiscal year the IESO is required to submit its business plan to the Minister of Energy for approval.[18] According to the IESO, "The IESO's Business Plan provides an overview of the organization's priority initiatives and associated resourcing requirements needed to deliver on core responsibilities, as well as the investments required now to enable longer-term benefits for both the sector and consumers."[19] I will elaborate on this under "Informal or Alternative Means for Energy to Direct the IESO" below.

34. In addition, the IESO states in its 2020 Annual Report that "the Province of Ontario controls the IESO by virtue of its ability to appoint the IESO's Board of Directors."[20] This is significant for two reasons: the IESO has unambiguously recognized in one of its own publications that, in its view, Ontario controls the IESO; and the IESO's Board of Directors is responsible for supervising the activities of and determining the overall strategic direction of the IESO.[21] The roles and responsibilities of certain representatives of the IESO, including the Chair and the Board of Directors, vis-à-vis Energy, are outlined in a Memorandum of Understanding with Energy.[22]

35. Based on the public record, the most recent Memorandum of Understanding between Ontario (as represented by Energy) and the IESO is from May 2017 (the "**MOU**"). It describes the various roles and responsibilities of Energy, the IESO and the IESO's Chair and Board of Directors. The purposes of this MOU are: to set out the accountability relationships between Energy and the IESO; to clarify the operation roles and responsibilities of various

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18 *Electricity Act*, *supra* note 2, s. 24(1).

19 **Exhibit C-2171**, IESO, 2019-2021 Business Plan (4 September 2018) at 4, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/financial/IESO-2019-2021-Business-Plan.pdf?la=en> [2019-2021 Business Plan].

20 **Exhibit C-2266**, IESO, 2020 Annual Report (10 March 2021) at 23, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/annual-reports/ieso-2020annualreport.ashx>.

21 **Exhibit C-2021**, Memorandum of Understanding between Her Majesty the Queen in Right of the Province of Ontario as Represented by the Ministry of Energy and the IESO (2016), s. 8.3, online (pdf): https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/governance/MOU-Minister-of-Energy-and-Chair-IESO.ashx [MOU].

22 According to the *Electricity Act*, the Minister of Energy is responsible for appointing at least eight, but no less than ten, individuals to sit on the IESO Board of Directors, along with the IESO CEO (see s. 10(2)). Each Director serves "at pleasure" for an initial term of two years and may be reappointed for successive terms not exceeding two years each (see s. 10(5)). Since June 2018, approximately 20 individuals have joined and/or departed the IESO Board of Directors. The current Chair at the time of this Report was appointed as a director under the current Ontario government.

representatives of Energy and the IESO; and to set out expectations for governance, operational, administrative, communications, financial, auditing and reporting arrangements between Energy and the IESO.[23]

36. The MOU indicates that:

(a) The Minister of Energy is responsible for developing "the Government's overall energy policy priorities and broad policy direction, and informing the Chair [of the IESO's Board of Directors] of same that may impact the IESO";[24]

(b) The Chair is responsible for "providing strategic policy advice to the Minister" and "seeking strategic policy direction for the IESO from the Minister";[25]

(c) In negotiating contracts, the IESO shall operate "in a manner that best fulfills its statutory mandate, emphasizing, as appropriate, the best interests of ratepayers";[26] and

(d) The IESO and Energy "shall establish and maintain a supportive relationship with each other by ensuring that an appropriate and timely exchange of information occurs between the IESO staff and the Ministry policy staff on technical and specific policy matters."[27]

37. In my opinion, the MOU further confirms the close and interconnected relationship between the IESO and Energy in respect of the carrying out of the IESO's objectives under the *Electricity Act*, including the entering into of procurement contracts.

1) Ability of IESO to Amend FIT Contract

38. Before I discuss what tools Energy or the Minister of Energy has to direct the IESO to take a particular action, it is helpful to clarify that the IESO had the ability to amend the

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23 MOU, *supra* note 21, s. 1.1.

24 *Ibid*, s. 8.1.

25 *Ibid*, s. 8.2.

26 *Ibid*, s.10.3.3.

27 *Ibid*, s.10.3.5. As I noted in paragraph 35 above, this is the latest version posted on the IESO website. The Term in section 14 notes that if a new Minister takes office, that new Minister is to affirm the MOU in writing. Based on the public record, it is not clear whether this was done in 2018 when then-Minister Rickford took office.

FIT Contract itself. Paragraph 1.10 of Schedule 1, the General Terms and Condition of FIT Contract Version 1.3.0, provides that:

> Except as expressly provided in this Agreement, no waiver of any provision of this Agreement shall be binding unless executed in writing by the Party to be bound thereby and no amendment of any provision of this Agreement shall be binding unless executed in writing by both Parties to this Agreement. NO waiver of any provision of this Agreement shall constitute a waiver of any other provision nor shall any waiver of any provision of this Agreement constitute a continuing waiver or operate as a waiver of, or estoppel with respect to any subsequent failure to comply, unless otherwise expressly provided.[28]

39. According to the above provision, there is no limitation on what provisions can, or cannot, be amended by the parties to the FIT contract. As a result, WWIS's Milestone Date for Commercial Operation ("**MCOD**") and other key milestone dates in the FIT Contract could have been amended by the parties.

40. The IESO also had broad power to amend its FIT contracts under the FIT Rules, which governed all aspects of the FIT program from eligibility and application through to contract execution. For example, under the FIT 1.0 Rules, amendments to the FIT contract are binding if signed by both parties and suppliers had the right to seek certain amendments to their projects and request certain extensions of time.[29]

41. Regarding the powers of the IESO under the FIT Rules, the Court in *APPEC* found that: (1) "these provisions allow the OPA/IESO to make any amendment outside of the scheduled program review in response to ministerial directions, changes in laws and regulations, significant changes in market conditions or other circumstances as required"; (2) such changes can be made "without any requirement to seek direction from members of the public or from any other persons who might be interested but who are not be [*sic*] a party to the Contract"; and (3) the FIT Rules gave the IESO "an almost unlimited discretion on how the FIT

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28 **Exhibit C-1952**, Standard FIT Contract Version 1.3.0, Schedule 1, paragraph 1.10.

29 *APPEC*, *supra* note 15 at paras. 13-14.

Program will run."[30] More specifically, the Court referred to the findings of Justice Nordheimer from the 2012 decision of *Skypower CL 1 LP v. Ontario (Minister of Energy)* ("***Skypower***"), where it was found that the FIT Rules 1.0 provided that:

(a) the OPA could amend the FIT Program and Rules in response to ministerial directions, changes in laws, or significant changes in the market place (section 10.1(a));

(b) the OPA had the right to cancel or suspend all or any part of the FIT Program (section 12.2.(d));

(c) the OPA had the right at its sole discretion to reject any application, even one properly completed (section 12.2(c));

(d) the OPA can make changes to the FIT Rules, Contracts, Price Schedules including substantial changes, suspension, or termination of the [FIT] Program without liability (section 12.2 (g)), and;

(e) changes to the Rules may apply with respect to existing Applications (sections 10.2(c) and 12.2(g)).[31]

42. Furthermore, following the award in NAFTA 1 and WWIS's commitment to continue with the Project, the IESO could have amended the FIT Contract to avoid the contract terminating due to its failure to achieve the specified MCOD. It would not have been novel for the IESO to amend a FIT contract in response to a court or tribunal decision.

43. For example, following a decision of Ontario's then Environmental Review Tribunal (now the Ontario Land Tribunal, "**OLT"**) that the White Pines Wind Project ("**White Pines**") could only have nine wind turbines instead of 27, the IESO amended the FIT contract

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30 *Ibid* at paras. 79, 82-83. As examples of the IESO's broad powers to run the FIT program, the Court in *APPEC* references sections 10.1(a), 10.2(c), 12.2(c), 12.2(d) and 12.2(g) of the FIT Rules 1.0, as described above.

31 *Ibid* at para. 78, referring to *Skypower CL 1 LP at al. v. Ontario (Minister of Energy)*, 2012 ONSC 4979 at para. 54. *Skypower* involved an application seeking a declaration that the Minister and OPA acted unreasonably in failing to process the applicant's FIT application in accordance with the FIT Rules 1.0.

with the proponent of White Pines to reflect same.[32] This amendment was challenged by a local interest group on the basis that the FIT contract was null and void because the proponent did not comply with the contractual requirement to deliver 75% of the contracted capacity, which capacity was based on the project having 27 turbines. In dismissing the challenge, the Court concluded that: "the FIT Rules are such that the IESO has an unlimited discretion, particularly based on the wording of the Contract, to amend the Contract in order to comply with any existing or new requirements. The requirements in this case were set out in the OLT decision that would allow only nine wind turbines with a capacity of 18.45 megawatts."[33]

44. I note that the IESO had also amended the White Pines FIT contract to extend the deadline for achieving the Commercial Operation Date ("**COD**") due to the ongoing appeal of that project's REA.[34] This extension was obtained in connection with a directive issued by the Minister of Energy to the OPA on August 2, 2011, that (at the time) allowed suppliers to obtain a waiver of the OPA's termination rights under section 2.4(a) (i.e., its unilateral ability to terminate prior to a Notice to Proceed is issued) of the FIT contracts.[35]

2) Formal Directions from Energy to IESO

45. From time to time, the Minister of Energy will issue directives and letters to the IESO articulating government policy.[36] Energy's formal power to direct the IESO to undertake,

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32 *Ibid* at para. 24. The amendment to reduce capacity was initiated by the proponent of White Pines but consented to by the IESO.

33 *APPEC*, *supra* note 15 at para. 85.

34 *Ibid* at paras. 21-22. The IESO received two amendment requests from the proponent of White Pines. One was to lower the contracted capacity of the project in light of the OLT decision and to change its connection point. The other was to extend the COD in light of the ongoing REA appeal. Regarding the request to extent the COD: "By virtue of the appeal and because a decision by the OLT may take longer than six months and in recognition that it was preferable from a community perspective that construction activities did not proceed during the appeal process, the IESO publicly offered suppliers (including White Pines) extension agreements upon the commencement of an appeal by objectors of an REA project to the OLT. This offer was posted to the OPA website and remains available on the IESO website. Under these extension agreements, the proponent agrees not to construct during the appeal and the IESO agrees to adjust the project timelines for a period sufficient to permit completion of the appeal process and subsequent completion of the project" (para. 21).

35 *Ibid* at paras. 18-19.

36 **Exhibit C-2420**, IESO, "Corporate IESO" (2022), online: <https://www.ieso.ca/en/Corporate-IESO>.

or refrain from undertaking, a particular course of action in respect of a specific matter comes from the *Electricity Act*.[37]

46. I identified earlier in paragraph 31 the various sections of the *Electricity Act* under which the Minister of Energy can direct the IESO to take certain actions. One of those sections, section 25.32(5), deals with procurement matters. Under section 25.32(5), the Minister (subject to the approval of the Lieutenant Governor in Council) may issue directives requiring the IESO to undertake "any request for proposal, any other form of procurement solicitation or any other initiative or activity that relates to a matter listed in" section 25.32(2),[38] which states that:

(a) "The IESO shall, if required to do so under an implementation plan, a directive issued under subsection (5) or a direction continued under subsection (9) or (10), as amended, and may, if an implementation plan provides the authority to do so, enter into contracts for the procurement of,

(i) electricity supply, capacity or storage;

(ii) changes in electricity demand;

(iii) measures related to the conservation of electricity or the management of electricity demand; or

(iv) transmission systems or any part of such systems, including the development of all or part of such systems."[39]

47. Therefore, using section 25.32(5) of the *Electricity Act*, the Minister of Energy can direct the IESO to undertake "any other initiative or activity" that relates to the entering into of contracts for the procurement of electricity, such as amending the MCOD of a particular FIT contract. As demonstrated by the imperative language used above, the IESO *must* implement any directives issued by the Minister under section 25.32(5). In other words, the IESO does not have the ability to refuse to do what is asked of it in a Minister's directive.

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37 *Grasshopper I, supra* note 4 at paras. 2-3.

38 *Electricity Act*, *supra* note 2, s. 25.32(5).

39 *Ibid*, s. 25.32(2).

48. In addition to the entering into of contracts, section 25.32(5) has also been relied on by Energy to direct the IESO to terminate contracts for the procurement of electricity. For example, the July 13, 2018, directive "Wind down of Feed-In Tariff and Large Renewable Procurement Contracts" (the "**July Directive**") was issued by the current Ontario government under the authority of sections 25.32(5) and (11) of the *Electricity Act*.[40] The July Directive ended the IESO's FIT program and ultimately resulted in the cancellation of 758 renewable energy procurement contracts.[41]

49. While many directives from the Minister of Energy to the IESO relate to broader planning and resource initiatives, the Minister has issued directives to the IESO that require the IESO to take particular actions with respect to certain contracts, certain proponents and/or certain procurement initiatives. For example, since 2016, the Minister of Energy has issued directives to the IESO to do the following:

(a) Extend timelines (including in-service deadlines and other contract performance-related time periods) for certain projects under the terminated Conservation First Framework ("**CFF**");[42]

(b) Report to Energy on various initiatives to support the IESO's Resource Adequacy framework, including future competitive procurement mechanisms and contract

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40 For reference, section 25.32(11) provides that directives (including in relation to the FIT programs) issued immediately before specified parts of the *Energy Statute Law Amendment Act, 2016* came into force may be amended or revoked by the Minister (until the day the first implementation plan submitted by the IESO is approved by the Minister) or by the Lieutenant Governor in Council (on and after that day).

41 *Grasshopper I*, *supra* note 4 at para.16: "Less than a week after assuming power, the Ford government fulfilled its promise to "Cancel energy contracts that are in the pre-construction phase" by issuing a directive from the Minister ordering the IESO "to immediately take all steps necessary to wind down all FIT 2, 3, 4 and 5 Contracts where the IESO has not issued [a Notice Proceed or] NTP". Consistent with the Minister's directive, the respondent [the IESO] immediately terminated 758 renewable energy contracts."

42 **Exhibit C-2417**, Minister's Directive to the IESO dated December 9, 2021, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/Letter-from-the-Minister-of-Energy-20211209.ashx>. Although the CFF was discontinued in March 2019, Energy has directed the IESO on three occasions (including the above-referenced directive) to extend timelines for completion of certain projects undertaken under the CFF in recognition of delays associated with the Covid-19 pandemic.

negotiations for the Oneida Energy Storage Project and Lake Erie Connector Transmission Project;[43]

(c) Evaluate a moratorium on the procurement of new natural gas generating stations and, by November 2022, develop an achievable pathway to zero emissions in Ontario's electricity sector;[44]

(d) Draft and enter into a ten-year contract for the Oneida Battery Park Project;[45]

(e) Pursue contract negotiations for the Lake Erie Connector Project, which is a proposed 1,000 MW transmission line that would run 117km underwater through Lake Erie between Ontario and Pennsylvania. This directive also asks that Energy staff be included in negotiations in an "observer role";[46]

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43 **Exhibit C-2407**, Minister's Directive to the IESO dated November 10, 2021, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/Letter-from-the-Minister-of-Energy-MC-994-2021-717.ashx>.

44 **Exhibit C-2395**, Minister's Directive to the IESO dated October 7, 2021, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/Letter-from-Minister-Gas-Phase-Out-Impact-Assessment.ashx>.

45 **Exhibit C-2387**, Minister's Directive to the IESO dated August 27, 2021, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/Letter-from-the-Minister-of-Energy-Oneida-20210827.ashx>. This directive asks the IESO to also submit the drafted final contract to the Minister for consideration, prior to a potential Minister's directive to execute the final contract. An earlier directive related to the Oneida Battery Park Project directed the IESO to explore a ten-year agreement for the project: **Exhibit C-2349**, Minister's Directive to the IESO dated February 22, 2021, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/MC-994-2021-146-letter-to-IESO-re-Oneida-Battery-Park-Project.ashx>. This directive also asked the IESO to also submit the proposed major contract terms to the Minister for review, prior to a potential Minister's directive to execute a contract. Then on January 27, 2022, the Minister issued another Directive directing the IESO to, among other things, enter into a ten-year procurement contract for the Oneida Energy Storage Project in substantially the same form as the draft contract previously submitted to the Minister: **Exhibit C-2426**, Minister's Directive to the IESO dated January 27, 2022, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/Letter-from-the-Minister-of-Energy-20220128.ashx> [January 27, 2022 Directive].

46 **Exhibit C-2367**, Minister's Directive to the IESO dated May 13, 2021, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/MC-994-2021-352.ashx>.

(f) Report to Energy on a potential extension and new five-year contract for the Calstock biomass generating facility, and subsequently, to enter into a procurement contract;[47]

(g) Immediately discontinue and wind-down the Hydroelectric Contract Initiative;[48]

(h) Hire a third party to undertake a targeted review of existing generation contracts to identify opportunities to lower electricity costs;[49]

(i) Immediately wind down certain FIT and Large Renewable Procurement ("**LRP**") contracts;[50] and

(j) Launch procurement initiatives with particular targets, such up to 600 MW of wind, up to 250 MW of solar photovoltaic, up to 50 MW of hydroelectricity and up to 30 MW of bioenergy through the LRP II procurement and up to 150 MW through the FIT 5 procurement.[51]

50. According to the IESO's website, since the current Ontario government came to power in June 2018, the Minister of Energy has issued 22 directives to the IESO.[52] Approximately 75% of Ministerial Directives issued to the IESO since June 2018 (including

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47 **Exhibit C-2342**, Minister's Directive to the IESO dated January 15, 2021, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/Letter-from-the-Minister-of-Energy-Northern-Development-and-Mines-20200115-1089.ashx>. The January 27, 2022 Directive I reference above also directs the IESO to enter into a five-year procurement contract for the Calstock facility in substantially the same form as the draft contract previously submitted to the Minister.

48 **Exhibit C-2288**, Minister's Directive to the IESO dated February 14, 2020, online: <https://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives/Wind-down-of-Hydroelectric-Contract-Initiative-HCI>.

49 **Exhibit C-2245**, Minister's Directive to the IESO dated November 6, 2019, online: <https://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives/Review-of-Generation-Contracts>.

50 **Exhibit C-2162**, Minister's Directive to the IESO dated July 13, 2018, online: <https://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives/Wind-Down-of-Feed-in-Tariff-and-Large-Renewable-Procurement-Contracts> [July Directive].

51 **Exhibit C-2028**, Minister's Directive to the IESO dated April 5, 2016, online: <https://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives/Future-Renewable-Energy-Procurements.

52 The IESO publishes Ministerial Directives (but not always the associated Executive Council of Ontario Orders in Council) on its website: IESO, "Ministerial Directives" (2022), online: <https://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives>.

seven related to the CFF) have targeted certain contracts, proponents, and/or procurement initiatives.

3) Informal or Alternative Means for Energy to Direct IESO

51. In addition to the use of formal directives issued by the Minister of Energy under the *Electricity Act*, Ontario has several other tools available which can be used to require the IESO to take a particular action.

52. First, each fiscal year, the Minister of Energy approves business plans that are prepared by the IESO. As discussed above, these plans "provide an overview of the organization's priority initiatives and associated resourcing requirements needed to deliver on core responsibilities, as well as the investments required now to enable longer-term benefits for both the sector and consumers."[53]

53. The Minister has the discretion to either approve the plan as proposed by the IESO or refer it back to the IESO for further consideration.[54] For example, on December 8, 2016, the Minister asked the IESO revise its 2017-2019 Business Plan to include resources for the Market Renewal projects and to resubmit this amended plan to the Minister for approval.[55] This request shows that Energy has the ability to direct the IESO to allocate resources to particular initiatives.

54. Section 9.1.2 of the MOU states that: "Senior IESO employees and senior Ministry staff shall, during the drafting of the business plan, discuss the contents of the plan in respect of the alignment of the IESO's key initiatives with current Government policies." This demonstrates that not only does the Minister of Energy have the final say on the IESO's business plan, but Energy staff are involved in the drafting of the business plan and ensuring it aligns with Ontario's energy policy at that time. For example, the IESO's 2019-2021 Business Plan, the first business plan released under the current Ontario government, noted that: "In July 2018, the IESO began terminating 751 contracts for electricity generation projects in the early stage of development, a move that is estimated to save ratepayers about $790 million without

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53 2019-2021 Business Plan, *supra* note 19 at 4.

54 *Electricity Act*, *supra* note 2, s. 24(2).

55 **Exhibit C-2051**, Minister's Directive to the IESO dated December 8, 2016, online: <https://www.ieso.ca/en/Corporate-IESO/Ministerial-Directives/IESO-2017-2019-Business-Plan>.

any adverse impact on the reliability of Ontario's electricity system."[56] Very similar language was used in the July 13, 2018, news release (accompanying the July Directive) that was issued by the Minister of Energy announcing the cancellations.[57]

55. Second, shortly after being elected in 2018, the current Ontario government used targeted legislative action to fulfill one of its key election promises and effect the cancellation of White Pines.[58] The *White Pines Wind Project Termination Act, 2018*, S.O. 2018, c. 10, Sched. 2 (the "***Termination Act***") terminated the FIT contract between the IESO and wpd White Pines Wind Incorporated, any agreements related to the FIT contract including the Secured Lender Consent and Acknowledgement Agreement with the IESO, the project's REA and all other approvals and permits.[59]

56. Among other things, the *Termination Act* obligates the proponent to decommission the partially-constructed project in accordance with regulatory requirements (which requirements are also outlined in O. Reg. 237/19 – Closure of the White Pines Wind Facility, issued under the *Environmental Protection Act*).[60] It also extinguished causes of action wpd White Pines Wind Incorporated may have against the Crown, any current or former member of the Executive Council or any current or former employee or agent of or advisor to the Crown, or against the IESO or any of its current or former directors, officers, employees or agents, as a direct or indirect result of a variety of events, including: the *Termination Act*; its regulations; or any revocation or termination of any instrument referred to in sections 2 or 3 or of contractual or other rights.[61]

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56 2019-2021 Business Plan, *supra* note 19 at 9.

57 **Exhibit C-2163**, Energy, Northern Development and Mines, News Release, "Ontario to Cancel Energy Contracts to Bring Hydro Bills Down" (13 July 2018), online: <https://news.ontario.ca/en/release/49720/ontario-to-cancel-energy-contracts-to-bring-hydro-bills-down> [Cancellation News Release].

58 White Pines was an 18.45 MW wind project that received a FIT 1 contract dated May 4, 2010. Its NTP was issued by the IESO on May 11, 2018. Because a NTP had been issued, the IESO could no longer avail itself of its unilateral termination right under section 2.4(a) of the FIT contract.

59 *White Pines Wind Project Termination Act, 2018*, S.O. 2018, c. 10, Sched. 2, ss. 2-3 [*Termination Act*].

60 *Ibid*, s. 4.

61 *Ibid*, ss. 5(1)-5(2). Proceedings in contract, restitution, tort, misfeasance, bad faith, fiduciary obligation, or any remedy under statute is barred under the *Termination Act*.

57. The *Termination Act* also included a formula for calculating the amount of compensation payable by the Crown to wpd White Pines Wind Incorporated in light of the cancellation of White Pines.[62]

58. The *Termination Act* was not issued under any particular authority. It simply "deems" the contracts and instruments described in sections 2 and 3 (and above in paragraph 55) revoked and is a stark example of how unilateral legislative action can be used to alter contractual relationships between private parties and government-related entities, like the IESO. In my view, similar legislation could have been passed by Ontario to require the IESO to amend a FIT contract, including the termination and/or MCOD provisions of WWIS's FIT Contract, or to enter into a new FIT contract on specified terms.[63]

59. Third, Ontario has also set a precedent of terminating energy projects by less formal means. For example, in 2010 and 2011, Ontario's then Liberal government announced

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[62] *Ibid*, s. 6, details the compensation owned by the Crown to wpd White Pines Wind Incorporated. Section 6(8) notes that unless provided for by regulation, no compensation is payable for any opportunity costs or for any loss of goodwill or possible profits. The *Termination Act* also includes a general power of the Lieutenant Governor in Council to make regulations respecting the calculations and payments under section 6, including any preconditions that must be met. As of January 2022, no regulations have been issued under the *Termination Act.* Decommissioning of the partially-constructed White Pines commenced in October 2019. I could not confirm in the public record whether compensation has been paid or the amount of any such payment. The media has reported that the proponent estimates the cancellation cost is over $100 million: **Exhibit C-2223**, Alexandra Mazur, "Ontario to compensate White Pines wind turbine developers for cancelled contract", *Global News* (8 July 2019), online: <https://globalnews.ca/news/5471632/ontario-white-pines-wind-turbine-cancelled/>.

Costs associated with the termination of FIT and LRP contracts under the July Directive (including the termination of White Pines) reportedly cost Ontario approximately $230 million, according to an entry for "other transactions" in the public accounts for Energy. See: **Exhibit C-2190**, Ontario, Treasury Board Secretariat, *Public Accounts of Ontario, Ministry Statement and Schedules 2018-2019*, vol. 1, online (pdf): <https://files.ontario.ca/tbs-public-accounts-2018-19-volume-1-en.pdf at 2-180>; **Exhibit C-2246**, Mike Crawley, "Doug Ford government spent $231M to scrap green energy projects", *CBC News* (19 November 2019), online: <https://www.cbc.ca/news/canada/toronto/doug-ford-green-energy-wind-turbines-cancelled-230-million-1.5364815>.

[63] In the context of the gas plant cancellations (discussed beginning at paragraph 59), Ontario also could have passed legislation to override municipal bylaws passed in Oakville that prevented development of energy project in certain locations within that municipality. A special report on the Oakville Power Plant Cancellation Costs prepared by the Office of the Auditor General of Ontario (October 2013) noted that Ontario could have used its legislative powers to override Oakville's opposition and authorize construction to go ahead. Ontario had previously pursued this option in the case of the York Energy Centre, a 393 MW gas-fired power plant planned for the Township of King in York region. In July 2010, a regulation was passed that exempted that plant's site from changes made to the Township's official plan. For more details, see O. Reg. 305/10 Energy Undertakings: Exempt Undertakings.

the cancellation and relocation of two gas plants that had been proposed in Oakville and Mississauga. No formal directive was issued by the Minister of Energy to the IESO to do this and no legislation was passed by the government at the time.

60. The Oakville project, which had entered into a Power Purchase Agreement with the OPA in 2009, was cancelled in 2010 after a news release stating that the project would not move forward was issued by Energy on October 7, 2010.[64] No specific authority was referred to in the news release and Ontario made this decision notwithstanding that it was not a party to any contract with the proponent, TransCanada Energy Ltd. ("**TransCanada**"). A letter was then sent to TransCanada by the OPA requesting TransCanada stop all work that same day.[65]

61. The Mississauga project, cancelled in 2011, was terminated by way of negotiation.[66] On October 24, 2011, Energy requested the OPA begin discussions to cancel the project.[67] Energy subsequently confirmed in a new release on November 21, 2011, that the proponent had agreed to stop the project.[68] The cost for cancelling the Oakville and Mississauga plants was estimated by the Auditor General to be between $950 million to $1.1 billion over 20 years.[69]

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64 **Exhibit C-1959**, Energy, Northern Development and Mines, News Release, "Oakville Power Plant Not Moving Forward" (7 October 2010), online: <https://news.ontario.ca/en/release/14587/oakville-power-plant-not-moving-forward>.

65 **Exhibit C-2012**, Ontario, Legislative Assembly, Standing Committee on Justice Policy, "The Cancellation and Relocation of the Gas Plants and Document Retention Issues" (February 2015), online (pdf): <https://www.ola.org/sites/default/files/node-files/committee/report/pdf/2021/2021-02/Remediated%20FINAL%20report%20EN.pdf> at Appendix B [Gas Plant Cancellation Report].

66 *Ibid*. This report also refers to a March 24, 2005, directive from Energy directing the OPA to execute a contract with Greenfield South Power Corp. and not to pursue two other contracts signed with another proponent (Eastern Power). While not directly relevant to this part of my Report, I simply flag this as another example of Energy directing the IESO/OPA to take action in relation to a specific contract. Directives preceding 2016 are not publicly available on the IESO website.

67 While it is not entirely clear whether a formal directive was issued for the OPA to do this, the Gas Plant Cancellation Report cited in footnote 65 above makes no mention of one in its timeline of events in Appendix B.

68 **Exhibit C-1973**, Energy, Northern Development and Mines, News Release, "Statement from Ontario Minister of Energy Christ Bentley" (21 November 2011), online: <https://news.ontario.ca/en/release/19610/statement-from-ontario-minister-of-energy-chris-bentley>.

69 Gas Plant Cancellation Report, *supra* note 65 at Appendix A.

62. A special report on the Mississauga Power Plant Cancellation Costs, prepared by the Office of the Auditor General of Ontario (April 2013) following the two gas plant cancellations, commented on the means by which Ontario could have cancelled the Mississauga project. The report notes that, since there was no termination for convenience clause in OPA contract for that particular project, the following options were considered: (1) unilaterally terminate the contract anyways; (2) pass legislation to terminate the contract and set the amount of compensation to be paid to the proponent; (3) allow construction to finish but do not allow the plant to operate; and (4) negotiate a settlement.[70]

63. Any one of these approaches (i.e., unilateral action to terminate or halt operation, legislation, or negotiation) are equally available means by which I would expect Ontario could direct the IESO to amend a FIT contract.

64. Lastly, and as discussed earlier in this Report, Energy appoints the eight members of the IESO's Board of Directors. While this may not have an immediate impact on the day-to-day operations of the IESO, it no doubt impacts the overall direction, strategy and approach the IESO takes to fulfilling its statutory objectives and contractual obligations.

(iv) Conclusion on Issue One

65. Energy is the key governmental actor that drives Ontario's energy policy, including the IESO's administration of the FIT program and associated FIT contracts. For the reasons given above, it is my opinion that Ontario had both formal and informal tools available to it, through Energy and the Minister of Energy, to direct the IESO to amend the key contractual milestone dates (including the MCOD) in the FIT Contract. In my view, such an amendment could have been achieved through any one of a Minister's Directive, targeted legislative action, unilateral action or negotiation with the IESO and Windstream.

66. Moreover, Ontario has previously inserted itself in the IESO's contractual relationships and has both acted unilaterally and directed the IESO to amend, cancel and even move energy projects. Directing the IESO to amend the FIT Contract, whether formally or informally, would not have been exceptional.

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70 **Exhibit C-1985**, Office of the Auditor General of Ontario, "Mississauga Power Plant Cancellation Costs Special Report" (April 2013), online (pdf): <https://www.auditor.on.ca/en/content/specialreports/specialreports/mississaugapower_en.pdf> at 13.

B. ISSUE TWO: FORD GOVERNMENT PRESENTS CHALLENGING, BUT NOT IMPOSSIBLE, ENVIRONMENT FOR WIND PROJECTS

67. In the following section I review the political and regulatory circumstances facing renewable energy projects in Ontario from 2016 to present. This will include a review and analysis of available data on REA approvals and applications, IESO procurements and cancellations and the attitude of Ontario towards renewable energy projects since June 2018 under Premier Ford. Overall, I conclude that while the current Ontario government has created a more challenging political environment for renewable energy projects, it has not created an impossible regulatory environment, as the Regulatory Framework has been largely unaltered since Windstream obtained the FIT Contract from the IESO in 2010.

(i) REA Projects from 2016 to Present

68. The Ministry of Environment, Conservation and Parks ("**MECP**") databases, that include data with respect to REA approvals and applications (the "**MECP Databases**"), confirms that the MECP received a total of 36 REA applications (not including amendment applications) from 2016 to January 2022.[71] Of these 36 REA applications:

(a) the MECP received a total of approximately 14 REA applications in the two-year period between 2016 and 2018;

(i) nine of the 14 applications (65%) were approved by the MECP;

(ii) three of the 14 applications (21%) were withdrawn by the proponent (all of which were wastewater treatment plant cogeneration facility (bioenergy) applications from the Regional Municipality of Waterloo); and

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71 The MECP Databases consist of (i) **Exhibit C-1956**, MECP "Renewable Energy Projects", available online at: <https://data.ontario.ca/dataset/renewable-energy-projects>; (ii) Environmental Registry of Ontario ("**ERO**"); and (iii) MECP "Access Environment". Searches of the three MECP Databases were completed August 10, 2021 and included a comparison of the relevant information from each database to ensure the REA statistics summarized in this report is as accurate as possible. A further review of the MECP Databases on January 19, 2022, confirmed no changes to the relevant information set out above.

(iii) two of the 14 applications (14%) were among the 758 renewable energy projects cancelled by the Ford government in July 2018 (Strong Breeze Wind Project (57.5 MW)[72] and Otter Creek Wind Farm (50 MW));

(b) the MECP received a total of approximately 22 REA applications in 2018;

(i) 20 of the 22 applications (91%) were submitted in April and June 2018 by a single proponent (a partnership entity of the Métis Nation of Ontario) with respect to a portfolio of 20 small (0.5 MW or less) solar groundmount projects (totalling approximately 10 MW);

(ii) two of the 22 applications (9%) were submitted in March and June 2018 consisting of one solar project (LSRA Solar Project (6.75 MW)) and one wind project (Eastern Fields Wind Power Project (32 MW)); and

(iii) all 22 REA applications were under technical review by the MECP at the time they were cancelled by the Ford government in July 2018;[73] and

(c) no new REA applications were received by the MECP after June 2018.

69. A search of the MECP Databases confirms that an additional three REAs were issued in 2016/2017 with respect to applications that were submitted to the MECP in 2014/2015 (Belle River Wind Project (100 MW), Fairview Wind Farm (16.4 MW) and Disco Road Biogas Utilization Project (2.8 MW)). Thus, a total of 12 REAs have been issued by the MECP since 2016.

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72 The status of the REA application for the Strong Breeze Wind Project is indicated in the MECP Databases as “screening for completeness”. Although there is no application submission date provided in the MECP Databases, we have assumed based on other public information that the application was likely received by the MECP for screening sometime in 2017 and had not yet been accepted as complete by the MECP to progress to technical review at the time the project was cancelled in July 2018.

73 On March 5, 2021, the MECP posted notices in the ERO indicating that the proposal notices with respect to 20 solar groundmount applications submitted in June 2018 by a the Métis Nation of Ontario have been updated to “advise the public that the applications are still under review and that the MECP is awaiting additional information from the applicant in relation to the new regulatory requirements”. Although these projects were included in the list of cancelled contracts by the Ford government in July 2018, the status of the FIT contracts for these 20 projects are unclear based on this recent update by the MECP on the status of the projects’ associated REA applications. I have not been able to find any further update on these projects following a review of publicly available information.

70. Ten of the 12 REAs issued since 2016 (83%) were issued within approximately five to seven months from the date the application was received by the MECP, for an average time of within six months.

71. A search of the MECP Databases confirms that, of the 12 REAs issued since 2016, three were appealed to the OLT. Of these appeals, one (Fairview Wind Farm (16.4 MW)) was granted by the OLT and the project's REA revoked,[74] one (North Kent 1 Wind Project (100 MW)) was withdrawn by the appellant following mediation[75] and one (Nation Rise Wind Farm (100 MW)) was dismissed by the OLT.[76]

72. As a result, 11 of the 12 REAs issued since 2016 (92%) continue in full force and effect today, the majority of which (nine or 75%) were obtained within six months of the REA application without appeal (including one 60 MW FIT wind project (Romney Wind Energy Centre)) and two of which were obtained within eight months (North Kent 1 Wind Project) and 14 months (Nation Rise Wind Farm) of the REA application upon disposition by the OLT of all outstanding appeals.[77]

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74 *Wiggins v. Ontario (Environment and Climate Change)*, 2017, OLT Case No. 16-036 [*Wiggins*]. Approximately three years elapsed between July 24, 2014, when the REA application was received by the MECP, and August 16, 2017, when the OLT decision was issued revoking the REA.

75 *Jakubec v. Ontario (Environment and Climate Change)*, 2016, OLT Case No. 16-076 [*Jakubec*].

76 *Concerned Citizens of North Stormont v. Ontario (Environment, Conservation and Parks)*, 2019, OLT Case No. 118-028 [*CCNS*]. On January 4, 2019, the OLT dismissed the appeal related to the Nation Rise Wind Farm. Subsequently, by letter dated December 4, 2019, the Minister of the Environment, Conservation and Parks revoked the REA issued for the construction and operation of the Nation Rise Wind Farm. On May 13, 2020, the Divisional Court quashed the Minister's decision to revoke the REA, finding that the Minister's decision was unreasonable because the Minister had acted without statutory authority in raising new issues on the appeal, applied the wrong legal test in making his decision, and made factual conclusions that were not supported by the evidentiary record; *Nation Rise Wind Farm Limited Partnership v. Minister of the Environment, Conservation and Parks*, 2020 ONSC 2984 at paras. 14, 31 and 159 [*Nation Rise*].

77 As noted above, the Nation Rise Wind Farm REA was revoked by the Minister of the Environment, Conservation and Parks in December 2019, approximately 11 months after the OLT dismissed the appeal. Construction was halted for approximately five months until May 2020, when the Minister's decision was quashed by the Divisional Court.

73. Of the 11 renewable energy projects with REAs issued since 2016 that continue in full force and effect, 10 (90%) are constructed and operating.[78,79] Six (60%) of the 10 operating projects have a nameplate capacity greater than 40 MW: Belle River Wind Project (100 MW); North Kent 1 Wind Project (100 MW); Romney Wind Energy Centre (60 MW); Nation Rise Wind Farm (100 MW); Loyalist Solar Project (54 MW); and Nanticoke Solar Project (44 MW).

(ii) IESO Energy Renewable Energy Procurements from 2016 to Present

74. From 2009 to 2016, under the *Green Energy Act, 2009*, S.O. 2009, c.12, Sched A. (the "**GEA"**), the OPA/IESO launched various procurement initiatives aimed at increasing renewable energy use in Ontario.

75. The FIT program was developed to encourage and promote greater use of renewable energy sources, including onshore wind, waterpower, renewable biomass, biogas, landfill gas and solar photovoltaic, for electricity generating projects in Ontario.[80] The FIT program, which was the most comprehensive program of its kind in North America, included standard program rules, standard power purchase contracts and standard pricing for qualifying renewable fuel sources (*e.g.*, waterpower, solar, onshore and offshore wind, etc.).[81] For example, for offshore wind power projects of any size, the FIT program stipulated a 20-year Power Purchase Agreement at a fixed price for the electricity generated at 19-cents per kilowatt-

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78 The project that has not yet been commissioned is the City of Toronto's 2.8 MW Disco Road Biogas Utilization Project. The project, with a planned operation target date of end of 2023, according to a City of Toronto July 20, 2021 press release, is in development and will produce renewable natural gas to create a low-carbon fuel blend that will be used to power city vehicles and heat City-owned facilities. The REA application was submitted in October 2015. The REA was issued approximately 16 months later in February 2017 and no appeals were launched. **Exhibit C-2379**, City of Toronto, News Release, "City of Toronto to start producing renewable natural gas from Green Bin organic wastes" (20 July 2021), online: <https://www.toronto.ca/news/city-of-toronto-to-start-producing-renewable-natural-gas-from-green-bin-organic-waste/>.

79 **Exhibit C-2393**, IESO, "Active Contracted Generation List" (30 September 2021), online (Excel): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/contracted-electricity-supply/progress-report-on-contracted-electricity-supply.ashx> [IESO Active Contracted Generation List].

80 **Exhibit C-2428**, IESO, "Feed-in Tariff Program" (2022), online: <https://www.ieso.ca/en/Sector-Participants/Feed-in-Tariff-Program/Overview>.

81 **NAFTA 1, Exhibit C-0724,** Ontario Power Authority, "FEED-IN TARIFF PROGRAM Overview" (2010). This Overview specifically confirms that qualifying renewable fuel sources in the FIT program include offshore wind.

hour.[82] Five rounds of applications and procurements under the FIT program were held. The final FIT application period was in 2016.

76. Early rounds of the FIT program (*i.e.*, FIT 1, FIT 2 and FIT 3[83]) are discussed in my 2014 Report. For purposes of this Report, I focus on contracts executed under FIT 4 and FIT 5, as these procurements related to contracts that were offered in 2016 and after the NAFTA 1 arguments had concluded.

77. Under FIT 4, 930 long-term contracts were offered for approximately 240 MW of small-scale renewable generation (232 MW solar, 3.45 MW bioenergy, 3 MW wind, 2.7 MW waterpower).[84] Of these offers, approximately 271 contracts (including six wind FIT contracts) were entered into by the IESO (63.1 MW solar, 1.1 MW bioenergy, 3.0 MW wind, 1.1 MW waterpower).[85] Based on the IESO Active Contracted Generation List as of June 30, 2021, 247 renewable energy projects under FIT 4 contracts have reached commercial operation, including one wind project (Moorefield Wind (0.5 MW)).[86]

78. Under FIT 5, the final FIT procurement, 390 applications representing approximately 150 MW of small-scale renewable generation were identified as eligible to receive a FIT contract (seven on-farm biogas, one municipal land fill gas and 382 solar projects).[87] No wind or waterpower projects were offered a FIT 5 contract. Of these offers,

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82 *Ibid*. See also page 7 of my 2014 Report.

83 Quarterly progress reports from the IESO for 2014 to 2017 indicate that one wind project was also entered into under FIT 3 (total capacity of 0.1 MW). See **Exhibit C-2008**, **Exhibit C-2015**, **Exhiit C-2080** and **Exhibit C-2145**.

84 **Exhibit C-2033**, IESO, News Release, "IESO expands role of renewable generation in Ontario with latest round of Feed-in-Tariff (FIT) contract offers" (29 June 2016), online: <https://www.ieso.ca/en/Corporate-IESO/Media/News-Releases/2016/06/IESO-expands-role-of-renewable-generation-with-latest-round-of-Feed-in-Tariff-contract-offers>.

85 **Exhibit C-2145**. The IESO's Q4 2017 progress report indicates that six wind contracts were executed under FIT 4, with one of those projects (Moorefield Wind) achieving commercial operations. I have not found any information in the public record or media regarding the status of the following four projects: (1) Ivan Farm (Steven Ivan Farms Inc., 500 kW); (2) Sundown (Sundown Farms Ltd., 500 kW); (3) Oak (D.K. & P. Johnson Oak Farms Limited, 500 kW); and (4) D. Crevits (Dennis Crevits, 500 kw). An additional FIT 4 contract was cancelled by Ontario in 2018, as discussed further below.

86 IESO Active Contracted Generation List, *supra* note 79.

87 **Exhibit C-2119**, IESO, News Release, "IESO Releases Final Round of Contract Offers under Ontario's Feed-in Tariff Program" (20 September 2017), online: <https://www.ieso.ca/en/corporate-ieso/media/news-releases/2017/09/ieso-releases-final-round-of-contract-offers-under-ontarios-fit-program>.

approximately 388 contracts were entered into by the IESO (149.9 MW solar, 2.1 MW bioenergy). Based on the IESO Active Contracted Generation List as of September 30, 2021, 27 renewable energy projects under FIT 5 contracts have reached commercial operation.[88]

79. According to the IESO progress report, as of the end of 2017, the IESO had executed a total of 4,131 FIT contracts. This includes the 758 renewable energy contracts that were cancelled in 2018. As of September 30, 2021, 3,196 projects with FIT contracts were currently in operation (2,511.57 MW onshore wind, 1,496.87 MW solar, 49.81 MW bioenergy, 68.95 MW waterpower).[89] Although only 51 of these projects are wind FIT projects (representing approximately 1.6% of the total number of operating FIT projects), they account for approximately 61% of the total approximately 4,127 MW associated with FIT projects.

80. In 2014, the IESO launched the Large Renewable Procurement ("**LRP**") program. At the time of its launch, Ontario was focussed on procuring large amounts of power from renewable sources in order to meet its 2025 target for renewable energy. As a result, unlike the later FIT procurements, LRP was focussed only on large renewable projects over 500 kW. LRP I, which concluded in April 2016, saw 103 proposals culminate in the execution of 16 contracts for approximately 455 MW of new wind, solar and hydro power.[90] Six projects with contracts under LRP I, including two wind projects (Nation Rise Wind (100 MW) and Romney Wind Energy Centre (60 MW)), representing a total of approximately 280 MW are currently operating.[91]

81. LRP II, which opened in late March 2016, was subsequently cancelled in September 2016.[92]

88 IESO Active Contracted Generation List, *supra* note 79.

89 IESO Active Contracted Generation List, *supra* note 79.

90 IESO, "Feed-in Tariff Program – FIT Archive" (2022), online: <https://www.ieso.ca/en/Sector-Participants/Energy-Procurement-Programs-and-Contracts/Procurement-Archive>; **Exhibit C-2131**, Gowling Lafluer Henderson LLP, *The Electricity Industry in Canada* (Toronto: Thomson Reuters, 2009) (loose-leaf updated 2018, release 4), ch. 9 at 9-57 [Gowlings Text]. According to the IESO Active Contracted Generation List (September 30, 2021), there are no hydro power projects with LRP I contracts currently operating.

91 IESO Active Contracted Generation List, *supra* note 79.

92 LRP II was cancelled following the results of the supply and demand forecasted by the IESO in the Ontario Planning Outlook; Gowlings Text, *supra* note 90.

82. Based on a review of the IESO webpage for "Energy Procurement Programs and Contracts Archive", as well as the IESO's Progress Report on Contracted Electricity Supply, no additional renewable energy-specific procurements have been completed between 2016 and present. That said, new clean (including renewable) energy procurements are on the horizon. On January 27, 2022, the Minister issued a directive to the IESO to: undertake a Medium-Term Request for Proposals ("**RFP**") to procure additional capacity from existing generation or storage facilities; prepare for future Medium-Term RFPs; and design a Long-Term RFP to procure at least 1,000 MW of new capacity.[93] According to Energy, these new procurements are necessary to address the forecasted supply need that is anticipated to grow through the latter part of this decade, at least partially due, in my opinion, to the need to electrify the economy in pursuit of achieving Ontario's and Canada's emissions reduction targets. In order to meet the increasing demand for electricity in a manner that is consist with the governments' legislated climate goals, Ontario and the IESO will have to rely on a mix of all renewable sources, including wind, to fill the supply gap. In my view, wind projects are well-positioned to help fill this gap due to their status as low-cost generators.

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93 As of January 2022, the IESO is in the process of launching the first Medium-Term RFP to secure up to 750 MW of capacity between 2026 and 2029. The IESO has indicated that their goal is to acquire resources "based on their ability to offer services such as capacity, energy and the ability to ramp up and down quickly and not by fuel type." The draft RFP posted to the IESO's website in November 2021 notes that Ontario's energy needs may be met by a variety of diverse resources, including wind. See: **Exhibit C-2432**, IESO, "Medium-Term RFP" (2022), online: <https://www.ieso.ca/en/Sector-Participants/Market-Operations/Markets-and-Related-Programs/Medium-Term-RFP>; and January 27, 2022 Directive, *supra* note 45.

On January 20, 2022, Energy also asked Ontario Power Generation to examine opportunities for new hydroelectric development, the results of which are to be shared with the IESO in furtherance of the IESO's work to develop an achievable pathway to zero emissions in the Ontario electricity sector: **Exhibit C-2424**, Energy, News Release, "Province Asking Ontario Power Generation to Investigate New Hydroelectric Opportunities" (20 January 2022), online: <https://news.ontario.ca/en/release/1001449/province-asking-ontario-power-generation-to-investigate-new-hydroelectric-opportunities>.

Subsequently on January 26, 2022, Energy asked the IESO to assess and report on options to establish a "clean energy credits registry", that would offer tradeable credits to existing non-emitting generation, including nuclear, waterpower, wind, solar and bio-energy. The IESO is also to consider "how the registry can incentivize future investment in new clean generation". The Directive suggests the registry could be launched in January 2023: **Exhibit C-2425**, Minister's Directive to the IESO dated January 26, 2022, online (pdf): <https://www.ieso.ca/-/media/Files/IESO/Document-Library/corporate/ministerial-directives/Letter-from-the-Minister-of-Energy-20220126.ashx>.

(iii) Ford Stance on Renewable Energy and Wind Projects

83. The current Ontario government campaigned in 2018 on a platform that highlighted its opposition to renewable energy projects, in particular, wind projects. During the election campaign, the Progressive Conservative Party released a platform (called "Plan for the People") that promised, among other things, to "stop sweetheart deals by scrapping the *Green Energy Act*, to cancel renewable energy projects in the pre-construction phase, and to re-negotiate other energy contracts."[94] As noted above, less than a week after taking office, the July Directive was released ordering the IESO to "immediately take all steps necessary to wind down all FIT 2, 3, 4 and 5 Contracts where the IESO has not issued a NTP," resulting in the cancellation of 758 renewable energy contracts.[95]

84. The 2018 Ontario Economic Outlook and Fiscal Review (released after the 2018 election but also entitled "A Plan for the People") noted the following with respect to renewable energy projects:

(a) "The Province understands the challenges of high electricity rates for businesses of all sizes and has already cancelled 758 unnecessary and expensive renewable energy contracts […];"[96]

(b) "Ontario ratepayers will benefit from $790 million in savings thanks to the government's decision to cancel 758 renewably energy contracts. Cancellations of these unnecessary and wasteful contracts is part of the plan to cut electricity rates by 12 per cent for families, farms and small businesses;[97]

(c) "Ontario currently has surplus electricity supply, and there are better and less expensive options to meet future electricity supply and capacity needs;"[98] and

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94 *Grasshopper I*, *supra* note 4 at para. 15.

95 Refer to the July Directive; *Grasshopper I*, *supra* note 4 at para. 16.

96 **Exhibit C-2130**, A Plan for the People 2018 Ontario Economic Outlook and Fiscal Review Background Papers (2018), online (pdf): <https://www.fin.gov.on.ca/fallstatement/2018/fes2018-en.pdf> at vii [A Plan for the People 2018]. As the only copy I have found in my public searches is dated October 2018, it is likely not the exact version that was campaigned on or referred to in the decision of *Grasshopper I* above.

97 *Ibid* at 48.

98 *Ibid* at 63.

(d) "The previous government had ratepayers subsidize unnecessary and expensive new energy projects to produce energy that people do not need. The proposed legislation to repeal the *Green Energy Act, 2009* would make amendments to the *Environmental Protection Act*, which would enhance the government's authority to make regulations prohibiting the issuance of Renewable Energy Approvals where the need for the electricity has not been demonstrated."[99]

85. In line with the statements above, critique of renewable energy by Premier Ford and his government has predominantly focussed on two key aspects: (1) costs to ratepayers; and (2) local opposition to projects, neither of which are connected to the purpose of the Moratorium (*i.e.*, the lack of understanding of environmental impacts).[100]

86. Regarding the cost of renewable energy projects to ratepayers, since July 2018, Ontario has said the following:

(a) "Since the introduction of the Feed-in Tariff (FIT) program in 2009 and the Large Renewable Procurement (LRP) initiative in 2014, the IESO has entered into a significant number of renewable energy contracts. These procurement initiatives have contributed to the cost pressures… there are other means of meeting future energy supply and capacity needs at materially lower costs than long-term contracts that lock in the prices paid for these resources.";[101]

(b) "We clearly promised we would cancel these unnecessary and wasteful energy projects as part of our plan to cut hydro rates by 12 per cent for families, farmers and small businesses.";[102]

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99 *Ibid* at 65.

100 It is significant, in my opinion, that neither Premier Ford nor the current Ontario government has focussed their critiques of renewable energy (in particular, wind) on the environmental impacts of these projects. Part of the stated reason for the Moratorium was that Ontario, at the time, felt that too little was known about the environmental impact of offshore projects on freshwater lakes and that, consequently, it would not proceed with any offshore wind projects "while further scientific research is pending." See: **Exhibit C-1969**, Environment, Conservation and Parks, News Release, "Ontario Rules Out Offshore Wind Projects" (11 February 2011), online: <https://news.ontario.ca/en/release/16973/ontario-rules-out-offshore-wind-projects>.

101 July Directive, *supra* note 50.

102 Cancellation News Release, *supra* note 57.

(c) "We're making sure we're getting the priorities right. This government here, the PC government—no one in the country has ever moved quicker for the taxpayers than this government right here. The Leader of the Opposition could look at our top 20—our top 20 where we're already saving hundreds of millions of dollars for the taxpayers, no matter whether it's getting rid of the wind turbines—over 700 turbines are gone, over $700 million is saved back into the taxpayers' pocket.";[103]

(d) "The original *Green Energy Act* led to the disastrous feed-in-tariff program and skyrocketing electricity rates for Ontario families, and took away powers from municipalities to stop expensive and unneeded energy projects in their communities. […] The days of sweetheart deals for energy insiders and unpopular projects forced on local municipalities are over.";[104]

(e) "The energy policies that they [the official opposition] supported, along with the Liberals, destroyed this province. We cancelled the White Pines Wind Project and made a lot of people happy in Minister Smith's area, and across the province. It's unfortunate that we can't cancel the rest of them—driving up costs anywhere from 14 cents per kilowatt to 40 cents. They're gouging the people. There has never been a bigger transfer of wealth from the hard-working people of Ontario to the political insiders than this energy project and these—.";[105] and

(f) "If we had the chance to get rid of all the wind turbines, we would, because it's totally unrealistic. We're paying 80-some-odd cents a kilowatt versus seven or eight cents. Something is broken here. There's no one out there that agrees on

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[103] **Exhibit C-2174**, Ontario, Legislative Assembly, "Government's Agenda", *Official Report of Debates (Hansard*), No. 23B (17 September 2018), online: <https://www.ola.org/sites/default/files/node-files/hansard/document/pdf/2018/2018-09/17-SEP-2018_L023B.pdf> at 996 (Hon. Doug Ford).

[104] **Exhibit C-2176**, Energy, Northern Development and Mines, News Release, "Ontario's Government for the People Introduces Legislation to Repeal the Green Energy Act" (20 September 2018), online: <https://news.ontario.ca/en/release/50043/ontarios-government-for-the-people-introduces-legislation-to-repeal-the-green-energy-act>.

[105] **Exhibit C-2218**, Ontario, Legislative Assembly, "Climate Change", *Official Report of Debates (Hansard*), No. 104 (9 May 2019), online: <https://www.ola.org/sites/default/files/node-files/hansard/document/pdf/2019/2019-05/09-MAY-2019_L104_0.pdf> at 4911 (Hon. Doug Ford).

paying 80 cents a kilowatt and making all the wind turbine folks multi-multimillionaires on the backs of the ratepayers."[106]

87. Regarding the second key aspect, local opposition to renewable energy projects, since July 2018, Ontario has said the following:

(a) "The government intends to introduce urgent legislation that will: … Cancel the White Pines Wind Project, effective today, which received notice to proceed during the election period before the government had a chance to make any decision on the project for the benefit of the people of Prince Edward County";[107]

(b) "Your new government will also respect our municipal partners. Whether by […] Or respecting the wishes of rural municipalities by putting an end to unfair, unaffordable green energy contracts that have been imposed on them over local objections";[108]

(c) "We called the legislature back immediately after taking office, because we believed there were too many urgent priorities to wait until the fall. […] It starts with these so-called green energy projects. The previous government decided to ram these wind and solar farms into the backyards of communities that didn't want them.";[109]

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106 **Exhibit C-2247**, Ontario, Legislative Assembly, "Government Contracts", *Official Report of Debates (Hansard*), No. 129 (21 November 2019), online: <https://www.ola.org/sites/default/files/node-files/hansard/document/pdf/2019/2019-11/21-NOV-2019_L129.pdf> at 6215 (Hon. Doug Ford) [November 2019 Hansard].

107 **Exhibit C-2160**, Government House Leader's Office, News Release, "Ontario's Government for the People Shares Top Legislative Priorities for Upcoming Sitting" (10 July 2018), online: <https://news.ontario.ca/en/release/49704/ontarios-government-for-the-people-shares-top-legislative-priorities-for-upcoming-sitting>.

108 **Exhibit C-2161**, Office of the Premier, Speech from the Throne, "A Government for the People" (12 July 2018), online: <https://news.ontario.ca/en/speech/49713/a-government-for-the-people>.

109 **Exhibit C-2169**, Office of the Premier, Speech, "Premier Doug Ford's remarks at the AMO 2018 Annual Conference" (20 August 2018), online: <https://news.ontario.ca/en/speech/49909/premier-doug-fords-remarks-at-the-amo-2018-annual-conference>.

(d) "[...] Along with repealing the *Green Energy Act*, the new legislation gives municipalities the final say over the siting of future energy projects in their communities.";[110] and

(e) "These wind turbines were rammed down the throats of communities that didn't even want them. The reason that people are doing their laundry at 9 o'clock at night and 10 o'clock at night is because the opposition and the former Liberal government were gouging, absolutely gouging, the people of Ontario."[111]

88. The five studies that I was able to obtain copies of (which were released between 2011 and 2016) did generally recognize the limited information available on the impact of offshore wind, particularly in a fresh water environment like the Great Lakes.[112] In my view, this is not fatal to the approval of future offshore wind projects in the Great Lakes. As I discuss in greater detail under "Issue Three", I would expect an adaptive management approach to be relied on by the regulators where "knowledge gaps" remain and, in my experience, this approach has been relied on by Ontario in other contexts, such as the regulation of onshore wind and hydropower projects. I am not aware of any further studies that have been commissioned to date by Ontario with respect to the potential environmental impacts of offshore wind.[113]

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110 **Exhibit C-2184**, Energy, Northern Development and Mines, News Release, "Ontario Scraps the Green Energy Act" (7 December 2018), online: <https://news.ontario.ca/en/release/50684/ontario-scraps-the-green-energy-act>. I describe below in "Ford Impact on Energy Legislation, including the Regulatory Framework" the expanded powers given to municipalities to reject renewable energy projects through amendments made by the current Ontario government to the *Planning Act*, R.S.O. 1990, c. P.13 (the "***Planning Act***").

111 November 2019 Hansard, *supra* note 106 at 6214 (Hon. Doug Ford).

112 The study on *Potential Effects of Offshore Wind Power Projects on Fish and Fish Habitat in the Great Lakes, Aquatic Research series 2011-01*, prepared by Sarah Nienhuis and Erin S. Dunlop, Aquatic Research and Development Section, MNR (2011) concluded on page 60 that: "if care is taken to properly site project locations, avoid sensitive habitat areas, employ available options or continue to develop new options for mitigation, and conduct appropriate biological monitoring, the potential impacts of offshore wind power production could in fact be minimal." See **Exhibit C-1970**.

113 As I note above, this is significant because the Moratorium indicated that Ontario would not proceed with any offshore wind projects "while further scientific research is conducted." Yet, Ontario has only commissioned and received five studies since the Moratorium came into effect and none since the last report was delivered in 2016. These studies are: (1) **Exhibit C-2030**, *Assessment of Offshore Wind Farm Decommission Requirements*, prepared by DNV-GL (May 17, 2016); (2) **Exhibit C-2032**, *Technical Evaluation – Sound Propagation Modelling for Offshore Wind Farms*, prepared by Valcoustics Canada Ltd. (June 1, 2016); (3) **Exhibit C-1971**, *Offshore*

(iv) Ford Impact on Energy Legislation, including Regulatory Framework

89. Despite the well-documented opposition of the current Ontario government to wind projects, little has changed in the Regulatory Framework since the election of Premier Ford's government in June 2018. In my opinion, and as discussed further below, but for the Moratorium, an offshore wind project, such as the Project, would be permitted under the current Ontario government in the same manner described in my 2014 Report and 2015 Supplementary Report.

90. For example, Part V.0.1 of the *Environmental Protection Act*, R.S.O. 1990, c. E.19 (the "***EPA***"), which is comprised of sections 47.1 through to 47.7 (regarding renewably energy and the issuance of REAs), has not been amended since 2010.

91. O. Reg. 359/09, which deals specifically with REAs issued under Part V.0.1 of the *EPA*, has only been amended twice since 2018: (1) to add eligibility requirements that enhance municipal authority over renewable energy projects; and (2) to add eligibility requirements related to electricity demand and prohibit the issuance of REAs for large wind projects (i.e., Class IV wind facilities ≥ 0.05 MW) if their Power Purchase Agreements were cancelled by the IESO.[114] The latter amendment was clearly intended to prevent the MECP from issuing a REA to a project that had been cancelled under the July Directive. Changes to the *EPA* resulting from the *Green Energy Repeal Act, 2018*, included the right of the Lieutenant Governor in Council to make regulations that could prohibit the issuance or renewal of REAs in prescribed circumstances, such as where the demand for the electricity that would be generated

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Wind Power Coastal Engineering Report – Synthesis of Current Knowledge and Coastal Engineering Study Recommendations, prepared by Baird and Associates Coastal Engineers Ltd. and Beacon Environmental (May 2011); (4) **Exhibit C-1970**, *The Potential Effects of Offshore Wind Power Projects on Fish and Fish Habitat in the Great Lakes, Aquatic Research series 2011-01*, prepared by S. Nienhuis and E.S. Dunlop (2011); and **Exhibit C-2490** (5) *Offshore Wind Power Projects in the Great Lakes: Background Information and Science Consideration for Fish and Fish Habitat, Aquatic Research Series 2011-02*, prepared by S. Nienhuis and E.S. Dunlop (2011).

114 Regarding the second of these two changes, ERO Notice No. 013-3800 indicated that: "the amended regulation prohibits renewable energy approvals for Class 4 wind facilities from being issued if: (1) the facility had an agreement with the IESO as part of the Large Renewable Procurement process; (2) that agreement has subsequent been terminated by the IESO; (3) a stop work notice was issued." See section 75.3 of O. Reg. 359/09. This change does not apply to the Project since it was not issued a Power Purchaser Agreement under LRP, but also because the Project would come in direct contact with surface water other than in a wetland, making it a Class V wind facility. **Exhibit C-2221**, ERO Notice No. 013-3800, "Amendments to the Renewable Energy Approvals Regulation (Ontario Regulation 359/09)" (11 June 2019), online: <https://ero.ontario.ca/notice/013-3800>.

as part of engaging in the renewable energy project has not been demonstrated in accordance with the regulations.[115]

92. Section 6 of O. Reg. 359/09, which defines the classes of "wind facilities" (including Class V offshore wind projects) eligible for a REA, has not been amended since 2016. Notwithstanding the two changes described above, the Regulatory Framework to permit an offshore wind project remains substantially the same under the current Ontario government. In other words, notwithstanding the Moratorium, Class V offshore wind projects, such as the Project, are still "wind facilities" eligible to obtain a REA under the *EPA*.

93. However, Premier Ford has left his government's mark on legislation governing renewable energy development in other ways. In December 2018, the *Green Energy Repeal Act, 2018*, S.O. 2018, c. 16 (the "***Green Energy Repeal Act***") was passed. This legislation repealed the GEA (and several regulations) in its entirety and resulted in the two changes to the *EPA* that I discussed in paragraph 91 above. There have also been several other amendments made under the current Ontario government that were designed to thwart renewable energy development. For example, the prohibition of any appeal of a municipality's refusal or failure to approve zoning bylaws or official plan amendments to allow renewable energy undertakings was removed.[116] In the *Planning Act*, the following addition was made to section 34 (zoning bylaws):

No appeal re renewable energy undertakings

(a) (11.0.7) Despite subsection (11), there is no appeal in respect of all or any part of an application for an amendment to a by-law if the amendment or part of the amendment proposes to permit a renewable energy undertaking.

Exception re Minister

(b) (11.0.8) Subsection (11.0.7) does not apply to an appeal by the Minister.

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[115] *Environmental Protection Act*, R.S.O. 1990, c. E. 19, s. 176(4.1)(e.1) [*EPA*]. As of January 2022, there have been no regulations created under section 176(4.1)(e.1) of the *EPA*.

[116] **Exhibit C-2177**, *Green Energy Act Repealed and Municipal Powers to Oppose Renewable Energy Reinstated*, Davies Ward Philips & Vineberg LLP (21 September 2018), online: <https://www.dwpv.com/en/Insights#/article/Publications/2018/Green-Energy-Act-Repealed>.

94. Notwithstanding these limitations, the *Green Energy Repeal Act* did not eliminate the possibility of returning to a state where renewable energy development is promoted by legislation; it has maintained the right of the Lieutenant Governor in Council to enact regulations under the *Electricity Act* that promote renewable energy in the future.[117]

95. Moreover, a number of consequential amendments related to renewable energy development (including the consequences of cancellations) have arisen from legislation passed under the current Ontario government, such as:

(a) Schedule 1 of the *Fixing the Hydro Mess Act, 2019*, c. 6, which amended certain sections of the *Electricity Act* related to procurement contracts, including by adding provisions regarding the payment of amounts by the IESO as a result of the termination of a procurement contract under Order in Council 1003/2018, made on July 5, 2018;[118]

(b) Schedule 5 of the *Supporting Recovery and Competitiveness Act, 2021*, S.O. 2021, c. 25 ("***SRCA***"), which repealed provisions of the *Electricity Act* that provided priority connection access to renewable energy generation facilities;[119] and

(c) Schedule 19 of the *SRCA*, which likewise amended the *OEBA* to remove a condition applicable to every licence issued to a transmitter or distributor to provide priority connection access for specified renewable energy generation facilities. It also removed "the use of renewable energy sources" from the list of factors the OEB must consider under section 96(2) when deciding whether the whether the construction, expansion or reinforcement of the electricity

117 *Ibid*. Section 25.35.1 of the *Green Energy Repeal Act, 2018* states that: "The Lieutenant Governor in Council may, by regulation, designate renewable energy projects, renewable energy sources or renewable energy testing projects for the following purposes: (1) to assist in the removal of barrier to and to promote opportunities for the use of renewable energy sources; (2) to promote access to transmission systems and distribution systems for proponents of renewable energy projects."

118 *Fixing the Hydro Mess Act, 2019*, S.O. 2019, c. 6, Sched. 1. According to documents provided by the IESO, Order in Council 1003/2018 was the official Executive Council of Ontario order in Council that approved the July Directive.

119 *Supporting Recovery and Competitiveness Act, 2021*, S.O. 2021, c. 25, Sched. 5.

transmission line or electricity distribution line, or the making of the interconnection, is in the public interest.[120]

96. Regarding the broader electricity sector, I note for completeness only that the current Ontario government has also made several changes to how Hydro One Inc. is managed, the objects of Ontario Power Generation, the salaries of executives at Hydro One Inc. and Ontario Power Generation, and conservation and energy efficiency initiatives under the *Electricity Act*, among other things. In addition, in my view, the *Termination Act* likely represents the most drastic measure taken by the current Ontario Government to date with respect to renewable energy development.

97. Although the current Ontario government has been active in making legislative changes within the energy sector since coming to power in July 2018, it has not eliminated the possibility for new wind projects to be built in the province. While certain priorities afforded to renewable energy projects have been removed, and additional eligibility requirements added, these changes have not fundamentally altered the core Regulatory Framework or stifled the ability of the IESO to enter into future Power Purchase Agreements with wind project proponents. In addition, none of the changes made under Premier Ford to date have targeted offshore wind projects specifically.

98. Given Premier Ford's strong public opposition to wind projects in particular, it is perhaps surprising that more drastic measures have not been taken to prevent new wind projects from being built in the province. As a result of the various changes I have described above, it is my opinion that the Regulatory Framework has largely remained intact under Premier Ford. Therefore in my opinion, but for the Moratorium, an offshore wind project, such as the Project, would be permitted under the current Ontario government in the same manner described in my 2014 Report and 2015 Supplementary Report.

(v) Cancellation of Renewable Energy Projects

99. I have reviewed the IESO's annual Q4 progress reports on contracted electrical supply for 2014 to 2017. Based on this review, by approximately 2015, a total of 63 FIT contracts had been executed by the OPA/IESO for onshore wind projects under FIT

[120] *Ibid*, Sched. 19. As a result of this amendment, currently the only public interest factor to be considered is "the interests of consumers with respect to prices and the reliability and quality of electricity service"; see *OEBA*, s. 96(2).

procurements in 2010 (FIT 1), 2011 (FIT 1) and 2014 (FIT 3).[121] By the end of 2015, 61 of these contracts remained active (60 FIT 1 contracts and one FIT 3 contract),[122] and by the end of 2016, 54 of these remained active (53 FIT 1 contracts and one FIT 3 wind contract).[123] An additional six wind FIT contracts were entered into under FIT 4 in 2016, for a total of 60 wind FIT contracts by the end of 2016. No wind contracts were entered into under FIT 5.

100. Approximately 16 contracts were also executed under LRP I in 2016, including five wind LRP contracts. As noted above, the LRP II procurement process was suspended on September 27, 2016. Consequently, there were no contracts executed under LRP II and a total of 65 wind FIT and LRP contracts had been executed by the end of 2016.

101. As stated above, a comparison of the year-end contract data in the IESO's 2015 and 2016 Q4 progress reports reveals that the total number of FIT 1 wind contracts decreased by seven during 2016 (from 60 contracts in 2015 to 53 contracts in 2016). Other public information suggests that five of these seven contracts were "quietly" cancelled in a July 2016 announcement by the IESO (Ostrander Point Wind Energy Park (22.5 MW),[124] Trout Creek (10 MW), Meyer Wind Farm (4 MW), Majestic Wind Farm (2 MW) and Clarington Wind Farm (8.1 MW)).[125] The remaining two of the seven deleted FIT 1 wind contracts in the IESO's 2016 year-end data may have included a FIT 1 wind contract (Big Thunder Windpark (32 MW)) with respect to which the proponent's REA application was refused by the MECP and a FIT I wind project that was terminated by the proponent (Skyway 126 Wind Project (10 MW)).[126]

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121 **Exhibit C-2008**, IESO Q4 2014 Progress Report.

122 **Exhibit C-2015**, IESO Q4 2015 Progress Report.

123 **Exhibit C-2080**, IESO Q4 2016 Progress Report.

124 The REA for Ostrander Point Wind Energy Park was also revoked, as the proponent did not appeal a 2015 Ontario Court of Appeal decision upholding a 2013 OLT decision that the remedies proposed to protect endangered turtles were not sufficient: *Prince Edward County Field Naturalists v. Ostrander Point GP Inc.*, 2015 ONCA 269. I note that the REA was revoked prior to the announcement that cancelled Ostrander Point Wind Energy Park's FIT contract.

125 **Exhibit C-2059**, Wind Concerns Ontario, "IESO cancels Feed In Tariff contracts for 5 wind power projects" (2017), online: <http://www.windconcernsontario.ca/ieso-cancels-feed-in-tariff-contracts-for-5-wind-power-projects/> and **Exhibit C-2034**, Rob Learn, "Province cancels Trout Creek wind contract", *NorthBayNipissing.com* (27 July 2016), online: <https://www.northbaynipissing.com/news-story/6785199-province-cancels-trout-creek-wind-contract/>. I have not been able to locate a copy of the actual IESO announcement from July 2016 in my public searches.

126 **Exhibit C-2026**, ERO Notice No. 011-8937, "Horizon Wind Inc." (24 February 2016), online: <https://ero.ontario.ca/archive/011-8937>; **Exhibit C-2113**, Wind Works Power Corp, News Release, "Wind Works Power Ontario Update – 48MW reach COD, end of Ontario Operations"

102. The IESO's Q4 2017 progress report reveals that by the end of 2017, one further FIT 1 contract was discontinued, for a total of 59 wind FIT contracts remaining (52 FIT 1 contracts (48 of which had reached commercial operation), one FIT 3 contract and six FIT 4 contracts (one of which had reached commercial operation)). In 2017, the REA issued to wpd Fairview Wind Incorporated (Fairview Wind Farm (16.4 MW)) was revoked upon appeal to the OLT and may account for the decrease in the total number of FIT 1 contracts evident in the IESO's 2017 year-end data.

103. Although I have not been able to locate any public information on the status of the one FIT 3 wind contract and four FIT 4 wind contracts, the current data suggest that these contracts were also likely discontinued (for reasons unknown to me) at some point prior to July 2018. As a result, based on my review of publicly available information, as of July 2018, 59 onshore wind FIT and LRP contracts remained (52 FIT 1 contracts, two FIT 4 contracts and five LRP contracts).

104. From July 2018 to present (the period for which the current Ontario government has been in power), approximately three more wind FIT contracts were cancelled. Two of these projects were cancelled under the July Directive announcing the cancellation of 758 contracts (Blind River Marina (FIT 1 - 0.05 MW) and "Matthew Rhody and Joyce Rhody" (FIT 4 - 0.5 MW)). White Pines (FIT 1 - 18.45 MW), was cancelled by the *Termination Act*. Three other wind projects with contracts issued under LRP I were also cancelled under the July Directive (Eastern Fields (32 MW), Strong Breeze (57.5 MW) and Otter Creek Wind Farm (50 MW)), leaving the total number of wind FIT and LRP contracts following the July Directive at 53 (50 FIT 1 contracts, one FIT 4 contract and two LRP contracts).

105. According to the IESO Active Contracted Generation List (as of September 30, 2021), all of the remaining 53 wind FIT and LRP projects have reached commercial operation. Based on my above analysis, approximately 12 wind FIT and LRP contracts were cancelled by

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(23 August 2017), online: <https://www.thenewswire.com/archives/LYzFKyPo-wind-works-power-ontario-update-48mw-reach-cod-end-of-ontario-operations.html>. In this announcement, the proponent of Skyway 126 references the following as contributing factors to their decision to terminate the project: "Given that the government of Ontario recently cancelled the previously repeatedly announced second bidding process for up to 850 MW renewable energy, and given the loss incurred by Cloudy Ridge due to repeated governmental uncertainties, Wind Works has decided to terminate any activities in the uncertain and unpredictable Ontario renewable energy market. Consequently, WW [Wind Works] has cancelled its previous plans to invest a further $300 Million in Ontario and to focus instead on the US market."

the IESO between 2016 and present, representing approximately 18% of the total 68 wind FIT (63) and LRP (five) contracts that were executed by the OPA/IESO under the FIT and LRP procurement programs.

1) Cancellation and Appeals of REAs from 2016 to Present

106. There has only been one case of an appeal of a cancelled REA for a FIT wind project since 2016, *Nation Rise Wind Farm Limited Partnership v. Ontario (MECP),* 2020 ONSC 2984. In this case, the proponent, Nation Rise Wind Farm Limited Partnership and Nation Rise Wind Farm GP Inc. (collectively, "**Nation Rise**"), had been issued a REA in May 4, 2018, for a 100 MW onshore wind project. An appeal of the REA by the Concerned Citizens of North Stormont ("**CCNS**") was dismissed by the OLT on January 4, 2019. However, on February 4, 2019, CCNS further appealed the OLT decision to the Minister of the Environment, Conservation and Parks.[127]

107. Nation Rise began constructing the project in May 2019, while the appeal to the Minister was pending. Nation Rise did so because their Power Purchase Agreement with the IESO required the project to achieve COD by March 9, 2020, and the IESO had advised Nation Rise that it would terminate the Power Purchase Agreement if this deadline was not met.[128] Nation Rise noted in their submissions that this insistence on achieving the COD deadline was "inconsistent with the past practice of the independent electricity operator, but consistent with the Progressive Conservative Party's agenda in relation to wind energy contracts."[129]

108. The Divisional Court noted in its decision that during the course of the Ministerial appeal, both Nation Rise and the Director under the *EPA* "emphasized to the Minister that the appeal could not be viewed as an avenue for effecting broader policy change in the area of granting renewable energy approvals."[130] Notwithstanding such warning, the Minister ultimately

127 At the time, the *EPA* provided two appeal routes from an OLT decision on a REA: (1) to the Divisional Court on a question of law; and (2) to the Minister on any matter other than a question of law. Section 145.6(2) of the *EPA*, which allowed for the appeal of an OLT decision on a REA to the Minister, was repealed in 2021.

128 *Nation Rise*, *supra* note 76 at paras. 42-43. For completeness, I note that the REA for Ostrander Point Wind Energy Park (22.5 MW) was revoked by the OLT in 2013, and subsequently appealed to the Divisional Court in 2014 and the Ontario Court of Appeal in 2015.

129 *Ibid* at para. 44.

130 *Ibid* at para. 25. None of the submissions before the Minister, including by the appellant CCNS, addressed the issue of bat maternity colonies.

decided to revoke Nation Rise's REA on the grounds that harm to bats (in particular, to bat maternity colonies) would be serious and irreversible. The Minister concluded that: "Considering this harm together in the context of the minimal contribution the project is likely to have on the electricity supply in Ontario, in my view it is not appropriate to confirm the decision of the Tribunal, but rather to amend it to revoke the approval."[131]

109. The Divisional Court ultimately found that the Minister's decision to revoke Nation Rise's REA was "unreasonable" and that the "process by which he reached the decision was procedurally unfair."[132] (The Minister revoked the REA solely on the basis of an issue that was not before the OLT and that no evidence had been submitted on during the appeal.) As a result, the Minister's decision was quashed. In addition, the Divisional Court found that this was "one of those exceptional cases" where the matter should not be remitted back to the Minister for redetermination.[133] Instead, the Divisional Court reinstated the original decision of the OLT.[134] One of the factors supporting the Court's decision on remedy was the deadline for completion of the project, since the IESO had advised that it would terminate Nation Rise's Power Purchase Agreement if commercial operation was not achieved on time.[135]

110. During the appeal, Nation Rise also made several allegations of bias against Ontario (including the Minister of the Environment, Conservation and Parks and the IESO). These allegations included reference to the following: the inconsistency of the IESO's practice in relation to the COD deadline before and after the election of the current Ontario government; Premier Ford's statements that he would "take any opportunity to get rid of all wind projects"; and the impugned Minister's public criticism of wind projects prior to his appointment as Minister of the Environment, Conservation and Parks.[136] As the Divisional Court found the Minister's decision to be unreasonable and devoid of procedural fairness, the Court did not go on to

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131 *Ibid* at para. 39.

132 *Ibid* at para. 6.

133 *Ibid*.

134 *Ibid*.

135 *Ibid* at para. 162. Another factor considered by the Divisional Court in concluding the appropriate remedy was to re-instate the original decision of the OLT (then ERT) was that the Minister had made clear in his decision that "the only basis on which he revoked the REA was his finding with respect to the bat maternity colonies. He explicitly stated that he found that the OLT decision was "thorough and well reasoned", and that he saw no errors in the OLT's decision with respect to other arguments raised regarding stray voltage and noise (para. 161).

136 *Ibid* at paras. 44-48.

consider Nation Rise's allegations of bias.[137,138] Ontario did not further appeal the Divisional Court's decision[139] and agreed to pay Nation Rise's legal fees.[140]

2) Cancellation and Appeals of Power Purchase Agreements from 2016 to Present

111. Since 2016, there have been a handful of cases regarding the cancellation of Power Purchase Agreements (including FIT contracts) by the OPA/IESO. Notably, those cases challenging the ability of the IESO to terminate a FIT contract for failing to meet commercial operation all arose after the current Ontario government came to power in June 2018.

112. I discussed *APPEC* earlier under "Ability of the IESO to Amend a FIT Contract". Although the decision centers around an amendment to a FIT contract, rather than its termination, it is worth mentioning again that the Court in *APPEC* found the IESO had "almost

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137 *Ibid* at para. 155.

138 I note for completeness that the case of *Trillium Power Wind Corp. v. Ontario (Ministry of Natural Resources)*, 2013 ONCA 683, dealt with the cancellation of an offshore wind project following the announcement of the Moratorium. However, as the proponent in that case did not have a Power Purchase Agreement or REA in hand, and that case arose prior to the current Ontario government coming into power, it is not relevant to my opinions herein aside from my general comments on the Moratorium outlined in Part I. In October 2021, Trillium's motion for summary judgment in an action seeking to hold Ontario liable for damages resulting from its alleged use of the Moratorium to specifically target Trillium was dismissed. See *Trillium Power Wind Corp. v. Ontario*, 2021 ONSC 6731.

139 Following the decision, a spokesperson from the MECP indicated that the government was "disappointed" with the outcome of the appeal. Opposition parties, including the Green Party, criticized the decision of the Minister and allege it was "politically-motivated": **Exhibit C-2298**, Emma McIntosh, "Court overturns Ford government's decision to cancel partially built wind farm", *Canada's National Observer* (14 May 2020), online: <https://www.nationalobserver.com/2020/05/14/news/court-overturns-ford-governments-decision-cancel-partially-built-wind-farm> and **Exhibit C-2299**, Canadian Press, "Ontario government's cancellation of wind farm quashed", *Toronto Sun* (14 May 2020), online: <https://torontosun.com/news/provincial/ontario-governments-cancellation-of-wind-farm-quashed>.

140 See *Nation Rise*, *supra* note 76 at paras.164-167. The parties agreed on costs and Nation Rise's legal fees were paid by Ontario ($126,500) and CCNS ($60,000). The Ontario Auditor General's report on the Public Accounts of Ontario (December 2020) noted that Ontario was required to pay approximately $100,000 of legal costs incurred by Nation Rise in connection with the matter: **Exhibit C-2334**, Office of the Auditor General, Public Accounts of Ontario (December 2020), online (pdf): <https://www.auditor.on.ca/en/content/annualreports/arreports/en20/20VFM_00publicaccts.pdf>. No further investigation by the Auditor General into the Nation Rise Wind Farm cancellation has taken place. A request from a Cabinet minister, the Legislative Assembly or a Legislative Committee would be required for a special investigation.

unlimited discretion" when it came to the running of the FIT program, including the ability to "amend the [FIT] Contract in order to comply with any existing or new requirements."[141]

113. In *Grasshopper Solar Corp. v. Independent Electricity System Operator*, 2019 ONSC 6397 ("***Grasshopper I***"), the applicant (Grasshopper Solar Corp. and several affiliated entities, collectively referred to here as "**Grasshopper**") was in the process of constructing 18 solar projects that had been awarded FIT contracts in 2016 under FIT 4. These contracts had MCOD dates of either August or September 2019 and Grasshopper sought an advanced ruling that failure to achieve commercial operation by the MCOD does not constitute a Supplier Event of Default under the projects' FIT contracts for which the IESO could terminate the contracts.[142]

114. According to the IESO, as stated in *Grasshopper I*, from June 17, 2013 (the date when the OPA put out a bulletin regarding project delays and potential Events of Default advising suppliers that the OPA would not act upon its termination rights where a complete NTP request had not been provided (the "**Bulletin**")[143]) to March 2019, "no FIT Contracts were terminated by it [the IESO] for failure to achieve commercial operation by the MCOD."[144] However, on March 29, 2019, after the current Ontario government came into power, the IESO sent a letter to its suppliers warning[145] them that the IESO would now be taking the following position with respect to MCOD deadlines:

(a) "Failure to achieve commercial operation by the FIT Contracts' MCOD constitutes a Supplier Event of Default which entitles the IESO to terminate the contract; and

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141 *APPEC*, *supra* note 15 at para. 85.

142 *Grasshopper I*, *supra* note 4 at para. 54.

143 According to the decision, following the release of this bulletin, the IESO sent form letters to suppliers who failed to achieve commercial operation by the MCOD in which it stated that failing to achieve commercial operation within 18 months of the MCOD would constitute a Supplier Event of Default under their FIT contracts. This essentially extended the deadline for suppliers to meet their MCOD deadlines by 18 months (see *Grasshopper I*, *supra* note 4 at para. 13).

144 *Grasshopper I*, *supra* note 4 at paras. 12, 14.

145 Although I do not have a copy of this letter to confirm whether the word "warning" is used by the IESO (the court defined this letter as the "Warning Letter"), part of the letter is reproduced at paragraph 17 of *Grasshopper I* and states that: "This notice is to remind you that the Milestone Date for Commercial Operation for the FIT Contract is […] PLEASE NOTE that except as expressly provided in the FIT Contract, the MCOD will not be extended. Failure to attain Commercial Operation by this date will constitute a Supplier Event of Default, for which the IESO will terminate the FIT Contract pursuant to Section 9.2(a)."

(b) Contrary to the practice set out in the Bulletin, the IESO will terminate FIT Contracts if commercial operation is not achieved by the MCOD."[146]

115. Grasshopper sought to rely on the past practice of the IESO, as evidenced in the Bulletin, as well as a variety of contractual arguments for its position that the IESO did not have the ability to terminate its FIT contracts for failure to achieve commercial operation by the MCOD, including for the following reasons:

(a) the wording of the FIT Contracts and their context make it clear that failure to achieve commercial operation by the MCOD is not a Supplier Event of Default that allows the IESO to terminate the contract;

(b) the IESO's interpretation of its termination rights under the FIT Contracts is commercially unreasonable; and

(c) if there is any ambiguity as to whether failure to achieve commercial operation by the MCOD is a Supplier Event of Default, *contra proferentem* should be applied and the FIT contracts construed against the IESO.[147]

116. The Court rejected all of Grasshopper's arguments and concluded that the IESO did have the right to terminate Grasshopper's FIT contracts for failing to achieve COD by the MCOD because: (1) the FIT contracts expressly provided that time is of the essence with respect to attaining COD; (2) surrounding clauses referred to the right of the IESO to terminate for failure to achieve COD by the MCOD; (3) achievement of COD by the MCOD was a fundamental obligation, and for that reason did not need to be specifically listed as a Supplier Event of Default in the FIT contracts; and (4) concluding that the IESO had this right to terminate still gives meaning to all of the provisions of the FIT contracts and was viewed to be "commercially reasonable".[148] The Court also cautioned that "[a]lthough the Bulletin confirmed the OPA's practice of waiving its right to terminate FIT Contracts for failure to achieve commercial operation by the MCOD, it [also] confirmed the OPA's position that it had the right to terminate Fit [*sic*] Contracts under s. 9.2(a) for failure to achieve commercial operation by the

146 *Grasshopper I*, *supra* note 4 at paras. 18-19. According to the decision, this March 2019 letter reduced the time available to achieve COD from 24 months to six months, "deadline that has been extremely difficult to meet."

147 *Ibid* at para. 24.

148 *Ibid* at paras. 29, 31-34-36 and 50.

MCOD. This should have been known to the Contracting Applicants when they entered into the FIT Contracts."[149]

117. In the appeal of *Grasshopper I* and *KL Solar Projects LP v. Independent Electricity System Operator*, 2019 ONSC 6501 ("***KL Solar***"), a related matter in which the applicant similarly asked for a declaration regarding the IESO's right to terminate its FIT contract, the Ontario Court of Appeal ("**ONCA**") upheld the decision of *Grasshopper I* and confirmed that the IESO was entitled to terminate the FIT Contracts as a result of the applicants' failure to achieve commercial operation by the MCOD. Furthermore, it upheld the decisions from *Grasshopper I* and *KL Solar* that the IESO was not estopped from terminating the FIT Contracts; neither estoppel by convention nor promissory estoppel was made out on the facts. ONCA ultimately concluded that either the entire agreement or waiver clauses of the FIT contract would preclude the suppliers from relying on the IESO's past practices, such as those indicated in the Bulletin.[150]

(vi) Ford on Infrastructure, Development and the Environment

118. Notwithstanding its targeted efforts to slow renewable energy development, the current Ontario government under Premier Ford can generally be characterized as pro-development. It has also prioritized eliminating what it perceives to be "red tape" requirements.

119. In my view, reducing the regulatory burden placed on industry has been at the heart of several recent policy changes under Premier Ford. For example, in 2020, the *Burden Reduction Reporting Act* was merged with the *Reducing Regulatory Costs for Business Act, 2017* to create a new single act, called the *Modernizing Ontario for People and Businesses Act, 2020*, S.O. 2020, C. 18, Sched. 11 (the "***MOPBA***"). The *MOPBA*, which came into force on January 1, 2021, codifies Ontario's seven burden reduction principles.[151] These principles are

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149 *Ibid* at para. 47.

150 *Grasshopper Solar Corporation v. Independent Electricity System Operator*, 2020 ONCA 499 at para. 76. The applicants from *KL Solar* further sought leave to appeal from the Supreme Court of Canada. The application for leave was dismissed without reasons on February 18, 2021: [2020] S.C.C.A. No. 361.

151 **Exhibit C-2109**, Ontario, Red Tape Challenge: Financial services report (24 July 2017), online: <https://www.ontario.ca/document/red-tape-challenge-financial-services-report>. A seventh principle was added to the six identified in the Red Tape Challenge Financial Services Report in section 4(1) the *MOPBA*. Those principles are: (1) recognized national and international standards should be adopted; (2) less onerous compliance requirements should apply to small businesses; (3) digital services should be provided; (4) excellent compliance should be recognized; (5) unnecessary reporting should be reduced so that regulated entities are not

aimed at streamlining regulatory requirements so that "businesses can count on clear, focused and effective rules that maintain or enhance protection for people's health, safety, and the environment."[152] This also ties in to Ontario's "commitment to be a modern regulator."[153] According to the preamble of the *MOPBA*, Ontario is dedicated to creating a regulatory environment that considers "both costs and benefits as part of the evidence, utilizes recognized standards, considers the unique needs of small businesses, provides digital options and recognizes businesses with excellent compliance records."[154] The preamble also states that Ontario is "committed to reducing unnecessary red tape and regulatory burdens."[155]

120. The *Ontario Rebuilding and Recovery Act, 2020*, S.O. 2020, c. 35, which came into force on December 8, 2020, aims to reduce barriers to the planning, design and construction of major infrastructure projects. According to Minister Mulroney: "The current approach to building major infrastructure projects is plagued with red tape and costly delays. Through these proposed measures, we're getting shovels in the ground more quickly on transportation projects that will improve the lives of Ontarians right across the province."[156] This followed a similar law passed in July 2020, the *Building Transit Faster Act, 2020*, S.O. 2020, c. 12, that provided Ontario with the tools to fast-track the building of four priority transit projects, including by eliminating hearings of necessity with respect to expropriation where the subject land is partly on transit corridor land and is for a priority transit project.[157]

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providing the same information multiple times; (6) focus on the user by communication clearly and creating a single point of contact; and (7) specify the result, rather than the means by which the result must be achieved. According to section 4(1), every Minister must consider these principles when developing an instrument governed by the *MOPBA*. Instruments governed by the *MOPBA* include draft bills, a regulation, any policy or form and any other instrument that may be prescribed (refer to section 1(1)).

152 **Exhibit C-2310**, Office of the Premier, Backgrounder, "Ontario Starting Down the Path to Growth, Renewal and Economic Recovery" (8 July 2020), online: <https://news.ontario.ca/en/backgrounder/57525/ontario-starting-down-the-path-to-growth-renewal-and-economic-recovery> [Ontario Recovery Release].

153 *Ibid.*

154 *Modernizing Ontario for People and Businesses Act*, 2020, S.O. 2020, C. 18, Sched. 11, preamble.

155 *Ibid*.

156 **Exhibit C-2327**, Office of the Premier, News Release, "Ontario Takes Steps to Accelerate the Building of Key Infrastructure Projects" (22 October 2020), online: <https://news.ontario.ca/en/release/58910/ontario-takes-steps-to-accelerate-the-building-of-key-infrastructure-projects>.

157 **Exhibit C-2309**, Office of the Premier, News Release, "Ontario Passes Legislation to Deliver Subways Faster" (7 July 2020), online: <https://news.ontario.ca/en/release/57505/ontario-passes-

121. Significant infrastructure projects that Ontario has supported since July 2018 include, among others: the entering into an agreement to advance the Northern Road Link, a proposed road that would provide access to the Ring of Fire mining region;[158] constructing the IAMGOLD Côté Gold Mine in Northern Ontario;[159] expediting the process to build four priority transit projects; and investing $1.2 billion with the Government of Canada in broadband infrastructure to bring high-speed internet access to 280,000 rural Ontario residents.[160] In addition, a new provincial agency focused on promoting Ontario as a key investment destination called Invest Ontario was launched in July 2020,[161] along with a "special mining working group" focused on reducing red tape (including streamlining regulatory approvals) and attracting major new investment (launched in March 2019).[162]

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legislation-to-deliver-subways-faster>. See also section 44(1) of the *Building Transit Faster Act, 2020*, S.O. 2020, c. 12.

158 **Exhibit C-2294**, Office of the Premier, News Release, "Moving Forward with Road Access to the Ring of Fire" (2 March 2020), online: <https://news.ontario.ca/en/release/56039/moving-forward-with-road-access-to-the-ring-of-fire>.

159 **Exhibit C-2322**, Office of the Premier, News Release, "New Gold Mine Will Support Economic Recovery in Northern Ontario" (11 September 2020), online: <https://news.ontario.ca/en/release/58358/new-gold-mine-will-support-economic-recovery-in-northern-ontario>. Regarding the IAMGOLD Côté Gold Mine, Premier Ford said: "The opening of this mine is a prime example of how the Ontario government can help businesses grow and create jobs by cutting red tape and removing regulatory roadblocks, without costs to taxpayers." A CBC article on the project reports that Premier Ford said the project had been stalled "a year and a half ago due to "government inaction" and said his government got it back on track thanks to the cutting of "red tape"."; **Exhibit C-2319**, "$1.3B Cote Gold Project near Gogama to create 450 permanent jobs, officials say", *CBC News* (11 September 2020), online: <https://www.cbc.ca/news/canada/sudbury/trudeau-ford-iamgold-cote-gold-project-1.5720330>.

160 **Exhibit C-2381**, Infrastructure, News Release, "Nearly 280,000 Ontario residents to benefit from historic agreement to improve access to high-speed internet" (29 July 2021), online: <https://news.ontario.ca/en/release/1000626/nearly-280000-ontario-residents-to-benefit-from-historic-agreement-to-improve-access-to-high-speed-internet>.

161 **Exhibit C-2354**, Invest Ontario, News Release, "Ontario, Canada Appoints Board of Directors for Province's new Investment Attraction Agency Invest Ontario" (19 March 2021), online: <https://www.investontario.ca/press-release/ontario-canada-appoints-board-directors-provinces-new-investment-attraction-agency-invest-ontario>.

162 **Exhibit C-2211**, Office of the Premier, News Release, "Ontario Cutting Red Tape in the Mining Sector" (4 March 2019), online: <https://news.ontario.ca/en/release/51394/ontario-cutting-red-tape-in-the-mining-sector>; and **Exhibit C-2183**, "Cutting red tape extends to the Ring of Fire", *Northern Ontario Business* (16 November 2018), online: <https://www.northernontariobusiness.com/industry-news/mining/cutting-red-tape-extends-to-the-ring-of-fire-1125688>. The special mining group was announced in 2019.

122. Part of Ontario's COVID-19 economic recovery plan also included reducing delays for infrastructure projects, mostly as a result of having to complete certain environmental requirements, in order to "get infrastructure projects built faster."[163]

123. The COVID-19 economic recovery plan in particular exemplifies the current Ontario government's approach to environmental regulation and several environmental groups have alleged that changes made under Premier Ford have "gutted" Ontario's key environmental legislation.[164] Ecojustice described the *COVID-19 Economic Recovery Act, 2019* (the "**CER Act**") as using "the premise of economic recovery to tear up environmental protections and prevent Ontarians from having a say on major projects that impact their lives."[165] Major amendments proposed by the CER Act included exempting many public sector infrastructure projects from environmental assessment[166] and expanding powers to unilaterally issue (controversial) Ministerial zoning orders ("**MZOs**") under the *Planning Act*. Less than two weeks after being tabled and without an opportunity for public comment, which was contrary to the advice of the Auditor General of Ontario in respect of the MZO amendments,[167] the CER Act became law.[168]

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163 Ontario Recovery Release, *supra* note 152.

164 For example, this Toronto Star article reports that the current Ontario government continually puts developers ahead of environmental protection: **Exhibit C-2333**, Star Editorial Board, "Once again, the Ford government is putting developers ahead of Ontario's environment", *Toronto Star* (29 November 2020), online: <https://www.thestar.com/opinion/editorials/2020/11/29/once-again-the-ford-government-is-putting-developers-ahead-of-ontarios-environment.html>.

165 **Exhibit C-2311**, Laura Bowman, "Ontario passes sweeping changes to environmental assessment" (17 July 2020), online (blog) *Ecojustice Blog* <https://ecojustice.ca/ontario-proposes-sweeping-changes-to-environmental-assessment/>.

166 This would also eliminate the ability of Ontario residents to submit "bump up" requests to the Minister of the Environment, Conservation and Parks for projects assessed under a class environmental assessment. The Minister may now only review projects that are subject to a class environmental assessment process for impacts on Aboriginal and treaty rights. See section 16(6) of the *EAA*. See also: **Exhibit C-2312**, *What Is and Is Not Modernized in Ontario's Re-Write of its Environmental Assessment Act*, Gowling WLG (28 July 2020), online: <https://gowlingwlg.com/en/insights-resources/articles/2020/modernized-ontario-environmental-assessment-act/>.

167 *Greenpeace Canada v. Ontario (Minister of the Environment, Conservation and Parks)*, 2021 ONSC 4521at paras. 68 and 99 [*Greenpeace*].

168 The use of MZOs has also been subject to recent challenges by several Ontario Indigenous communities. In September 2021, the Williams Treaty First Nations reportedly filed a judicial review application to stop a housing development near Lake Simcoe that had been approved by MZO on the basis that Ontario did not adequately consult the Indigenous community. The Six Nations of the Grand River have publicly expressed their view that they have not been adequately consulted (and the Haudenosaunee Development Institute not at all) with respect to a proposed

124. In response, several environmental groups challenged Ontario's failure to consult on the proposed changes in Bill 197 and alleged that the government pushed these changes through in contravention of the public notice and comment requirements under the *Environmental Bill of Rights* ("***EBR***"). On September 3, 2021, the Divisional Court unanimously ruled that Ontario had acted "unreasonably and unlawfully" by failing to comply with the *EBR* requirements for public consultation on the changes to MZOs.[169]

125. Other actions that have been taken under the current Ontario government to reduce environmental protections include, but are not limited to: scrapping Ontario's cap and trade program;[170] limiting the assessment triggers for private sector projects under the *Environmental Assessment Act* (the "***EAA***")[171] exempting logging operations in a Crown forest from the core protection provisions of the Ontario *Endangered Species Act, 2007*, S.O. 2007, c. 6 (the "***ESA***") ;[172] eliminating the office of the environmental commissioner (an independent

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MZO for a distribution warehouse near Cambridge. As of January 2022, neither of these challenges have been resolved. See **Exhibit C-2411**, Noor Javed, "Indigenous group launches legal action over Ford government's use of MZO to fast-track development", *Toronto Star* (19 November 2021), online: <https://www.thestar.com/news/gta/2021/11/15/indigenous-group-launches-legal-action-over-ford-governments-use-of-mzo-to-fast-track-development.html>.

169 I note that the Divisional Court in *Greenpeace* found Ontario was not required to consult on all of the proposed changes; however the *EBR* requirements did apply to the expansion of the MZO powers because of their environmental significance and thus a period of public notice and comment was required for those particular changes. Consultation was found to not be required for the proposed changes to the environmental assessment regime. Ontario relied on a proposed, and later enacted, statutory exemption in Bill 197 that added a new provision to the *EBR* that would exempt the proposed changes from the consultation requirements. The Divisional Court found this new provision to be a valid legislative provision with retroactive effect. As a result, it was found to be reasonable for these amendments not to be posted for public consultation. See paragraphs 54-62 of *Greenpeace*. However, the remedy awarded was a declaration and thus these provisions are still considered law (refer to paragraphs 99-100 of *Greenpeace*).

170 See: *Cap and Trade Cancellation Act, 2018*, S.O. 2018, c. 13. Ontario's Auditor General has forecasted that Ontario's 2030 climate targets (30% below 2005 levels of greenhouse gas emissions by 2030) will not be met. The Auditor General's November 2021 report noted that the most recent status (based on 2019 data released in 2021) is that the province will only achieve reduced emissions approximately 20% below 2005 levels: **Exhibit C-2401**, Office of the Auditor General of Ontario, "Value-for-Money Audit: Reporting on Ontario's Environment" (November 2021), online (pdf): <https://www.auditor.on.ca/en/content/annualreports/arreports/en21/ENV_Reporting_en21.pdf> at 44.

171 See changes regarding Part II.3 projects in Schedule 6 of the *COVID-19 Economic Recovery Act, 2020*, S.O. 2020, c. 18 (Bill 197).

172 *Protect, Support and Recover from COVID-19 Act (Budget Measures), 2020*, S.O. 2020, c. 36, Sched. 8 (Bill 229) [*Bill 229*]. The amendment to the *Crown Forest Sustainability Act, 1994*, in Schedule 9 exempts a person conducting forest operations in a Crown force in accordance with an approved forest management plan and on behalf of the Crown or under the authority of a

watchdog position created under the *EBR*);[173] and scaling back approval powers of and funding for local environmental authorities under the *Conservation Authorities Act*, R.S.O. 1990, c. C.27.[174] Ontario was also one of the provinces that recently unsuccessfully challenged the validity of the federal carbon tax regime at the Supreme Court of Canada.[175]

(vii) Conclusion on Issue Two

126. The current Ontario government has positioned itself (and acted) as anti-wind. However, and in my opinion most important to the matter at issue, the Regulatory Framework has not been fundamentally altered by Ontario. The Project would be required to satisfy additional eligibility requirements since enacted under O. Reg. 359/09, such as the demonstration of a demand for electricity. However, notwithstanding the Moratorium and several changes that have been made to electricity, environmental and planning legislation since 2018, the path remains the same to permit, construct and operate an offshore windfarm, with the three critical steps being to obtain: (1) a Power Purchase Agreement with the IESO; (2) appropriate land tenure approval from the Ministry of Northern Development, Mines, Natural Resources and Forestry;[176] and (3) a REA from the MECP.

127. Moreover, 90% of projects that have been issued a REA by the MECP since 2016 are now constructed and operating and these projects received their REAs on average within six months.

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forest licence from: sections 9(1)(a) (prohibition on killing, harming, harassing, etc.) and 10(1) (prohibition on damage to habitat) of the ESA.

173 Bill 57 transferred the commissioner's position to the Office of the Auditor General and moved the overall responsibility to uphold the EBR to the Minister of the Environment, Conservation and Parks: *Restoring Trust, Transparency and Accountability Act, 2018*, S.O. 2018, c. 17, Sched. 15 (Bill 57). See also: **Exhibit C-2405**, Emma McIntosh and Fatima Syed, "First, Doug Ford 'stopped the carbon tax': how Progressive Conservatives reshaped Ontario's environmental policy", *The Narwhal* (9 November 2021), online: <https://thenarwhal.ca/doug-ford-ontario-environment-explainer/>; and **Exhibit C-2205**, Fatima Syed, "Ontario environment watchdogs say Doug Ford just gutted a law that protects your rights", *Canada's National Observer* (4 January 2019), online: <https://www.nationalobserver.com/2019/01/04/news/ontario-environment-watchdogs-say-doug-ford-just-gutted-law-protects-your-rights>.

174 Bill 229, *supra* note 172, Sched. 6.

175 See: *Reference re Greenhouse Gas Pollution Pricing Act*, 2021 SCC 11.

176 Referred to in my 2014 Report and 2015 Supplementary Report by its predecessor's name, the Ministry of Natural Resources or MNR.

128. While the IESO has not launched any renewable energy-specific procurements since 2016[177] (and the MECP has not received any new REA applications since 2018), since Windstream entered into the FIT Contract in 2010, these statistics suggest to me that, had the Moratorium not come into effect and the Project been issued a REA, the Project would likely be constructed and operating at the time of this Report.

129. Additionally, in my view, the current Ontario government's position on renewable energy is contrary to its approach to infrastructure and development more generally. As demonstrated by the examples I described above, since coming to power in 2018, Premier Ford and his government have supported significant infrastructure projects and have prioritized eliminating regulatory "red tape" (often at the expense of environmental protection) in an effort to reduce the regulatory burden for developers and get projects built faster. Ontario has not shied away from using targeted legislative amendment to achieve these goals and has incorporated some of its more sweeping changes in dense, omnibus bills and COVID-19 recovery legislation. Conversely, it is my view that environmental protection has not been top of mind for Ontario since at least July 2018.

130. While the current Ontario government has created a more challenging political environment for wind projects to get built, it has not created an impossible regulatory environment. The fact of the matter is that the Regulatory Framework is still in place and is largely the same as it was in 2010 when Windstream obtained the FIT Contract.

C. ISSUE THREE: REGULATORY FRAMEWORK STILL PROVIDES REASONABLE CERTAINTY

131. Notwithstanding the current Ontario government's strong opposition to wind energy projects, there have been no material changes to the Regulatory Framework (including the Moratorium) since the conclusion of NAFTA 1, nor since Premier Ford came to power in 2018. As a result, assuming that the Moratorium was lifted and the MCOD in the FIT Contract was amended as of February 2020, it is my opinion that the Project could have completed the

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177 As noted in footnote 93 above, renewable energy projects are eligible to participate in the IESO's upcoming Medium-Term RFP and Ontario has asked Ontario Power Generation to investigate new hydroelectric opportunities.

Regulatory Framework within approximately three years of such date, which is generally consistent with the development timeframes of other large wind energy projects in Ontario.[178]

132. As discussed in more detail below, in forming this opinion, I note that:

(a) the Regulatory Framework minimized regulatory risk in Ontario by implementing a streamlined approvals process to develop wind energy projects;

(b) the MECP consistently met the REA completeness review and six-month service standards in all material respects;

(c) large-scale offshore development projects are commonplace in the Great Lakes and provincial and federal regulators have decades of experience regulating in-water development, coupled with extensive knowledge of Great Lakes ecosystems. This regulatory and scientific expertise would have provided general guidance on the development of offshore wind energy projects in Ontario. Any residual knowledge gaps regarding such development would be addressed by the regulators in the context of the existing Regulatory Framework on a site-specific, application-based and adaptive management approach;

(d) while the REAs for the vast majority of large onshore wind energy projects were appealed, the OLT consistently held that engaging in such projects would not cause serious harm to human health or serious/irreversible harm to the environment. The OLT upheld the vast majority of such REAs and these projects are now operating; and

(e) wind energy developers in Ontario have extensive experience developing strategic partnerships with Indigenous communities, which reduces project risk.

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178 This opinion is consistent with my opinion set out in the 2014 Report that, at the relevant time in August 2010, it would have been commercially reasonable for a developer to assume that the permitting of an offshore wind power project could have been completed in approximately three years. As discussed in the 2014 Report, based on my experience with a number of large onshore wind energy projects in Ontario, the average time for a developer to obtain a REA for a large onshore wind energy project (from commencement of required REA reports to the submission of a complete REA application) has been approximately 24 to 30 months. To date, 21 REAs for large (over 50 MW) onshore wind energy projects have been issued by the MECP. These projects were successfully permitted notwithstanding a maturing and evolving Regulatory Framework and significant public opposition to the projects.

(i) Streamlined Approvals Process

133. In my experience, regulatory frameworks are rarely, if ever, static. Regulatory risk is a key challenge in developing any large infrastructure, energy or resource project in Ontario, as these types of projects require a broad and complex range of permits from federal, provincial and/or municipal governments.

134. To minimize this regulatory risk in Ontario, a key component of the GEA was a single streamlined approvals process with a six-month service standard (the "**Standard**") that combined existing MECP permits into a single approval, the REA.[179]

135. Prior to the GEA, renewable energy projects in Ontario were subject to a patchwork of approval processes, each focusing on a different part of the project and with separate requirements. A proposed wind energy project, for example, could have been required to complete a number of different procedures to obtain all of the necessary permits. Prior to 2009, these would have included: a Certificate of Approval for noise under the EPA; a Permit to Take Water under the *Ontario Water Resources Act*; and official plan, zoning and site plan approvals under municipal land use planning processes. A wind energy project would also have been required to comply with the more cumbersome assessment processes for electricity generation projects under the *EAA*.

136. The Regulatory Framework enacted under the GEA replaced this patchwork with an integrated approval process in order to eliminate duplication and provide greater clarity in the REA approval process. It combined into the integrated REA process the provincial interests that were previously addressed by various ministries and managed through several different assessment and approval processes.[180]

179 Other GEA components intended to address regulatory barriers to wind energy development included a limited appeal right to the OLT (for serious harm to human health or serious and irreversible harm to the environment) with a six-month deadline for the OLT to determine the appeal.

180 As discussed below, offshore wind applicants would also be potentially subject to the federal *Impact Assessment Act*, S.C. 2019, c. 29, s. 1 ("**IAA**") and/or require approvals under the federal *Fisheries Act*, R.S.C. 1985, c. F-14 and/or the *Canadian Navigable Waters Act*, R.S.C. 1985, c. N-22. In my opinion, it is unlikely that a federal environmental assessment would be required under the IAA, as the Project is not designated by the IAA's Physical Activities Regulation. Regardless, any federal assessment would be conducted concurrently with the REA application process. Similarity, any material federal permits would be obtained concurrently with the REA application process. This is standard practice in Ontario.

137. In my experience, this streamlined approvals process did in fact significantly minimize regulatory risk in developing large wind energy projects in Ontario.

(ii) REA Program Success

138. As noted above, the REA process is underscored by the Standard, which provided the MECP with six months to reach a decision on a complete REA application.[181]

139. In my experience, and the experience of our clients, who have developed or financed some of the largest and most complex renewable energy projects in Ontario, the MECP generally met the Standard (taking into account delays generally caused by: (i) proposed project changes *after* the REA application had been submitted to the MECP; or (ii) failure to submit a complete REA application in first instance).

140. According to the MECP's Renewable Energy Projects Listing, the MECP received a total of 75 REA applications (not including amendment applications) for onshore wind energy projects from September 1, 2010, to May 26, 2021.[182] Of these 75 REA applications:

(a) two of the 75 applications (3%) were refused by the MECP;

(b) nine of the 75 applications (12%) were either returned or withdrawn by the applicant; and

(c) 64 of the 75 applications (85%) submitted received a REA.[183]

141. These numbers, along with the data I have presented under "Issue Two" above, demonstrate that: (i) Ontario generally, and the MECP more specifically, has significant experience with the Regulatory Framework and with assessing and permitting large onshore wind energy projects; and (ii) four of the five REAs issued for onshore wind energy projects since 2016 were obtained within six months of the submission of a complete application,

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181 **Exhibit C-2364**, Technical Guide to Renewable Energy Approvals (MECP) (2019), Chapter 1, Section 10.3, online: <https://www.ontario.ca/document/technical-guide-renewable-energy-approvals-0> [MECP REA Guide]. I note that the Standard has not been modified or amended since NAFTA 1.

182 MECP Databases, *supra* note 71: https://data.ontario.ca/dataset/renewable-energy-projects. As discussed in "Issue Two" above, the MECP has not received any new REA applications since June 2018 and the last REA was issued on May 4, 2018, to Nation Rise Wind Farm.

183 21 of the 64 wind power project REA applications that were approved (33%) were considered "large" (over 50 MW) wind power projects.

consistent with the Standard, with the approximate length of the MECP's technical review in each case as follows: Belle River (six months); North Kent Wind (five months); Romney (six months); and Nation Rise (six months).[184]

142. Further, it is my experience that the MECP has met the Standard in all material respects.[185] For example, for one client's 100 MW wind energy project, the REA application was submitted in May 2015, deemed complete in July 2015, and amended by the proponent to reflect proposed project changes (to remove three turbines from the project and adjust the location of six turbines), which required the submission of amendments to the noise impact assessment and natural heritage and archaeological report addenda and the notification of the proposed changes to the public, Indigenous communities and governmental agencies. Notwithstanding the proponent's project changes during the application process, the REA was still issued within six months in January 2016.[186] Similarly, for another client's 100 MW wind energy project, the REA application was submitted in November 2015, deemed complete in February 2016, and within five months was approved by the MECP in June 2016.[187]

143. In my view, and based on my experience, it is reasonable for an experienced renewable energy developer like WWIS (supported by experienced environmental and technical

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184 The Fairview Wind Farm energy project received an REA within 19 months of the submission of an application, the delay being primarily due to project changes by the proponent, as well as the MECP's determination during the technical review that the proponent was required to prepare further reports and conduct additional consultation (the application was also subject to two ERO notices for a total public comment period of 90 days), including the preparation of a clarification document to highlight and summarize changes, clarifications and additions that had been made.

185 In addition to the more recent examples noted above, for one client's 270 MW wind energy project, the REA application was submitted in January 2012, deemed complete in February 2012, and amended by the proponent to reflect proposed project changes (e.g., to reflect, among other matters, landowner requests, avoidance of archaeological resources, moving further away from receptors, etc.), which required additional consultation and re-posting on the ERO. Notwithstanding the proponent's project changes during the application process, the REA was still issued in approximately six months in June 2012. Refer to **NAFTA 1, Exhibit C-1632**, Ministry of the Environment, "Information Notice: Renewable Energy Approval application for Samsung Renewable Energy Inc. and Pattern Energy's South Kent Wind Project" (EBR Registry No. 011-5964 (March 20, 2012)). Similarly, another client's 270 MW wind energy project was issued its REA in July 2013, within approximately six months of submitting a complete REA application (taking into account the following REA report changes post-submission: mapping corrections; a supplementary water assessment; and a revised noise assessment report). See REA Number 3259-98EQ3G: **Exhibit C-2340**, http://www.k2wind.ca.

186 REA Number 2765-A4ER2P: **Exhibit C-2429**, https://belleriverwind.com/.

187 REA Number 5272-A9FHRL: **Exhibit C-2422**, https://northkentwind.com/. The REA was appealed by a third party to the OLT and the OLT dismissed the appeal in October 2016 upon the request of the parties, following mediation and the appellant's withdrawal of the appeal.

consultants, such as WSP) to assume that the MECP would deem WWIS's REA application complete within 90 days and meet the Standard in all material respects.

144. Lastly, I note that it would be inconsistent with the current Ontario government's emphasis on "red tape reduction" and efforts to streamline regulatory approvals for major developments (as discussed under "Issue Two" above), for the MECP to materially deviate from the Standard or any other prescribed timelines in the context of any REA application.

(iii) Development Projects are Commonplace in the Great Lakes

145. Large-scale offshore development projects are commonplace in the Great Lakes and regulators have decades of experience regulating such in-water development, coupled with extensive knowledge of Great Lakes ecosystems.[188]

146. As discussed in detail in the 2014 Report, although individual projects raise specific environmental concerns, the process through which these concerns are addressed, and permits are granted, is well established at the federal and provincial levels.

147. For example, our clients frequently obtain the requisite permits from federal and provincial regulators to develop a broad range of complex projects in Ontario, including in sensitive and important freshwater ecosystems, such as drinking water intakes, cooling water intakes for nuclear facilities, sewage outfalls, bridges, submarine cables, waterpower facilities and tailings deposits.

148. A recent example of offshore development in the Great Lakes is the ITC Lake Erie Connector project, a proposed 1,000 MW bi-directional underwater transmission line that would run from Ontario to Pennsylvania through Lake Erie (with ~ 47 kilometers running on the lakebed on the Canadian side). The federal and provincial governments approved the Lake Erie Connector Project in 2017,[189] finding that with the implementation of specified environmental

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[188] I am not aware of any legal steps that have been taken by Ontario to formalize or otherwise implement the Moratorium. Further, there has been little discussion in the public record since Premier Ford came to power regarding the Moratorium and I am not aware of any plans on the part of the Ontario government to repeal the Moratorium.

[189] **Exhibit C-2066**, Reasons for Decision, ITC Lake Erie Connector LLC, Lake Erie Connector International Power Line Project EH-001-2015 (January 2017), online (pdf): <https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90548/2680096/2785333/3159835/3161303/A81375-1_NEB_-_Reasons_for_Decision_-_ITC_Lake_Erie_-_International_Power_Line_-_EH-001-2015_-_A5I2L0.pdf?nodeid=3166590&vernum=-2>. The project would consist of three distinct

protection and mitigation measures, the project was not likely to cause significant adverse environmental effects.[190] The project has also received the necessary US federal, state and local permits, including a US Presidential Permit.

149. Further, while the REA application process has not been without challenges for both proponents and regulators, in my experience the MECP and project proponents have worked together to address and overcome these challenges. In addition, I would expect that any offshore development issues would be similarly managed by the regulators in accordance with the Regulatory Framework on a site-specific, application-based approach.[191]

150. The Project may also require authorization for impacts to provincial species at risk under the *ESA*. Wind developers have been able to rely on the *ESA* exemption available to wind facilities under section 23.20 of O. Reg. 242/08 General. This particular exemption allows a wind developer to register its activity and submit an Operational Mitigation Plan ("**OMP**") satisfying the criteria in section 23.20 to the Minister for approval in lieu of obtaining an Overall Benefit Permit under the *ESA*. Ongoing mitigation, reporting and monitoring, among other things, are required in order for the developer to remain eligible to rely on the exemption.[192] Our

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components: (1) HVDC converter stations and facilities; (2) terrestrial cable systems; and (3) underwater cables.

[190] The conditions in the then National Energy Board's Certificate of Public Convenience and Necessity for the Lake Erie Connector Project address a variety of issues and concerns raised during the environmental assessment process, including conditions related to environmental protection, fish and fish habitat, procurement and employment, treaty rights, ancestral remains and archaeological artifacts. See the Reasons for Decision (January 2017) in the footnote above.

[191] Offshore wind applicants would also be potentially subject to the IAA and/or require approvals under the federal *Fisheries Act* and/or the *Canadian Navigable Waters Act*. In my opinion, it is unlikely a federal environmental assessment would be required under the IAA, as the Project is not designated by the IAA's Physical Activities Regulation. Regardless, any federal assessment could be conducted concurrently with the REA application process. Similarly, any material federal permits required for in-water works could be obtained concurrently with the REA application process. This is standard practice in Ontario. Further, the Project is unlikely to require an authorization under the federal *Species at Risk Act*, S.C. 2002, c. 29 ("**SARA**") for impacts to federal species at risk. By way of background, I worked with a wind developer and its First Nation partner on the largest wind farm in Ontario to date to obtain approval under SARA for protected species. This permit took approximately 12 months to negotiate and was the first of its kind on reserve lands and, to my knowledge, the only federal SARA permit required for a wind energy project in Ontario. Based on this experience, in the event a SARA approval is required for the Project, I would expect it to be completed in tandem with the REA process and in the same manner as this client's project. If required, I do not believe the requirement to obtain a SARA permit would pose a material delay to the Project schedule. Finally, the Ontario *EAA* would not apply to the Project: see O. Reg. 116/01, s. 2.

[192] "The Explanatory Note [for the proposal to add exemptions to O. Reg. 242/08 for 16 different categories] stated that for a majority of the regulatory proposals, the exemption would require the

clients whose wind energy projects have required authorization under the ESA have generally proceeded by way of exemption and OMP.

151. I would expect any "knowledge gaps", including related to potential environmental impacts, to be addressed jointly by the regulator and WWIS as the Project progresses through the REA process. Even with the Project being the first offshore wind energy project in Ontario, it is reasonable to assume that any "knowledge gaps" or material uncertainties would be addressed in the context of an adaptive management approach since such an approach has been used extensively in Ontario in other contexts, including the regulation of onshore wind and waterpower power projects.[193]

152. Further, I believe that the various developments I elaborate on under "General Update on Offshore Wind Development" below demonstrate that there are useful precedents of proposed and developed offshore wind energy projects whose experiences addressing environmental and/or technical issues can be leveraged during the REA process by both WWIS and the MECP.

153. As a result of the above, it is my opinion that any additional federal or provincial approvals for the Project (including *Fisheries Act* and species at risk approvals) would be completed within approximately three years.[194]

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proponent to prepare a mitigation plan that identified the steps in which the proponent would engage to minimize adverse effects on the species at risk. Where a mitigation plan was to be required, it would have to be accompanied by monitoring requirements and be updated periodically to reflect the information obtained through monitoring." *Wildlands League v. Lieutenant Governor in Council*, 2015 ONSC 2942 at para. 14.

193 Please refer to page 36 of my 2014 Report for examples on the use of an adaptive management approach by the MECP and MNR in practice.

194 This timeline would include the completion of the Crown land tenure process. As described in the 2014 Report, this has always been a cumbersome and time-intensive process for developers. That said, such process has not typically been considered a key gating issue with respect to the development of renewable energy projects.

(iv) OLT Has Generally Upheld REAs

154. Large wind energy projects (whether onshore or offshore) must also account for the risk of REA appeals. Subject to some qualifications, the OLT has six months from the date an appeal is filed to issue a decision.[195]

155. Based on my experience, our clients (developers and lenders) all assumed that REAs for large wind energy projects would be appealed to the OLT and factored in the time and costs associated with defending REA appeals into their project development budgets. Given the size of the Project and its status as the first offshore wind energy project in Ontario, it is more likely than not that any REA issued to WWIS would face an appeal and such appeal process would presumably be built into the Project schedule.[196] However, notwithstanding the likelihood that a REA issued for the Project would be appealed, in my experience, the OLT has generally upheld REAs on the basis that engaging in such projects would not cause serious harm to human health or serious or irreversible harm to the environment. To date, only two REAs (Fairview (16.4 MW) and Ostrander Point Wind Energy Park (22.5 MW)) have been revoked by the OLT under the Regulatory Framework. As I explained in "Ability of the IESO to Amend a FIT Contract", the OLT required the number of turbines at White Pines to be reduced following a successful appeal of its REA, which Ontario later revoked by the *Termination Act*.

156. As noted in "Issue Two" above, of the 12 REAs issued by the MECP since 2016, three were appealed to the OLT. All of these appeals were for wind energy projects. Of these appeals, Fairview Wind Farm (16.4 MW) appeal was granted by the OLT and the project's REA revoked.[197] The North Kent Wind (100 MW) appeal was withdrawn by the appellant following mediation[198] and the Nation Rise Wind Farm (100 MW) appeal was dismissed by the OLT.[199] The latter two projects are currently operating.[200]

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195 MECP REA Guide, *supra* note 181, Chapter 1, Section 11. See also section 59 of O. Reg. 359/09.

196 In the 2015 Report, I also indicated that of the 51 REAs issued for onshore wind power projects prior to June 2015 and 48 of those REAs had been appealed to the OLT. At that time, approximately 42 of those 48 appeals (88%) had been dismissed or otherwise withdrawn.

197 *Wiggins*, *supra* note 74.

198 *Jakubec*, *supra* note 75.

199 *CCNS*, *supra* note 76.

200 For example, in the initial OLT decision regarding an appeal of the White Pines REA, the OLT required the number of turbines to be reduced from 27 to nine, thereby reducing the size of the

157. Further, as described in the 2014 Report, the IESO took a pragmatic and commercial approach to address contractual risk regarding REA appeals in order to facilitate the development of FIT projects in Ontario. In addition to the FIT contract *force majeure* provisions, the IESO would adjust a developer's MCOD (by way of an amending agreement)[201] for a period equal to the REA appeal period, which was defined as the period commencing at the date of the notice of appeal and terminating at the date of the notice of decision on the ERO.

(v) Enhanced Indigenous Engagement

158. A key component of the Regulatory Framework that has continued to evolve since NAFTA 1 is the requirement for enhanced Indigenous engagement in Ontario.

159. The Crown (i.e., the federal and/or provincial governments) has a legal duty to consult with, and where appropriate accommodate, Indigenous peoples where the Crown contemplates decisions or actions that may adversely impact Indigenous and treaty rights (collectively, the "**Indigenous Rights**"). This duty is grounded in the honour of the Crown and seeks to provide protection to the Indigenous rights while furthering the goal of reconciliation between Indigenous peoples and the Crown.[202]

160. From a practical perspective, this means that Crown actions that potentially affect Indigenous Rights, such as the issuance or renewal of governmental approvals, are subject to the Crown's duty to consult. Under the REA application process, certain procedural aspects of consultation are delegated to proponents in order to understand any notable issues and/or concerns that the relevant Indigenous communities may have with respect to a proposed project (e.g., adverse impacts on fishing rights, wildlife, fish resources, aquatic habitat, etc.). To address any potential impacts on such rights, proponents are often required to comply with

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proposed project from 60 MW to 18.45 MW. Notwithstanding, White Pines was ultimately terminated by Ontario under the *Termination Act*.

201 I note that in addition to revoking the REA or dismissing the appeal, the OLT also has the ability to alter the conditions of an appealed REA, so as to allow the project in question to proceed under revised terms. **NAFTA 1, Exhibit C-1119**, IESO, Approach to FIT Contracts That Have REAs Appealed to Environmental Review Tribunal (February 14, 2014).

202 This duty emanates from section 35 of the *Constitution Act, 1982*, s. 35, being Schedule B to the Canada Act 1982 (UK), 1982, c. 11. The Crown's duty to consult is triggered when the Crown has knowledge, actual or constructive, of the potential existence of the Indigenous Rights and contemplates conduct that might adversely affect such rights. While the term "Aboriginal" (as opposed to Indigenous) is often used in legislation and by regulators to be consistent with section 35, I have used the term "Indigenous" for the purposes of this memorandum

extensive mitigation measures that are set out in the project approvals and/or choose to voluntarily enter into project agreements.

161. Not surprisingly, failure to conduct appropriate consultation and/or accommodation represents a material risk to any renewable energy project, as such projects require a broad range of Crown approvals.[203]

162. Formal Indigenous consultation designed to satisfy the Crown's constitutional duty to consult takes place during the REA process. The MECP identifies the relevant Indigenous communities to be engaged for consultation purposes and delegates procedural aspects of consultation to proponents.[204]

163. Further, proponents generally offer opportunities for more meaningful Indigenous participation in major infrastructure and energy developments, like the Project. Meaningful ownership can be seen as a method of economic reconciliation and is an important way for project proponents to contribute to local capacity building, among other broader reconciliation goals in line with the spirit of UNDRIP. In my experience, equity participation by Indigenous communities in large renewable energy projects has generally become the norm.

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203 From a political perspective, Canada has committed to a renewed nation-to-nation relationship with Indigenous groups. To facilitate this reconciliation, Canada has released principles respecting its relationship with Indigenous peoples, including going "beyond the legal duty to consult" to ensure that Indigenous groups have a "role in public decision-making." Further, in June 2021, *An Act respecting the United Nations Declaration on the Rights of Indigenous Peoples*, S.C. 2021, c. 14 (the "**Act**") became law, which seeks to implement and ensure Canadian (federal) laws are consistent with the *United Nations Declaration on the Rights of Indigenous Peoples* ("**UNDRIP**") and provides a two-year timeline to prepare an action plan to achieve the objectives of UNDRIP. Understanding how UNDRIP's standard of free, prior and informed consent (or "**FPIC**") will interact with Canada's current duty to consult framework will likely be a key area of focus in implementing the Act. It is Canada's view that the Act itself does not immediately change the existing duty to consult Indigenous groups, or other consultation and participation requirements as set out in legislation (including the IAA). Instead, the Act is intended to support Canada's ongoing implementation of its constitutional duty and provides a legislative framework within which to advance the implementation of UNDRIP in Canada.

204 For nearby projects (Amherst Island Wind Energy Project, Wolfe Island Wind Power Project and White Pines), the MECP required consultation with the following communities: Mississaugas of Scugog Island First Nation; Curve Lake First Nation- Mississaugas of Mud Lake Curve Lake; Hiawatha First Nation – Mississaugas of Rice Lake; Alderville First Nation – Mississaugas of Alderville; Kawartha Nishnawbe First Nation; Mohawks of the Bay of Quinte – Tyendinaga Mohawks Territory; Williams Lake First Nations Claims Coordinator; and the Métis Nation of Ontario. I would expect several of the Indigenous communities identified by the MECP for consultation for the Project to come from this list (although this list may be added to and/or subtracted from based on the specific traditional territories and Indigenous Rights located in proximity to the Project).

164. Several renewable energy projects I worked on included Indigenous partners. For example, the Henvey Inlet Wind Energy Centre (300 MW), which is sited entirely on Henvey Inlet First Nation reserve land, is jointly owned and operated through a 50/50 partnership with the Henvey Inlet First Nation. Further, the 7.5 MW Innavik Hydro Project is structured as a 50/50 partnership between the Pituvik Landholding Corporation, an Inuit corporation, and Innergex Renewable Energy Inc. North Kent Wind (100 MW) is also a joint venture partnership owned by Bkejwanong First Nation, Pattern Development, Samsung Renewable Energy and Entegrus Renewable Energy Inc.

165. Given this trend, I would expect WWIS to likely seek an Indigenous partner(s) as part of the project development process and to negotiate any such partnership arrangement during the approximately three years it will take for the Project to complete the Regulatory Framework.

166. Based on my experience, Indigenous communities in Ontario are commercially sophisticated and willing partners in wind energy projects. As a result, I do not anticipate engaging an Indigenous partner(s) would result in a material delay in the Project schedule. Indigenous consultation typically takes place both in advance and alongside the MECP review of the REA application and likewise I would expect any partnership agreement with an Indigenous community to be negotiated during completion of the Regulatory Framework. As a result, it is my opinion that adequate Indigenous consultation and negotiation of a partnership arrangement for the Project could be completed within approximately three years.

(vi) Conclusion on Issue Three

167. Assuming that the Moratorium was lifted and the MCOD in the FIT Contract was amended as of February 2020, it is my opinion that the Project could have completed the Regulatory Framework within approximately three years at such date, which is generally consistent with the development timeframes of other large wind energy projects in Ontario.

168. I have reviewed the Renewable Energy Approval and Permitting report prepared for Windstream by WSP dated February 18, 2022. Overall, I agree with the findings of WSP in that report and believe WSP's conclusions to generally align with my conclusions in Issue Three herein.

D. GENERAL UPDATE ON OFFSHORE WIND DEVELOPMENT

169. Although the Moratorium remains in place in Ontario, this has not halted offshore wind development elsewhere, as significant investment and progress has been made since 2016. Globally, installed offshore wind capacity is projected to exceed 250 GW by 2030. Cumulative installed capacity as of 2020 was estimated to be 33 GW, which is nearly triple the installed capacity of offshore wind from 2016.[205] According to Rystad Energy, capital and operational expenditure for offshore wind between 2020 and 2030 is estimated to be USD $810 million.[206] While Europe is expected to remain the dominant player in offshore wind, spending in North and South America is predicted to hit approximately USD $70 billion during the same time period.[207]

170. As of 2021, the United Kingdom (the "**UK**") had a world-leading approximately 10 GW of installed offshore wind capacity and has announced intentions to expand to 40 GW by 2030 (to aid in achievement of the UK's ambitious net-zero emissions goals).[208] Prime Minister Johnson announced in October 2020 that offshore wind would produce enough electricity to power every home in the UK by 2030.[209] A study was also launched by the Crown Estate in

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205 **Exhibit C-2386**, "Crown Estate Launches Study of Wind Farm's Impact on Marine Ecosystems", *The Maritime Executive* (24 August 2021), online: <https://www.maritime-executive.com/article/crown-estate-to-study-wind-farm-impact-mitigation-for-marine-ecosystem> [Maritime Article] and **Exhibit C-2365**, Rystad Energy, Press Release, "An expenditure splash of $810 billion is expected for the offshore wind industry this decade" (29 April 2021), online: <https://www.rystadenergy.com/newsevents/news/press-releases/an-expenditure-splash-of-$810-billion-is-expected-for-the-offshore-wind-industry-this-decade/> [Rystad Energy].

206 Rystad Energy, *supra* note 205.

207 *Ibid*.

208 **Exhibit C-2418**, Department for Business, Energy & Industrial Strategy (UK), Press Release, "Biggest ever renewable energy support scheme opens" (13 December 2021), online: <https://www.gov.uk/government/news/biggest-ever-renewable-energy-support-scheme-opens>. On December 13, 2021, the UK launched its "biggest ever" renewably energy support scheme and is aiming to secure 12 GW of electricity capacity (open to, among other technologies, offshore wind and floating offshore wind) through the fourth round of its Contracts for Difference Scheme. £200 million of the £285 million per year budget for the fourth round procurement is allocated for offshore wind, and £75 million is allocated for emerging technologies, including remote island wind, tidal stream and floating offshore wind. Subject to the outcome of the procurement, it is expected this round "will be a major step towards delivering the government's increased ambition to have 40 GW of offshore wind by 2030, including 1 GW to come from floating offshore wind": see Maritime Article, *supra* note 205.

209 **Exhibit C-2324**, Prime Minister's Office, Department for Business, Energy & Industrial Strategy (UK), Press Release, "New plans to make UK world leader in green energy" (6 October 2020), online: <https://www.gov.uk/government/news/new-plans-to-make-uk-world-leader-in-green-energy>. Regarding the use of offshore wind to meet the UK's climate goals, Duncan Clark, Head of UK Region for Ørsted said: "Offshore wind is the most cost effective way to achieve the UK's

August 2021 on how offshore wind farms affect the marine environment.[210] I note that this study on environmental impact is taking place *after* several offshore projects have already been developed and at the same time that the UK continues to make significant investments in the development of offshore wind projects.

171. In May 2021, President Biden announced a major offshore wind plan for the United States (the "**US**"). The plan includes a goal of deploying 30,000 MW (or 30 GW) of offshore wind turbines in coastal wasters nationwide by 2030 and 110 GW by 2050.[211] The federal Bureau of Ocean Energy Management ("**BOEM**") plans to advance new lease sales and complete its review of at least 16 Construction and Operations Plans (representing over 19 GW of new offshore wind energy) by 2025.[212] The BOEM also announced its intention to prepare an Environmental Impact Statement for the Ocean Wind Offshore Wind Project, a proposed 1,100 MW wind farm developed by Ørsted and PSEG located 15 miles off the coast of southern New

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net zero ambitions and delivering 40 GW of offshore wind by 2030 is an essential part of this roadmap."

210 Maritime Article, *supra* note 205.

211 **Exhibit C-2357**, Lisa Friedman and Brad Plumer, "Biden Administration Announces a Major Offshore Wind Plan", *The New York Times* (29 March 2021, last updated 25 May 2021), online: <https://www.nytimes.com/2021/03/29/climate/biden-offshore-wind.html>; and **Exhibit C-2356**, The White House, Fact Sheet, "Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs" (29 March 2021), online: <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/29/fact-sheet-biden-administration-jumpstarts-offshore-wind-energy-projects-to-create-jobs/>.

Exhibit C-2383, The Office of Energy Efficiency & Renewable Energy's Offshore Wind Mark Report: 2021 Edition (August 30, 2021) reported that the US offshore wind pipeline grew 25% since 2020, and that 35,324 MW of offshore potential was in various stages of development at the time of the report. It further reported that 15 projects have reached the permitting phase and eight states have set procurement goals for offshore wind that total approximately 40,000 MW by 2040: U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, *Offshore Wind Mark Report: 2021 Edition* (August 2021), online (pdf): <https://www.energy.gov/sites/default/files/2021-08/Offshore%20Wind%20Market%20Report%202021%20Edition_Final.pdf>.

Regarding President Biden's ambitious plan, National Climate Advisor Gina McCarthy said: "[…] That's because President Biden believes we have an enormous opportunity in front of us to not only address the threats of climate change, but use it as a chance to create millions of good-paying, union jobs that will fuel America's economic recovery, rebuild the middle class, and make sure we bounce back from the crises we face. Nowhere is the scale of that opportunity clearer than for offshore wind. This commitment to a new, untapped industry will create pathways to the middle class for people from all backgrounds and communities."

212 **Exhibit C-2372**, The White House, Fact Sheet, "Biden Administration Opens Pacific Coast to New Jobs and Clean Energy Production with Offshore Wind Development" (25 May 2021), online: <https://www.whitehouse.gov/briefing-room/statements-releases/2021/05/25/fact-sheet-biden-administration-opens-pacific-coast-to-new-jobs-and-clean-energy-production-with-offshore-wind-development/> [White House Offshore Fact Sheet].

Jersey.[213] Additionally, the BOEM expected to initiate environmental reviews for up to ten additional offshore wind projects in late 2021.[214] On January 12, 2022, it was announced that the BOEM would hold an offshore wind energy auction for development in the New York Bight (the area between the states of New Jersey and New York). The auction will allow wind developers to bid on six lease areas and could result in up to 7 GW of offshore wind energy.[215]

172. At the US state-level, there are two notable developments specific to offshore wind in the Great Lakes context. First, is the continued progression of the Icebreaker Wind Project ("**Icebreaker**") through the US federal and Ohio regulatory regime. Icebreaker is a proposed 20.7 MW demonstration offshore wind farm to be located in Lake Erie, roughly eight miles north of Cleveland, Ohio. It will be comprised of six turbines. If approved, Icebreaker will be the first offshore wind project in the Great Lakes and the first freshwater wind project in North America. The project received the necessary regulatory approvals in 2020; however, an appeal of one of the key approvals remains before the Supreme Court of Ohio at the time of this Report.[216] According to the Icebreaker project website, construction is planned to begin in Summer 2022 and commercial operation is expected by the end of 2022.[217]

173. Second, in February 2021, the New York State Energy Research and Development Authority ("**NYSERDA**") launched a study on the feasibility of developing offshore wind in the Great Lakes adjacent to the state.[218] The study will explore the viability of offshore wind projects in Lake Erie and Lake Ontario and "paths forward for Great Lakes Wind to help

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213 *Ibid* and **Exhibit C-2441**, Ocean Wind 1, online: <https://oceanwind.com/>. If built, Ocean Wind Offshore Wind Project would become the US's third commercial-scale offshore wind project.

214 White House Offshore Fact Sheet, *supra* note 212.

215 **Exhibit C-1908**, Bureau of Ocean Energy Management (US), "New York Bight" (2022), online: <https://www.boem.gov/renewable-energy/state-activities/new-york-bight>.

216 As of January 31, 2022, there is a legal challenge before the Supreme Court of Ohio to overturn the Ohio Power Siting Board's approval (Certificate of Environmental Compatibility and Public Need for an Electric Generating Facility) for Icebreaker. While there is no statutory timeline for the court to release its decision within, oral argument took place in December 2021, and a ruling is anticipated in 2022: **Exhibit C-2380**, Kathiann M. Kowalski, "Condo owners' appeal could be last legal hurdle for offshore wind in Great Lakes", *Energy News Network* (20 July 2021), online: <https://energynews.us/2021/07/20/condo-owners-appeal-could-be-last-legal-hurdle-for-offshore-wind-in-great-lakes/>.

217 **Exhibit C-2431**, LEEDCo, "The Project: Icebreaker Wind" (2022), online: <http://www.leedco.org/index.php/about-icebreaker>.

218 **Exhibit C-2421**, NYSERDA, "Great Lakes Wind Feasibility Study" (2022), online: <https://www.nyserda.ny.gov/great-lakes-wind-feasibility-study>.

New York to achieve its ambitious Clean Energy Standard."[219] NYSERDA has reportedly been consulting with relevant international jurisdictions, including Ontario, Québec and Canada, as part of its study and anticipates completing the associated report in February 2022.[220]

174. Other significant offshore wind developments in certain US states include:[221]

(a) New Jersey is targeting 7.5 GW of offshore wind by 2035, with approximately 3.7 GW having already been awarded by the New Jersey Board of Public Utilities and a third solicitation for 1,200 MW anticipated to open in 2022;[222]

(b) North Carolina's governor issued an Executive Order in June 2021 that targets 2.8 GW of offshore wind by 2030 and 8 GW by 2040;[223]

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219 The NYSERDA study follows a 2016 study completed by the U.S. Department of Energy Office of Scientific and Technical Information on Great Lakes offshore wind. The findings of this study provided recommendations on offshore wind integration scenarios, the locations of points of interconnection, wind profile modeling and simulation, and computational methods to quantify performance, along with operating changes and equipment upgrades needed to mitigate system performance issues introduced by an offshore wind project. For more details, refer to the *Great Lakes Offshore Wind Project: Utility and Regional Integration Study* (June 2016).

220 Although the study was ongoing at the time, during a study update webinar in November 2021, the team indicated that Lake Ontario presented a less challenging environment compared to Lake Erie and that floating turbines (although untested in ice-covered waters) would likely be recommended for use in Lake Ontario.

221 The development of offshore wind resources in the US has not been without challenge. Similar to the Regulatory Framework in Ontario pre-GEA (and pre-REA), the US regulatory regime is a patchwork of federal and state requirements and has undergone significant change, resulting in delays, financing challenges and ultimately defeat for certain proposed offshore projects. However, as demonstrated above, the federal US and state governments continue to push forward with offshore wind development. As of 2020, the National Renewable Energy Laboratory estimated US offshore wind energy potential exceeds 4,000 GW: **Exhibit C-2268**, Martin Levy, "Offshore Wind Development: Federal Permitting Program Challenges", (2020), online (blog): *Harvard Law School Environmental & Energy Law Program* <http://eelp.law.harvard.edu/wp-content/uploads/Offshore-Wind-Development-Blog_03242020.pdf>.

222 **Exhibit C-1907**, New Jersey Board of Public Utilities, "New Jersey Offshore Wind Solicitations" (n.d.), online: <https://www.njcleanenergy.com/renewable-energy/programs/nj-offshore-wind/solicitations>. Most recently, on June 30, 2021, the New Jersey Board of Public Utilities awarded 2,658 MW of offshore wind capacity to EDF/Shell's Atlantic Shores Offshore Wind and Ørsted's Ocean Wind II projects.

223 **Exhibit C-2382**, U.S. Department of the Interior, Press Release, "Interior Department Announces Next Steps for First Proposed Wind Energy Project Offshore North Carolina" (29 July 2021), online: <https://www.doi.gov/pressreleases/interior-department-announces-next-steps-first-proposed-wind-energy-project-offshore>.

(c) Virginia's *Virginia Clean Economy Act*, passed in 2020, sets a target of 5.2 GW of offshore wind energy by 2034;[224]

(d) In 2021, Massachusetts announced it would move forward with contract negotiations for two offshore wind projects proposed by Mayflower Wind Energy LLC (400 MW) and Vineyard Wind (1,200 MW), as part of Massachusetts' third offshore wind solicitation;[225]

(e) Efforts are underway in California to open an initial 4.6 GW of offshore wind capacity.[226] In addition, on September 23, 2021, Assembly Bill No. 525 ("**Bill 525**") was signed into law. Bill 525 requires the Energy Commission to undertake various actions to evaluate and quantify California's maximum potential offshore capacity by June 1, 2022.[227]

175. Although offshore wind has yet to take off in Canada, there are several projects totaling over 3.6 GW that have been proposed, including the NaiKun Project, a 400 MW proposed project in the Hecate Strait, British Columbia, and five projects by Beothuk Energy Inc. ("**Beothuk**") planned for Newfoundland and Labrador, Nova Scotia, Prince Edward Island and New Brunswick, totaling over 3,200 MW.[228] After being awarded contracts for a proposed 800

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224 *Ibid*.

225 **Exhibit C-2419**, Office of Governor, Governor's Press Office, Executive Office of Energy and Environmental Affairs, Massachusetts Department of Energy Resources, Press Release, "Baker-Polito Administration Announces Historic Selection of Offshore Wind Projects to Bring Clean, Affordable Power to the Commonwealth" (17 December 2021), online: <https://www.mass.gov/news/baker-polito-administration-announces-historic-selection-of-offshore-wind-projects-to-bring-clean-affordable-power-to-the-commonwealth>. The state's Energy and Environmental Affairs Secretary at the time of the award said: "Offshore wind is the centerpiece of Massachusetts' climate goals and our effort to achieve Net Zero emissions in 2050 […]"

226 White House Offshore Fact Sheet, *supra* note 12. California's website indicates a joint federal-state task force on offshore wind has been in place since 2016: **Exhibit C-2267**, California Energy Commission, "Offshore Renewable Energy" (2022), online: <https://www.energy.ca.gov/programs-and-topics/topics/renewable-energy/offshore-renewable-energy>.

227 **Exhibit C-2391**, U.S., A.B. 525, *An act to add and repeal Chapter 14 (commencing with Section 25991) of Division 15 of the Public Resources Code, relating to energy*, 2021-2022, Reg. Sess., Cal., 2021 (enacted).

228 **Exhibit C-2084**, Canada Energy Regulator, "Canada's Adoption of Renewable Power Sources – Energy Market Analysis Energy Market Analysis" (May 2017), online (pdf): <https://www.cer-rec.gc.ca/en/data-analysis/energy-commodities/electricity/report/2017-canadian-adoption-renewable-power/2017cnddptnrnwblpwr-eng.pdf> at 25. No recent updates have been provided by the developers of these projects. In December 13, 2019, the British Columbia Environmental

MW offshore wind project in Massachusetts in 2018, Atlantic Canada Offshore Developments (a partnership between Beothuk and Copenhagen Infrastructure Partners), stated that their “next priority is to realize the first Canadian offshore wind farm.”[229]

176. With a new 350 MW renewable energy procurement announced by Nova Scotia in July 2021, and currently underway,[230] Beothuk may soon have an opportunity. The *Renewable Electricity Regulations*, which outline the details and eligibility requirements for the procurement, define “Province” as: “includes the lands and submarine areas within the limits of the offshore area described in Schedule I to the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation (Nova Scotia) Act*, as amended.”[231] The procurement also requires a proposed project to be a “Renewable Low-Impact Electricity Generation Facility”, which the regulations define to include electricity generated from wind energy (but not specifically onshore or offshore wind energy), as well as ocean-powered energy, among others.[232] This criteria appears broad enough to potentially include offshore wind projects in this new procurement. To date, efforts to develop marine renewable energy in Nova Scotia have focused largely on tidal power.[233]

Assessment Office confirmed that the NaiKun Project’s Environmental Assessment Certificate (issued in December 10, 2009) has expired due to the project not being substantially started.

229 **Exhibit C-2156**, Atlantic Canada Offshore Developments, Press Release, “Atlantic Canada Offshore Developments (ACOD) Partner Awarded Contracts for 800 Megawatts of Offshore Wind Power in Massachusetts; Next Priority is to Realize the First Canadian Offshore Wind Farm” (4 June 2018), online: <https://www.globenewswire.com/en/news-release/2018/06/04/1516218/0/en/Atlantic-Canada-Offshore-Developments-ACOD-Partner-Awarded-Contracts-for-800-Megawatts-of-Offshore-Wind-Power-in-Massachusetts-Next-Priority-is-to-Realize-the-First-Canadian-Offsho.html>.

230 The procurement is presently underway, with an RFP anticipated to be issued in February 2022, and successful proponents notified by late July 2022. Successful proponents will be awarded Power Purchase Agreements with Nova Scotia Power Inc. See **Exhibit C-1909**, Nova Scotia Rate Base Procurement (2022), online:< https://novascotiarbp.com/>.

231 N.S. Reg. 155/2010, s. 3(1). The definition of “Province” is important because the renewable energy procurements apply to renewable low-impact electricity generation facilities “in the Province”.

232 *Ibid*, s. 3(1). “Renewable low-impact electricity” is defined to mean electricity produced from any of the following: (i) solar energy; (ii) wind energy; (iii) run-of-the-river hydroelectric energy; (iv) ocean-powered energy; (v) tidal energy; (vi) wave energy; (vii) biomass that has been harvested in a sustainable manner; (viii) landfill gas; and (xi) any resource that, in the opinion of the Minister of Energy and consistent with Canadian standards, is able to be replenished through natural processes or through sustainable management practices so that the resource is not depleted at current levels through consumption.

233 On September 2, 2021, Nova Scotia announced that BigMoon Canada Corporation (“**BigMoon**”) was selected by the independent procurement administrator for a Marine Renewable-Electricity

177. Federally, the Government of Canada has completed pre-engagement consultations on a discussion paper for its proposed *Offshore Renewable Energy Regulations* (the "**Offshore Regulations**").[234] The Offshore Regulations are intended to regulate health and safety and environmental matters for future offshore renewable energy projects, including offshore wind, and would apply to projects that are regulated under Part 5 of the *Canadian Energy Regulator Act*, S.C. 2019, c. 28, s. 10.[235] The principles that will guide the development of the Offshore Regulations include, among other things, the use of a risk-based approach to focus resources on higher risk areas and, where possible, adopting outcome-based requirements "to promote innovative solutions and technological advancements that increase levels of safety and environmental protection over time and reduce costs."[236] As of January 2022, the Offshore Regulations are expected to be released in the *Canada Gazette* for public comment in 2023 and in force in 2024.[237]

178. Recent actions taken by various Canadian actors indicate their confidence in the Lake Erie Connector project proceeding through to development. In April 2021, ITC and the Canada Infrastructure Bank ("**CIB**") announced an agreement in principle whereby CIB will invest up to $655 million (or up to 40%) of the project cost.[238] The Minister of Energy also

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licence and a power purchase agreement: **Exhibit C-2321**, Energy and Mines (Nova Scotia), News Release, "New Tidal Energy Developer Joins FORCE" (2 September 2020), online: <https://novascotia.ca/news/release/?id=20200902001>. BigMoon has proposed to design, construct, and operate eight 500 kW in-stream tidal energy generators with an aggregate capacity of 4 MW: **Exhibit C-2317**, Adis Ajidin, "BigMoon to replace Capre Sharp at FORCE" (4 September 2020), online: *Offshore Energy* <https://www.offshore-energy.biz/bigmoon-to-replace-cape-sharp-at-force/>.

234 **Exhibit C-2279**, Natural Resources Canada, "Discussion Paper Canada's Approach to Offshore Renewable Energy Regulations" (2020), online (pdf): <https://www.rncanengagenrcan.ca/sites/default/files/pictures/participate/orer-paper-accessible-pdf-fip-wm-en.pdf> [NRCan Offshore Regulations Paper].

235 Part 5 applies to projects in Canada's offshore areas, which are defined in the *Canadian Energy Regulator Act* as: (a) the part of the internal waters of Canada or of the territorial sea of Canada that is not situated in (i) a province other than the Northwest Territories, or (ii) the onshore, as defined in section 2 of the *Northwest Territories Act*; and (b) the continental shelf of Canada and the waters superjacent to the seabed of that shelf. The Government of Canada has indicated an intention to work closely with interested provinces and territories on the Offshore Regulations.

236 NRCan Offshore Regulations Paper, *supra* note 234 at 10 (4. Guiding Principles).

237 **Exhibit C-2433**, Natural Resources Canada, The Offshore Renewable Energy Regulations Initiative (n.d.), online: <https://www.rncanengagenrcan.ca/en/collections/offshore-renewable-energy-regulations-initiative>.

238 **Exhibit C-2362**, Canada Infrastructure Bank, News Release, "The CIB and private sector partners to invest $1.7 billion in Lake Erie Connector" (13 April 2021), online:

released a directive to the IESO on May 13, 2021, directing the IESO to proceed with contract negotiations with ITC and to report back on the status of such negotiations by December 31, 2021.[239] In addition, the Minister has asked for Energy staff to be included in the negotiations as "observers" and for proposed major contracts to be submitted to the Minister for review and approval. Subject to Lieutenant Governor in Council approval, the Minister will then determine whether to direct the IESO to execute a contract with ITC.[240]

I would be pleased to answer any further questions that may be posed to me in respect of this matter.

February 18, 2022	
Date	**Sarah V. Powell**

<https://www.newswire.ca/news-releases/the-cib-and-private-sector-partners-to-invest-1-7-billion-in-lake-erie-connector-828722096.html>.

239 As of January 31, 2022, there was no update in the public record with respect to the status of contract negotiations with ITC. The latest provided is the Minister's Directive from May 2021 referred to in footnote 46 above.

240 *Ibid.*

APPENDIX A – CURRICULUM VITAE

See attached.

DAVIES

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Expertise
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Bar Admissions
Ontario, 1993

Sarah uses her thorough understanding of evolving issues in environmental and energy law to provide clients with practical, concise advice. She works with clients – both directly and as a member of Davies' transaction teams – to evaluate environmental and social risks in Canadian and international deals.

Renewable energy, mining and Indigenous issues are significant areas of focus. Sarah is also very successful at advocating before administrative tribunals regarding permitting for infrastructure, resource development and manufacturing projects.

Sarah is a member of our Management Committee. She is deeply involved in the development and reform of Canadian environmental law and has held many leadership roles in prominent legal and business organizations.

REPRESENTATIVE WORK

Interfor Corporation
Acting for Interfor Corporation in its acquisition of the equity interests of Kelso & Company-backed EACOM Timber Corporation.

PSP Investments
Acted for PSP Investments in its acquisition of interests held by Pattern Energy Group LP in the 271.4 MW Gulf wind project located in Texas.

The Manufacturers Life Insurance Company
Acted for The Manufacturers Life Insurance Company to finance a portfolio of solar projects in Alberta.

Federal Crown Corporation
Acted for a **federal Crown corporation** in its development of a first of its kind, flexible financing program for the Government of Canada's zero-emission buses initiative.

DIF Capital Partners and Valley Fiber Limited
Acted as lead transaction counsel to DIF Capital Partners and Valley Fiber Ltd. in their investment together with Canada Infrastructure Bank in the Southern Manitoba Fibre project, which involves the construction of 2,657 kilometres of mainline fibreoptic cabling.

Axium Infrastructure Inc.
Acted for Axium Infrastructure Inc. in its acquisition from the Canada Pension Plan Investment Board of a interest in an approximately 396 MW portfolio of four wind generation facilities and two solar generation facilities, all located in Ontario.

Premium Brands Holdings Corporation
Acted for Premium Brands Holdings Corporation in its groundbreaking partnership with a coalition of Mi'kmaq First Nations to jointly acquire Clearwater Seafoods Incorporated, Atlantic Canada's largest wild seafood company.

The Pallinghurst Group
Acted for The Pallinghurst Group in its joint 50-50 acquisition with Investissement Québec of Nemaska Lithium Inc.

PSP Investments
Acted for PSP Investments in its acquisition of interests held by Pattern Energy Group LP in the 324.3 MW Broadview wind project located in New Mexico and Texas.

PSP Investments
Acted for PSP Investments in its acquisition of interest from Pattern Energy Group LP in the 138 MW St. Joseph wind project located in Manitoba.

The Manufacturers Life Insurance Company
Acted for **The Manufacturers Life Insurance Company** in the financing of the Romney Wind Project.

Axium Infrastructure Inc.
Acted for Axium Infrastructure Inc. in its equity investment in a 900 MW combined cycle natural gas power plant to be built near Edson, Alberta, known as the Cascade Power Project.

The Manufacturers Life Insurance Company
Acted for The Manufacturers Life Insurance Company in the project financing for the Innavik Hydro Project, a 7.5 MW run-of-river hydroelectric facility being developed on the Innuksuac River in northern Québec by the first ever partnership between an Inuit corporation, which was formed under the James Bay and Northern Québec Agreement, and a leading independent power producer.

Axium Infrastructure Inc.
Acted for Axium Infrastructure Inc. in its acquisition from Osaka Gas Co., Ltd. of a 50% interest in a portfolio of nine solar farms located in Ontario.

The Manufacturers Life Insurance Company
Acted for The Manufacturers Life Insurance Company in its acquisition of a 50% interest in the York Energy Centre, a 400 MW natural gas fired power plant near Newmarket, Ontario.

Axium Infrastructure Inc.
Acted for Axium Infrastructure Inc. in its acquisition from Mitsubishi Corporation of a 50% interest in a portfolio of nine solar farms located in Ontario.

Birch Hill Equity Partners
Acted for Birch Hill Equity Partners in the $101.6-million acquisition and related financing of non-core midstream and power assets in Canada from AltaGas Ltd. and in the $63.4-million acquisition of a 13.3% interest in Tidewater Midstream and Infrastructure Ltd., a public company, from AltaGas.

PSP Investments
Acted for **PSP Investments** with its acquisition of a minority interest in the 100 MW Belle River wind farm located near Chatham-Kent, Ontario.

Axium Infrastructure Inc. and The Manufacturers Life Insurance Company
Acted for Axium Infrastructure Inc. and The Manufacturers Life Insurance Company in their joint $1.4-billion acquisition of AltaGas Ltd.'s remaining 55% interest in three hydroelectric projects in northwest British Columbia: the 195 MW Forrest Kerr Hydroelectric Facility, the 66 MW McLymont Creek Hydroelectric

Facility and the 16 MW Volcano Creek Hydroelectric Facility.

Fengate Capital Management
Acted for Fengate Capital Management in its acquisition of the Heartland Petrochemical Complex's Central Utility Block (CUB) cogeneration facility from Inter Pipeline Ltd. and the project financing for the development, construction and operation of the CUB.

PSP Investments
Acted for **PSP Investments** in its acquisition of interest in the Stillwater Wind Project, an 80 MW operating wind energy project located in Montana.

Axium Infrastructure Inc. and The Manufacturers Life Insurance Company
Acted for (i) Axium Infrastructure Inc. and The Manufacturers Life Insurance Company in their joint $922-million acquisition from AltaGas Ltd. of a 35% interest in three hydroelectric projects in northwest British Columbia: the 195 MW Forrest Kerr Hydroelectric Facility, the 66 MW McLymont Creek Hydroelectric Facility and the 16 MW Volcano Creek Hydroelectric Facility; and (ii) Northwestern Hydro Acquisition Inc., the special purpose acquisition vehicle formed to complete the acquisition, in a subsequent $650 million senior secured bond financing and related letter of credit facility.

Hydroméga Services Inc.
Acted for Hydroméga Services Inc. in the acquisition of Cochrane Power Corporation's Cochrane Power Generating Station, a cogeneration facility equipped with a 30MW natural gas turbine and a 15MW biomass fuelled boiler and steam turbine.

Nomura Securities International, Inc.
Acted for Nomura Securities International, Inc. in the refinancing of credit facilities in an aggregate amount of approximately $230 million made available for the long-term operation of seven 10-MW ground-mount solar photovoltaic projects in Ontario, each of which had been awarded a 20-year power purchase contract with the IESO.

Axium Infrastructure Inc.
Acted for Axium Infrastructure Inc. in its $540-million acquisition of TransCanada's Ontario solar portfolio, consisting of eight facilities totalling approximately 105 MW of installed capacity.

PSP Investments
Acted for PSP Investments in its strategic initiatives with Pattern Energy Group Inc., including (i) the acquisition of a 9.9% interest in Pattern Energy; (ii) the joint venture between PSP and Pattern Energy to co-invest in various renewable projects; (iii) the joint acquisition with Pattern Energy of a 51% and 49% interest, respectively, in the 179 MW Meikle wind project in British Columbia and the 143 MW Mont Sainte-Marguerite wind project in Québec; and (iv) the acquisition of 49% of the Class B interests held by Pattern in the Panhandle 2 wind project in Texas.

Manulife Financial Corporation
Acted for the Manufacturers Life Insurance Company in financing the operation of 10 ground-mount solar projects in Ontario, each of which had been awarded a

20-year power purchase contract under Ontario's Feed-in Tariff Program.

Fortis Inc.
Acted for Fortis Inc. in connection with its sale to Energy Ottawa Inc. of 10 run-of-river hydroelectric facilities located in Ontario and New York State representing 31 megawatts of installed operating capacity.

Manulife Financial Corporation
Acted for the Manufacturers Life Insurance Company in connection with the financing of the construction and long-term operations of the Rural Energy Solar Portfolio, which consists of 10 photovoltaic ground-mount solar projects located in Ontario.

Stonebridge Financial Corporation
Acted for Stonebridge Financial Corporation in connection with the establishment of a credit facility for Affinity Wind LP to finance the construction and long-term operation of a 13.2-MW wind farm to be located near Truro, Nova Scotia.

Manulife Financial Corporation
Acted for a group of lenders, comprising the Manufacturers Life Insurance Company, the Caisse de Dépôt et placement du Québec and the Canada Life Assurance Company, in connection with the $491.6-million non-recourse construction and term project financing for the Upper Lillooet River and Boulder Creek run-of-river hydroelectric projects owned by Innergex Renewable Energy Inc. and Ledcor Power Group Ltd.

RECOGNITIONS

Chambers Global: The World’s Leading Lawyers for Business—Environment (Band 1)

Chambers Canada: Canada’s Leading Lawyers for Business—Environment (Band 1)

The Legal 500 Canada—Environment (Leading Individual)

The Lexpert/American Lawyer Guide to the Leading 500 Lawyers in Canada—Environmental Law

Lexpert Special Edition: Energy

Lexpert Special Edition: Infrastructure

Lexpert Special Edition: Mining

Lexpert Zenith Award—Environmental Law (2014)

Lexpert Guide to US/Canada Cross-Border Lawyers in Canada—Environmental Law

The Canadian Legal Lexpert Directory—Environmental Law (Most Frequently Recommended); Energy: Electricity; Indigenous Law

The Best Lawyers in Canada—Aboriginal Law; Energy Law (Lawyer of the Year 2017, Toronto); Energy Regulatory Law (Lawyer of the Year 2019, Toronto); Environmental Law (Lawyer of the Year 2018, Toronto); Natural Resources Law

Who's Who Legal: Canada—Environment; *Who's Who Legal: Environment* (Global Elite Thought Leader); *Who's Who Legal: Thought Leaders Global Elite*—Environment

Expert Guides' *Women in Business Law*; Expert Guides—Environment

INSIGHTS

Start Your (Little) Engines: Activist Investor Wins Exxon Board Seats
June 01, 2021

Moderator, Canadian Bar Association, CAN Neerls Online Symposium, "State of Play in Renewable and Distributed Energy Across Canada"; Webcast
May 06, 2021

Supreme Court of Canada Rules on Carbon Pricing, Paving Way for Offset Credit Regulations
Mar. 29, 2021

Going Green: Recent Climate Change and Energy Developments
Nov. 23, 2020

Davies Governance Insights 2020
Oct. 05, 2020

Updated Equator Principles Take Effect
Oct. 01, 2020

IESO Releases Contract Review Directive Report
Sept. 03, 2020

Ontario to Review Existing Generation Contracts
Nov. 08, 2019

Environmental Update: Recent Regulatory Developments
Sept. 20, 2019

Canadian Securities Regulators Provide Guidance on Climate Disclosure
Aug. 08, 2019

Ontario Court of Appeal Rules That Federal Carbon Pricing Scheme Is Constitutional
July 03, 2019

Moderator, Canadian Bar Association, Environmental, Energy & Resources Law Summit, "Canada's Green Energy Development Shifts West"; Vancouver, BC
May 03, 2019

Top Court Rules Bankrupt Corporations Can't Evade Environmental Obligations
Feb. 05, 2019

Green Energy Act Repealed and Municipal Powers to Oppose Renewable Energy Reinstated
Sept. 21, 2018

Canadian Securities Regulators Report on Climate Disclosure
Apr. 06, 2018

Canada Resets Federal Environmental Assessment for Major Project Reviews
Feb. 09, 2018

Pan-Canadian Carbon Pricing Update: Federal Backstop Legislation Proposed
Jan. 18, 2018

Enlarged Carbon Market and New Oil Gas Statutory Framework in Québec…Predictability or Uncertainty Ahead?
Sept. 22, 2017

Financial Stability Board Task Force on Climate-Related Disclosures Releases Final Report
June 29, 2017

Details Released on Federal Proposal for Pan-Canadian Price on Carbon
May 19, 2017

Pan-Canadian Price on Carbon
Oct. 04, 2016

United States Joins Canada and European Union in Adopting Transparency Rules
June 29, 2016

Ontario's Cap-and-Trade Regime
May 20, 2016

"Publish What You Pay" Guidance Finalized
Mar. 21, 2016

Ontario's Carbon Market Revealed
Feb. 26, 2016

Ontario Bar Association, Hot Topics in Climate Change: Ontario in the National and International Contexts 2016 Program, "The Regulatory & Policy Framework: Learning From Other Jurisdictions' Experiences with Climate Change Regulation"; Toronto, ON
Feb. 02 to 06, 2016

Greenhouse Gas Emissions: Important Provincial Initiatives
July 06, 2015

"Publish What You Pay" Standards Now in Force for Canada's Extractive Industries
June 02, 2015

Plan Nord, Take Two
Apr. 29, 2015

Ontario and Québec Collaborate to Reduce Carbon Emissions
Apr. 14, 2015

Co-chair, Canadian Bar Association, 2015 Annual National Environmental, Energy and Resources Law Summit, "Environment in the Courtroom: Evidentiary Issues in Environmental Prosecutions and Hearings"; Calgary, AB
Mar. 06 & 07, 2015

New Nuclear Liability Regime Passed
Mar. 03, 2015

EDUCATION

Queen's University, LLB, 1991
McGill University, BA (Honours), 1988

PROFESSIONAL AFFILIATIONS

American Bar Association
Canadian Bar Association
Ontario Bar Association

BOARD MEMBERSHIPS

ERCO Worldwide
The Stop Community Food Centre
Soulpepper Theatre Company, Chair's Advisory Council

COMMUNITY INVOLVEMENT

Canadian Centre for Environmental Arbitration and Mediation, Mediator/Arbitrator
Canadian Bar Association, National Environmental, Energy and Resource Law Section, Past Chair
Ontario Bar Association, Environmental Law Section, Past Chair

APPENDIX B – DOCUMENTS REVIEWED

For the purposes of preparing this report, I have reviewed the following documents (collectively, the "**Documentation**"):

(a) Windstream's Notice of Intent to Submit a Claim to Arbitration dated January 22, 2020;

(b) Windstream's Supplementary Notice of Intent to Submit a Claim to Arbitration dated March 25, 2020;

(c) Windstream's Notice of Arbitration dated November 2, 2020;

(d) Government of Canada's Response to the Notice of Arbitration dated January 22, 2021;

(e) Renewable Energy Approval and Permitting report prepared by WSP Canada Inc. for Windstream dated February 18, 2022;

(f) the *Electricity Act*, the *Ministry Act*, the *Energy Statute Law Amendment Act, 2016*, the *OEBA*, the GEA and the *Green Energy Repeal Act*;

(g) the EPA and O. Reg. 359/09;

(h) the *Termination Act* and O. Reg. 237/19;

(i) various pieces of provincial legislation related to the development of wind projects in Ontario as referenced herein, including the *Planning Act*, the *EBR*, the *EAA*, O. Reg. 116/01, the *ESA*, O. Reg. 242/08 and the *Ontario Water Resources Act*;

(j) various pieces of federal legislation related to the development of wind projects in Ontario as referenced herein, including the IAA, the *Canadian Navigable Water Act*, the *Fisheries Act*, *SARA*, the *Constitution Act, 1982*, and the Act and UNDRIP;

(k) various pieces of legislation enacted by the current Ontario government, including the *Fixing the Hydro Mess Act, 2019*, the *SRCA*, the *MOPBA*, the *Ontario Rebuilding and Recovery Act, 2020*, the *Building Transit Faster Act, 2020*, the CER Act, Bill 57, Bill 197 and Bill 229;

(l) the directives referenced herein from the Minister of Energy to the IESO;

(m) the policies, guidance and ERO postings referenced herein of the OPA/IESO, the MECP and the Ministry of Northern Development, Mines, Natural Resources and Forestry;

(n) the Quarterly Progress Reports, Active Contracted Generation List, business plans, procurement guidance and other reports and public website materials referenced herein of the IESO;

(o) the Standard FIT Contract Version 1.3.0 and FIT 1.0 Rules;

(p) exhibits from NAFTA 1 referenced herein;

(q) all decisions of the OLT and various Ontario courts referenced herein;

(r) all regulatory approvals and decisions from the MECP and the Canada Energy Regulator referenced herein;

(s) N.S. Reg. 155/2010;

(t) all studies, papers, reports, text books, speeches, news releases and news articles referenced herein; and

(u) my 2014 Report and my 2015 Supplemental Report.