REQUEST FOR PROPOSALS

FOR

Wind Turbine Procurement for a Proposed 30 Megawatt Wind Project

For the PEI Energy Corporation

Request for Proposal Number: 5172

Date Issued: 12 December 2018

Submission Deadline: 07 February 2019

Version:170207

PART 1 – INVITATION AND SUBMISSION INSTRUCTIONS

1.1 Invitation to Proponents

This Request for Proposals (the "RFP") is an invitation by the Prince Edward Island Energy Corporation ("the "Corporation") to prospective proponents to submit proposals for the supply of wind turbines for a Proposed 30 Megawatt Wind Project as further described in the **RFP Particulars (Appendix C)** (the "Deliverables").

The Corporation is now in the process of evaluating site options for the development of the 2020 project with the intent of further scoping options for the location of a 2025 project. Wind monitoring programs are presently underway in three locations and the Corporation has narrowed the alternatives for the 2020 project to three locations; Eastern Kings, near the existing Eastern Kings Wind Plant, Irishtown, north of the community of Kensington and western Prince County. These studies will be completed on January 31, 2019 and final reports will be available by mid-February. The selection of the host community will be finalized by February 28, 2019, once the wind resource assessments are completed and community engagement is completed.

The objective of the RFP is to receive and review proposals from qualified wind turbine suppliers to identify a preferred manufacturer with whom detailed negotiations will be held to select the most viable turbine for the project.

The Prince Edward Island Energy Corporation is a provincial Crown corporation under the auspices of the Minister responsible for the energy portfolio. With a form and function dictated under statute, the Corporation's stated objectives are to "…develop and promote the development of energy systems and the generation, production, transmission and distribution of energy, in all its forms, on an economic and efficient basis, to provide financial assistance for the development, installation and use of energy systems ...''.

1.2 RFP Contact

For the purposes of this procurement process, the "RFP Contact" shall be:

Heather MacLeod, P.Eng.,
PEI Energy Corporation
PO Box 2000
3rd Floor Sullivan Building
16 Fitzroy Street
Charlottetown, PE C1A 7N8

Tel. (902) 368-5011
Fax. (902) 894-0290
E-mail: hamacleod@gov.pe.ca

Proponents and their representatives are not permitted to contact any employees, officers, agents, elected or appointed officials or other representatives of the Corporation, other than the RFP Contact or their designate, concerning this RFP. Failure to adhere to this rule may result in the disqualification of the proponent and the rejection of the proponent's proposal.

1.3 Type of Contract for Deliverables

The selected proponent will be required to enter into a turbine supply agreement (TSA) with the Corporation for the provision of the Deliverables. The Corporation reserves the right to extend the agreement for two five-month extensions beyond the initial term, for an overall potential maximum of two years in total.

1.4 RFP Timetable

Issue Date of RFP	**12 December 2018**
Deadline for Questions	**10 January 2019**
Deadline for Issuing Addenda	**17 January 2019**
Submission Deadline	**07 February 2019, 2:00pm AST.**
Anticipated Execution of Agreement	**30 April 2019**

The RFP timetable is tentative and may be changed by the Corporation at any time.

1.5 Submission of Proposals

1.5.1 Proposals to be submitted at the Prescribed Location

Proposals must be submitted at:

PROCUREMENT SERVICES
PEI Department of Finance
105 Rochford Street
2nd Floor, Shaw Building
Charlottetown, PE
C1A 7N8

Attention: Mark Kays

1.5.2 Proposals to be submitted on Time

Proposals must be submitted at the location set out above on or before the Submission Deadline (February 7, 2019, 2:00pm AST) as indicated in section 1.4. The Proponent is solely responsible for the delivery of its proposal to the exact location (including floor, if applicable) indicated in this RFP on or before the Submission Deadline. The Corporation does not accept any responsibility for proposals delivered to any other location by the Proponent or its delivery agents. Proposals submitted after the Submission Deadline will be rejected. The Corporation's time clock will be deemed to be correct.

1.5.3 Proposals to be submitted in Prescribed Format

In a sealed package, Proponents should submit their proposal containing two hard copies of their proposal and one (1) electronic copy saved as a Portable Document Format (PDF) on a USB flash drive, unless otherwise indicated. The file name on the electronic copy should include an abbreviated form of the proponent's name and RFP#. If there is a conflict or inconsistency between the hard copy and the

electronic copy of the proposal, the hard copy of the proposal shall prevail. In the interest of environmental sustainability, please refrain from using binders, binding, plastic covers, or similar fastening or presentation materials when submitting the proposal. Similarly, unless specifically requested in this solicitation document, proponents should not submit product catalogues, swatches, or other marketing materials with their bid. Sealed packages should be prominently marked with:

- the RFP title and number (see RFP cover)
- the full legal name and return address of the proponent

The Corporation will not accept proposals submitted by facsimile transfer, email, or any other electronic means.

1.5.4 Amendment of Proposals Prior to Submission Deadline

Proponents may amend their proposals prior to the Submission Deadline by submitting the amendment in a sealed package prominently marked with the RFP title and number and the full legal name and return address of the proponent to the location set out in section 1.5.1. Any amendment must clearly indicate which part of the proposal the amendment is intended to amend or replace. Any amendments received after the Submission Deadline will not be accepted. Amendment must be signed by the person who signed the original proposal submission or by a person authorized to sign on his or her behalf.

1.5.5 Withdrawal of Proposals

Proponents may withdraw their proposals prior to the Submission Deadline. To withdraw a proposal, a notice of withdrawal must be received by the RFP Contact prior to the Submission Deadline and must be signed by an authorized representative of the proponent. The Corporation is under no obligation to return withdrawn proposals.

1.5.6 Proposals Irrevocable after Submission Deadline

Proposals shall be irrevocable for a period of One Hundred and Twenty (120) days from the Submission Deadline.

[End of Part 1]

PART 2 – EVALUATION OF PROPOSALS

2.1 Stages of Evaluation

The Corporation will evaluate proposals in the following three stages:

2.2 Stage I – Mandatory Submission Requirements

Stage I will consist of a review to determine which proposals comply with all of the Mandatory Submission requirements. Proposals that do not comply with all of the Mandatory Submission requirements as of the Submission Deadline will be disqualified and not evaluated further.

2.2.1 No Amendment to Forms

Other than inserting the information requested on the mandatory submission forms set out in the RFP, a Proponent may not make any changes to any of the forms. Any proposal containing any such changes, whether on the face of the form or elsewhere in the proposal, will be disqualified.

2.2.2 Submission Form (Appendix B)

Each proposal must include a completed **Submission Form (Appendix B)** signed by an authorized representative of the proponent to indicate they understand the terms of the RFP and to authorize the proposal.

2.2.3 Proposal Document

Each proposal must include a proposal document, in a format of the proponent's choosing, that addresses all the technical, operational and pricing information specified in the RFP. Incomplete responses will be reflected in scoring matrix.

2.3 Stage II – Evaluation

Stage II will consist of the following two sub-stages:

2.3.1 Mandatory Technical Requirements

It is mandatory requirement that sufficient technical information be provided by the proponent to enable a complete assessment of the turbine's technical viability. The Corporation will review the proposals to determine whether the mandatory technical requirements, as set out in Section C.7 and Section C.8 of the **RFP Particulars (Appendix C),** have been met. Questions or queries on the part of the Corporation as to whether a proposal has met the mandatory technical requirements will be subject to the verification and clarification process set out in Section 3.3.4. If this information is provided in the proponent's standard documentation, rather than within the body of the proposal, the document providing the required technical information, must be referenced. If, in the opinion of the review committee, a proponent fails to satisfy the mandatory technical requirements (for example a proposal from an inexperienced company or a wind turbine platform that has not been sufficiently proven) its proposal may be excluded from further consideration.

2.3.2 Rated Criteria

The Corporation will evaluate each compliant proposal on the basis of the criteria as set out in **RFP Particulars (Appendix C)** of the RFP. The following is an overview of the categories and weighting for the

rated criteria of the RFP. Proponents who do not meet a minimum threshold score for a category will not proceed to the next stage of the evaluation process.

The Corporation is seeking to work with a wind turbine manufacturer and wind turbine that will ensure a viable cash flow over the 20 - 25 year service life of the turbine. Because this is a publicly financed venture, risk management is critical. Turbine manufacturers must demonstrate that their product offering brings minimal risk to the Corporation. Once risk concerns are resolved, the primary consideration for selecting the turbine is the lowest levelized cost of energy, which will be computed for each proposed turbine.

Each proposal will be evaluated using four criteria, discussed in more detail below and ranked by weight as shown in **Appendix C**.

- **Technical Viability of Offering**

  Each turbine proposed will be evaluated with respect to the technical parameters described and the capacity of the proponent to ensure the turbine operates reliably throughout its service life. Only low risk and high-performance options will be considered.

- **Experience and Reference Projects**

  It is imperative that the offered turbine must operate reliably in the site's harsh conditions. References and experience for the proposed turbine will be evaluated in detail. Turbines without a long operating history will require strong corporate backing.

- **Compelling Advantage**

  Any proposals that, in the view of the review committee, present to the Corporation, a 'compelling advantage', such as local economic development or the offer of economic energy storage options, have the potential of scoring additional points.

All proposals will be evaluated to ensure they can provide reliable and productive operation service over the required design life. Any proposed turbines which are felt not to meet these requirements, as indicated by a total score of less than 60 points in the technical evaluation will not be considered further.

- **Evaluated Levelized Cost of Energy and Net Present Value**

  Each turbine offering will be modelled into the wind project, to optimize the layout and to evaluate annual energy yields. Project costing and operational costs over the life of the project will be computed to determine the levelized cost of electricity (LCOE) over the life of the project and the net present value (NPV) to the Corporation. The proposed turbine with the best combination lowest LCOE and the highest NPV will be rated highest, etc.

Rated Criteria Category	**Weighting (Points)**	**Minimum Threshold**
T*echnical Evaluation*		
Technical viability of offering (C.7 – C.9)	**30 points**	**N/A**
Experience and reference projects (C.7.2)	**20 points**	**N/A**

Compelling advantage	**10 points**	**N/A**
Subtotal	**60 points**	**30 points minimum**
Economic Evaluation		
Evaluated LCOE / NPV (Computed from details in C7 - C.10)	**40 points**	**N/A**
Total Points	**100 points**	**60 points minimum**

2.4 Stage III – Verification & Selection

The highest scoring proponent will be provided final details on the site selection with the compiled wind data for the selected site, with a proposed layout of the wind plant, using their proposed turbines. If the layout, subject to joint modification, is acceptable, a turbine sales agreement will be negotiated with the highest rated proponent.

2.5 Selection of Highest Scoring Proponent

After the review of submitted proposals, all scores will be added together, and each proponent will be ranked based on its total score. The proponent with the highest score will be selected to enter into more detailed discussions prior to the negotiation of a turbine sales agreement.

2.6 Notification to Other Proponents

Once an agreement is finalized and executed by the Corporation with a proponent, the other proponents will be notified in accordance with the Terms and Conditions of the RFP Process (Part 3).

[End of Part 2]

PART 3 – TERMS AND CONDITIONS OF THE RFP PROCESS

3.1 General Information and Instructions

3.1.1 RFP Incorporated into Proposal

All of the provisions of this RFP are deemed to be accepted by each proponent and incorporated into each proponent's proposal. A proponent who submits conditions, options, variations or contingent statements inconsistent with the terms set out in this RFP, either as part of its proposal or after receiving notice of selection, will be disqualified.

3.1.2 Proponents not to change terminology

Changes to the terminology of this RFP are prohibited

3.1.3 Proponents to Follow Instructions

Proponents should structure their proposals in accordance with the instructions in this RFP. Where information is requested in this RFP, any response made in a proposal should reference the applicable section numbers of this RFP.

3.1.4 Language

All proposals are to be in English, or both English and French. If there is a conflict or inconsistency between the English version and the French version of the proposal, the English version of the proposal shall prevail.

3.1.5 No Incorporation by Reference

The entire content of the proponent's proposal should be submitted in a fixed form, and the content of websites or other external documents referred to in the proponent's proposal but not attached will not be considered to form part of its proposal.

3.1.6 References and Past Performance

In the evaluation process, the Corporation may include information provided by the proponent's references and may also consider the proponent's past performance or conduct on previous contracts with the Corporation.

3.1.7 Information in RFP Only an Estimate

The Corporation makes no representation, warranty or guarantee as to the accuracy of the information contained in this RFP, received from the RFP contact or issued by way of addenda. Any quantities shown or data, or opinion contained in this RFP or provided by way of addenda are estimates only and are for the sole purpose of indicating to proponents the general scale and scope of the Deliverables. It is the proponent's responsibility to obtain all the information necessary to prepare a proposal in response to this RFP.

3.1.8 Proponents to Bear Their Own Costs

The proponent shall bear all costs associated with or incurred in the preparation and presentation of its proposal, including, if applicable, costs incurred for interviews, presentations or demonstrations.

3.1.9 Proposal to be retained by the Corporation

The Corporation will not return the proposal, or any accompanying documentation submitted by a proponent.

3.1.10 No Guarantee of Volume of Work or Exclusivity of Contract

The Corporation makes no guarantee of the value or volume of work to be assigned to the successful proponent. The agreement to be negotiated with the selected proponent will not be an exclusive contract for the provision of the described Deliverables. The Corporation may contract with others for goods and services the same as, or similar, to the Deliverables, or may such goods and services from resources within the Corporation.

3.2 Business Registration

Proponents may be required to be registered to carry on business in accordance with applicable laws. For information on the business registration requirements of the Consumer, Corporate and Financial Services, Department of Justice and Public Safety, please consult:

http://www.gov.pe.ca/jps/index.php3?number=1027199&lang=E

The status of a proponent's business registration does not preclude the submission of a proposal in response to this RFP. A proposal can be accepted for evaluation, regardless of (i) whether the company is registered, or (ii) whether its business registration is in good standing. However, if the proponent is selected as the successful proponent, that proponent must bring itself into compliance prior to the execution of an agreement.

3.3 Communication after Issuance of RFP

3.3.1 Proponents to Review RFP

Proponents shall promptly examine all of the documents comprising this RFP, and report any errors, omissions, or ambiguities; and direct questions or seek additional information in writing by email to the RFP Contact on or before the Deadline for Questions. No such communications are to be directed to anyone other than the RFP Contact. The Corporation is under no obligation to provide additional information, and the Corporation will not be responsible for any information provided by or obtained from any source other than the RFP Contact. It is the responsibility of the proponent to seek clarification from the RFP Contact on any matter it considers to be unclear. The Corporation will not be responsible for any misunderstanding on the part of the proponent concerning this RFP or its process.

3.3.2 All New Information to Proponents by Way of Addenda

This RFP may be amended only by addendum in accordance with this section. If the Corporation, for any reason, determines that it is necessary to provide additional information relating to this RFP, such information will be communicated by addendum on the **Prince Edward Island Tendering Site**. Each addendum forms an integral part of this RFP and may contain important information, including significant changes to this RFP. Proponents are responsible for obtaining all addenda issued by the Corporation and will be deemed to have read all posted addenda.

3.3.3 Post-Deadline Addenda and Extension of Submission Deadline

If the Corporation determines that it is necessary to issue an addendum after the Deadline for Issuing Addenda, the Corporation may extend the Submission Deadline for a reasonable period of time.

3.3.4 Verify and Clarify

During the evaluation process, the Corporation may request further information from the proponent or third parties in order to verify or clarify the information provided in the proponent's proposal, including but not limited to clarification with respect to whether a proposal meets the mandatory technical requirements set out in Section C of the **RFP Particulars (Appendix C)**. The Corporation may revisit and re-evaluate the proponent's response or ranking based on any such information.

3.4 Execution of Agreement, Notification and Debriefing

3.4.1 Selection of Proponent and Execution of Agreement

The Corporation will notify the proponent with the highest score from **Stage II - Evaluation** of an interest in further negotiation toward a TSA. Prior to further negotiation, the Corporation will provide final details on the selected site, with an updated Climatic Data Sheet, in a format required by the manufacturer, and a preliminary site layout for review and suggested revision by the turbine supplier. Once the turbine supplier approves the site and layout and confirms the suitability of the proposed turbine for the site's climate conditions, the business plan will be executed and the Corporation will select the most attractive proposal.

3.4.2 Failure to Enter into Agreement

In addition to all of the Corporation's other remedies, if a selected Proponent fails to execute an agreement or satisfy any other applicable conditions within sixty (60) days of notice of selection, the Corporation may, in its sole and absolute discretion and without incurring any liability, withdraw the selection of that Proponent and proceed with the selection of another Proponent or cancel the RFP Process.

3.4.3 Notification of Outcome of Procurement Process

Once an agreement is executed by the Corporation with a Proponent, notification of the outcome of the Procurement process will be posted on the **Prince Edward Island Tendering Site**.

3.4.4 Debriefing

Proponents may request a debriefing after notification of the outcome of the procurement process. All requests must be in writing to the RFP Contact and must be made within sixty (60) days of notification of the outcome of the procurement process. The intent of the debriefing information session is to aid the proponent in presenting a better proposal in subsequent procurement opportunities. Any debriefing provided is not for the purpose of providing an opportunity to challenge the procurement process or its outcome.

3.5 Conflict of Interest and Prohibited Conduct

3.5.1 Conflict of Interest

The Corporation may disqualify a proponent for any conduct, situation or circumstance, determined by the Corporation, in its sole and absolute discretion, to constitute a Conflict of Interest. For the purposes

of this Section, "Conflict of Interest" has the meaning ascribed to it in the **Submission Form (Appendix B).**

3.5.2 Disqualification for Prohibited Conduct

The Corporation may disqualify a proponent, or terminate an agreement entered into if the Corporation, in its sole and absolute discretion, determines that the proponent has engaged in any conduct prohibited by this RFP.

3.5.3 Prohibited Proponent Communications

A proponent shall not engage in any communications that could constitute a Conflict of Interest and must take note of the Conflict of Interest declaration set out in the **Submission Form (Appendix B)**.

3.5.4 Proponent not to Communicate with Media

A Proponent may not at any time directly, or indirectly, communicate with the media in relation to this RFP or any agreement entered into pursuant to this RFP without consent of the Corporation, and then only in coordination with the Corporation.

3.5.5 No Lobbying

A proponent shall not, in relation to this RFP or the evaluation and selection process, engage directly or indirectly in any form of political or other lobbying whatsoever to influence the selection of the successful proponent.

3.5.6 Illegal or Unethical Conduct

Proponents shall not engage in any illegal business practices, including without limitation activities such as bid-rigging, price-fixing, bribery, fraud, coercion or collusion. Proponents shall not engage in any unethical conduct, including lobbying, as described above, or other inappropriate communications; offering gifts to any employees, officers, agents, elected or appointed officials or other representatives of the Corporation; submitting proposals containing misrepresentations or other misleading or inaccurate information; or any other conduct that compromises or may be seen to compromise the competitive process provided for in this RFP.

3.5.7 Rejection of Proposals

The Corporation may reject a proposal based on past performance or based on inappropriate conduct, including but not limited to the following:

(a) illegal or unethical conduct as described above;
(b) the refusal of the proponent to honour its submitted pricing or other commitments;
(c) any conduct, situation or circumstance determined by the Corporation, in its sole and absolute discretion, to have constituted an undisclosed Conflict of Interest;
(d) the Corporation's past experience with the proponent within the 18 month period prior to the Submission Deadline for similar or related services; or
(e) any information provided to the Corporation by any references of the proponent, pursuant to either section 3.1.6 or section 3.7.1(e) of this RFP.

3.6 Confidential Information

3.6.1 Confidential Information of the Corporation

All information provided by or obtained from the Corporation in any form in connection with this RFP either before or after the issuance of this RFP

(a) is the sole property of the Corporation and must be treated as confidential;
(b) is not to be used for any purpose other than replying to this RFP and the performance of the agreement for the Deliverables;
(c) must not be disclosed without prior written authorization from the Corporation; and must be returned by the proponent to the Corporation immediately upon request of the Corporation.

3.6.2 Confidential Information of Proponent

A proponent should identify any information in its proposal or any accompanying documentation supplied in confidence for which confidentiality is to be maintained by the Corporation. The confidentiality of such information will be maintained by the Corporation, except as otherwise required by law or by order of a court or tribunal. Proponents are advised that their proposals will, as necessary, be disclosed, on a confidential basis, to advisers retained by the Corporation to advise or assist with the RFP process, including the evaluation of proposals.

Proponents are also advised that all documents forming part of the RFP process, including all submitted proposals, are subject to the *Freedom of Information and Protection of Privacy Act* R.S.P.E.I. 1988, Cap. F-15.01 ("FOIPP"). A copy of FOIPP is available online at:

https://www.princeedwardisland.ca/sites/default/files/legislation/f-15-01_0.pdf

3.6.3 Personal Information

The *Freedom of Information and Protection of Privacy Act* R.S.P.E.I. 1988, Cap. F-15.01 ("FOIPP") governs the collection, use and disclosure of personal information by the Corporation and its service providers. The successful proponent shall be required to comply with all requirements of FOIPP during the term of the Agreement.

A copy of FOIPP is available online at:

https://www.princeedwardisland.ca/sites/default/files/legislation/f-15-01_0.pdf

3.7 Reserved Rights, Limitation of Liability and Governing Law

3.7.1 Reserved Rights of the Corporation

The Corporation reserves the right to:

(a) make public the names of any or all proponents;
(b) request written clarification in relation to a proponent's proposal;
(c) waive minor formalities that do not constitute mandatory submission requirements or mandatory technical requirements;
(d) verify with any proponent or with a third party any information set out in a proposal;
(e) check references other than those provided by any proponent;
(f) disqualify any proponent whose proposal contains misrepresentations or any other inaccurate or misleading information;

(g) disqualify any proponent or the proposal of any proponent who has engaged in conduct prohibited by this RFP;
(h) amend this RFP process without liability at any time prior to the execution of a written agreement between the Corporation and a proponent. These changes are issued by way of addendum in the manner set out in this RFP;
(i) cancel this RFP process without liability at any time prior to the execution of a written agreement between the Corporation and a proponent. A cancellation is communicated by way of addendum in the manner set out in this RFP. The Corporation may in its sole discretion issue a new RFP for the same or similar Deliverables; or
(j) reject any or all proposals.

These reserved rights are in addition to any other express rights or any other rights that may be implied in the circumstances, or that the Corporation has at law.

3.7.2 Limitation of Liability

By submitting a proposal, each proponent agrees that:

(a) neither the Corporation nor any of its employees, officers, agents, elected or appointed officials, advisors or representatives will be liable, under any circumstances, for any claim arising out of this RFP process including but not limited to costs of preparation of the proposal, loss of profits, loss of opportunity or for any other claim; and
(b) the proponent waives any claim for any compensation of any kind whatsoever, including claims for costs of preparation of the proposal, loss of profit or loss of opportunity by reason of the Corporation's decision to not accept the proposal submitted by the proponent, to enter into an agreement with any other proponent or to cancel this proposal process, and the proponent shall be deemed to have agreed to waive such right or claim.

3.7.3 Governing Law and Interpretation

These terms and conditions of the RFP Process (Part 3):

(a) are intended to be interpreted broadly and independently (with no particular provision intended to limit the scope of any other provision);
(b) are non-exhaustive and shall not be construed as intending to limit the pre-existing rights of the parties to engage in pre-contractual discussions in accordance with the common law governing direct commercial negotiations; and
(c) are to be governed by and construed in accordance with the laws of the province of Prince Edward Island and the federal laws of Canada applicable therein.

[End of Part 3]

APPENDIX A – CONFIDENTIALITY AND NONDISCLOSURE AGREEMENT

This Confidentiality and Nondisclosure Agreement (the "Agreement") is made and entered into this ____ day of ___, 20__ by the Prince Edward Island Energy Corporation (the "Corporation"), a provincial Crown corporation organized under the laws of the Province of Prince Edward Island, and _____ , hereafter referred to as the "Supplier".

WITNESSETH

WHEREAS the Corporation is seeking a proposal from the Supplier for provision of wind turbines (the "Turbines") for a proposed wind development in Prince Edward Island;

AND WHEREAS the Supplier will require certain Confidential Information from the Corporation in order to prepare a proposal for a Request for Proposal (RFP) process and, if successful in the RFP process, to utilize this Confidential Information in supplying the Turbines;

NOW THEREFORE in consideration for the Supplier being provided the opportunity to submit a proposal for the Turbines, the Supplier agrees to the following terms in regards to all information that is provided to the Supplier that is deemed as Confidential Information:

1. **Confidential Information Received Prior to Proposal Submission**. All information provided to the Supplier by the Corporation prior to the close of the RFP process shall be deemed as Confidential Information.

2. **Confidential Information Provided to Successful Supplier after RFP Process**. Information provided to the Supplier in the event that the Supplier is successful in the RFP process may be deemed as Confidential Information at the sole discretion of the Corporation.

3. **Nondisclosure and Use of Confidential Information**. The Supplier shall keep the Confidential Information strictly confidential. The Supplier may disclose the Confidential Information to its employees, consultants, subcontractors, attorneys, auditors and agents (collectively, "Representatives"), but only if such Representatives need to know the Confidential Information in connection with submitting a proposal in response to the RFP process or in connection with providing the Turbines. It is understood that (i) such Representatives will be informed by the Supplier of the confidential nature of the Confidential Information and shall be required to adhere to the terms of this Agreement by the Supplier, and (ii) in any event, the Supplier will be responsible for any breach of this Agreement by any of their Representatives. The Supplier shall not disclose the Confidential Information in any form whatsoever to any person other than as permitted hereby, and shall safeguard the Confidential Information from unauthorized disclosure. For purposes hereof, "person" will be interpreted broadly to include any corporation, company, partnership, individual or governmental authority.

4. **Notice Preceding Compelled Disclosure**. In the event that the Supplier or their Representatives are requested or required (by oral question, interrogatories, requests for information or documents, subpoena, civil investigate demand or similar process) to disclose any Confidential Information, the Supplier shall promptly notify the Corporation of such request or requirement so that the Corporation may seek an appropriate protective order or waive compliance with this Agreement. If, in the absence of a protective order or the receipt of a waiver hereunder, the Supplier or their Representatives are compelled to disclose the Confidential Information or else

stand liable for contempt or suffer other censure or penalty, the Supplier and their Representatives may disclose only such Confidential Information to the party compelling disclosures as it is required by law or a court or similar body of competent jurisdiction and, in connection with such compelled disclosure, the Supplier and their Representatives shall use their reasonable efforts to obtain from the party to whom the disclosure is made written assurance that confidential treatment will be accorded to such portion of the Confidential Information as disclosed.

5. **Return and Destruction of Confidential Information**. The Confidential Information will remain the property of the Corporation. Any written Confidential Information or any copies thereof will be returned to the Corporation promptly upon the request of the Corporation. Any Confidential Information that may be in the form of electronic documents, drafts, notes, compilations, studies, synopses, or summaries thereof, or other documents prepared by or for the Supplier or their Representatives, and written or electronic documents not so requested to be returned, will be held by the Supplier and kept subject to the terms of this Agreement, or destroyed. Notwithstanding the return or destruction of material, information or electronic documents containing Confidential Information, the Supplier shall continue to be bound by the obligations of confidentiality and other obligations hereunder. Notwithstanding anything contrary in this paragraph, it is acknowledged that the Supplier's computer system may automatically back-up copies of Confidential Information such that electronic copies may be retained in the computer system's archives. Notwithstanding paragraph 8, these electronic copies are subject to the provisions of this Agreement until they are destroyed or erased.

6. **No Waiver.** No failure or delay in exercising any right, power or privilege hereunder will operate as a waiver thereof, nor will any single or partial exercise thereof preclude any other exercise thereof or the exercise of any right, power, or privilege.

7. **Remedies.** The Supplier acknowledges and agrees that monetary damages may not be a sufficient remedy for any breach of this Agreement by the Supplier or their Representatives and the Corporation may be entitled to specific performance and injunctive relief as remedies for any such breach. Such remedies will not be deemed to be exclusive remedies for a breach of this Agreement by the Supplier or any of their Representatives but will be in addition to all other remedies available at law or in equity to the Supplier.

8. **Term of Agreement**. This Agreement shall remain in force and effect for one (1) year from the date first written above unless earlier terminated in writing by the Corporation.

9. **Notice for the Corporation.** In the event of the circumstances described in paragraph 4, notice to the Corporation from the Supplier shall be in writing and delivered personally, by mail, courier or facsimile, addressed as follows:

Prince Edward Island Energy Corporation
16 Fitzroy Street, 3rd Floor
PO Box 2000
Charlottetown, PE C1A 7N8
Attention: Heather MacLeod
Email: hamacleod@gov.pe.ca

Notices shall be deemed received on the Business Day following delivery by courier or facsimile, or, when sent by mail, five (5) Business Days after the date of mailing. For the purposes of this paragraph, "Business Day" means every day except Saturday, Sunday and statutory holidays in the Province of Prince Edward Island.

10. **Successors and Assigns.** This Agreement is binding on the successors and assigns of the Supplier, provided that the Supplier does not assign this Agreement without the written consent of the Corporation to the address described in paragraph 9.

11. **Entire Agreement.** This Agreement constitutes the entire agreement between the Supplier and the Corporation pertaining to Confidentiality and Nondisclosure.

12. **Headings.** The headings of the sections or paragraphs of this Agreement are inserted for convenience only and do not constitute a part hereof or affect in any way the meaning or interpretation of this Agreement.

13. **Execution of Agreement.** This Agreement may be executed in multiple counterparts, each of which shall be deemed to be an original for all purposes. The Agreement may be executed by facsimile or reproductive signature and both parties shall recognize such execution as the valid and binding execution thereof.

14. **Freedom of Information and Protection of Privacy.** The Supplier and the Corporation recognize that this Agreement may be subject to the (PEI) *Freedom of Information and Protection of Privacy Act, R.S.P.E.I. 1988, Cap. F-15/01.*

15. **Jurisdiction of Law.** This Agreement will be governed by and construed in accordance with the laws of the Province of Prince Edward Island.

IN WITNESS WHEREOF, the undersigned have executed this Agreement as of the date first written above.

PRINCE EDWARD ISLAND ENERGY CORPORATION "Corporation"

By: _____
(Signature of Officer)

Name: _____
(Printed Name of Officer)

Title: _____
(Title of Officer)

_____ **"Supplier"**
(Business Name of Supplier)

By: _____
(Signature of Officer)

Name: _____
(Printed Name of Officer)

Title: _____
(Title of Officer)

APPENDIX B – SUBMISSION FORM

B.1 Proponent Information

Please fill out the following form, naming one person to be the proponent's contact for the RFP process and for any clarifications or communication that might be necessary.	
Full Legal Name of Proponent:	
Any Other Relevant Name under which Proponent Carries on Business:	
Street Address:	
City, Province/State:	
Postal Code:	
Phone Number:	
Fax Number (if any):	
Company Website (if any):	
Proponent Contact Name and Title:	
Proponent Contact Phone:	
Proponent Contact Fax (if any):	
Proponent Contact Email:	
HST / GST Registration Number (Leave blank if NOT applicable):	

B.2 Offer

The proponent has carefully examined the RFP documents and has a clear and comprehensive knowledge of the Deliverables. The proponent represents and warrants its ability to provide the Deliverables in accordance with the requirements of the RFP. Proposals, submitted in the proponent's standard proposal format, are acceptable, as long as they provide the technical and pricing information specified in the RFP document and provide clear indication of the pricing and for the supply and service offerings.

B.3 Mandatory Documents

The proponent encloses as part of the proposal the mandatory forms set out below:

FORM	INITIAL TO ACKNOWLEDGE
Complete review of RFP document	
Number of Addenda reviewed -	
Submission Form (Appendix B)	
Confidentiality and NDA (Appendix A)	

Proposal	

B.4 Pricing

The proponent has submitted its pricing in accordance with the instructions in the RFP and in a format that clearly identifies all costs associated with the offer.

B.5 Addenda

The proponent is deemed to have read and taken into account all addenda issued by the Corporation.

B.6 No Prohibited Conduct

The proponent declares that it has not engaged in any conduct prohibited by this RFP.

B.7 Conflict of Interest

For the purposes of this RFP, the term "Conflict of Interest" includes, but is not limited to, any situation or circumstance where:

(a) in relation to the RFP process, the proponent has an unfair advantage or engages in conduct, directly or indirectly, that may give it an unfair advantage, including but not limited to (i) having, or having access to, confidential information of the Corporation in the preparation of its proposal that is not available to other proponents, (ii) communicating with any person with a view to influencing preferred treatment in the RFP process (including but not limited to the lobbying of decision makers involved in the RFP process), or (iii) engaging in conduct that compromises, or could be seen to compromise, the integrity of the open and competitive RFP process or render that process non-competitive or unfair; or

(b) in relation to the performance of its contractual obligations under an agreement for the Deliverables, the proponent's other commitments, relationships or financial interests (i) could, or could be seen to, exercise an improper influence over the objective, unbiased and impartial exercise of its independent judgement, or (ii) could, or could be seen to, compromise, impair or be incompatible with the effective performance of its contractual obligations.

Proponents should disclose the names and all pertinent details of all individuals (employees, advisers, or individuals acting in any other capacity) who participated in the preparation of the proposal; **AND** were employees of the Corporation within twelve (12) months prior to the Submission Deadline.

If the box below is left blank, the proponent will be deemed to declare that (a) there was no Conflict of Interest in preparing its proposal; and (b) there is no foreseeable Conflict of Interest in performing the contractual obligations contemplated in the RFP.

Otherwise, if the statement below applies, check the box.

☐ The proponent declares that there is an actual or potential Conflict of Interest relating to the preparation of its proposal, and/or the proponent foresees an actual or potential Conflict of Interest in performing the contractual obligations contemplated in the RFP.

If the proponent declares an actual or potential Conflict of Interest by marking the box above, the proponent must set out below details of the actual or potential Conflict of Interest:

B.8 Proposal Irrevocable

The proponent agrees that its proposal shall be irrevocable for a period of **One hundred and twenty (120)** days following the Submission Deadline.

B.9 Disclosure of Information

The proponent hereby agrees that any information provided in this proposal, even if it is identified as being supplied in confidence, may be disclosed where required by law or by order of a court or tribunal. The proponent hereby consents to the disclosure, on a confidential basis, of this proposal by the Corporation to the advisers retained by the Corporation to advise or assist with the RFP process, including with respect to the evaluation of this proposal.

B.10 Execution of Agreement

The proponent agrees that in the event its proposal is selected by the Corporation, it will negotiate the final turbine supply agreement in good faith and in a timely manner in order to finalize all agreements to conform to the project schedule outlined in the RFP document.

_____
Signature of Witness

_____
Name of Witness

_____
Signature of Proponent Representative

_____
Name of Proponent Representative

_____
Title of Proponent Representative

_____
Date

I have the authority to bind the proponent.

APPENDIX C – RFP PARTICULARS

C.1 Introduction

In 2017, the Prince Edward Island Energy Corporation (the Corporation) was assigned responsibility to construct two additional wind facilities within the Province to further reduce PEI's dependence on fossil fuels and to increase the amount of electricity generation from an increasingly economic supply of wind generated electricity. The directive requires 30 MW of wind capacity be operational by September 30, 2020 and an additional 40 MW by 2025.

The Corporation is now in the process of evaluating site options for the development of the 2020 project with the intent of further scoping options for the location of the 2025 project. Wind monitoring programs are presently underway in three locations and the Corporation has narrowed the alternatives for the 2020 project to three locations; Eastern Kings, near the existing Eastern Kings Wind Plant, Irishtown, north of the community of Kensington and western Prince County. These studies will be completed on January 31, 2019 and final reports will be available by mid-February. The selection of the host community will be finalized by February 28, 2019, once the wind resource assessments are completed and community engagement is completed.

C.2 Objective of the RFP

The objective of the RFP is to receive and review proposals from qualified wind turbine suppliers to identify a preferred manufacturer with whom detailed negotiations will be held to select the most viable turbine for the project.

The Corporation is seeking to work with a wind turbine manufacturer and wind turbine that will ensure a viable cash flow over the 20 - 25 year service life of the turbine. Because this is a publicly financed venture, risk management is critical. Turbine manufacturers must demonstrate that their product offering brings minimal risk to the Corporation. Once risk concerns are resolved, the primary consideration for selecting the turbine is the lowest levelized cost of energy, which will be computed for each proposed turbine.

While the RFP relates to the supply of turbines for the 2020 project, the Corporation understands the subsequent project, in 2025, will follow quickly and is cognizant of the advantages of continuity.

C.3 Wind Energy and the PEI Energy Strategy

Prince Edward Island has been a world leader in producing renewable electricity from wind power since it commissioned Atlantic Canada's first commercial wind farm at North Cape, PEI. The Corporation led this development of this 5.26 MW facility in November 2001 and has been regularly developing wind projects since. The North Cape project was doubled in 2003. Building on the success of these projects, both of which continue to provide reliable service to the Corporation, the Corporation built Canada's first project using a 3-MW platform when it installed 10 Vestas V90-3.0 MW turbines at the 30-MW Eastern Kings Wind Plant. In 2013, the Corporation added another 30 MW of wind capacity at the Hermanville Wind Plant. Building on the Corporation's success other public and private organizations developed wind projects of their own. The present wind capacity, targeted for domestic consumption, is 104 MW, of which nearly 74 MW is owned by the people of PEI through their Energy Corporation.

Wind presently generates about 24% of our electricity requirements and that number will approach 40% of our electricity when the planned additional 70 MW of wind projects are developed by 2025.

C.4 Prince Edward Island Energy Corporation

The Prince Edward Island Energy Corporation is a provincial Crown corporation under the auspices of the Minister responsible for the energy portfolio. With a form and function dictated under statute, the Corporation's stated objectives are to "... develop and promote the development of energy systems and the generation, production, transmission and distribution of energy in all its forms on an economic and efficient basis, to provide financial assistance for the development, installation and use of energy systems ...". Day to day operations of the Corporation's affairs are directed by a Chief Executive Officer acting under a Board of Directors.

C.5 Project Background

The Corporation is a Crown Corporation of the Province of Prince Edward Island with a mandate to pursue and promote the development of energy systems and the generation, production, transmission and distribution of energy, in all its forms, on an economic and efficient basis.

This current development will represent the Corporation's fourth wind project and with the installation of this phase, the total wind generation capacity owned by the PEIEC will be 104 MW. This is a significant project for the Corporation for two reasons. First, because the project will be owned by the people of Prince Edward Island, it represents a continuing commitment to public development of the Province's renewable resource. Second, with the commissioning of this facility, PEI will have more than 110 MW of wind capacity allocated to domestic supply. This means that 30% of the Province's electricity supply will be provided by wind energy. This is in addition to a merchant plant that adds nearly 100 MW of wind generation for export use. All this, more than 200 MW, of wind generation will be managed within the Province's electrical grid that has a peak load of approximately 280 MW. With this project, Prince Edward Island is demonstrating continued environmental leadership and world class levels of wind energy integration.

Prince Edward Island, located off the eastern coast of Canada, is separated by the neighbouring Maritime Provinces of Atlantic Canada by the Northumberland Strait. The north shore of PEI is bounded by the Gulf of St. Lawrence, which flows directly into the Atlantic Ocean. The adjacent water provides the province with a marine climate that results in warmer winters and cooler summers than other mainland areas of eastern Canada.

The average January temperature in Charlottetown, the provincial capital, is -7C. This locale experiences an average July temperature of +18C. Extreme temperatures in Prince Edward Island have ranged from +36C to -30C.

Precipitation is generally distributed evenly throughout the year, both in terms of frequency and amount. Average annual precipitation amounts, including snowmelt equivalent, is about 1100 mm. The average annual snowfall amount is approximately 300 centimeters.

Freezing rain events in winter, late fall and early spring are not uncommon. The frequency and duration of these events are highly site specific but most sites do not experience more than ten per year.

Based on Environment Canada data, PEI experiences an average of 42 lightning flashes per one hundred square kilometres per year.

The project schedule, shown in **Appendix D**, targets a wind turbine delivery schedule of June 2020 with installation being completed by August 2020 and commissioning completed by September 2020.

C.6 Site Information

For the purposes of the RFP, the project is assumed to be located in Elmira, in eastern Prince Edward Island with exposure to the Gulf of St. Lawrence. The average wind speed is slightly less than 8 m/sec at 80 meters as summarized in the attached wind resource in **Appendix E (Climatic Data)**. The land ownership for the project is privately held land with lease agreements signed with the landowners and adjacent landowners as well.

The probable point of entry to PEI will be through the port of Georgetown, over all season highways. Souris, more adjacent to the project, also has full service port facilities where wind turbines have been unloaded in the past. However, limited wharf capacity in Souris has constrained some turbine deliveries. Short term storage is possible at either port. For the purposes of this proposal, suppliers are asked to assume delivery to the Port of Georgetown. Proposals may be based on delivery DDP, to the port of Georgetown, with delivery to site (Elmira is 70 km from Georgetown), quoted as an extra. The final TSA will require the turbines delivered, DDP, to site.

The selected site will be suitable for spread footing wind turbine foundations.

Electrical Interconnection will be made near the base of each turbine to connect to a 34.5-kV collector circuit. It is expected that the transformer will be wye grounded/wye grounded with a delta buried tertiary winding.

With the constraints in land availability, we anticipate the size of the selected turbines will be in the 3 MW+ class.

C.7 Technical Requirements

C.7.1 Turbine Technical Details

Provide a detailed technical description of the proposed turbine. If the requested information, outlined below, is described within an available technical information package provided, indicate its location in the material.

Please provide detailed technical specifications of the proposed turbine including:

- **Power curve**

Provide a certified copy of the turbine's power curve and thrust curve, in conformance to IEC 61400-12-1 standards. Outline the terms of the power curve warranty.

Provide the Annual Energy Production (AEP) of proposed turbine on a site with an annual average wind speed of 8 m/s at 80 meters above ground level with a Rayleigh wind distribution.

- **Turbine certifications**

List all third-party certifications this turbine has received.

- **Grid Compatibility**

Maritime Electric Co. Ltd., the electric utility of Prince Edward Island, has technical requirements for the connection the wind park and the turbines to the electricity grid.

The PEI electrical system is operated as a radial load supplied from the New Brunswick system. PEI is interconnected with the New Brunswick system through four submarine cables buried under the Northumberland Strait. Two of these cables are rated for 100 MW and two for 180 MW, at 138 kV, for a total interconnection capacity of 560 MW.

Wind Generation facilities, connected to the NB Transmission System, must comply with North American Electric Reliability Corporation (NERC) and Northeast Power Coordinating Council (NPCC) criteria, guides, requirements, and standards.

The proposed 30 MW wind facility will be connected to Maritime Electric (MECL) grid and must be evaluated through a system impact study as directed by the utility. Generally, a wind plant connecting to Maritime Electric must be able to operate continuously for all normal and emergency system operating voltages. There are additional requirements:

- The Wind Plant must be able to operate for ± 5% for normal operating voltage and ±10 % for emergency operating voltage. The Wind Plant must have Voltage Set Point Control that is controlled from MECL's Energy Control Centre in Charlottetown. The Wind Plant must be able to dynamically hold the voltage constant with sufficient reactive capability at full rated MW output to maintain the power factor in the range of 0.98 leading to 0.98 lagging, all at the Point of Common Coupling.
- The Wind Plant Point of Common Coupling voltage unbalance must not exceed 3% between phases.
- The Wind Plant must meet the CAN/CSA-C61000 with the Pst ≤ 0.35 and the Plt ≤ 0.25 at the Point of Common Coupling 95% of the time;
- The Wind Plant must comply with IEEE 519-1992: Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.
- The Wind Plant must comply with the NPCC standard for under frequency trip protection for generators. The Wind Plant must operate continuously for frequency variations 59.4 Hz to 60.6 Hz at PCC during normal operation of the grid. The under-frequency ride through standard requires generators to be capable of operating at frequencies down to 57 Hz for up to 3.3 seconds without tripping off line.
- An Automatic Facility Control scheme is required for externally actively controlling the Wind Plant MW output from MECL's Energy Control Centre in Charlottetown. Such scheme shall restrict the output of the plant to no more than the value that is to be sent to the plant via the on-site Remote Terminal Unit (RTU).
- The Wind Plant must comply with the low voltage ride through standard in Federal Energy Regulatory Commission Order No. 661-A. (zero volts for 9 cycles at the turbine terminals).
- Site data shall be communicated to the MECL control center via on on-site RTU.
- Frequency Tolerance – refer to NPCC Directory #1, Section 6.0. This document is available from Northeast Power Coordinating Council at the following link: https://www.npcc.org/Standards/Directories/Forms/Public%20List.aspx
- Flicker – refer to CSA Standard C61000, 3-7 for guidelines

- The wind plant must also comply with MECL's Open Access Transmission Tariff. This document is available from Maritime Electric at the following link: https://secure.maritimeelectric.com/mesa/

The system operator, New Brunswick Power (NB Power) has technical requirements for the communication of the wind turbine and wind farm control. A version of this document, attached as **Appendix F (NBSO Technical Requirements)** may be superseded although no revisions are available. Proponents will be expected to provide a fully compliant wind turbine and are asked to confirm their turbines conform to the requirements of the system operator. There are a number of pertinent items in this document. Most important are the requirements for Voltage Control and Reactive Power Capability that Maritime Electric is expected to require.

- **Voltage Control**
  - The wind facility shall be equipped with a Wind Plant management system that allows for the provision of automatic voltage regulation. The automatic voltage regulation scheme shall be capable of automatically responding to a kV set-point sent by the interconnecting utility and setting and holding the voltage at a *WPGF PCC* to the kV set-point established by the utility.

- **Reactive Power Capability**
  - The wind plant shall meet the minimum reactive power capability requirements at the *PCC* as specified by the utility. The utility will require the total reactive power capability of the wind plant shall be comprised of a dynamic portion that provides reactive power capability from -0.987 to +0.987 power factor (+/- 5 MVAR for a 30 MW facility); and a dynamic or non-dynamic portion that, in combination with the required dynamic portion, that provides reactive power capability from -0.95 to +0.95 power factor (+/- 10 MVAR for a 30 MW facility). The dynamic reactive power capability of the wind plant shall be continuously acting, be continuously variable and have a time response similar to that of a conventional synchronous generator.

C.7.2 Fleet Operating History

Please indicate the number of the proposed turbines in service and provide three references that would be deemed relevant to this project.

C.7.3 Turbine Availability

Please provide information on the fleet availability of the turbine you propose. Please describe the availability guarantees and details on liquidated damages in the event that the turbines fail to operate at specified availability levels.

C.7.4 Foundation Requirement

Please provide commentary on foundation requirements with estimates of foundation loads, details on tower foundation interface options and common foundation types.

C.7.5 Design to Meet Canadian Standards

Please confirm that the proposed turbine is compatible with Canadian design standards and that all electrical and electronic components are CSA approved.

C.7.6 Noise

Please provide a copy of independent reports on noise measurements in standardized format that provides octave sound power levels and tonality, measured and documented per IEC 61400-11 standard for wind turbine noise measurement. A successful supplier will be required to guarantee or warrant sound power levels and tonal audibility levels.

C.7.7 Supervisory Control and Data Acquisition (SCADA) System

Please provide information on the internal turbine control system and external (remote) set point and monitoring capabilities. Also indicate the systems' capability to add additional data monitoring points and to provide signals to external data logging systems.

System should be compatible with IEC 61400-25 series of standards - *Communications for monitoring and control of wind power plants*.

C.8 Turbine Operational Parameters

C.8.1 Cold Weather Operation

Provide details on the operational temperature range for your standard wind turbine.

If there is a cold weather package offered, please provide technical details and the impact this package has on the operating temperature range and the survivability temperature range.

C.8.2 Operation in Icing Conditions

Describe the operation of your turbine during icing events and any technical features that improve operation under icing conditions.

C.8.3 Project Service and Support

Describe your company's capabilities to provide service and support for the project, including possible contracted maintenance support with local maintenance service contractor.

C.8.4 Maintenance Requirements

Describe annual and semi-annual maintenance requirements and summarize the labor and cost components of each maintenance interval. Please provide technical details on the extent of any service programs offered.

C.8.5 Warranty and Extended Warranty Offerings

Provide technical and pricing details on your standard warranty and extended warranty offerings.

C.8.6 Service Life

State the design service life of your turbine. Identify the components that will be replaced under the normal maintenance program within the service life of the turbine. Also indicate the anticipated service life and frequency of replacement.

C.8.7 High and Low Wind Speed Shutdowns

Describe the operation of your turbine during wind speed transitions from the operating range into both the high wind speed and low wind speed ranges in which the turbine will not be operating.

C.8.8 Production Curtailment

Describe the operation of your turbine when the production "set point" is lowered from nameplate capacity to a value that is less than the current output. Similarly, describe the operation of your turbine when the production "set point" is raised from a value that is lower than the current production potential given the availability and wind characteristics, to the nameplate capacity. The description shall include information on controls, mechanical actions, reaction times, ramp speeds, and wear and tear on equipment.

C.9 Delivery & Installation

Logistical constraints may impact local delivery. It is important that we fully understand the implications for shipping and erecting your turbine. Please provide details on how the turbines would likely be delivered to Canada, including origin of main components, and what the likely options would be for delivery to eastern Prince Edward Island.

Component	Shipping Dimensions	Shipping Weight (tonnes)	Erection Weight (tonnes)
Nacelle			
Blades			
Hub			
Rotor			
Tower top			
Tower upper - mid			
Tower lower - mid			
Tower base			
Other			

C.10 Pricing Details

The submission should provide enough information to enable the detailed pricing items, described below, to be determined.

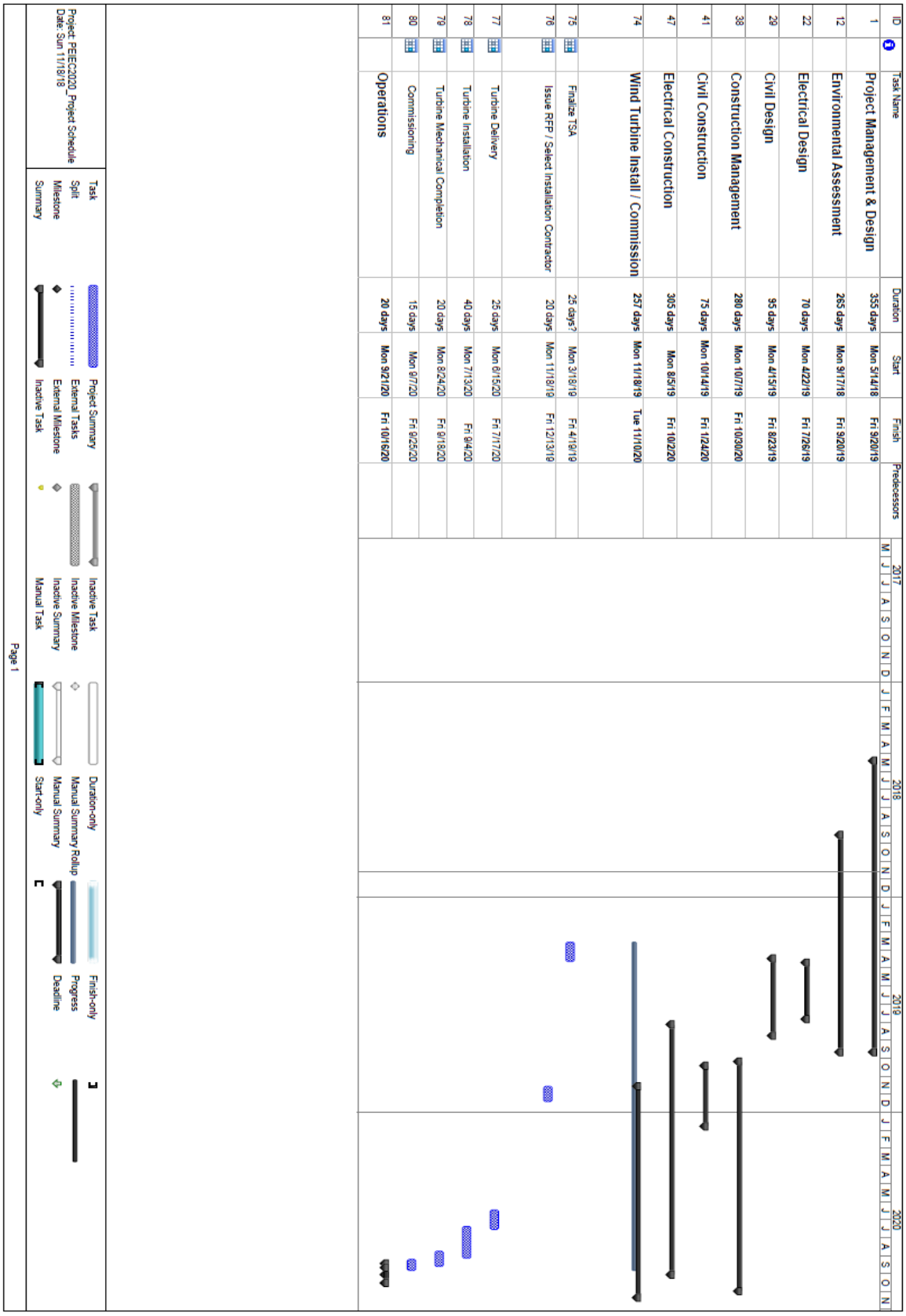
Please provide all pricing FOB to the Port of Georgetown, Prince Edward Island. Proponents may assume that temporary storage is available at the port. Before the TSA is finalized, the Corporation may

require adjusted pricing based on a confirmed site location that also accounts for inland delivery to the site.

Pricing should include:

- Price, per turbine or per lot, delivered to Georgetown, PEI
- Price for Low Voltage Through (LVRT) capabilities if not included in base model
- Price for full service O&M for two years
- Price for full service O&M for five years
- Estimated price for full service O&M for ten years; Confirm availability warranties and associated LDs
- Estimated price for full service O&M for twenty years; Confirm availability; Confirm availability warranties and associated LDs
- Price for standard warranty for two years with liquidated damages on production
- Price for extended warranty for five years with liquidated damages on production
- Estimated price for extended warranty for ten years with liquidated damages on production; Confirm availability
- Estimated price for extended warranty for twenty years with liquidated damages on production; Confirm availability for this option
- Price for heated blades. Confirm availability of this option and provide technical details
- Price for provision of optional components or services, for example energy storage capability

APPENDIX D – PROJECT SCHEDULE



APPENDIX E – CLIMATIC DATA

PEI Energy Corporation Wind Plant 2020

Climatic Data Information

The attached climatic data sheet applies to the wind resource in the Eastern Kings project site. Proponents may assume the wind resource at the selected site will be similar to the Eastern Kings resource. Active wind resource assessment programs will conclude in late January 2019 and the final site selection will be completed prior to final negotiations for the wind turbine supply agreement.

Climatic Conditions Summary Form

Prepared by:	Frontier Power Systems Inc PO Box 22068 Parkdale Charlottetown, PE C1A 9J2

Prepared Date:	November-16-18

Client / Developer:	PEI Energy Corporation PO Box 2000 Charlottetown, PE

Site Description:	PEI Energy Corporation 2020
Site Name	PEI
Site Location	Not Disclosed currently
Latitude	46° 27.1'
Longitude	62° 0.6'
Datum	NAD83
Elevation (m asl.)	16 - 24
Number of Turbines	10
Hub Height (m)	TBD

Normal Wind Conditions:	Site Average	Site Maximum
Measurement Period	2009/10/23 to 2011/12/13	
Measurement Height (m)	80	80
Height for Normal Wind Conditions (m)	80	80
Annual Average Wind Speed (m/s)	8.1	8.3
Weibull A scale parameter (m/s)	9.2	9.3
Weibull k shape parameter	2.2	2.3
Mean Ambient Turbulence Intensity (4-25m/s)	11.2	11.5
Mean Ambient Turbulence Intensity at 15m/s	10.8	10.9
Standard deviation of Turbulence Intensity at 15m/s	2.9	2.9
Wind shear exponent	0.3	0.34

Extreme Wind Conditions:	
Measurement Period	2009/10/23 to 2011/12/13
Measurement Height (m)	80
Height for Estimated Extreme Conditions (m)	80
(m/s)	42.5
(m/s)	59.5
Basis of estimate	IEC class II wind

Environmental Conditions:	
Measurement Period	1994 - 2010
Measurement Height (m)	1.5
Annual Average Temperature (°C)	6.1
Lowest Site Recorded Temperature (°C)	-25.3
Highest Site Recorded Temperature (°C)	32.4
Days with temperature below -20°C (days/yr)	2
Days with temperature above 40°C (days/yr)	0
Annual Average Air Density (kg/m^3)	1.26
Annual Average Relative Humidity (%)	82.4
Other environmental considerations (eg. Salt spray, hail, icing, dust, etc)	Salt spray and icing may occur at this site.

Wind Rose - Wind speed and frequency distribution

Height for Conditions (m)	80

Sector	Direction	Frequency (%)	Weibull A (m/s)	Weibull k
1	0	7.5	9.1	1.94
2	30	7.4	9.6	1.95
3	60	4.9	8.7	1.85
4	90	3.5	6.8	2.35
5	120	4.2	6.4	2.02
6	150	9.4	11.4	2.31
7	180	10.9	9.2	2.65
8	210	12.8	9.3	3.27
9	240	8.9	8.2	4.28
10	270	7.8	8.5	2.87
11	300	10.9	8.8	2.36
12	330	12.1	10.5	2.19

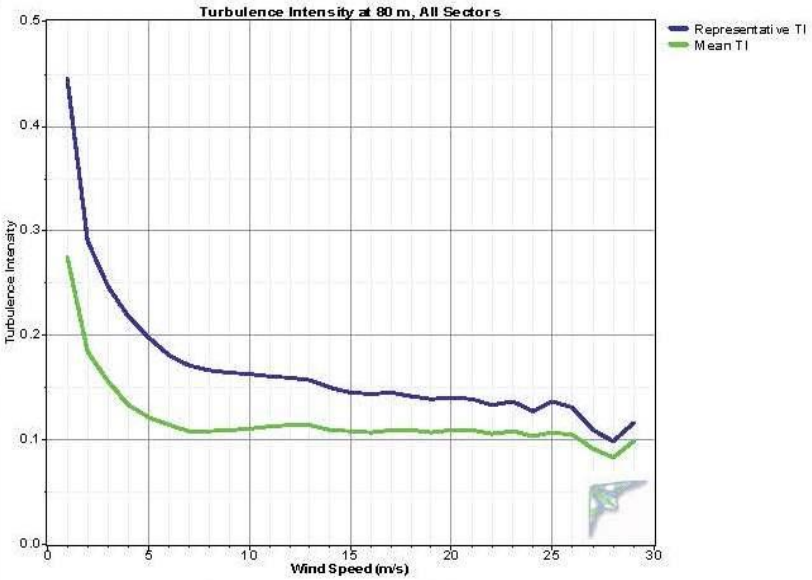
Turbulence Intensity Rose

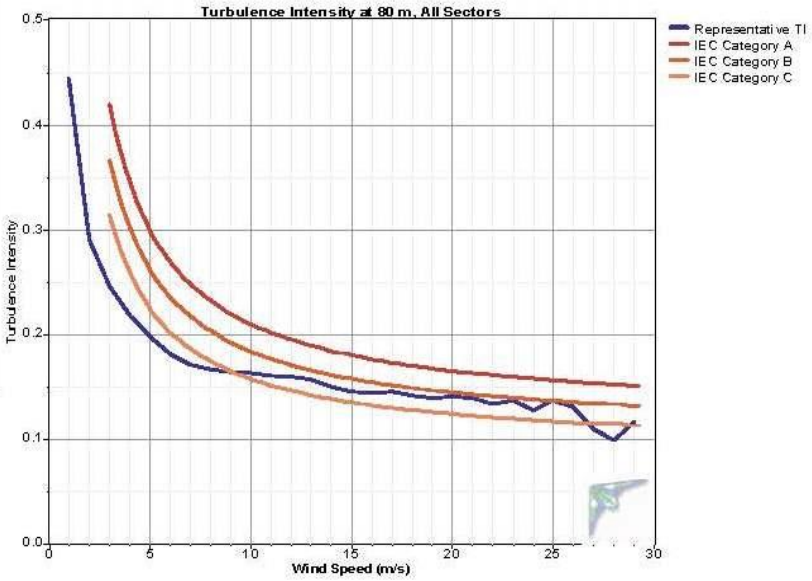
Height for Conditions (m)	80

Sector	Direction	Turbulence Intensity (%)	TI at 15m/s (%)	Stdev of TI at 15m/s (%)
1	0	11.4	9.5	2.1
2	30	11.8	9.5	1.8
3	60	12	8.4	1.2
4	90	12.3	10.7	0
5	120	11.7	7.2	2
6	150	11	10.1	1.5
7	180	11.4	11.1	1.9
8	210	11.3	12.8	2.8
9	240	11	15.6	0
10	270	13.2	18.2	2.5
11	300	14.4	13.6	2.4
12	330	11.1	9.7	1.8

Turbulence Intensity by Wind Speed at 80m (IEC 61400-1 3rd Edition)							
Bin	Bin Endpoints (m/s)		Records in Bin	Mean Turbulence Intensity	Standard Deviation of Turbulence Intensity	Representative Turbulence Intensity	Peak Turbulence Intensity
(m/s)	Lower	Upper					
1	0.5	1.5	1,357	0.274	0.133	0.444	1.038
2	1.5	2.5	3,567	0.184	0.083	0.29	0.699
3	2.5	3.5	6,149	0.155	0.071	0.246	0.665
4	3.5	4.5	7,550	0.133	0.066	0.217	0.613
5	4.5	5.5	8,913	0.121	0.059	0.197	0.51
6	5.5	6.5	9,094	0.114	0.052	0.181	0.429
7	6.5	7.5	9,411	0.108	0.049	0.171	0.553
8	7.5	8.5	10,078	0.108	0.045	0.166	0.348
9	8.5	9.5	9,779	0.109	0.043	0.164	0.504
10	9.5	10.5	8,814	0.11	0.041	0.162	0.413
11	10.5	11.5	6,851	0.113	0.037	0.16	0.309
12	11.5	12.5	5,126	0.114	0.036	0.16	0.296
13	12.5	13.5	3,750	0.114	0.034	0.157	0.326
14	13.5	14.5	2,869	0.11	0.031	0.149	0.273
15	14.5	15.5	2,259	0.108	0.029	0.145	0.244
16	15.5	16.5	1,676	0.107	0.029	0.144	0.223
17	16.5	17.5	1,318	0.109	0.028	0.145	0.224
18	17.5	18.5	900	0.109	0.025	0.142	0.286
19	18.5	19.5	748	0.107	0.025	0.139	0.215
20	19.5	20.5	470	0.11	0.024	0.14	0.237
21	20.5	21.5	271	0.109	0.023	0.139	0.19
22	21.5	22.5	184	0.106	0.021	0.133	0.159
23	22.5	23.5	150	0.108	0.022	0.136	0.172
24	23.5	24.5	121	0.103	0.019	0.128	0.149
25	24.5	25.5	81	0.107	0.023	0.137	0.162
26	25.5	26.5	42	0.104	0.02	0.13	0.163
27	26.5	27.5	28	0.091	0.014	0.109	0.133
28	27.5	28.5	13	0.083	0.012	0.099	0.107
29	28.5	29.5	4	0.098	0.014	0.116	0.11
30	29.5	30.5	0	0	0	0	0

Site Classification Summary (At 80magl)	
Records in 15 m/s bin	2,259
Mean TI at 15 m/s	0.108
Representative TI at 15 m/s	0.145
IEC3 turbulence category	C





APPENDIX F – NBSO TECHNICAL REQUIREMENTS

NEW BRUNSWICK SYSTEM OPERATOR

CONNECTION REQUIREMENTS GUIDE FOR WIND POWERED GENERATION IN NEW BRUNSWICK

NBSO-PSE-001

Version: 001.0

Document Approval

Role	**Name**	**Signature**	**Date** (yy/mm/dd)
Owner	Alden Briggs		
Director, Power System Engineering	Alden Briggs		
Director, Infrastructure and System Support	Dave Daley		
Director, Power System Operations	Ross Stairs		

Version History

Version No.	Date (yy/mm/dd)	Changes	Authors	Reviewers
001	2009/07/13	Initial release.	Development Group Scott Brown Dean Landers A.W. MacNaughton Rob Murray Phil Robinson Alex Rost	

Table of Contents

Acronyms and Definitions

Acronyms

DFIG	Doubly Fed Induction Generator
FERC	Federal Energy Regulatory Commission
IEEE	Institute of Electrical and Electronics Engineers
LVRT	Low Voltage Ride-Through
NBSO	New Brunswick System Operator
NPCC	Northeast Power Coordinating Council
PCC	Point of Common Coupling
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SPS	Special Protection System
STATCOM	Static Synchronous Compensator
SVC	Static VAR Compensator
WPGF	Wind Powered Generation Facility
WTG	Wind Turbine Generator

Definitions

Collector System	The equipment and circuits within a *Wind Powered Generation Facility* that interconnect each wind turbine generator to the substation containing the *Step-Up Transformer*.
Generation Rejection	The process of deliberately removing pre-selected generation from a power system, or initiating HVDC runback, in response to a contingency or an abnormal system condition in order to maintain the integrity of the system.
Low Voltage Ride-Through	The capability of a wind turbine generator to stay connected to a transmission system during low voltage grid conditions (e.g. during system faults).
Market Participant	A person who is, subject to the New Brunswick Electricity Act, licensed by the Energy and Utilities Board of New Brunswick and accredited by NBSO to provide or convey, or to cause to be provided or conveyed, electricity or Ancillary Services into, though or out of the NBSO-controlled gird.
Point of Common Coupling	The high voltage side of the *Step-Up Transformer* connecting a *Wind Powered Generation Facility* to the NBSO-controlled grid.
Special Protection System	A protection system designed to detect abnormal system conditions and take corrective action other than the isolation of faulted elements.
Step-Up Transformer	The transformer that directly connects a *Wind Powered Generation Facility* to the NBSO-controlled grid.
Transmitter	The owner or operator of the transmission system element directly connected to a *Wind Powered Generation Facility's Point of Common Coupling*.
Wind Powered Generation Facility	All of the components that make up a generation facility that is powered by wind energy, including, but not limited to, Wind Turbine Generators, Collector System, Step-Up Transformers and voltage support equipment.

1 Introduction

1.1 Purpose

The purpose of the this document is to facilitate the development of wind powered generation in New Brunswick while ensuring system reliability by outlining the minimum mandatory requirements for connecting *WPGF*s to the NBSO-controlled grid.

1.2 Scope

This document is intended for any parties involved with the integration of *WPGF*s within the NBSO-controlled grid. The requirements outlined in this document are applicable to any *WPGF* with a net cumulative output of 5 MVA or more that is connected to, or planning to connect to, the NBSO-controlled grid as of July 13th, 2009.

Additional requirements for *WPGF*s not contained in this document will be enforced by NBSO. Such requirements may include, but not be limited to

- requirements arising from FERC, NERC or NPCC standards, criteria, guidelines and procedures,
- additional requirements in the NBSO Open Access Transmission Tariff not contained in this document, and
- additional requirements that are identified through a System Impact Study.

This document covers the following topics as they relate to each *WPGF* connected to the NBSO-controlled Grid:

- Frequency and Power
- Voltage, Reactive Power and Power Quality
- Modeling and Validation
- Operational Monitoring and Control
- Physical Connection Requirements

Links to documents that explain the connection application process are also provided in this document.

1.3 Legal Disclaimer

The posting of documents on the NBSO website is done for the convenience of *Market Participants* and other interested visitors to the NBSO website. Please be advised that, while NBSO attempts to have all posted documents conform to the original, changes can result from the original, including changes resulting from the programs used to format the documents for posting on the website as well as from the programs used by the viewer to download and read the documents. NBSO makes no representation or warranty, express or implied that the documents on the NBSO website are exact reproductions of the original documents listed. In addition, the documents and information posted on the NBSO website are subject to change.

NBSO may revise, withdraw or make final these materials at any time at its sole discretion without further notice. The viewer is solely responsible to ensure that the up-to-date documents and information are being used.

This document may contain a reference to the Open Access Transmission Tariff, a Market Rule or an industry criterion or standard. It is the viewer's responsibility to ensure compliance not only with this document, but also with any other applicable requirements of the Tariff, Market Rules or industry standard or criterion.

2 Frequency and Power

2.1 Frequency Tolerance

Each *WPGF* connected to the NBSO-controlled grid shall operate continuously during under-frequency conditions as per NPCC Directory #2, Emergency Operations [1].

From NPCC Directory #2, section 5.4:

Generators should not be tripped for under-frequency conditions in the area above the curve in Figure 2.1.1.

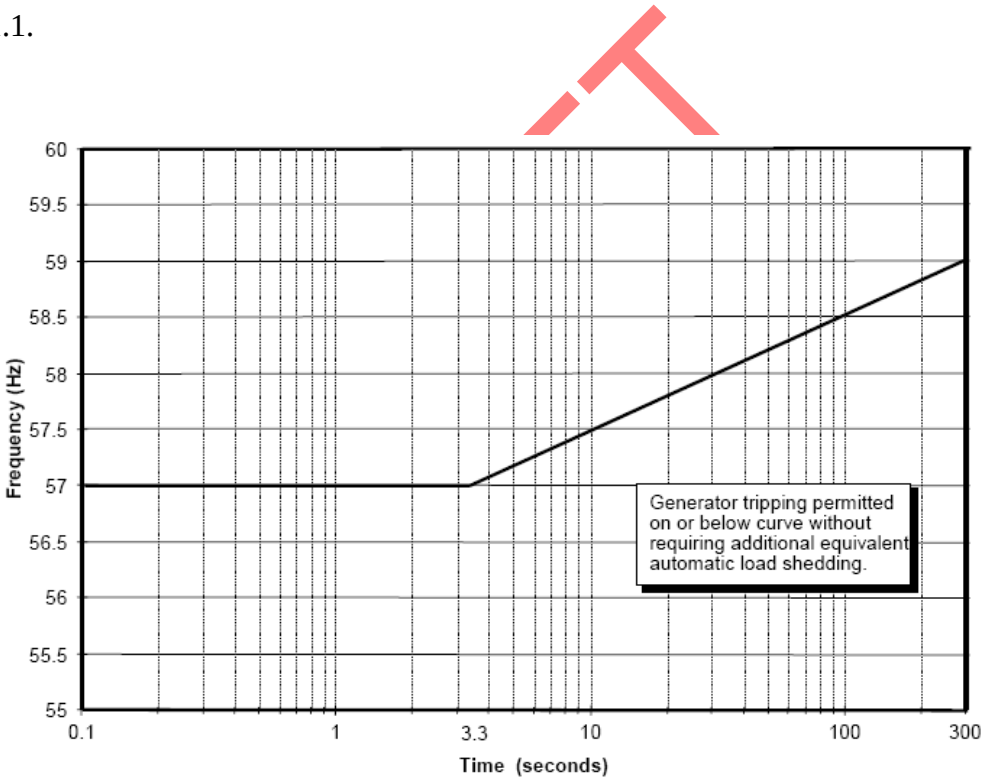


Figure 2.1.1 NPCC standards for setting under-frequency trip protection for generators

The NPCC Directory #2 can be found at:
http://www.npcc.org/documents/regStandards/Directories.aspx.

2.2 Power Control

There may be system conditions that require NBSO to limit the real power output of a *WPGF*.

Each *WPGF* connected to the NBSO-controlled grid shall be equipped with a *WPGF* management system that allows for the provision of real time power control. The power control component of the system shall be capable of

- responding to a MW set-point sent by the NBSO through the NBSO SCADA system; and
- limiting a *WPGF* MW output to the MW set-point established by NBSO.

The MW output of a *WPGF* shall not exceed the NBSO established MW set-point. A *WPGF* MW output may fall below the NBSO established MW set-point (e.g. during low wind conditions).

The power control component of the *WPGF* management system should operate in such a way that, where possible, WTGs are kept on-line or on stand-by instead of shut down in order to bring down and hold a *WPGF* MW output to the MW set-point established by NBSO.

2.3 Ramp-Rate Control

Each *WPGF* connected to the NBSO-controlled grid shall be equipped with a control system that allows for the provision of real power ramp-rate control in order to meet system operating requirements.

2.4 Frequency Response Control

The Maritimes area is susceptible to islanding from the Eastern Interconnection. Adequate frequency response capability from the Maritimes system during such islanding conditions is

critical to ensure reliability. Factors affecting frequency response include system inertia and the governing response of on-line generation.

WTGs, in general, have a negligible contribution to system inertia. In addition, the power generated by WTGs may displace conventional generation and thus reduce system inertia and governing response. System conditions may exist when system frequency response capability is unacceptable (e.g. during light load conditions with high levels of wind powered generation and limited on-line conventional generation).

NBSO may require that *WPGF*s connected to the NBSO-controlled grid be equipped with a control system that allows for the provision of frequency response control. The frequency response control shall be capable of the following:

- being activated and set by NBSO through the NBSO SCADA system;
- holding a *WPGF* MW output to an operator adjustable percentage of its calculated maximum MW output during pre-disturbance conditions; and
- responding to frequency disturbances with a frequency droop characteristic specified by NBSO.

3 Voltage, Reactive Power, and Power Quality

3.1 Voltage Operating Ranges

Each *WPGF* connected to the NBSO-controlled grid shall be able to operate continuously for all normal and emergency system operating voltages at the *PCC*.

The NBSO-controlled grid

- normal operating voltage range is between 0.95 pu to 1.05 pu; and
- emergency operating voltage range is between 0.90 pu to 1.10 pu.

3.2 Voltage Control

Each *WPGF* connected to the NBSO-controlled grid shall be equipped with a *WPGF* management system that allows for the provision of automatic voltage regulation. The automatic voltage regulation scheme shall be capable of automatically

- responding to a kV set-point sent by the NBSO through the NBSO SCADA system, and
- setting and holding the voltage at a *WPGF PCC* to the kV set-point established by the NBSO.

Planned outages of a *WPGF* automatic voltage regulation scheme must be authorized by NBSO.

3.3 Reactive Power Capability

Each *WPGF* connected to the NBSO-controlled grid shall meet the minimum *WPGF* reactive power capability requirements at the *PCC* as specified in Figure 3.3.1 and Table 3.3.1. These requirements apply for all *WPGF* real power output levels at the *PCC*.

The total reactive power capability of each *WPGF* connected to the NBSO-controlled grid shall be comprised of the following:

- a dynamic portion that meets the requirements outlined in Figure 3.3.1 and Table 3.3.1; and
- a dynamic or non-dynamic portion that, in combination with the required dynamic portion, meets the requirements outlined in Figure 3.3.1 and Table 3.3.1.

The dynamic reactive power capability of each *WPGF* connected to the NBSO-controlled grid shall:

- be continuously acting;
- be continuously variable; and
- have a time response similar to that of a conventional synchronous generator.

The dynamic reactive power requirement may be met by:

- WTGs capable of injecting or absorbing reactive power in accordance with the requirements outlined in this section, or
- the installation of equipment that meet the requirements outlined in this section (SVC, STATCOM, etc.).

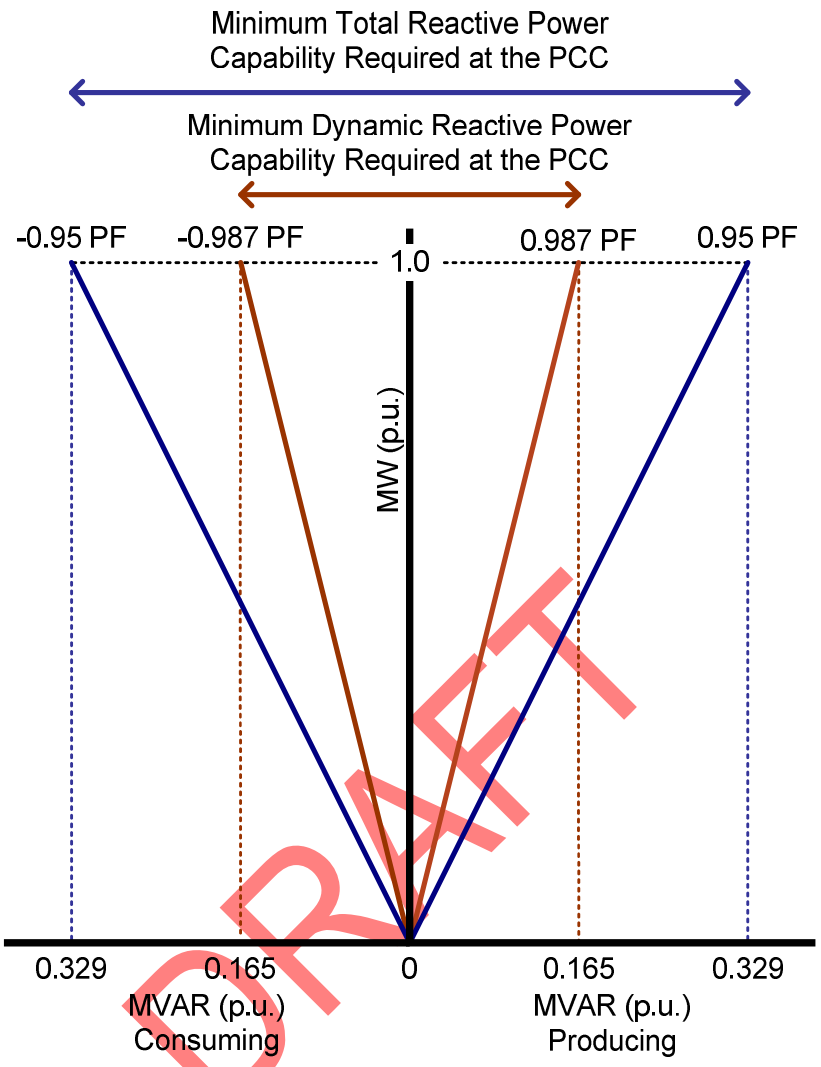


Figure 3.3.1 Minimum WPGF Reactive Power Capability Requirements
(PCC voltage = 1 pu)

Table 3.3.1 Minimum WPGF Reactive Power Capability Requirements

	Minimum WPGF Reactive Power Capability Requirements			
PCC Voltage (pu)	**Total Leading Power Factor**	**Total Lagging Power Factor**	**Dynamic Leading Power Factor**	**Dynamic Lagging Power Factor**
1.05	0.95	0.95*	0.987	0.987*
1.00	0.95	0.95	0.987	0.987
0.95	0.95*	0.95	0.987*	0.987

* Will be reviewed by NBSO on a case by case basis

3.4 Harmonics

The harmonic content of the voltage and current waveforms at the *PCC* of a *WPGF* shall be within the limits set by IEEE Standard 519-1992 [2].

Harmonic problems will be addressed on a complaint basis. If a *WPGF* is determined to be the cause of a harmonic problem, then that *WPGF* shall be removed from the NBSO-controlled grid until the condition is resolved. All costs associated with research and corrective action, including settlements paid to other customers, will be at the *WPGF* owner's expense.

3.5 Flicker

Each *WPGF* connected to the NBSO-controlled grid shall not exceed the HV-EHV P_{st} and P_{lt} planning levels at the *PCC* for more than 1% of the time, as outlined in IEEE Standard 1453-2004 [3].

Each *WPGF* connected to the NBSO-controlled grid shall not cause a voltage drop or rise of 3% or more at the *PCC* during non-faulted conditions. Events that may cause such a voltage drop or rise include the following:

- the start-up or shut-down of any number of WTGs in a WPGF;
- non-fault tripping of WTGs in a WPGF; and
- power surges due to wind gusts.

Flicker problems will be addressed on a complaint basis. If a *WPGF* is determined to be the cause of a flicker problem, then that *WPGF* shall be removed from the NBSO-controlled grid until the condition is resolved. All costs associated with research and corrective action, including settlements paid to other customers, will be at the *WPGF* owner's expense.

3.6 Voltage Unbalance

The magnitude of voltage unbalance shall not exceed 2% between phases at the *PCC* for any *WPGF* connected to the NBSO-controlled grid.

3.7 Low Voltage Ride-Through Requirements

Each *WPGF* connected to the NBSO-controlled grid shall comply with the Post-Transition Period *LVRT* Standard outlined in Appendix G of FERC Order 661-A (Dec 2005) [4].

FERC Order 661-A (Dec 2005) can be found at:
http://www.ferc.gov/EventCalendar/Files/20051212171744-RM05-4-001.pdf

4 Modeling and Validation

4.1 Provision of Physical Specifications and Data

The NBSO requires complete and accurate data to enable the proper modeling of *WPGF*s in load flow, transient stability and fault studies. Specifications and data shall be provided for the following:

- WPGF layout (one-line diagram and description).
    - *WPGF* geographical location
    - *WPGF* equipment (total number of WTGs, capacitors, STATCOM, etc.)
    - Layout of *Collector System* and WTG connections/groupings

- WTG specifications
    - Make and model
    - MVA and MW ratings
    - Nominal operating voltage
    - Generator type (induction, DFIG, etc.)
    - Generator MW/MVAR capability curves/data
    - Protection specifications (frequency, voltage, *LVRT*, etc.)

- WTG transformer specifications
    - High-side and low-side kV
    - Reactance (%, specify base)
    - R/X ratio
    - Tap specifications

- WPGF Step-Up Transformer data
    - Nameplate drawings
    - High-side and low-side kV

- Reactance (%, specify base)
- R/X ratio
- Tap specifications, if applicable

- WPGF Collector System data
  - Resistance, reactance and shunt admittance (%, specify base) for each *WPGF* collector circuit

Additional data may be required by NBSO.

4.2 Provision of PSS®E Models and Data

Complete and accurate PSS®E models and associated data are required for all applicable equipment within each *WPGF* connected to the NBSO-controlled grid. These PSS®E models enable the proper modeling of *WPGF*s for load flow, transient stability and fault studies. Applicable equipment includes, but is not limited to, WTGs and dynamic reactive power devices (SVC, STATCOM, etc…). Appropriate and complete documentation shall be provided with each required model.

The performance of the supplied PSS®E models and associated data shall be validated against the results from laboratory and/or field tests. The *WPGF* owner shall be responsible for providing the evidence of this validation

Any required models shall be compatible with PSS®E versions 30.3.X.

5 Operational Monitoring and Control

5.1 SCADA Capability

Each *WPGF* connected to the NBSO-controlled grid shall have the capability to transmit data and receive instructions from the SCADA systems at the NBSO primary and back-up control centres.

Each *WPGF* owner is responsible for the cost to install and maintain continuous SCADA communications between the *WPGF* and the NBSO primary and back-up control centres.

Each *WPGF* connected to the NBSO-controlled grid is required to have 7 days-per-week, 24 hours-per-day repair capability for all SCADA circuits.

5.2 Control Authority

NBSO shall have direct control over the following:

- opening of the *WPGF* breaker at the *PCC;*
- *WPGF* MW production set-point limits;
- voltage control kV set-point; and
- arming of *WPGF*s for *Generation Rejection*.

The *WPGF* owner shall have direct control over the operation of the *WPGF* breaker at the *PCC*. At no time shall this breaker be operated without the explicit consent of the NBSO power system operator. The *WPGF* owner will take necessary actions, without prior approval of NBSO, when the urgent removal from service or de-rating of equipment is necessary to prevent an actual failure that could jeopardize safety, the environment, or the equipment itself. When such actions are necessary, the *WPGF* owner will notify NBSO as soon as practicable following the action.

5.3 Data Communication Requirements

An RTU is required for the transmittal of data between a *WPGF* and the NBSO primary and back-up control centres. The communications protocol to be used by any RTU shall be specified by the NBSO.

Data shall be carried on leased telephone company provided circuits or on private infrastructure. The Internet shall not be used for telemetry or control. Existing *Transmitter* owned data communication networks may be used. In this case the *WPGF* owner is responsible for the incremental costs associated with accessing that network.

The availability of the communication link and the RTU shall be no less than 99.98%

5.4 Monitoring and Control Signals

NBSO requires that all non-meteorological *WPGF* monitoring and control signals shall have an update time of two seconds.

In addition, NBSO requires that all analog non-meteorological *WPGF* monitoring and control signals shall adhere to the following minimum resolutions:

- 1 MW/MVAR for all signals representing MW/MVAR quantities.
- 0.5 kV for all signal representing voltage quantities at 100 kV and above.
- 0.1 kV for all signal representing voltage quantities below 100 kV.

All of the non-meteorological *WPGF* monitoring and control signals required by NBSO are listed in Table 5-A.

5.5 Meteorological Data

NBSO requires that meteorological data at a *WPGF* be transmitted to the NBSO primary and back-up control centres and have a minimum update time of one minute.

Table 5-B lists all of the meteorological *WPGF* data required by NBSO.

5.6 Coordination with SPSs

SPSs exist in the NBSO-controlled grid that rejects pre-selected generation during specific disturbances experienced under certain system operating conditions.

NBSO may require *WPGF*s to be available for selection for *Generation Rejection*. Such *Generation Rejection* would be initiated by *SPS* action. *WPGF*s will not be compensated by the NBSO for costs incurred due to tripping by *SPS* action.

5.7 System Disturbance Monitoring

The installation of a disturbance recording device with clock synchronization is required for all *WPGF*s connected to the NBSO-controlled grid. The disturbance recording devices will be used to monitor and record the responses of *WPGF*s to disturbances on the NBSO-controlled grid in order to verify the dynamic response of *WPGF* equipment.

5.8 References to Operational Documentation

The following documents are useful for understanding the requirements outlined in this chapter and any other requirements and practices not covered in this document.

- Template of the Common Operating Practices between the NBSO and the *WPGF* owner.
- Attachment J (Generator Connection Agreement) of the NBSO Open Access Transmission Tariff: http://www.nbso.ca/Public/en/op/transmission/tariff.aspx

Table 5-A: Required WPGF Monitoring and Control Signals

WPGF Monitoring and Control Signals	**Units**	**Monitor**	**Control**	**Notes**
WPGF Total Output Power	MW	X		On the HV side
WPGF Total Output Reactive Power	MVAR	X		On the HV and LV sides
WPGF Voltage	kV	X		On the HV and LV sides
Step-up Transformer Tap Position	Tap	X		
WPGF Production Set-Point Limits	MW	X	X	
Voltage Regulation Control Status	On/Off/Mode	X		
Voltage Control Set-Point	kV	X	X	
Dynamic Reactive Power Device(s) Status	On/Off	X		
Dynamic Reactive Power Devices Output	MVAR	X		
WPGF HV Circuit Breaker(s) Status	Open/Close	X	X	Open control only
WPGF HV Circuit Breaker(s) Reclosure/Restoration Status	On/Off	X		
WPGF Substation Breakers Status	Open/Close	X		

Table 5-A: Required WPGF Monitoring and Control Signals (Continued)

WPGF Monitoring and Control Signals	Units	Monitor	Control	Notes
Reactive Power Device(s) Circuit Breaker(s) Status	Open/Close	X		For both static and dynamic devices
WPGF Substation Motor Operated Disconnects Status	Open/Close	X		
WPGF Total Available Power	MW	X		
WPGF Total Available Reactive Power	MVAR	X		
WPGF WTG On-Line	# of WTG	X		Shall be known for each associated grid connected transformer
WPGF WTG Availability	# of WTG	X		Shall be known for each associated grid connected transformer
WPGF WTG Shutdown by High Winds	# of WTG	X		Shall be known for each associated grid connected transformer
WPGF WTG Shutdown by Cold Temperature	# of WTG	X		Shall be known for each associated grid connected transformer
System Disturbance Monitor Status	On/Off	X		

Table 5-B: Required Meteorological Data

Meteorological Signals	Units	Notes
Wind Speed	m/s	One minute average
Wind Direction	Degrees	One minute average
Air Temperature	ºC	

6 Physical Connection Requirements

6.1 Physical Connection to the NBSO-Controlled Grid

Each *WPGF* connected to the NBSO-controlled grid shall follow the physical connection standards of the *Transmitter*. Such physical connection standards may include, but not be limited to, standards for the following:

- tapping transmission lines;
- breaker requirements and arrangement;, and
- isolation switch requirements and placement.

If a *WPGF PCC* is connected to a transmission element that is shared between multiple *Transmitters* (e.g. an interconnecting transmission line) then the most stringent of all the Transmitter physical connection standards will be applied to that *WPGF*.

The *WPGF* System Impact Study will outline the appropriate *Transmitter* physical connection standards, as well as any other necessary physical connection requirements. The final design of a *WPGF* physical connection to the NBSO-controlled grid shall be approved by the NBSO.

6.2 Step-Up Transformer

*WPGF*s shall connect to the NBSO-controlled grid through a *Step-Up Transformer* of adequate MVA rating and proper voltage rating for conversion from the *WPGF Collector System* voltage to the transmission system voltage. The high voltage side of the *Step-Up Transformer* shall be solidly grounded and in a wye configuration. As a minimum, *Step-Up Transformers* shall have tap settings that span ±5% of the nominal voltage at 2.5% intervals.

The NBSO shall direct the setting of the taps for WPGF *Step-Up Transformers*.

6.3 Protection Equipment and Characteristics

Each *WPGF* connected to the NBSO-controlled grid shall design, install, maintain and operate appropriate protection systems. The *Transmitter* shall approve the specific relays, connection equipment and protection settings of a *WPGF* before it can connect to the NBSO-controlled grid.

6.4 Substation Equipment

WPGF station grounds shall be designed and installed in accordance with the *Transmitter's* substation standards. The NBSO and the *Transmitter* shall approve a *WPG* substation design before that *WPGF* can connect to the NBSO-controlled grid.

7 Facility Connection Process

7.1 Facility Connection Process

NBSO approval is required for all *WPGF* projects connecting to the NBSO-controlled grid. NBSO is responsible for ensuring that the connection and operation of any generator does not compromise the reliability of the NBSO-controlled grid or have any negative impact on existing transmission customers.

Further information on facility connection can be found on the NBSO website at: http://www.nbso.ca/Public/en/op/transmission/connecting/default.aspx.

The NBSO grid Connection Assessment process is outlined in NBSO Market Procedure 21 which can be accessed on-line at:
http://www.nbso.ca/Public/en/op/market/procedures/document.aspx?id=5287663c-dccc-4024-9694-bc652d8f4f50

8 References

[1] "Regional Reliability Reference Directory #2: Emergency Operations", Northeast Power Coordinating Council, NPCC, October 21, 2008. http://www.npcc.org/documents/regStandards/Directories.aspx

[2] "IEEE Standard 519-1992, IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems".

[3] "IEEE Standard 1453-2004, IEEE Recommended Practice for Measurement and Limits of Voltage Fluctuations and Associated Light Flicker on AC Power Systems"

[4] "Federal Energy Regulatory Commission - Grid Interconnection for Wind Energy", Docket No. RM05-4-001, Order No. 661-A, December 12, 2005. http://www.ferc.gov/EventCalendar/Files/20051212171744-RM05-4-001.pdf