



Request for Proposals

Phase 2 Energy Innovation Roadmap Onshore Wind/Transmission in Harsh Environments

**Department of Natural Resources
Government of Newfoundland and Labrador
St. John's, Newfoundland and Labrador
Canada**

December 2011

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Energy Innovation Roadmap
Phase 2: Onshore Wind/Transmission
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1.0 Introduction**

The Department of Natural Resources (NR), Government of Newfoundland and Labrador, is in the process of developing Energy Innovation Roadmaps to identify opportunities, set priorities and plan for new investments in the energy sector in Newfoundland and Labrador (NL). This process requires independent consultancy advice and expertise to assist the Department in this important and strategic planning exercise.

2.0 Background

In September 2007, the Government of Newfoundland and Labrador released its Energy Plan, *Focusing Our Energy* (<http://www.nr.gov.nl.ca/energyplan>). In the Plan, Government identified NL's abundant energy resource warehouse which includes oil, natural gas, hydroelectricity and wind, along with a number of other potential sources such as ocean energy, hydrogen, uranium and biomass. NL's energy industry is a key economic driver in our economy and innovation, coupled with resource development, has significant potential to contribute to future growth in our economy. However, the goals of sustainable development and a long term viable energy industry can not be achieved without strategies to identify opportunities, establish priorities and overcome challenges.

The Government of Newfoundland and Labrador recognizes the importance of energy innovation in improving the way energy is produced, transported and utilized. In an ever changing world, innovation is critical to ensure that the province's energy sector remains adaptable and sustainable in the long term.

The Energy Plan committed to invest in the planning, implementation and financing of energy innovation in the province, including the creation of an Energy Innovation Roadmap. The Plan further committed to:

- pursue a strategic, coordinated approach to energy innovation focusing on areas of competitive advantage;
- identify and work with various groups to focus on key opportunity areas;
- leverage existing strengths and energy expertise at Centres of Excellence and elsewhere by encouraging a common, coordinated approach to executing energy research; and
- address the lack of venture capital and other funding necessary to move ideas ahead into implementation.

The Government of Newfoundland and Labrador views the development of Energy Innovation Roadmaps (EIR) as an important step in the process of planning for energy innovation and development. The EIR will be a strategic planning tool for future investments in innovative energy technologies, from R&D through to technology demonstration and commercial deployment.

The EIR project is being undertaken in two phases:

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- Phase 1: Priorities Identification – this Phase, which has been completed, consisted of an analysis of NL’s energy sources and innovation opportunities based on various screening criteria to determine the priority areas to focus development of energy innovation roadmaps;
- Phase 2: Roadmapping – this Phase will involve the development of energy innovation roadmaps for the priority areas that were identified in Phase 1.

Through a public, competitive process, NR retained consultants to undertake Phase 1. All energy sources relevant to NL were considered including crude oil, natural gas, wind, hydro, ocean, biomass, hydrogen, uranium, peat, geothermal and solar, as well as power transmission and energy efficiency & conservation.

The four main energy sources (crude oil, natural gas, wind, hydro) in the Energy Plan were earmarked for detailed evaluation from project start. However, the remaining other energy sources went through a filtering process to determine which ones may warrant further assessment. The filtering approach included the following screening criteria for the various energy types:

- Does NL have (or could NL have) sufficient local resources?
- Is the energy type consistent with the Energy Plan?
- Is technical innovation required i) locally, and ii) elsewhere external to NL?
- Is it feasible that NL has, or could have, appropriate capabilities to meet the challenge considering existing capability (e.g. university, industrial base) and international competitiveness?

Once this process narrowed the source types under consideration, a further analysis was undertaken which included an examination of:

- barriers to determine where Innovation may be required;
- innovation opportunities to determine how valuable innovation would be and whether the innovation is well advanced outside Newfoundland and Labrador;
- innovator competitiveness to determine whether Newfoundland and Labrador has a basis to be competitive for the required innovation; and
- innovation priorities to determine the extent innovation may be a priority for local and/or external markets.

As a result of the above analysis, nine priority themes across four energy areas were recommended for Phase 2 roadmapping:

- **Oil & Gas** – given the complexity of the issues and the number of stakeholders that are involved in this sector, separate Roadmaps were recommended to address the following six priority areas: harsh

environment, Arctic conditions, subsea protection, enhanced recovery,

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far offshore logistics and onshore seismic.

- **Onshore Wind** – one Roadmap for this sector was recommended which would address barriers impacting onshore wind innovation in the province, particularly related to icing, cold conditions, grid inflexibility and resource mapping.
- **Transmission** – one Roadmap was recommended to focus on innovations that would enhance power line de-icing capabilities (e.g. prediction, monitoring, control strategies, de-icing technologies) with a specific focus on Labrador conditions.
- **Remote Energy** – one Roadmap was recommended to address remote location power systems technologies that could be applied to smaller scale, off-grid settings such as outports (e.g. Ramea). This roadmap will be broad-based and provide considerable flexibility given the early stage and uncertain development path that that some of these technologies (e.g. small scale generation, energy storage, control systems) may take.

Four reports for Phase 1 have been completed: (1) *Analysis Document: 'Energy Warehouse' Areas (Onshore Wind Energy, Hydroelectricity, Transmission, Upstream Oil & Gas, Midstream Gas)*; (2) *Screening Document: Other Energy Types*; (3) *Analysis Document: Other Energy Themes (Remote Energy Systems, Marine Energy Technologies, Energy Efficiency)*; and (4) *Recommendations for Innovation Priorities*. These reports are available online at <http://www.nr.gov.nl.ca>.

In light of the Cougar helicopter crash and the BP oil spill in the Gulf of Mexico, the results of Phase 1 were reviewed to determine if there were any prioritization implications from a health, safety and environment (HSE) perspective in relation to the development of the oil and gas innovation roadmaps. This review indicated that the high level priorities for innovation within the oil and gas sector have not been fundamentally altered as a result of the two incidents. However, the relative importance of innovation areas within the general priorities has changed. An example is the heightened significance of oil spill-related innovation within the previously defined category of "Arctic conditions". The report noted that the province has strength in areas such as oil spill detection and tracking in ice environments, and safety response and evacuation simulation. Other areas of provincial knowledge and capabilities that are relevant to innovation-need include the testing of flight suits and Arctic weather work-wear and support for oil spill clean-up in cold water environments. The results of this analysis are contained in a report *Oil and Gas HSE Addendum* which is also available online at <http://www.nr.gov.nl.ca>.

3.0 Scope of Work

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Through this Request for Proposals, NR invites proposals from consulting firms that are interested in undertaking and completing the development of an Energy Innovation Roadmap for specific technology issues related to Onshore Wind and Energy Transmission in Harsh Environments. Requests for Proposals to cover development of Energy Innovation Roadmaps for other priority areas will be issued separately.

The work undertaken for this initiative will be directed by a project Steering Committee comprised of officials from the Department of Natural Resources (lead), Department of Innovation, Business and Rural Development, Department of Business, the Newfoundland and Labrador Research & Development Corporation, and Nalcor Energy. An Executive Steering Committee, comprised of the Deputy Ministers, Chief Executive Officer and Vice-President(s) of the above departments/organizations will also direct the work and meet with the consultants during the course of the project.

As noted above, this Request for Proposals covers the preparation of an Energy Innovation Roadmap for Onshore Wind and Transmission. The Roadmap should address only innovation/technology issues and opportunities such as those outlined in this Scope of Work. It should be emphasized that the Roadmap itself should not try to solve each specific innovation/technology issue that will be considered (e.g. identify a specific solution for operating turbines at -40 °C or actually produce a provincial wind and ice map). Rather, the intent is to develop and recommend options for how to address these issues specifically within the Newfoundland and Labrador context, along with estimated timelines, costs, etc. Issues that are company, market or regulatory related will be considered through mechanisms outside of this roadmapping initiative.

3.1 Onshore Wind

The Energy Plan estimates that there are more than 5,000 Megawatts (MW) of potential wind energy available within the province, with much of the province having average wind speeds of between seven and ten metres per second at 50 metres above the ground.

There are two wind farms (Fermeuse and St. Lawrence) operating in the province which together generate up to 54 MW of wind energy. Both farms each generate 27 MW using nine, Vestas V90, 3 MW turbines. Nalcor Energy is also in the process of commissioning 390 kilowatts (six 65kw) of wind power as part of its Wind-Hydrogen-Diesel energy project in Ramea, on the southwest coast of the island.

Newfoundland and Labrador has a number of options for future engagement in innovation in the onshore wind sector, either as a wind turbine manufacturer, component manufacturer, test facility or research institute. These include establishing new entities or partnering with third parties with the relevant innovation capabilities. These options will be explored further as part of the roadmapping process.

For Onshore Wind, four areas were identified in Phase 1 which require innovation specific to Newfoundland and Labrador, particularly as it relates the operation of

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turbines in harsh environments. The four areas to be included in the Roadmap, as outlined below, are: Icing; Cold Conditions, Grid Inflexibility/Integration; and Resource Mapping.

3.1.1 Icing:

Build-up of ice on turbine blades can unbalance and damage turbines. Ice can also be thrown from the blades. Turbine energy production can be improved with the use of anti-icing or de-icing techniques. Anti-icing prevents the formation of ice, while de-icing removes ice when a predetermined amount has accumulated. The methods use to prevent and remove ice from wind turbine rotors can be mechanical, passive or active.

There is a considerable amount of existing and ongoing research related to anti-icing, de-icing and ice detection solutions for medium and severe icing conditions. While various applications have been developed in recent years, challenges still remain and reliable, commercial solutions need to be improved and/or developed.

The following work will be required with respect to turbine icing:

- review the existing research/literature and current practices in other jurisdictions (e.g. Yukon, Manitoba, Finland, Sweden, Norway) related to anti- and de-icing technologies and/or techniques to determine applicability and/or adaptation to Newfoundland and Labrador's circumstances. Examples of literature to review, but not limited to, include:
 - **Recommendations for Wind Energy Projects in Cold Climates**, Technical Research Centre of Finland, Working Paper 151, 2009;
 - **State-of-the-Art of Wind Energy in Cold Climates**, Technical Research Centre of Finland, Working Paper 152, 2010;
 - **Analysis and Mitigation of Icing Effects on Wind Turbines**, Wind Energy Research Laboratory, Université du Québec à Rimouski;
 - **Systems for Prediction and Monitoring of Ice Shedding, Anti-Icing and De-Icing for Overhead Power Line Conductors and Ground Wires**, CIGRE (International Council on Large Electric Systems) Working Group B2.29, July 2010;
 - **Guidelines for Meteorological Icing Models, Statistical Methods and Topographical Effects**, CIGRE (International Council on Large Electric Systems) Working Group B2.16, April 2006;
 - Relevant presentations from previous wind related conferences (e.g. **Wind Energy Development in Harsh Environments**, St. John's, 2010; **Winterwind**, Sweden, 2008, 2011).
- recommend anti- and/or de-icing technologies and techniques (e.g. icephobic coatings that are designed specifically for harsh environments) that could be adapted or developed and tested for future implementation in the province, with particular reference to Labrador;
- recommend options to undertake long term research-grade observations of wind (using ice-free anemometers) and icing conditions through the lower

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boundary at heights up to 300-400 m above ground in particularly ice-prone areas;

- recommend options to implement research and demonstration sites to collect detailed icing impacts data that could lead to more effective anti-/de-icing measures;

3.1.2 Cold Conditions:

Although the cold climate turbine market is still relatively small, it is growing in countries such as Canada, China, US, Sweden, Norway and Finland. Task 19 of the International Energy Agency estimates that 5-10% of the total installations in Canada, US, Europe and China are cold climate installations.*

Similar to the issues related to icing, operation of wind turbines in cold conditions, such as in Labrador, is extremely challenging. For example, existing cold climate packages for turbines are normally rated for -30 °C. However, turbines operating in Labrador need to be able to operate at temperatures of -40 °C.

The following work will be required with respect to the operation of wind turbines in cold conditions:

- review the existing research/literature (see above) and current practices in other jurisdictions (e.g. Yukon, Manitoba, Finland, Sweden, Norway) related to the operation of wind turbines in cold climates to determine applicability and/or adaptation to Newfoundland and Labrador's circumstances;
- recommend options for the development and testing of more reliable turbines capable of working in cold conditions (e.g. -40 °C);
- recommend new concepts for the operation and maintenance of wind turbines in cold conditions (e.g. the development of equipment and operational processes that allow wind-based systems to be operated over higher duty cycles and serviced in harsher environmental conditions).

3.1.3 Grid Inflexibility/Integration:

The ability of the grid to absorb higher penetrations of intermittent wind energy is a function of the flexibility of other generation supply, interconnection, customer loads, and the availability of electricity storage facilities. This is particularly challenging for Newfoundland and Labrador given the absence of these features at the present time.

* **Wind Energy in Cold Climates IEA Task 19**, Presentation to Winterwind 2011, Sweden.

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The following work will be required with respect to grid inflexibility/integration:

- review the existing research/literature and experiences in other jurisdictions (e.g. Manitoba, Ontario, British Columbia, United States, Finland) related to issues of grid integration and assess the applicability and/or adaptation to Newfoundland and Labrador's circumstances. Examples of literature to review, but not limited to, include:
 - ***Integration of Wind Generation with Power Systems in Canada Overview of Technical and Economic Impact***, Natural Resources Canada, February 2006.
 - ***The Hydroelectricity Industry's Role in Integrating Wind Energy***, Summary Report, CEATI Project No. T102700-0371.
 - ***Impacts of Large Amounts of Wind Power on Design and Operation of Power Systems, results of IEA Collaboration***, 2009.
 - ***Wind Farm Integrated into Hydroelectric Power System/Washington State, USA***, Natural Resources Canada.
 - ***BPA Wind Integration Services***, Bonneville Power Administration, March 2004.
 - Relevant presentations from previous wind/energy related conferences (e.g. **Wind Energy Development in Harsh Environments**, St. John's; 2010; **Winterwind**, Sweden, 2008, 2011; **RETECH**, United States, 2011);
- compare existing grid codes that are applied in Newfoundland and Labrador regarding wind turbine generator unit design and utilization with other developments in Canada and elsewhere. Particular attention should be given to recognizing grid codes and practices in island power systems around the world that are host to significant amounts of variable renewable generation;
- assess the flexibility of the existing generating capacity in Newfoundland and Labrador, particularly with respect to the integration of a significant amount of variable generation (e.g. wind power);
- recommend options and technologies that could improve the flexibility of the existing generating facilities;
- recommend options which could lead to the development of new concepts for the techno-economic integration of high wind penetration systems featuring hydro and gas (possibly) and storage facilities;
- given that large-scale wind development in Labrador could involve the addition of a HVDC transmission link and associated AC transmission in the province and beyond, recommend options for cost effective HVDC transmission, control development especially in weak networks, HVDC cable reliability, multi-terminal effects, voltage source converters and real-time or faster than real-time simulation.
- recommend options for the development of power management strategies and system designs that are tolerant of high proportions of wind generated power and the consequent fluctuations in energy supply, by providing

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mechanisms such as storage loads or wide area balancing that provide grid stability despite unpredictable supply characteristics.

3.1.4 Resource Mapping

Although resource mapping is well advanced as a discipline, the combined effects of wind and ice for wind energy are not well understood or mapped. This is needed for Labrador wind development.

Nalcor Energy is undertaking a three-year Wind Monitoring Program in four communities in coastal Labrador – Nain, Hopedale, Makkovik and Cartwright. The scope of the work will include site visits for wind prospecting, the evaluation of transmission requirements, constructability, and other desirable qualities of a wind development site, as well as the collection and validation of the wind data from each site.

Without duplicating work that will be undertaken as part of the Wind Monitoring Program noted above or ongoing work of Natural Resources Canada and/or Environment Canada, options should be identified to:

- improve, verify and operationally implement meso-scale modelling approaches to predict the occurrence and amount of icing conditions;
- develop a provincial and regional atlas which would include the frequency and duration of icing conditions and distribution of ice amounts at high resolution (e.g. 1 km, and from 10-400 m above ground), particularly for potential wind energy and transmission line sites in Labrador and on the island;
- develop a long term predictability methodology for the creation of high-resolution wind and ice digital databases involving the creation of synthetic time series (using a mesoscale atmospheric model) of meteorological variables (e.g. winds, temperature, humidity, freezing rain, cloud liquid water content) at a horizontal resolution of 1 km over Newfoundland and Labrador, with a time sampling of every ten minutes;
- develop improved numerical forecasting of short term (0 to 48 hours) energy production;
- develop a methodology for the study of historical weather extremes (e.g. cold, icing conditions, precipitation) and their future trends in a changing climate.

3.2 Transmission

For the purpose of this RFP, transmission is defined as the establishment and operation of infrastructure for transmitting electricity at high and medium voltages. The Transmission industry is mature and well developed. However, similar to the icing issues related to onshore wind development, icing of above ground power lines is a hazard faced in many parts of the world and can bring down lines over long

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distances. It is a key factor for some parts of Labrador energy development since there is unlikely to be alternative routes to provide redundancy.

The following work is required with respect to transmission:

- recommend options to enhance power line de-icing capabilities (prediction, monitoring, control, de-icing technologies) with a focus on Labrador conditions.

3.3 General

In addition to the above, the following work is required:

- compile an inventory of existing onshore wind-related innovation capabilities and infrastructure in Newfoundland and Labrador;
- review the **Wind Technology Road Map** prepared for the Government of Canada (2009) to determine areas of potential fit with Newfoundland and Labrador's Innovation Roadmap for Onshore Wind;
- define, evaluate and recommend options for engagement including establishing new entities or partnering with third parties (e.g. research/test facilities, turbine/component manufacturers, etc.) taking into consideration key factors such as, but not necessarily limited to, cost to implement, time to implement, ease of implementation;
- evaluate and make recommendations on the potential to export the capabilities and expertise that will reside in the province as a result of developing and implementing the specific innovations that are recommended in the Roadmap for Onshore Wind/Transmission.

3.4 Energy Innovation Roadmap Structure

The Roadmap should cover a multi-year planning horizon and include the following components:

- **Overview** - this component should include an overview of the onshore wind and electrical transmission landscape in Newfoundland and Labrador, the challenges and opportunities that the environment poses to development, recent technological innovations that have occurred in these areas which have particular relevance to this province, recent and current research in the province that is related to onshore wind and transmission in harsh environments, and Canadian and NL company onshore wind and transmission expertise/capabilities.
- **Vision** - this component should identify the vision that will guide the objectives and actions that will be required to achieve it.
- **Innovation/Technology Objectives** - this component should identify innovation/technology objectives consistent with the vision.

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- **Actions Required** – this component should identify specific, detailed actions that are required to achieve the vision and objectives outlined in the previous section.
- **Ownership for Action** – this component should identify an organization(s) that could take a lead role in implementing the recommended action. An organization could be government (provincial or federal), university, institute, or individual companies. As outlined above, options for the type and level of engagement should be explored and recommendations developed. This could include, among other things, collaborative options for engagement with wind turbine companies (manufacturers), universities/institutes, testing centres, electric power utilities, and/or technology solution providers.
- **Key Milestones** – this component should identify key milestones over the planning period for the commencement and completion of the specific actions that will be required to fulfill the vision and innovation/technology objectives.
- **Resource/Cost Estimates** – this component should identify estimated costs of implementing the specific actions that will be required to fulfill the vision and objectives.
- **Performance Indicators (PIs)** – this component should identify specific performance indicators that can be used to evaluate the progress of achieving the vision and each objective.
- **Executive Summary (Report and Presentation formats)** – this component should provide a concise, visual presentation of the objectives, specific actions that are required to fulfill the objectives, and time frames for commencement and completion of the actions.

3.5 Methodology

Stakeholder interviews, focus groups and/or specific workshops will be required to obtain information and input to inform development of the Roadmap. It may be necessary to undertake meetings and site visits in other Canadian provinces and international, in order to complete the due diligence required. A stakeholder engagement strategy/approach should be proposed and costed in detail by the consultant as part of its proposal submission, including potential meetings and/or focus groups and proposed locations. The final strategy/approach and stakeholder/consultation list to be approved by the Department prior to implementation. A potential stakeholder/consultation list is attached as Appendix A.

The consultant will be expected to complete and deliver a final presentation to the Steering Committee, as well as a final written Roadmap report, no later than September 30, 2012. As well, the consultant should expect to complete and submit two (2) interim reports and/or presentations during the contract period, the content and timing of which will be agreed to by the Department. The consultant will be expected to meet in-person with the Steering Committee at the beginning of the project and in-person monthly thereafter until project completion, as well as

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participate in weekly teleconferences. Other shorter oral and/or written updates may also be required, at the discretion of the Department, from time to time.

The final report should include an Executive Summary, the format of which will be subject to final approval of the Department. The consultant will deliver the report in an electronic software format agreed by NR and the consultant. The consultant will also deliver any related and supporting work, reports, presentations and documentation from the completion of this work. The consultant should be aware that any work undertaken and completed by the Government of Newfoundland and Labrador, including that done by consultants on its behalf, is subject to possible public release. Any confidential information provided should be clearly identified.

4.0 Proposal Submission

Interested consultants are asked to review this Request for Proposals, available reports, studies and other documentation and submit proposals to complete an Energy Innovation Roadmap for the Onshore Wind and Transmission sectors. As referenced in Section 3, Requests for Proposals to cover development of Energy Innovation Roadmaps for other energy areas will be issued separately. The Government of Newfoundland and Labrador is not obligated to engage the consultant selected to complete the Onshore Wind and Transmission Energy Innovation Roadmap to develop any other Roadmap(s) that may be undertaken in the future.

Each submitted proposal must detail how the consultant will address the areas of local Newfoundland and Labrador knowledge, energy sector expertise and experience, and outline whether the consultant plans to subcontract work to local consultants with specific expertise in particular areas. The consultant's approach to addressing these requirements will form part of the overall evaluation of the consultant's proposal submission.

Proposals should include:

- project approach, summary/overview of work, and anticipated Energy Innovation Roadmap outline;
- project work schedule, including work schedule of the consultant's team members;
- key milestone check points to facilitate the Committee's review of progress towards completing the Roadmap;
- details as to how the consultant will address the areas of local Newfoundland and Labrador knowledge;
- the percentage of work under the contract to be undertaken in Newfoundland and Labrador;
- detailed budget including daily rates and total cost of each of the consultant's team members, including costs to travel to/from the province, within the province and to other proposed locations. Cost estimates for out-of-province consultations should be included separately as options;
- company prospectus, services offered and details on the experience of the firm, including previous experience in undertaking similar work;
- anticipated role/contribution and previous experience/curriculum vitae

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for each of the consultant's team members, particularly with respect to their knowledge, experience and expertise related to energy innovation and innovation/technology Roadmaps;

- names of former clients and associates for whom similar or relevant work has been performed presented as references, including a description of the work completed (minimum of three (3) references required); and
- any additional information the consultant deems relevant to its proposal submission.

All proposals submitted in response to this Request for Proposals must be delivered in a sealed package and clearly marked with the title "Energy Innovation Roadmap – Phase 2: Onshore Wind/Transmission in Harsh Environments" to the Government Purchasing Agency, 30 Strawberry Marsh Road, St. John's, Newfoundland and Labrador, Canada, A1B 4R4 no later than the closing date of Friday, January 13, 2012 at 4:00 pm (NST). A proposal package shall include one (1) signed original and eight (8) complete paper copies and one (1) complete electronic copy in Adobe Reader format. Facsimile or electronic only proposals are not acceptable and will not be considered.

All proposals must remain valid and open for acceptance for not less than ninety (90) calendar days from the closing date of this Request for Proposals.

Consultants are solely responsible, and without recourse for any expenses they incur in preparing and submitting a proposal and for their participation in the Request for Proposals process including, but not limited to, attending any interviews or presentations requested by the Department of Natural Resources and providing any additional information that may be requested. The Department of Natural Resources shall not defray nor be liable for any reason for any expenses incurred by the consultant in responding to this Request for Proposals.

All proposals and accompanying documentation submitted under this Request for Proposals are considered to be the property of the Department of Natural Resources and will not be returned.

All proposals must address the content of this Request for Proposals. Proposals are those that clearly demonstrate a thorough understanding of this Request for Proposals, and its stated requirements and criteria. The Department of Natural Resources will disqualify proposals that do not demonstrate this understanding and do not include the information that is requested in this Request for Proposals.

5.0 Proposal Acceptance

The Department of Natural Resources reserves the unfettered right to reject any or all responses received in response to this Request for Proposals and is not bound to accept the highest ranking or any response. The Department of Natural Resources may elect to cancel this Request for Proposals at any time with or without cause and no liability shall accrue to the Department nor the Government of Newfoundland and Labrador as a result of its exercise of its discretion in this regard.

Should the Department of Natural Resources decide not to accept any proposal

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received, all proponents will be given written notice of such decision.

The proposal of the successful proponent will form part of any resulting agreement by attachment and incorporation by reference. Claims made in the proposal will constitute contractual commitments. Any provision in the proposal may be included in the resultant agreement as a direct provision thereof.

Any agreement resulting from this Request for Proposals shall be governed by the laws of the Province of Newfoundland and Labrador. An agreement issued pursuant to this Request for Proposals shall be issued in the name of the proponent exactly as that proponent's personal or corporate name is stated in the Request for Proposals document. Funds payable (CDN\$) for materials delivered pursuant to this agreement shall be paid only to the proponent who is listed as party to this agreement.

All documents and other records in the custody of, or under the control of some or all of the Department of Natural resources, or its representatives, shall remain confidential.

6.0 Proposal Evaluation

Proposals will be evaluated for completeness, conciseness and general suitability. Additional information may be requested from the consultant, if necessary, to validate and support proposals submitted in response to this Request for Proposals. Any such additional information will be provided at the consultant's expense.

Only proposals that have been deemed by the Department of Natural Resources to have met all mandatory requirements as identified within this Request for Proposals document will be evaluated.

Interviews or presentations may be requested of proponents, if necessary, to validate responses. Any presentations made on site will be at the proponent's expense.

Proposals should identify project costs by category, including the per diem rates and number of days for each person on the project team. All costs should be quoted in Canadian dollars, exclusive of applicable taxes.

The proposals will be scored out of 100 as follows:

Evaluation Criteria	Maximum Number of Points	Minimum Number of Points
Consultant Proposal Bid Price (CDN\$, exclusive of applicable taxes)	25	15
Consultant Profile, Proposed Team, Project Role, Expertise and Experience (including energy sector and innovation/technology roadmapping related experience)	30	15

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Local (NL) Knowledge, Energy Sector Expertise and Experience	10	5
Work Plan, Work Schedule, Approach and Proposed Methodology for Evaluating Opportunities and Developing the Roadmap	35	15
Total	100	50

Proposals which receive a score below the minimum threshold in any of the above categories will be removed from further consideration.

7.0 General Terms and Conditions

The successful proponent must be in good standing with the Workplace Health, Safety and Compensation Commission (WHSCC) or its equivalent in the jurisdiction where the proponent organization is located and provide a certification letter to this effect prior to receiving any payments for this contract.

If the proponent is a corporation, the organization must be licensed to conduct business in its own jurisdiction and shall be in good standing in that jurisdiction.

Any contract resulting from this Request for Proposals will be governed by the laws of the province of Newfoundland and Labrador.

The Department of Natural Resources will retain copyright of any programs, systems or other intellectual property developed as part of this project. The proponent will, upon either completion or termination of the project, immediately transfer to the Department of Natural Resources all materials including, but not restricted to, all research reports, papers, tapes, slides, CDs, films, photographs, audio-visual materials, electronic data or other information submitted to the proponent or developed by the proponent in the performance of the assignment, whether in draft or completed form.

8.0 Inquiries and Communication

Inquiries and questions related to this Request for Proposals are to be submitted to the Department of Natural Resources no later than Friday, January 6, 2012 at 4:00 pm (NST). Inquiries and requests received after this date will not be addressed.

Please forward all inquiries to:

Paul Morris
Assistant Deputy Minister
Energy Innovation Roadmap
Department of Natural Resources

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All inquiries are to be submitted in writing or by e-mail and the Request for Proposals title "Energy Innovation Roadmap – Phase 2: Onshore Wind/Transmission" should be quoted on all correspondence. The Government Purchasing Agency shall provide to all bidders who have registered to receive amendments, any relevant information in response to inquiries received in writing without revealing the source of those inquiries. Bidders are cautioned that it is their responsibility to ensure that they receive all information relevant to this Request for Proposals. The Government of Newfoundland and Labrador shall not be responsible for bidders who fail to inform themselves regarding the scope and nature of the work. The Government Purchasing Agency shall publish all amendments to the procurement website at www.gpa.gov.nl.ca. Bidders may register on the procurement website to receive amendments automatically by fax. Bidders not registered to receive amendments are solely responsible for ensuring they are aware of and have complied with all amendments by closing time.

Verbal information or representations shall not be binding upon the Department of Natural Resources. Only written changes, alterations, modifications or clarifications approved by the Department of Natural Resources are binding. In order to be valid, all such changes, alterations, modifications or clarifications shall be issued in the form of addenda and all such addenda shall become part of this Request for Proposals.

Information pertaining to the Department of Natural Resources obtained by the proponent as a result of this Request for Proposals is confidential and must not be disclosed by the proponent, except as authorized by the Department of Natural Resources.

The Department of Natural Resources may, during the assessment period, request a meeting with a proponent to clarify points in the proposal. Demonstrations of any or all proposed solutions may also be requested. No changes or amendments by the proponent will be permitted to its proposal after the Request for Proposals closing date. The proponent shall be responsible for any expenses incurred related to this requirement.

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**Appendix A
Potential Stakeholder/Consultation List**

- Memorial University
 - Associate VP Research
 - Dean, Engineering & Applied Science
 - Associate Dean Research, Engineering & Applied Sciences
 - Various Faculty Members, Engineering & Applied Science
 - Genesis Research
- Government of Newfoundland and Labrador
 - Department of Natural Resources
 - Department of Innovation Trade & Rural Development
 - Department of Business
 - Department of Labrador and Aboriginal Affairs
 - Department of Environment & Conservation
 - Research & Development Corporation
 - Rural Secretariat
 - Women's Policy Office
- Government of Canada
 - Atlantic Canada Energy Office
 - Atlantic Canada Opportunities Agency
 - Industry Canada
 - Natural Resources Canada - (Ottawa, ON)
 - National Research Council of Canada (Ottawa, ON)
 - Environment Canada (Ottawa, ON; Montreal, QC)
- Newfoundland and Labrador Environmental Industries Association
- Newfoundland and Labrador Association of Technology Industries
- Canadian Manufacturers Association - NL
- Newfoundland and Labrador Organization for Women Entrepreneurs
- SafetyNet – Centre for Occupational Health & Safety Research
- College of the North Atlantic, Office of Applied Research
- Natural Sciences and Engineering Research Council of Canada
- Women in Science and Engineering Newfoundland and Labrador
- Women in Resource Development Corporation
- Professional Engineers & Geoscientists of Newfoundland and Labrador
- Newfoundland and Labrador Federation of Labour
- Canadian Wind Energy Association (Ottawa, ON)
- Canadian Electricity Association (Ottawa, ON)
- Electric Power Research Institute (Palto Alto, California)
- Wind Energy Institute of Canada (North Cape, PEI)
- Sustainable Development Technology Canada (Ottawa & Toronto, ON)
- Vestas (Toronto, ON; Houston, Texas; Denmark)
- Frontier Power Systems (Alberton, PEI)
- National Renewable Energy Centre – CENER (Sarriguren, Spain)
- CIGRE (International Council on Large Electric Systems), Montreal, QC; Paris France
- Bonneville Power Administration (Portland, Oregon)
- Wind Energy Strategic Network
- Wind Energy TechnoCentre (Gaspé, QC)

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- CEATI International Inc. (Centre for Energy Advancement through Technological Innovation, Montreal, QC)
- Electric Reliability Council of Texas, Inc. (Austin, Tx)
- National Renewable Energy Laboratory (Washington, DC)
- National Wind Technology Center (Boulder, Co)
- Finnish Meteorological Institute (Helsinki, Finland)
- Mount Washington Observatory (White Mountains, NH)
- Leading Edge Projects Inc. (Whitehorse, Yukon)
- WindREN (Färentuna, Sweden)
- GL Garrad Hassan (Ottawa, ON)
- Hatch (Mississauga, ON)
- VTT Technical Research Centre of Finland
- GE Energy (Canada, USA)
- Manitoba Hydro
- University of Alberta
- University of Windsor
- University of Manitoba
- University of Saskatchewan
- Compusult (Mount Pearl, NL)

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