**Date : 6/27/2012 7:28:09 PM**
**From : "Bown, Charles W."**
**To : "'GBennett@nalcorenergy.com'"**
**Cc : "Scott, Paul G."**
**Subject : Fw: Newfoundland Wind Assessment Study - MHI proposal**
**Attachment : NFL3 Proposal for Wind Capacity Assessment rev 7.docx;2012 06 27 NFL3 Wind Capacity Assessment Project Plan.pdf;NFL3 Proposal for Wind Capacity Assessment (scope of work).docx;**

I'd appreciate an assessment tomorrow on the scope of this work. We can't wait any longer or else we will be in a delay. I'd like to review with minister this week,please.
Charles

Sent Via BlackBerry

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**From**: Paul Wilson <plwilson@mhi.ca>
**To**: Bown, Charles W.; Parsons, Walter
**Cc**: Danny Northcott <dnorthcott@hvdc.ca>
**Sent**: Wed Jun 27 19:25:25 2012
**Subject**: Newfoundland Wind Assessment Study - MHI proposal

Hello Charles, MHI has reworked the technical proposal based on input from yourself, Walter, and Cory along with my technical team here in Winnipeg. This project has an aggressive schedule with a tight time line (when are they not?) and I suspect that the schedule will slip into early September with the dependency on Nalcor. The effort, schedule and financial proposal are attached for your review and comment. My technical leads indicated that you can do this work for 10k, 250k, or 2 million depending on the depth of study. I have opted for a fast track screening level study which I believe best matches the goals and time frames. I understand that you will want to send the scope of work to Nalcor so I have included a separate document that contains just the scope of work for your use.

Let us know if you want changes or wish to proceed. If we are going to meet the target of the end of August, we will have to move very quickly.

My regards,

Paul Wilson, P. Eng.
Managing Director, Subsidiary Operations
Manitoba Hydro International Ltd.
211 Commerce Drive
Winnipeg, MB R3P 1A3
Canada
P: +1 204 989-1271
F: +1 204 475-7745
M +1 204 510-1271

Manitoba HYDRO INTERNATIONAL

**Project:** Assessment of Wind Capacity Credits for the Isolated Island of Newfoundland

**Client:** Government of Newfoundland and Labrador – Department of Natural Resources

# PROJECT PROPOSAL - DRAFT

**Proposal Prepared for:**

Charles Bown
Associate Deputy Minister
P.O. Box 8700
50 Elizabeth Avenue
St. John's, NL A1B 4J6
Canada

**Proposal Prepared by:**

Paul Wilson
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211 Commerce Drive
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Canada
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Phone: (204) 989-1271

File: NFL3

Date: June 27, 2012

Manitoba HYDRO INTERNATIONAL

## Scope of Services

# 1.0 Introduction

This proposal is in response to an enquiry from the Government of Newfoundland and Labrador, Department of Natural Resources to carry out the goals listed below in the scope of work.

Manitoba Hydro International (MHI) possesses a roster of well-qualified personnel to draw upon for this assignment. In particular MHI staff have been engaged in generation planning projects in several countries throughout the world and can count on the support of Manitoba Hydro's 6000 plus employees. Our human resources capabilities are available to cover all disciplines and tasks required for the successful completion of this project. We are proposing various experts to meet the requirements of this important work, all of which have worked extensively in their relevant fields. The staff CVs are available on request.

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The basic question is "Can sufficient wind generation be installed on the Island to provide a firm supply of electricity to Island customers?" The Island of Newfoundland is large with varying wind resources available across the Island. At this time, the probability of the entire island becalming is unknown. The transmission system has limited power transfer capability west-east to the Avalon Peninsula and would likely require upgrades. Cost is an important consideration to customers.

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The assessment should determine:

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b) What is the capacity credit[2] of wind power on the Island of Newfoundland? Can there be sufficient wind power investment to provide a reliable firm supply for island customers with overbuild.

Study Goals:

1. Perform a desktop exercise to review existing literature, working group papers, technical resources, and industry know-how to describe the technology used in the industry, identify existing wind farm applications in isolated networks, identify the key issues in their application, document known issues with these applications.

2. When the key facts noted above are considered together with the situation on the Island of Newfoundland, describe the applicability of the key issues and whether there is any merit in proponent claims that wind power can be a sole solution for Newfoundland.

3. Develop a wind and hydroelectric generation resource master plan to the extent that is technically feasible in meeting the Nalcor 2012 Load Forecast prepared for Decision Gate 3 over the same study period. Examine the quality of the wind resource, site wind farms to meet the needs in the generation resource master plan, and estimate the capital investment required. Calculate the cumulative present worth of the generation resource plan in a comparison to the Isolated Island alternative calculated for Decision Gate 3.

The Consultant will also provide such advice and other services as may be required from time to time by the Client.

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Role: Project Director

Danny Northcott, P.Eng. – Power System Simulation and Project Engineer, MHI
Role: Project Manager

[2] The capacity credit for intermittent generation, the additional conventional capacity required to maintain a given level of reliability and thus the overall system margin are all related to each other. The smaller the capacity credit, the more capacity needed to maintain reliability, hence the larger the system margin. The amount by which the system margin must rise in order to maintain reliability has been described in some studies as "standby capacity", "back-up capacity" or the "system reserves". But there is no need to provide dedicated "back-up" capacity to support individual generators. Source: http://www.wind-works.org/articles/GridIntegrationofWindEnergy.html

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Role: AC integration and Industry Trends

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Role: Wind Farm Reliability Study

Tom Molinski, P.Eng. – Emerging Energy Systems Section Head, Manitoba Hydro,
Role: Wind Turbine Technologies, cold weather operation

Rick Horocholyn – Financial Specialist, Manitoba Hydro
Role: Financial modelling and rates analysis

Additional engineering resources from MHI will assist the technical leads when required. Individuals from the design services team will be used for the final report publication.

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The Services which the Consultant shall perform or cause to be performed include the following:

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   Perform a desktop exercise to review existing literature, working group papers, technical resources, and industry know-how to describe the technology used in the industry, identify existing wind farm applications in isolated networks, identify the key issues in their application, document known metrics with these wind farm applications.

| | | |
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| Task 1.2: | Review and report on Wind Turbine Technologies applied to Isolated Island scenarios (Examine other Isolated power systems: Ireland, UK, Tasmania, Hawaii, Spain-Canary Islands, or others as applicable). | David Jacobson<br>Tom Molinski |
| Task 1.3: | Review and report on Wind Turbine Technologies applied in Isolated Island power systems, turbine technology matches, and applications in extreme cold weather climates. | Tom Molinski |
| Task 1.4: | Review and report on best practices and existing metrics by region for Wind Capacity Credit assessment.<br>Review IEEE/NERC documents and summarize findings. | David Jacobson<br>Bagen Bagen |
| Task 1.5: | Identify key factors in integration issues for a high penetration of variable generation (wind turbines). This will include grid planning, real time control, reliability assessment, turbine maintenance and operations KPIs. | Tom Molinski |

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| | | |
|---|---|---|
| Task 1.6: | In consultation with Nalcor, review and document the Nalcor's important considerations for a high level of wind power penetration on the Island of Newfoundland. | All |

2. Assessment of Wind Farm Applications for Newfoundland – Setup

When these key facts noted in Task 1 above are considered together with the situation on the Island of Newfoundland, the study will propose an appropriate strategy for wind analysis and integration for the Island.

| | | |
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| Task 2.1: | Develop a technology compliance matrix for wind farms applied to the Island of Newfoundland and identify critical gaps in the technologies. | Tom Molinski |
| Task 2.2: | Review Nalcor's updated Wind Generation report for critical assumptions and parameters relevant for the wind capacity credit and wind/hydroelectric generation resource plan study. | All |
| Task 2.3: | Document methodologies necessary to perform a full capacity credit assessment for the Island of Newfoundland. | David Jacobson<br>Bagen Bagen |
| Task 2.4: | Collect required data necessary for the generation resource study including load characteristic data, wind resource data, and hydro-electric plant operating characteristics for the Island of Newfoundland. | David Jacobson<br>Tom Molinski |

3. Wind Application Resource Plan for the Island of Newfoundland

Develop a demonstrative generation resource and associated transmission expansion plan for energy and capacity to the extent technically feasible to meet the Decision Gate 3 2012 Load Forecast for the study period. Perform the Wind Capacity Credit Assessment for the Island of Newfoundland. This study will examine the hydroelectric generation resources available on the Island of Newfoundland, examine the quality of wind resources and location, match technology to the intended application, identify control and dispatch issues, determine installed capacity and energy requirements to maintain reliability, identify generation mix scenarios, determine the amount of investment required to meet the future load demand over a stated period.

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|---|---|---|
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| Task 3.2: | Formulate a mix of generation resources available on the Island of Newfoundland as required to support a high penetration of variable generation. Formulate generation resource mix scenarios for the Island of | David Jacobson<br>Tom Molinski |

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| | | |
|---|---|---|
| | Newfoundland based on wind and available hydroelectric sources, including consideration of storage. | |
| Task 3.3: | Develop a wind based Generation Resource Plan and associated transmission expansion plan for the study period to meet the load demand and capacity requirements denoted by the Nalcor 2012 Load Forecast for the DG3 study period. Match base load forecast to generation resource requirements factoring in wind resource energy and capacity availability, along with the transmission, reactive power, frequency control, and operational requirements. A simple desktop model will be used in this analysis. | Tom Molinski<br>David Jacobson<br>Bagen Bagen |
| Task 3.4: | Determine installed capacity and energy requirements to maintain reliability over the study horizon. | David Jacobson<br>Bagen Bagen |
| Task 3.5: | Estimate capital budget for investment in wind farm technologies including generation, control and communications, transmission, operations and maintenance for wind to be the sole new generation source on the Island along with existing available hydroelectric resources, and/or storage. | Tom Molinski<br>David Jacobson<br>Bagen Bagen |
| Task 3.6: | Calculate the Cumulative Present Worth of the identified scenarios to provide a basis for comparison to Muskrat Falls, the thermal base case, and the identified wind scenarios. | Rick Horocholyn |

4. Report Development

| | | |
|---|---|---|
| Task 4.1: | Draft a report on study and findings. Preparation of a final report is anticipated to include the following:<br>• An executive summary;<br>• A description of the methodology used to complete the Services;<br>• A discussion of the results of the study, including a discussion any observations and recommendations.<br>• This report will be formatted for public use.<br>• Present the report to the Client | Danny Northcott<br>Paul Wilson<br>Design Team |

5. Provide support on this subject to the Client until the project closes.

Manitoba HYDRO INTERNATIONAL

**Schedule Item Scheduled Completion Date**

- Kick off Meeting: July 13th,2012
- Draft Report: August 15th, 2012
- Final Report: August 30st, 2012
- Presentation: TBD
- Completion of Services: September 30th, 2012

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# 5.0 Financial Proposal

## *5.1. Summary of Costs*

Total Project Budget: [redacted]

Which is comprised of
Labour:
Expenses (trip 1):
Expenses (trip 2):
[redacted]

| Summary of Costs | | | |
|---|---|---|---|

| Item | Costs |
|---|---|
| | Canadian Dollars (CAD) |
| Costs of Financial Proposal | $ [redacted] |

## *5.2. Breakdown of Staff Remuneration*

Break down of remuneration by Consultant and position.

| Breakdown of Remuneration | | | | |
|---|---|---|---|---|
| **Name** | **Position** | **Staff Rate Per Day (CAD)** | **Total Days** | **Total Remuneration** |
| Paul Wilson | Project Director | [Home] [redacted] | [redacted] | |
| Danny Northcott | Project Manager | [Home] | | |
| David Jacobson | System Interconnection Engineer/Win | [Home] | | |
| Tom Molinski | Emerging Energy Systems | [Home] | | |
| Rick Horocholyn | Finance Specialist | [Home] | | |
| Bagen Bagen | Reliability Engineer | [Home] | | |
| Eve Dillastone | Technical Writer | [Home] | | |
| Martin Gerrard | Professional Writer | [Home] | | |
| Barbara Hicks | Design Specialist | [Home] | | |
| **TOTAL Remuneration** | | | | |

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### 5.3. *Break down by Activity*

| Breakdown of Labour by Activity | | | | | |
|---|---|---|---|---|---|
| **Activity Number:** | **1** | **2** | **3** | **4** | |
| **Activity Description** | Task 1 | Task 2 | Task 3 | Task 4 | |
| **Names** | | | | | **Days** |
| Paul Wilson | | | | | |
| Danny Northcott | | | | | |
| David Jacobson | | | | | |
| Tom Molinski | | | | | |
| Rick Horocholyn | | | | | |
| Bagen Bagen | | | | | |
| Eve Dillastone | | | | | |
| Martin Gerrard | | | | | |
| Barbara Hicks | | | | | |
| **GRAND TOTAL** | | | | | |

### 5.4. *Breakdown of Reimbursable Expenses*

| Breakdown of Reimbursable Expenses | | | | | |
|---|---|---|---|---|---|
| **N°** | **Description** | **Unit** | **Total Units** | **Unit Cost (CAD)** | **Total Cost** |
| | | | | | |
| **Total Cost** | | | | | |

The above chart shows the quantity and per unit rates for various expense categories. These expenses will be invoiced monthly as they are incurred.

Per Diems are sourced from the US Department of State site for meals in St. John's. A daily rate will be submitted for each staff member traveling to and from site in lieu of meal receipts.

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*5.5. Breakdown of Costs and Project Total*

| Breakdown of Costs | | | |
|---|---|---|---|
| Activity No.: | 1 | Description: | Task 1 |
| Cost Component | | | Costs Canadian Dollars (CAD) |
| Labour Remuneration | | | [redacted] |
| Reimbursable Expenses | | | |
| Miscellaneous Expenses | | | |
| **Subtotals** | | | $ |
| Activity No.: | 2 | Description: | Task 2 |
| Cost Component | | | Costs United States Dollar (USD) |
| Labour Remuneration | | | [redacted] |
| Reimbursable Expenses | | | - |
| Miscellaneous Expenses | | | - |
| **Subtotals** | | | $ [redacted] |
| Activity No.: | 3 | Description: | Task 3 |
| Cost Component | | | Costs United States Dollar (USD) |
| Labour Remuneration | | | [redacted] |
| Reimbursable Expenses | | | - |
| Miscellaneous Expenses | | | - |
| **Subtotals** | | | $ [redacted] |
| Activity No.: | 4 | Description: | Task 4 |
| Cost Component | | | Costs United States Dollar (USD) |
| Labour Remuneration | | | [redacted] |
| Reimbursable Expenses | | | |
| Miscellaneous Expenses | | | |
| **Subtotals** | | | $ |

*Note: the Financial Proposal is non-inclusive of Harmonized Sales Tax (HST). Where applicable, HST will be added to invoices.

To facilitate project cost control, timecards will be examined and approved by the Project Director including all reimbursable expenses.

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This is a time and materials contract. Time and expenses incurred will be billed monthly. Costs incurred beyond the total estimate will be billed only in consultation, and on the approval of the Client.

## 6.0 Contract Terms

The Consultant acknowledges that the Client is relying on the skill and knowledge of the Consultant in performing the Services. The Consultant shall exercise the degree of skill, care and diligence required by customarily accepted practices and procedures for such a Contract.

The Consultant shall only use key personnel to perform the Services who have been named by the Consultant in the Proposal and who have been accepted by the Client. The Consultant may only substitute or replace the accepted key personnel with the prior written agreement of the Client.

The provision of these services under the existing or similar contract for "Manitoba Hydro International's review of the Muskrat Falls and Labrador Island HVdc Link (LIL) and the Isolated Island options for the Government of Newfoundland and Labrador" would be acceptable to MHI. Otherwise our standard terms and conditions apply.

[redacted]

Manitoba HYDRO INTERNATIONAL

**Project:** Assessment of Wind Capacity Credits for the Isolated Island of Newfoundland

**Client:** Government of Newfoundland and Labrador – Department of Natural Resources

# PROJECT PROPOSAL - DRAFT

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**Proposal Prepared by:**

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Phone: (204) 989-1271

File: NFL3

Date: June 27, 2012

Manitoba HYDRO INTERNATIONAL

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