Project Description Report

Project Title:
WindTech Research and Development Facility

1. Project Summary
The main objective of WindTech R&D project is to conduct research in wind energy generation and utilization. The project is funded by Canada Foundation for Innovation (CFI), Ontario Ministry of Research and Innovation (MRI), Ryerson University (RU) and industry partners through CFI’s Leading Edge Program.

The WindTech mandate is to advance wind energy technologies through leading edge research and innovation, thus accelerating the development, generation, and integration of wind energy. Researchers in four Ontarian institutions will actively participate in the project, including Ryerson University (leading institution), University of Toronto, University of Waterloo, and University of Western Ontario. The WindTech facility will also be used by the dealers, suppliers, developers, grid owners/operators, and electricity regulators in the wind energy business for testing, data requisition, and other purposes.

The WindTech program will provide practical, hands-on training for students and other technical personnel. The practical training and hands-on experience will better prepare trainees to enter high-technology jobs in the emerging wind energy market, and thus contribute to the economic growth in Canada.

2. The facilities, equipment or technology that will be used to convert the renewable energy source or any other energy source to electricity.
The facility is mainly composed of six small wind turbines to convert wind energy source to electricity. The wind turbines are of different technologies and designs. They include horizontal- and vertical-axis turbines, induction and synchronous generators, single-phase and three-phase systems, variable- and fixed-speed operations, grid-tied and standalone systems, and gearboxed and direct-drive technologies. These turbines represent the latest wind energy technology and can be used to develop leading edge technologies for future applications. The wind turbine systems have been carefully selected such that they can be used to fulfill all the research objectives and activities.

Distribution lines of 4.8kV will be connected to the wind farm from Hydro One’s distribution network about 1km away. There are six transformers on the wind farm. The main transformer is rated 120kVA at 4.8kV/600V. This transformer will be installed on a hydro pole outside wind farm’s Electrical Room. The other five transformers include two units of 30kVA 600V/240V, two units of 50KVA 600V/480V, and one unit of 30KVA 600V/208V. All of them will be installed in the Electrical Room.
The roadway for wind turbine foundation construction and installation already exists. No new roadways are needed for the transportation or installation of the turbines.

Of the six turbines, the longest blade is only 3.5m. Each turbine tower is composed of three pieces with a maximum length of 10.16m per piece. As a result, no dedicated laydown sites are required. The generators, blades and towers can be put on a piece of grass land on the property.

3. The class of the renewable energy generation facility.
The total capacity of the wind turbines is 40.1KW. Since the power rating of the facility is below 50KW and all the turbines are land-based, the wind turbine facility is of Class 2 facility.

4. The activities that will be engaged in as part of the renewable energy project.
The WindTech facility is essentially for research in wind energy generation, utilization and system integration. The research activities can be categorized into the following four areas.
• Area 1: Investigates power converter systems and wind generators to match the different scales of wind energy generation. These include cost-effective, low-power converters for small wind turbines in rural areas, high-performance converters for larger wind turbines in commercial wind farms and innovative wind generators for enhanced performance and reliable operation.
• Area 2: Develops control schemes for various types of wind energy systems. Advanced controls are crucial to efficient/reliable wind turbine operation. They ensure maximum wind power capture and conversion, minimum manufacturing/operating costs, optimal system performance, and reliable operation of individual turbines.
• Area 3: Focuses on reliable fault diagnostics and protection of individual wind turbines and wind farms to accommodate grid-side power-quality events and erratic wind speeds that can damage wind turbines and other equipment in a wind farm.
• Area 4: Addresses wind farm power management and optimization through active/reactive power control, frequency regulation, and grid voltage control. The adverse effects of wind farm interactions with the grid intensify as levels of wind power penetration increase. To be integrated into the utility grid, wind farms must meet standard codes that govern the operation, development, and coordination of all grid users.

The geotechnical tests on the locations where the six turbines are to be erected were performed in August 2009. The turbine foundations were designed by a certified engineering firm in October 2009. The funding from Canada Foundation for Innovation has been in place. We plan to construct the turbine foundations in September 2010, install towers and turbines in October, 2010, and test/commission individual turbines in November 2010. The facility is expected be fully operational in December 2010.

5. The name plate capacity of the renewable energy generation facility.
Six wind turbines with a total capacity of 40.1KW will be installed. The nameplate capacity of the turbines is as follows:
6. The ownership of the land on which the project location is to be situated.
The location at RR1 Fergus, Ontario, N1M 2W3 is owned by Jeannine and Richard Ross. A letter of consent for the installation and operation of the proposed facility is included within our application (Landowner Consent - Reference Document #3).

7. Environmental effects that may result from engaging in the project.
The WindTech research project will have an overall positive impact on the environment. The mandate of the WindTech facilitate is to advance wind energy technologies through leading-edge research and innovation, thus accelerating the development, generation, and integration of wind energy in Ontario and Canada. WindTech’s research outcome, personnel training and industrial collaboration in wind energy development and utilization will help Ontario and Canada to increase its wind energy generation and penetration levels, thereby reducing greenhouse gas emissions. Boosting levels of wind power penetration by just 20% would cut Canada’s annual greenhouse gas emissions by 17 Megatonnes as predicted by CanWEA in its report “Wind Vision 2025” [1].


Ryerson has been pro-active and retained Stantec Consulting Limited, one of Canada’s premier professional environmental and scientific consulting firms. Stantec provided an independent assessment and opinion of the potential for negative environmental effects of the WindTech Research and Development Facility related to the natural environment.

Stantec concluded that: “It is our opinion that the potential environmental effects of the proposed WindTech Research and Development Facility are negligible in magnitude and extent. While some bird and bat mortality may occur, it is extremely unlikely to occur at levels that have the potential to adversely affect populations at the local or regional level, due to the small size of the turbines in the inland location of the facility.”

Small amount of emissions is expected during the construction of foundation and installation of towers due to the use of diesel operated equipment such as cranes.
8. Map for the project location.