



## WIND ENERGY INSTITUTE OF CANADA OPERATIONAL STATUS FALL 2008

### MISSION

*"WEICan will advance the development of wind energy across Canada through research, testing, training and collaboration"*



Contract negotiations with Cleanfied Energy Corp for testing of their V3.5, a 3.5 kW vertical axis wind turbine (VAWT) have been completed. The turbine is to arrive at WEICan fall 2008.

There are currently three other contracts under negotiations with an announcement of test commencement expected shortly.

### Strategic Focus

*WEICan's Four Areas of Strategic Focus:*

- *Testing Leading to Certification*
- *Research, Development and Demonstration*
- *Training, Outreach and Public Education*
- *Technical Consultation and Assistance*

### Progress, Accomplishments and Efforts

Many projects have been undertaken by WEICan since its inception. Some of these projects will continue over the coming years and their results will help influence the technical program and research efforts of WEICan.

## TESTING LEADING TO CERTIFICATION

### RFP for Small wind testing leading to certification

In 2007 WEICan initiated a Type Testing program for small wind turbines and announced a RFP for turbine manufacturers. Type Testing will be in accordance with the International Electrotechnical Commission (IEC) 61400 standard. Specific test include; power performance, power quality, acoustic noise emissions, duration and safety. Results can be certified through organizations such as the Small Wind Certification Council (SWCC).

WEICan is pleased to announce that there were nine applicants as a result of the RFP and Raum Energy's 1.3 kW is the first wind turbine erected, of the five chosen for Type Testing. Contract negotiations have concluded, the wind turbine was delivered to WEICan and WEICan staff (above right) oversaw the erection of the turbine on September 19, 2008.

### DEWI Partnership

In March 2007 WEICan signed a cooperation agreement with the German Wind Energy Institute (DEWI) to collaborate on testing large wind turbines for the purpose of certification. DEWI has delivered on-site training and will be returning to WEICan to deliver specific training on power performance measurement, acoustic testing and electrical power quality testing in accordance with the IEC 61400 standards. Equipment purchased and skills acquired will apply to testing of small wind turbines as well.

## RESEARCH, DEVELOPMENT AND DEMONSTRATION (R, D&D)

### RFP for Innovative Technologies

In late 2007 WEICan announced a RFP for developers of innovative technologies with substantial potential benefits for the wind industry. A variety of responses were received. Three companies were selected to pursue RD&D activities at WEICan's North Cape site.

The first company to begin the RD&D program is Catch the Wind Inc. (CTW). CTW has recently introduced the Vindicator™ Laser Wind Sensor with the ability to measure wind speed and direction while mounted on a wind turbine generator. The nacelle-mounted Vindicator™ Laser Wind Sensor (LWS) (below) gives data on wind conditions directly in front of the WTG. WEICan will correlate the wind speed and direction from the Vindicator™ LWS with standard wind measurements located around the WTG. As the structure of the wind is constantly changing, both the stress

and energy produced from the wind depend directly on the WTG's ability to adjust nacelle yaw and blade pitch to those dynamic conditions. By looking ahead into the wind approaching, the Vindicator™ LWS hopes to give the WTG control system critical time to process the wind data and make those adjustments.



### **North-East Region Wind Integration Seminar**

WEICan, working closely with the New England Governors and Eastern Canadian Premiers (NEG-ECP) Conference, with financial assistance from ACOA and technical support from the US Utility Wind Integration Group (UWIG); hosted the 'North-East Region Wind Integration Seminar'. This invitation-only seminar brought together senior management of all Eastern Canadian System Operators to explore actions that would facilitate the grid integration of wind energy in the North American North East. The findings of the seminar were collated by WEICan in consultation with the NEG-ECP and UWIG. The Northeast International Committee on Energy (NICE) has expressed an interest in the results.

### **Universal Inverter Project**

In 2006 NRCan requested proposals for the development of a prototype inverter (called the Universal Inverter (UI)) that would be suitable for up to a 100 kW turbine, have a capability of varying the rotor speed to optimize the energy capture at low wind speeds and also being able to work at a range of voltages and single or 3-phase modes. The UI was connected to the EWS turbine and a report was issued to NRCan in February 2008.

### **PEI Hydrogen Village Project**

WEICan is assisting the PEI Energy Corporation (PEIEC) in their Hydrogen Village project which is housed at North Cape. The building is under construction and equipment is being purchased as the project expects to be in operation in 2009. WEICan's small wind turbine inventory will be supplying the power to produce the hydrogen. Other technical assistance is also being discussed with PEIEC.

### **Wenvor 30 kW (University of New Brunswick / Université de Moncton)**

UNB/UdeM supplied a Wenvor 30 kW turbine to WEICan in December 2007 for research into turbine operation and as a test bed for UNB's newly developed prototype inverter. The turbine has been installed and is in service in its standard configuration and UNB is performing initial tests on the prototype inverter.

### **WhalePower Blades Project**

WhalePower Corporation of Toronto, ON, has been doing preliminary research into turbine blades that emulate the tubercles (bumps) found on the leading edge of humpback whale fins. After discussions with NRCan, WEICan reviewed the initial research and agreed to develop a test program. WhalePower has built one set of blades by modifying the blades of a Wenvor 25kW turbine. The blades were installed in September 2007 and test data was accumulated in accordance with IEC 61400-12 power performance measurement standard. WEICan issued a report in July, 2008 presenting the turbine performance. The next phase of tests are being developed.



### **Northern Community Hybrid System Development**

WEICan began discussions with the Territorial Governments regarding the role WEICan could play in moving toward finalizing a pragmatic and workable solution for the design, construction and ownership of hybrid systems in remote communities. Discussions are on going with the Department of Indian and Northern Affairs Canada as well as aboriginal communities.

### **Wind Energy Strategic Network**

The Canadian Wind Energy Strategic Network (WESNet) recently announced its start-up as Canada's nation-wide wind energy research collective. This multi-partner alliance includes leading researchers from 16 Canadian universities in six provinces, NRCan and Environment Canada, the Canadian Wind Energy Association, utility companies, wind sector businesses and WEICan. WESNet activities are divided into four themes: Wind Resource Assessment, Wind Energy Extraction, Power Engineering and Wind Energy Integration.

On September 17, 2008 WESNet held a meeting of its Scientific Committee at the Wind Energy Institute of Canada (below). Liuchen Chang, Principle Investigator of WESNet had this to say; "WESNet is looking forward to working with WEICan, this world class laboratory with experienced personal will be invaluable towards achieving goals in our four theme areas. UNB has been collaborating with WEICan since 1995 and one of the goals of WESNet will be to have more universities capitalize on this synergy." WEICan has committed to providing financial and intellectual

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support to WESNet up to a total of \$150,000 over five years and agreed to contribute \$30,000 of in-kind support per year as well. With total financing of \$5mn over 5 years, WESNet is poised to play a leading role in nationwide academic wind energy research.



### Small Wind Turbine Inventory

WEICan's small turbine inventory continues to be maintained in order to have equipment available for testing, research, development and demonstration purposes; specific examples of such have been explained above. In addition to those turbines mentioned previously WEICan's inventory includes: (manufacturer, model and rated capacity)

- Entegrity Wind Systems – EWS 15/50 – 65 kW
- Vergnet – GEV 15/60 – 60 kW
- Wenvor – 10/25 – 25 kW
- WindMatic – WM 15S/65 – 65 kW
- Bornay – 3000 – 3 kW
- ARE – 110 – 2.5 kW
- Southwest Windpower - Sky Stream – 3.7 – 1.8 kW

## TRAINING, OUTREACH AND PUBLIC EDUCATION

### Public Outreach Activities

This past year WEICan has hosted numerous professional groups in North Cape, including; journalists, diplomats, Provincial and Territorial Premiers and Ministers, MLA's and MP's, wind industry professionals, conference organizers and others. In addition, WEICan has participated in the preparation of numerous off-site activities such as wind energy conferences, seminars, and presentations to industry associations. These activities have been an important part of the process of educating key decision makers about the technical and economic capabilities of wind energy.

### International Business Development Agreement (IBDA) Trade Mission

This in-bound trade mission took place from September 30th to October 3rd, 2007. There were 39 attendees of whom 30 were from the private sector representing a total of 4 countries (Denmark, Germany, Canada and Australia). The trade mission took place in North Cape (above right)

and then continued on to Quebec City. The mission aimed to promote the services of WEICan to those in attendance as well as provide an opportunity for Atlantic Canadian companies to gain a better appreciation of the opportunities in the wind energy industry.



### Visiting Professors and Academics Program (VPAP)

The Visiting Professors and Academics Program was developed in order to enhance and recognize the contribution of scholars in the field of wind energy. Participants are able to enhance their scholarship through intellectual interactions with other visiting academics, WEICan management and staff and other clients of WEICan. Since its inception WEICan has had professors visit from California Polytechnic State University in the United States; Lambton College of Applied Arts and Technology in Ontario, Canada; Hefei University of Technology in China; and the University of Moncton in New Brunswick, Canada.

### Co-op Engineering Students Employment Program

A concerted effort has been undertaken to attract engineering students from across the country for work terms at WEICan. To date students from University of New Brunswick, Memorial University of Newfoundland, Dalhousie University, Concordia University and University of Waterloo have accepted assignments at the Institute. The co-op program at WEICan has been very successful and rewarding for both the student and the facilities. Hiring co-op students gives WEICan the opportunity to inject new and innovative ideas as well as have additional resources available for specific projects and tasks. The work term gives the student a chance to explore the wind energy field and gives them an opportunity to bridge the realms of academia and industry. Over the years co-op students have worked on many different projects including: power curve performance programming,



uncertainties calculations, data reduction and analysis, product selection, project coordination, modeling, instrumentation, repairs, oral presentations and working with a technical team.

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## Wind Technician Training

Development of a Wind Turbine Service Technician training program is now underway at Holland College on Prince Edward Island with students expected in fall 2008. WEICan will purchase a training tower with the assistance of ACOA to use for this type of training program. WEICan has also had discussion with and will be marketing the use of this training tower to other training programs as well as private sector companies who wish to use the tower on a fee for service basis. Below WEICan technicians undergo "Fall Rescue" training at WEICan.



## TECHNICAL CONSULTATION AND ASSISTANCE

### National Research Council Canada / Industrial Research Assistance Program

In July 2007 WEICan signed a cooperation agreement with the National Research Council Industrial Research Assistance Program (NRC/IRAP) to provide technical assistance and review of applications NRC/IRAP receive from the wind energy sector. Under this agreement WEICan has been working with three renewable energy start-up companies; expanding upon our client base.

One company based in Cape Breton is partnering with a French company that has designed a 3 kW VAWT which incorporates a number of innovative design features. This turbine has the potential to work in the high wind speeds found in Cape Breton and is modular enough that the turbine can be built in Canada. They are moving ahead with purchasing a test unit for installation in Cape Breton.

WEICan has reviewed another VAWT concept from a PEI based technology development company that includes unique ideas for the physical design and power output control.

A review of a Toronto based technology that uses belt drives and a new concept for speed control was also done to consider its applicability to wind turbines.

## Wind Resource Assessment

WEICan worked with Natural Resources Canada (NRCan) and Corrections Services Canada (CSC) to undertake wind resource assessments at two CSC sites, in Nova Scotia and Ontario. WEICan continues to explore opportunities for such contract services with select clients as a revenue generating activity.

## Board of Directors

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Andy Doucette - Electromechanical Technician  
Gary Wedge - Electronics Technician  
Joan Martin - Administrative Assistant  
WEICan also employees Co-op students on a regular basis

*For more information please contact:*

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