

Nova Scotia Energy Research and Development Forum 2012

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Title: Wind Speed Measurements Using SoDAR Technology

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Category: Alternative Energy & Sustainability

Nova Scotia's COMFIT program serves to actively encourage the installation of renewable energy projects. Farmers can play an integral part in the development of community wind. They inherently have land, are located in rural communities and in some cases have access to three phase power. There are, however, challenges farmers face which this project intends to address:

- 1) The lack of detailed wind speed data for specific site decisions.
- 2) The time consuming nature of collecting data, forming a Co-op and applying for COMFIT.

This project will address both these issues by undertaking a comprehensive study of wind resources on site specific farm based locations. Using measured data from the exact site where a turbine could be located provides for a stronger business case should wind speeds be sufficient. It also gives farmers and other investors more confidence in the proposed co-op and project.

Wind speeds are being measured with the Second Wind Triton Sonic Detection and Ranging (SoDAR) system on a three week rotation coupled with 13m MET towers which are placed in six locations around the province for one year.

The Second Wind Triton SoDAR unit sends a sonic pulse into the air from three different lobes with different axis. The resulting echoes from the air at various different heights are recorded and the Doppler effect is used to interpret wind speeds. Samples are collected every 3 seconds and averaged over 10 minutes to generate one time step. Wind data is imported into Windographer™ analysis software, which is used to generate wind roses, probability distribution functions and create predictions of power production for various turbines based on the wind regime at a given location.

Over 35 farms have registered to participate in wind collection and analysis. Average wind speeds at various heights are reported, some of which indicate sufficient wind potential for wind turbines installation. Based on the data a 50kw turbine with a capacity factor of 23%, rotor diameter of 15m and hub height of 40m could generate an average annual energy output of 104,000 kwh/yr, worth ~\$51,896 based on small wind COMFIT rates. Alternatively a 2Mw turbine with a capacity factor of 23%, rotor diameter of 82m and hub height of 78m would produce around 5,000,000 kwh/yr worth ~\$655,000 based on large wind COMFIT rates.