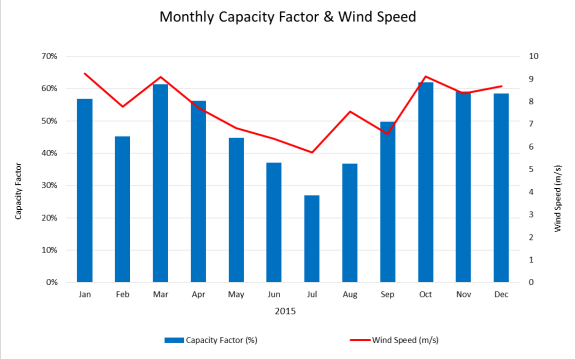
Wind Energy Institute of Canada

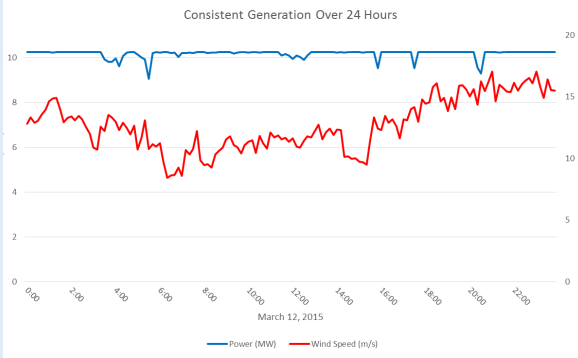
Leading the development of wind energy across Canada through research, testing, innovation, and collaboration.

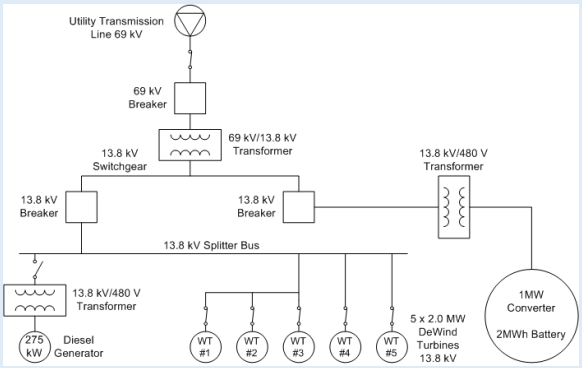
The Wind Energy Institute of Canada (WEICan), located in North Cape, Prince Edward Island, has been leading the development of wind energy across Canada through technical testing and consultation; research, development and demonstration; and outreach since its formation in 1981. As a national research facility and independent wind farm and battery energy storage system operator, with strong industry ties, the Institute is well-positioned to lead research in the advancement of wind energy.

WEICan owns and operates a Wind R&D Park that features five 2 MW wind turbines and an energy storage system with a 1 MW/2 MWh capacity. The Institute views this infrastructure as a laboratory that is available for research and is open to collaboration with interested parties.

WIND R&D PARK — FACT SHEET







WIND TURBINE PERFORMANCE

Since commissioning in 2013, the Institute's 10 MW Wind R&D Park turbines have generated over 136.6 GWh of energy.

Attributes of the Wind R&D Park's DeWind D9.2 turbines:

- Reliable operation in harsh coastal environment and cold weather
- Direct medium voltage tie-in of the D9.2's 13.8 kV synchronous generator
- Voltage control capabilities providing stability to utility grid presents a unique opportunity to view impact on grid

2015 Performance Statistics (January 2015 to December 2015):

- 44.9 GWh energy produced
- 95% + Availability
- 51% + Capacity Factor

Wind R&D Park Wind Turbine Specifications:

Installed Turbine Capacity	10 MW
Number of Wind Turbines	5
Model	DeWind D9.2
Frequency	60 Hz
Cut In Wind Speed	4 m/s
Cut Out Wind Speed	25 m/s
Operating Temperature Range	-30°C to +40 °C

BATTERY ENERGY STORAGE SYSTEM (BESS)

BESS Performance Statistics (March 2014 to September 2016):

- 5 services tested
- Up to 76% AC-AC efficiency

Battery Energy Storage System Specifications:

Storage Capacity	2 MWh
Storage Rating	1 MW
Inverter Model	S&C Purewave
Battery Model	GE Durathon

RESEARCH PROJECTS HIGHLIGHTS

Wind energy storage and grid integration:

Objective is to understand how wind turbine operation and energy storage can offer benefits in wind energy integration into the grid. Scenarios tested include:

- Demand/Energy Avoidance
- Diesel Displacement
- Automatic Generation Control
- Time Shifting

Service Life Estimation:

The Institute is interested in how factors such as complex terrain, high capacity factors, icing and severe weather, cold climate, and delayed maintenance cycles will impact turbine service life and/or performance degradation.

a) *Data Analytics for Canadian Commercial Wind Industry*
Data collection from SCADA, log books, condition monitoring equipment, met masts, to estimate wind turbine service life

b) *Impact Of Wakes And Cliffs On Wind Speed And Turbulence*
Collaborative study of the impact of wakes and cliffs on wind speed and turbulence and how this affects wind turbine performance and service life.

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