# Wind Energy Institute of Canada

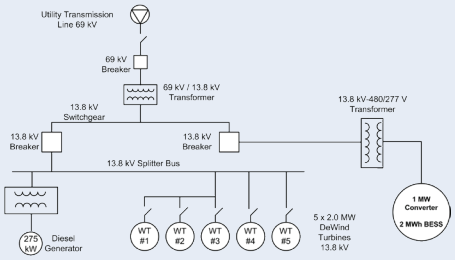
***Leading the development of wind energy across Canada through research, testing, innovation, and collaboration.***

*The Wind Energy Institute of Canada (Institute), 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.*

*The Institute received funding through NRCan's Clean Energy Fund and a loan from the province of PEI to own and operate a Wind R&D Park that features five 2 MW wind turbines and a 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 CHARACTERISTICS

| | |
|---|---|
| Wind R&D Park Capacity | *10 MW* |
| Number of Wind Turbines | *5* |
| Model | *DeWind D9.2* |
| Storage Capacity | *2 MWh* |
| Storage Rating | *1 MW* |
| Inverter Model | *S&C Purewave* |
| Battery Model | *GE Durathon* |
| Temperature Range | *-30°C to +27°C* |
| Topography | *10 m cliffs and 300° ocean exposure* |




## WIND R&D PARK PERFORMANCE STATISTICS (APR'14 TO MAR'15):

- 41.7 GWh energy produced
- 95% + Availability
- 47% + Capacity Factor

## BATTERY STATISTICS (MAR' 14-JUL'15):

- 3 services tested
- 230 MWhs delivered
- Up to 76 % AC-AC efficiency for month long scenario


## CURRENT RESEARCH PROJECTS

### WIND ENERGY STORAGE AND GRID INTEGRATION:

*Objective is to understand the benefits energy storage can offer in wind energy integration.*

GOALS:

- Determine best battery operational plan for the Institute, the grid, and the battery, both technically and financially
- Lifetime analysis on the battery
- Educate the industry on the benefits of using storage systems

### SMALL WIND TURBINE PERFORMANCE STUDY:

*Objective is to study small wind turbine performance to establish baseline performance and determine causes of performance issues.*

GOALS:

- Determine whether small wind turbines meet performance expectations
- Determine the cause for any discrepancy between expectations and actual performance

### SERVICE LIFE ESTIMATION:

**Data Analytics for Turbine Component Service Life**

*Objective is to use performance and condition monitoring data to determine wind turbine service life.*

GOALS:

- Identify trends in maintenance issues
- Assess changes in loading conditions
- Identify causes for underperformance and component wear
- Map structural aging

**Impact of Wakes and Cliffs on Wind Speed and Turbulence**

*Objective is to understand the impact of wakes and cliffs on wind speed and turbulence and how this affects wind turbine performance and service life.*

GOALS:

- Spatially map wind speed and turbulence to form a database that can be used for physical and numerical simulations
- Correlate wind speed and turbulence data to turbine performance and condition monitoring results

**Climate Change Project**

*Objective is to understand the impact climate change will have on wind resource extraction and its impact on service life.*

GOALS:

- Provide 30 years of climate data to determine future climate predictions through statistical downscaling
- Improve long-term planning with regard to turbine types and locations
- Improve the long term return on investment of wind energy systems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