

North Cape Wind Farm



Located near the town of Tignish, Prince Edward Island (PEI), the North Cape Wind Farm was developed by the Prince Edward Island Energy Corporation (PEIEC). It consists of 16 Vestas wind turbines, each rated at 660 kW, for a total installed capacity of 10.56 megawatts (MW) – enough to power over 4,000 homes.

Using the data collected for several years by the Atlantic Wind Test Site (now the Wind Energy Institute of Canada or WEICan) at North Cape, PEIEC developed the wind farm in two phases: an initial 5.28 MW in 2001, then another 5.28 MW in 2003.

The project is sited on land that is 70% public and 30% private, giving a total area of less than 1 km².



photo courtesy of VisionQuest

“The money brought in by the project surely is a help”, says A.H., landowner. “Moreover, it is good clean energy. And if it helps dragging down the monthly bills, it’s even greater”.

PROJECT AT A GLANCE

Operating Data

Total installed capacity: **10.56 MW**
Energy production: **35 GWh/year**
Equivalent number of households: **4,050 homes**

Wind Turbines

Number of Turbines: **16**
Manufacturer: **Vestas**
Number of Blades: **3**
Rotor Speed: **29 rpm**
Rotor Diameter: **47m**
Hub Height: **50m**

Local Benefits

Jobs

18.5 person-years during development & construction
2 full time jobs created for operation & maintenance

Investment (local portion)

\$3,600,000 for development & construction
+245,000 \$ / year during operation

Tourism

60,000 visitors / year

Construction Period

Phase I : 2001 (5 months)
Phase II: 2003 (5 months)

Developer, operator, owner

Prince Edward Island Energy Corporation: PEIEC is a provincial crown corporation with a mandate to “develop and promote the development of energy systems and the generation, production, transmission and distribution of energy in all its forms”. PEIEC has been particularly involved in the development of renewable energy since its inception in 1978. The Corporation also provides policy direction to the provincial government on energy issues.

“Wind energy projects are of great interest to our firm since they often encompass many of the services provided by Jacques Whitford Ltd. These services may include field studies (rare plants, birds, etc.) to assess potential environmental impacts, geotechnical investigations to obtain subsurface information required for foundation and access road design, and various inspection or testing services for foundation and road construction. We are also very conscious of the importance of the development of renewable energy sources for the long-term well being of our planet”.

George Zafiris, Jacques Whitford Ltd.,
environmental services

Local Benefits: Preparation Phase

Investment	\$100,000
Employment (person-years)	1.5
engineers, managers	0.75
trades	0.25
support staff	0.5

Community Benefits

The North Cape Wind Farm project engaged 5 local companies that were involved in collecting and analysing the wind data, conducting the geotechnical analysis at turbine foundation sites, designing the roads and electrical infrastructure, conducting the environmental assessment and project management. These activities generated a total of \$100,000 of sales for these companies - the equivalent of 3 full time jobs over 6 months.



DEVELOPMENT

Overview

There are many stages of development before a wind farm can be approved and built. Once a site has been selected for its good overall potential (see CanWEA fact sheets – Planning a Wind Farm and building a Wind Farm), work begins on several main tasks::

Wind assessment:

Usually the first critical step is assessing the wind resource. Scientists and engineers use meteorological masts to measure wind speed and other climatic conditions for at least one year. This data is then used to estimate how much energy the wind farm will produce.

Wind Farm Design:

Wind data is combined with topographical information to design the wind farm. Engineers use this data to model wind flow, turbine performance, sound levels and other parameters to optimize the location of the wind turbines. They also design the access roads, turbine foundations and local electric network, as well as the connection to the electricity grid.

Environmental Study:

Environmental assessments are conducted to identify any impacts on landscape, plants and wildlife, soil and water, land use or other activities such as aviation and telecommunications. If negative impacts are identified, the design is adjusted to avoid or mitigate them.

Land Acquisition:

Early in the process, developers usually approach landowners to negotiate “option” agreements to use their land. As the project progresses, the developer will seek to convert the options into firm land lease agreements

Permitting and Public Consultation:

As with any other major power project, developers must seek municipal, provincial and federal permits before the project can go ahead. They also meet the local communities to present the project, solicit their feedback and seek community support.

Economic and Financial Analysis:

Developers must demonstrate the economic viability of their project to raise the funds to build the wind farm. On one hand, they work to estimate the cost of turbines and their installation, as well as roads, electrical system, operation and maintenance, etc. On the other hand, they estimate the income they will get from the energy production of the wind farm over the lifetime of the project. Then they make sure everything balances.



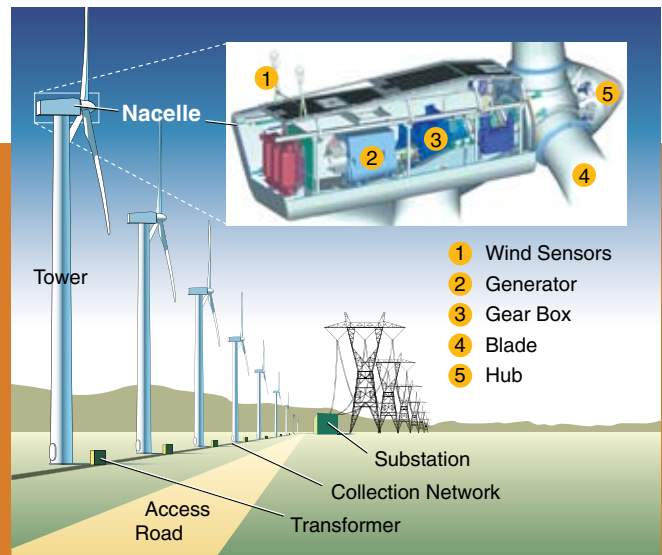
Contribution of local companies

Although the manufacturing of components was executed outside the region, the construction of the wind farm engaged many local firms. Close to 10 local companies worked on site and road preparation, the construction and control of foundations, the erection and assembly of the turbines, the installation of the electrical collection network and the interconnection to transmission lines. All these activities were also supervised by a local company.

These activities generated over \$3.5 million of local sales and created the equivalent of 16 jobs over a period of one year.

Local Benefits: Construction Phase

Phase	Preparation	Foundations	Assembly	Network	Commissioning
Total phase duration	2 months	3 months	3 months	1 month	1 month
Investment	\$3,500,000				
Employment (person-years)	1.2	3.2	2.2	6.2	3.2
engineers, managers	0.2	0.2	0.2	0.2	0.2
trades	-	1	1	6	2
support staff	1	2	1	-	1



Commissioning:

Finally, the wind farm is tested before becoming fully operational.

Currently in Canada, the construction phase presents the best opportunities for local business and jobs. Other activities related to logistics, travel, lodging and material supply generate significant additional local revenue.

CONSTRUCTION

Overview

This is the stage where the project gets its green light. The project has been approved and an agreement signed to sell the power. The design has been finalized and contractors can be engaged to build the wind farm. The overall process consists of a manufacturing stage off-site and a construction stage on-site.

Manufacturing:

The wind turbine parts are manufactured and pre-assembled into the main components at the factory, then shipped to the wind farm site where the final assembly will take place.

Site preparation:

In the meantime, the crews have to prepare the site. They build access roads and clear the areas where turbines will be erected. Then they prepare the foundations; excavating, installing the formworks and pouring concrete.

Construction:

Once all components have been received, the assembly can take place. A crane is used to erect the tower and install the nacelle and rotor with its hub and blades. On the ground, the electrical collection network is installed and connected to the grid through the substation.



Tourism

The North Cape Wind Farm has become a new regional attraction in its own right, attracting over 60,000 visitors per year. The government built a restaurant and a gift shop at the site to capitalize on and further promote the interest in wind power. This resulted in a capital expenditure of \$1.4 million that included an upgraded parking lot and other site works. The restaurant and gift shop make approximately \$260,000 in annual sales and employ 20 workers from mid-May to the end of October.

“With local companies using local labour and materials, the project took on a feeling of community. The economic benefits to us and our area were very high. This project has given us the ability to take our experience elsewhere, we are now competing successfully on other projects in other areas, where we are now ‘from away’.

Harley Perry, Perry's Construction Ltd.,
construction works

Operation and Maintenance

In order to operate and maintain the North Cape Wind Farm, 2 full time jobs have been created. The annual budget, including salaries, is \$225,000.

Land Lease Payments

An amount of \$20,000 is paid annually to private landowners to lease their land. Landowners share this revenue according to the number of turbines on their land.

Local Benefits: Operation & Maintenance

Investment	\$225,000
Salaries	\$120,000
Products & Services	\$105,000
O&M employment	2
engineers, managers	1
trades	1
support staff	0

OPERATION & MAINTENANCE

Overview

Wind farms are designed to last 25 years and longer, producing clean energy for the region and accruing a variety of additional benefits for the host community.

Operation and maintenance

A variety of skill sets are required to ensure the effective operation of a Wind Farm. The activities that have to be performed on a regular basis throughout the project's life include monitoring and analyzing performance, conducting environmental surveys and performing preventative maintenance and repairs on the turbines and other components of the facility.

In addition to the permanent employment created to perform these tasks, a region with several wind farms may take the opportunity to develop and deliver new training programs for the specialized workers needed for these jobs.

Local Revenues

Wind energy is a special kind of commodity because it can deliver a stable financial reward with little or no effort on the part of the landowners. Rural communities are in an excellent position to benefit from wind farms. More

than co-existing peacefully with agricultural land uses, wind farms provide an alternative income stream to farmers and ranchers and help them weather the ups and downs of farming. They therefore preserve communities and livelihoods that are precious to us. Wind farms also provide a new tax revenue stream for local municipalities that can benefit all community members. New choices can be made: community centers, roads, parks and other local initiatives can be assisted through this new tax base.

The wind farm workers' use of local lodging, transportation and other services also benefits the community directly.

And more...

Wind farms are objects of fascination for many and as such they can generate tourism for the local community. The benefits of drawing new visitors to the community can be felt by many businesses including shops, restaurants and hotels. Access roads built for the project may even open routes to new outdoor recreation opportunities.



CanWEA acknowledges the contribution of Industry Canada.



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