



# Prince Wind Energy Project

//: Sault Ste. Marie, Ontario



**The Project //:** The project consists of 126 GE 1.5 sle wind turbines in a total area of 100 km<sup>2</sup>. The townships of Prince, Penefather and Dennis, and the City of Sault Ste. Marie host the 126 turbines each rated at 1.5 MW, for a total capacity of 189 MW.

The site was selected in 2000 and once the design was finalized in 2005, it took 12 months to build phase I of the wind farm and make it operational, and an additional two months to complete phase II of the wind farm and make it operational.

90 percent of the turbines are situated on private land and the entire project area spreads over a total area of 100 km<sup>2</sup>.

### **BROOKFIELD POWER: DEVELOPER, OPERATOR AND OWNER**

Brookfield Power comprises the power generating and marketing operations of Brookfield Asset Management Inc. Brookfield Power has developed and successfully operated hydroelectric power facilities for almost 100 years. Brookfield Power's portfolio comprises over 3,800 megawatts of capacity and includes over 140 hydroelectric power generating stations and 1 pumped storage facility located on over 50 river systems, 1 wind farm, 2 thermal plants, principally in the north-eastern North America and South America.

<sup>1</sup> Figure assumes average Canadian household electricity use (not including heating) of 8.66 MWh per household per year. Source: Energy Use Data Handbook, 1990 and 1997 to 2003; "Residential Secondary Energy Use by Energy Source and End-Use", Natural Resources Canada, June 2005.

## **PROJECT AT A GLANCE**

### **OPERATING DATA**

Installed capacity: **189 MW**  
Energy production: **534 GWh / year**  
Equivalent number of households: **61,660 homes<sup>1</sup>**

### **WIND TURBINES**

Number of Turbines: **126**  
Manufacturer: **GE 1.5 sle**  
Number of Blades: **3**  
Rotor Speed: **variable speed**  
Rotor Diameter: **77 m**  
Hub Height: **80 m**

### **LOCAL BENEFITS**

Jobs: **357 person-years** during development & construction  
**17 full time jobs** created for operation and maintenance  
Investment: (local portion) **\$1.6 M / year** during operation

### **DEVELOPMENT PERIOD**

November 2000 — November 2006

## **PROJECT TIMELINE**





**Development //:** 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.

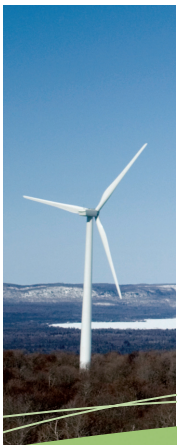
**ECONOMIC AND FINANCIAL ANALYSIS:**

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.

**COMMUNITY BENEFITS**

Seven local companies were involved in project development, feasibility and engineering. Local consultants for forestry, mapping, surveying, engineering, SODAR technical support, hydrogeology, waste management, and cultural and archaeological resources were utilised.

Local Benefits: Preparation Phase	
INVESTMENT	\$400,000
EMPLOYMENT (PERSON-YEARS)	75



**STEVE KENT, SAULT STE. MARIE, ONTARIO:**

Steve Kent was involved in all development stages of the Prince Wind Energy Project and said “... it was a positive experience overall and a first in the wind industry.” Steve has been involved with land and natural resource consulting, and since his experience with Brookfield Power, his consulting now includes aspects of wind energy development. “It is a fast moving industry, but by the same token it is frustrating due to transmission line constraints in the province [Ontario]...I hope someone addresses this issue as there is good wind energy potential in Northern Ontario...”

**JEFF AVERY, SAULT STE. MARIE, ONTARIO:**

“I was first introduced to the project through a consulting firm. It was a natural process that Avery Construction became involved with the project because our company constructs roads. There are no downsides to the Prince Wind Energy Project as it brought employment to our company and to several local companies that we subcontracted. It was beneficial to the community at large. In terms of the environment, there wasn’t much resistance because, for the most part, the wind farm was in a remote location. Northern Ontario is a good fit with wind energy because it is remote. I look forward to more projects in the future.”



**Construction //:** This is the stage when 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.

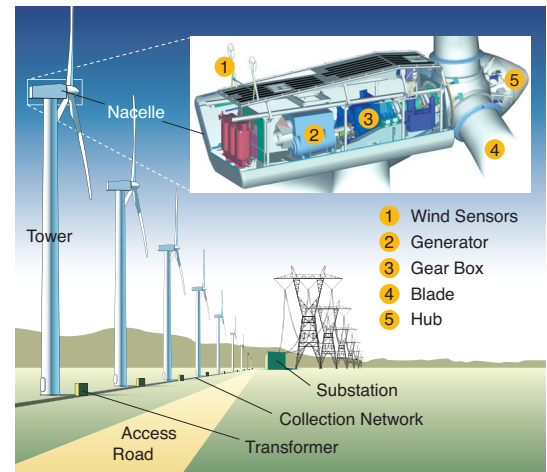
**CONSTRUCTION:**  
Once all components have been received, the assembly can take place. A crane is used to erect the tower and install the nacelle

and rotor with its hub and blades. On the ground, the electrical collection network is installed and connected to the grid through the substation.

**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.



Main components of a typical wind farm

**CONTRIBUTION BY LOCAL COMPANIES**

38 local companies participated in the construction of the wind farm. Various services were provided to prepare the site (e.g. dirt work, roads and crane pads building, trenching for underground lines, etc.), install the foundations, assemble the tools and

equipment required for construction and transport and erect the turbine components. These activities created the equivalent of 97 jobs per year over a 35 month period.

Local Benefits: Construction Phase					
PHASE	PREPARATION	FOUNDATIONS	ASSEMBLY	NETWORK	COMMISSIONING
TOTAL PHASE DURATION	10 months	9 months	3 months	7 months	6 months
INVESTMENT	Approximately CDN \$400 million for both phases				
EMPLOYMENT (PERSON-YEARS)	85	90	36	59	12
• engineers, managers	15	15	7	9	4
• trades	50	50	20	40	3
• other key occupations	1	1	1	1	1
• support staff	19	24	8	9	4

**OTHER BENEFITS**

In January 2007, Brookfield Power and Sault College announced a partnership to enhance local training programs focused on the energy sector. The Brookfield Power Energy Training Centre will be located on campus at Sault College in Sault Ste. Marie, Ontario, and will contain new instructional space that will provide students with access to upgraded vocational labs and shops, and serve as home to courses relating to wind energy that the College plans to introduce. Sault College also has plans to install a fully operational wind turbine on its campus before the end of 2007.





# Operation //: 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 preventive 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.

## LOCAL BENEFITS FROM OPERATION AND MAINTENANCE

Operation and maintenance at the Prince Wind Energy Project created 17 full time jobs. All operations and maintenance activities result in approximately \$1.6 million of annual local spending.

Local Benefits: Operation and Maintenance	
INVESTMENT O&M EMPLOYMENT	\$1,600,000 17

## LAND LEASE AND TAX PAYMENTS

A total amount of \$1,016,840 is paid annually, mainly as land rental to the private landowners hosting the wind turbines, as property taxes to the Township of Prince and as road maintenance taxes to the City of Sault Ste. Marie.

Land owner B.H. said "It is good revenue. I originally bought the property to log it. The wind energy project turned out good for us because it built a road infrastructure for logging and the

amount of money you make off of it is a good investment... I when my granddaughter came out and I showed it to her [The wind farm] she thought it looked rather elegant."

The CAO/Administrator for the Township of Prince said "The Township of Prince is fortunate to have 61 Wind Turbines located in our township. Wind energy is the future and we are happy to be part of it."



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## Who We Are //:

By harnessing a naturally occurring resource, CanWEA believes that wind energy can meet Canada's growing energy needs, reduce our dependence on fossil fuels, and result in significant environmental and economic benefits.