

## Wind

### Wind Power

#### What is It?

- Wind power has long been used to drive water pumps on Canadian farms – and for centuries in Europe to grind grain.
- Modern wind turbine technology is a result of advancements in aerodynamics, electrical engineering, electronics, instrumentation and meteorology, all of which have immensely improved the performance and efficiency of the modern wind turbine.
- Typical wind turbines can now generate up to 3 megawatts (MW) of electricity each and are 200 times more efficient than they were two decades ago.
- Efficiency gains from technological advancements have also made wind power more competitive, with the cost of wind generated electricity dropping by 80% in just 20 years.
- The generation of energy using wind creates no emissions. Properly designed and sited, wind power is one of the cleanest, greenest energy generation technologies in the world.

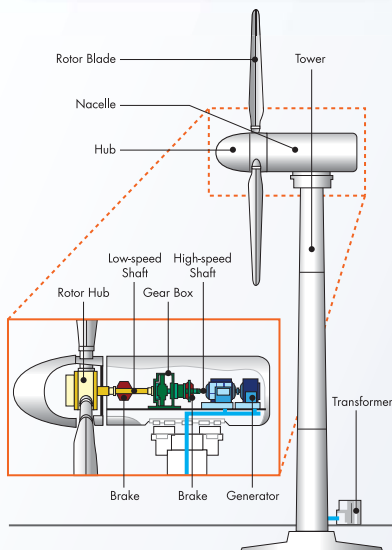
#### Why Wind?

- British Columbia has some of the best wind resources in Canada.
- Wind generated power is clean, renewable, proven and cost competitive.
- Wind energy projects are operating in over 70 countries around the world as well as in every other province in Canada.
- Wind supports hydro storage projects, allowing water to be stored when the wind is blowing. Conserved hydro power can then generate in hours when wind resources are not available.

#### The Technology

- Modern wind turbines spin the blades and convert wind into electricity. Wind turbines sit atop towers so that the blades of the turbine are free of obstacles and take advantage of higher and more constant wind speeds. When the blades turn in the wind the mechanical power is used to turn a generator and produce electricity. Cables carry this electrical current to transmission lines that then carry it to homes and businesses.
- The modern commercial scale onshore wind turbine typically stands 70 to 138 meters tall, with three blades each 35 to 45 meters in length. Offshore turbines can have blades exceeding 50 meters in length.
- A 2 MW turbine can generate the equivalent annual power usage of over 500 BC homes.
- The most economical and environmentally responsible way of generating wind energy is to develop wind projects with multiple wind turbines that use only one transmission line right-of-way; providing more power with a smaller environmental footprint.

<sup>1</sup> Based upon an average 30% capacity utilization factor and annual average electricity consumption of a typical BC home of 10 MWh per home per annum. See Gov't of BC source: [www.gov.bc.ca/empr/down/energy\\_for\\_our\\_future\\_sept\\_27.pdf](http://www.gov.bc.ca/empr/down/energy_for_our_future_sept_27.pdf).



Cross-section of typical wind turbine.



Main wind generation regions in B.C.

## Wind Power in BC

- British Columbia has some of the strongest, most consistent wind regimes in Canada and the ideal hydro resource base with which to integrate wind power.
- A number of areas in BC are undergoing intensive study for the development of wind projects - Northern Vancouver Island, the North Coast, the Peace region, and the southern and eastern Interior/Okanagan.
- British Columbia also has vast offshore wind potential; particularly along the north coast where the seabed is flat, the water is shallow and winds are strong.
- Wind projects are currently under construction in the Peace region, with the first large-scale, wind-generated electricity expected to come on-line in late 2008.

## Environmental & Regulatory Considerations

- A typical 100 megawatt (MW) wind energy project will produce 306,600 megawatt hours (MWh) of green energy annually and would displace approximately 215,000 tonnes of carbon dioxide, the equivalent of taking 45,000 cars off the road each year.
- Projects are subject to review by government agencies at both the federal and provincial levels. They are regulated and must apply for and obtain several licenses and permits.
- First Nations communities are also consulted by developers and some First Nations have become project partners or negotiated participation agreements.
- Proponents of wind projects consult with local stakeholders early in the process and throughout the stages of development regarding environmental impacts of projects as well as social and economic effects.
- In British Columbia, wind power projects over 50 MW must undergo a comprehensive Environmental Assessment process.
- The EAO website <http://www.eao.gov.bc.ca/> contains specific process and project information.

## Key Links:

### Canadian Wind Energy Association (CanWEA):

[www.canwea.ca](http://www.canwea.ca)

### American Wind Energy Association:

[www.awea.org](http://www.awea.org)

### European Wind Energy Association:

[www.ewea.org](http://www.ewea.org)

### British Wind Energy Association—Offshore:

[www.bwea.com/offshore](http://www.bwea.com/offshore)

### Environmental Assessment Office:

[www.eao.gov.bc.ca](http://www.eao.gov.bc.ca)

### BC Sustainable Energy Association on wind power:

[www.bcsea.org/sustainableenergy/wind.asp](http://www.bcsea.org/sustainableenergy/wind.asp)

### The Audubon Society on wind:

[www.audubon.org/campaign/windpowerQA.html](http://www.audubon.org/campaign/windpowerQA.html)

### BC Ministry of Energy, Mines and Petroleum Resources:

[www.gov.bc.ca/empr](http://www.gov.bc.ca/empr)

### BC Hydro:

[www.bchydro.com/info](http://www.bchydro.com/info)

### BC Utilities Commission:

[www.bcuc.com](http://www.bcuc.com)

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## Public vs. Private

- Encouraging the competitive development of wind projects by the private sector protects ratepayers from the risks of construction cost over-runs, and the cost of starting development (meteorological towers, initial biostudies and stakeholder engagement and preliminary design) of projects that are ultimately found to be unfeasible. For projects that look initially promising but ultimately are not competitive or cannot get permitted risks are borne by private shareholders, not by BC Hydro ratepayers or taxpayers.
- Competition among private developers ensures only projects which are cost efficient and environmentally sustainable are developed, thus bringing clean electricity at the best value to ratepayers.
- Like other power projects, most wind projects will be built on public land, with the developer making lease payments to the BC government. Title to the land remains with the government and the public.
- Private power generation operations are subject to intensive environmental and regulatory application processes that can take up to three years to complete. Significant public and First Nations consultation occurs throughout the application processes.
- All wind power contracts in BC require the entire output to be sold to BC Hydro. The contracts are 20 – 40 years. BC Hydro invites wind IPPs to bid new projects every 2 or 3 years in competitions that have included over 50 bidders.
- Awarded contracts, as well as the competitive BC Hydro process, are rigorously reviewed and overseen by a regulatory agency, the BC Utilities Commission, to ensure cost efficiency and best value to the ratepayers.

## Socio-Economic Benefits

- Building new power generation projects will reduce BC's reliance on imported carbon intensive fuels that emit greenhouse gasses.
- Ensures environmentally sustainable development of local resources.
- Diversifies economic activity in remote areas.
- Provides training and employment opportunities for First Nations and communities.
- Fights climate change by reducing our reliance on polluting, electricity imports.
- Provides a continuous source of clean, green renewable energy with minimal environmental impact.
- Provides power to BC Hydro at a fixed price, guaranteed for the length of the contract, eliminating fuel cost risk associated with thermal sources such as natural gas.



Design concept of Bear Mountain Wind Park near Dawson Creek, B.C. (under construction). Credit: Aeolis Wind Power Corp.