

## Wind energy in Canada and world

Canada's current wind power installed capacity is 1,670 MW, enough to power 480,000 Canadian homes or the equivalent of 0.6 per cent of total electricity demand.

Wind power is the world's fastest growing energy source, increasing more than 30 per cent annually for the past five years. In 2006, worldwide wind-generated capacity exceeded 59,000 MW. Experts predict global wind energy capacity will be 95,000 MW by 2008 and 194,000 MW by 2013.

## Connecting wind to the transmission system

New or upgraded transmission lines are required to ensure the power produced by wind developers is transferred safely and reliably to customers.

The AESO has begun consultation on the necessary reinforcements to the transmission system in Southern Alberta to accommodate future wind power potential. Developing a transmission system is a continuous process. Plans are frequently updated to reflect changes in generation (supply) and demand (load) to ensure we meet the electricity demands of Albertans now and in the future.

# Guide to wind power in Alberta



We keep the lights on, managing the system that delivers power to Albertans every day. We're plugged into the action, contributing to economic growth by providing a fair, efficient and openly competitive market for electricity.

November 2007

## Canada's current installed capacity: 1,670 MW



Credit: CanWEA website.



Alberta's wind industry has dedicated valuable time and resources to wind development during the last few years. The AESO will continue working with our stakeholders to manage the future potential of wind development in Alberta.

Around the world, interest in wind development as a source of renewable energy continues to grow. In Alberta, wind power is part of the diverse mix of generation sources that supplies the growing electricity demands of Albertans.

At the AESO, we have been ahead of the curve in working with stakeholders on wind power integration in Alberta. We were the first jurisdiction in North America to develop a specific standard for connecting wind power facilities to the grid. We were the first jurisdiction in Canada to launch a

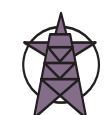
sophisticated wind forecasting study using international vendors. And, we currently have more wind connected to the electricity grid than any other jurisdiction in the country.

There are currently over 500 megawatts of wind power on the Alberta grid, enough power to supply three cities the size of Red Deer with more under development. In the long term, we expect to see a significant increase in the amount of wind power currently connected to the Alberta electric system.



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## Wind as a source of electricity

The basic nature of an electric system is that supply and demand must be in perfect balance at all times to ensure customers receive reliable service.

Wind can start, stop or change how hard it blows at any moment. Wind can also blow when the demand for

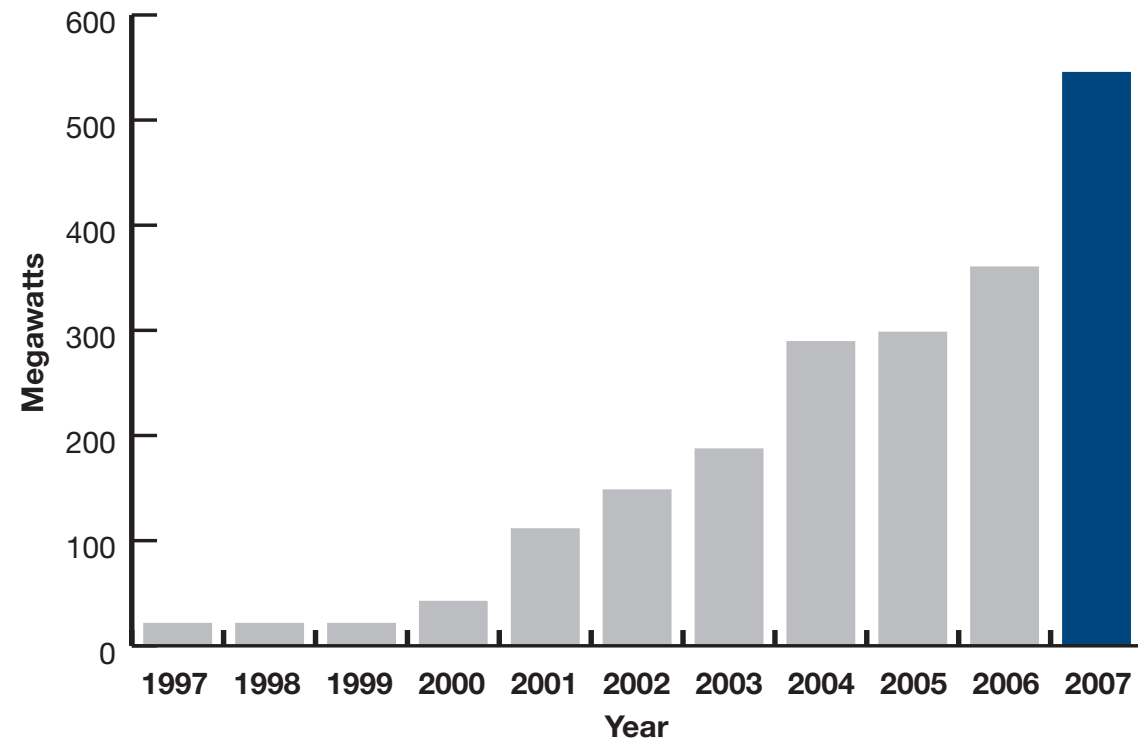
electricity is low (i.e. in the middle of the night) and stop blowing when the demand for electricity is at its highest (i.e. in the morning). Today, there is no means to store large amounts of electricity, therefore wind power must be backed up by another power source.

### Managing the variability of wind on the electric system

One approach to managing the variability of wind is to have additional generation sources available as back up for when wind power decreases, then reduce output from those sources when wind power increases. Some generation sources, like hydro and gas-fired generators are flexible and can increase or decrease power quickly. However, the bulk of Alberta's electricity is supplied by coal-fired generation which can take several hours to start and are much less flexible in their ability to quickly adjust their output.

Another means of maintaining the supply demand balance is to import electricity from neighbouring jurisdictions B.C. and Saskatchewan. There are limits to how much we can lean on our neighbours and we must comply with international standards to ensure reliable operation of the grid.

### Growth in Alberta's wind power



Alberta currently has about 500 MW of wind connect to the electric system.  
By the end of 2007, there will be about 550 MW connected to the grid.

## Working with stakeholders to integrate more wind

The AESO worked collaboratively with stakeholders and the Canadian Wind Energy Association (CanWEA) to develop a framework for large scale wind integration in Alberta.

The framework includes ways to manage the variability of wind on the grid while maintaining system reliability. The AESO is developing the necessary practices and tools to ensure that supply and demand is kept in balance at all times.

### 1. Wind Power Forecasting

– the AESO is exploring methods of forecasting. This information will help the System Operator forecast wind patterns and ensure that adequate resources are available to support the system.

### 2. Backing Up Wind Power

– The AESO will first use our competitive energy market to dispatch electricity to back up wind. When required, we will add additional services such as Regulating Reserves to manage variability in the minute to minute time frame or Load / Supply Following services to supplement the energy market and keep up with large changes in wind power.

### 3. Power Management

– Wind power facilities will be equipped with controls to limit the amount of power connected to the grid, as well as the rate at which wind power increases or decreases. In this way, wind developers will help contribute to ensuring system reliability.

*“New tools for managing system reliability”*



The AESO is committed to integrating as much wind power as possible to the Alberta electric system without compromising reliability or the fair, efficient and openly competitive operation of the market.