Manitoba Wind Farms

Overview

Wind is the world's fastest growing energy source with sustained worldwide growth rates in excess of 20% annually. By the end of 2013, world-wide wind-generated capacity was over 318,000 megawatts (MW). As of January 2014, Canada had over 7800 MW – representing over 3% of the global installed capacity! This is enough to power over 2 million homes or equivalent to about 3 % of Canada's total electricity demand, and the Canadian market is growing as fast or faster as the global market. According to the Global Wind Energy Council, (GWEC), Canada is ranked 9th overall in installed wind generating capacity. According to the Canadian Wind Energy Association (CanWEA), we have about 50,000 MW of developable wind resource-enough to supply about 20% of Canada's electricity supply.

Improvements in technology have lowered the cost of wind generated power, so that today, wind power can compete with traditional sources of generation. Manitoba has a world-class wind resource and is well positioned to be a leader in this emerging energy. With the recent commissioning of the 138 MW St. Joseph Wind Farm and the 16.5 MW expansion of the St. Leon wind farm to 120.45 MW Manitoba now has over 258 MW of installed capacity.

Canada's massive hydroelectric resource, which provides 60% of Canada's electricity, is an excellent complement for wind energy and provides an excellent opportunity to integrate more wind energy into the system. In Manitoba, 98% of our generation capacity is hydro electric. Because wind is intermittent, it must be firmed and shaped so it can be supplied to customers when they need it. Manitoba Hydro has good firming and shaping capabilities. When the wind is blowing, water can be stored in reservoirs. When the wind is calm, water is released to generate power at the dam site ensuring that customers get firm power on demand. In addition, our wind regime is most productive in the winter months when our peak demand for power occurs. In Canada, Manitoba has very good access to transmission lines so we can move the energy effectively and we have an enthusiastic rural population that embraces wind development. So, overall Manitoba is well positioned to become a leader in wind generation.

Q & As

1. Do Wind Turbines kill birds and bats?

A. Rarely.

B. A recent U.S. study found that the number of birds killed each year, through collisions with wind turbines, is about two (2) birds per turbine.

C. This is a very low number – particularly when you compare it to the 10,000 migratory birds that are killed in Toronto each year, by flying into brightly-lit office towers at night.

D. Manitoba Conservation requires a thorough review of the wind-farm site, bird and bat species, and migratory flight paths, before it will consider issuing an environmental licence for the project. This information is part of the Environmental Impact Assessment.

E. The National Audubon Society has stated – "on balance, the Audubon Society strongly supports wind power as a clean alternate energy source that reduces the threat of global warming."

2. How much noise does a wind turbine make?

A. Modern wind turbines are <u>not</u> noisy.

B. Most turbines are set back at least 500 to 600 meters from surrounding homes. A 500-meter distance is becoming common for most municipalities.

C. Today's turbines produce about 45 decibels, from a distance of 200 to 300 meters. In comparison, a car 100 meters away, driving at a speed of 64 kilometers per hour, is noisier – at 55 decibels. The noise levels of these turbines are within acceptable levels established by Manitoba Conservation.

3. What about low-frequency and infrasonic noise? I heard they can make you sick.

A. Frequency refers to the "pitch" of a sound, whether it has a high or low pitch. Sound frequency (or pitch) is measured in cycles per second, or hertz (hz).

B. The range of hearing for most people is <u>between 20 and 20,000 hz</u>. The low-frequency noise produced by modern wind turbines is <u>below 200 hz.</u> In otherwords, for a noise to be heard at this low-frequency level, it would have to be <u>extremely</u> loud, like a jet plane landing (which produces about 170 decibels). On the contrary, today's turbines produce approximately 45 decibels at a distance of 200 to 300 meters).

C. A small number of people are highly sensitive to low-frequency sound. Fortunately, the levels produced by modern wind turbines, when set back at appropriate distances, cannot be detected by the human ear.

D. To put this in context:

-The average speaking range is between 500 and 4,000 hz. With more than 237,000 MW of installed wind capacity in the world, reports of people getting sick from turbine noise are extremely isolated events.

-Wind power continues to have a high-growth rate worldwide. As the market continues to grow larger more densely populated areas are adopting this green

energy alternative. For example, the state of California has committed to adding significant wind power in the near term. If there were any hint that low-frequency noise could be a significant health concern, the larger cities and states would not be adopting it so readily.

4. What have turbine manufacturers done in recent years to reduce turbine noise?

A. Thanks to the rapid advancements in technology, today's turbines barely resemble their earlier counterparts. Improvements include: a better design and shape, increased soundproofing, superior blades that produce more energy, and gearboxes designed for quiet operation. Together, these improvements contribute to reducing the noise and vibrations.

B. Improvements and advancements in more detail**:**

-Better design and shape: Both the nacelle (a strong, hollow shell that contains the inner workings of the turbine) and the tower now have a more aerodynamic shape. Also, better designs are being incorporated to reduce noise and vibrations.

-Increased soundproofing: Manufacturers have increased the soundproofing in the nacelles. Also, gearboxes, generators and other mechanical equipment are being mounted on buffer pads to further reduce any noise.

-Superior blades: Today's blades are considerably more efficient when compared to earlier models. They produce more rotational energy and less aerodynamic noise.

-Quieter operation: Newer gearboxes, contained in the nacelles, have been designed for quiet operation. The result is less mechanical and low-frequency noise and vibrations.

5. What about the shadow-flicker effect?

A. The shadow-flicker effect is the "moving shadow" that occurs when the turbine blades appear between you and the sun (like the shadow produced when a car drives past your window on a sunny day). The intensity of the shadow depends on the brightness of the sun.

B. <u>You can avoid this shadow-flicker effect completely</u> by ensuring the wind turbine is placed at an appropriate distance from your home – approximately 500 meters.

C. You can ensure the appropriate set-back distance with proper planning.

D. If the shadow-flicker effect is experienced, it is generally short-lived and occurs during a particular season. You can avoid this temporary nuisance by simply closing the drapes.

6. What are sufficient set-back distances for rural municipalities to consider?

A. Every rural municipality (RM) is different – different population density, different use of land, and different land-use priorities. The Canadian Wind Energy Association (CanWEA) is looking at appropriate set-back distances based on two criteria – noise and safety.
   The association's current guidelines point to a set-back distance of 500 to 600 meters from dwellings and about 55 to 60 meters from roads. These are only guidelines and every municipality should assess their individual requirements.

B. Generally, developers are very sensitive to a community's wishes and offer flexibility in the project design and layout.
   - Some RMs have allowed wind farm development to be a **permitted use.** This means developers are required to meet minimum, established, set-back distances predetermined by the RM.
   - Other RMs have allowed (or are considering) wind farm development as a **conditional use.** This ensures the RM and the public have input into the final layout and design of the wind farm. (Conditional use also requires minimum set-back requirements, and is conditional on community approvals.)
   - CanWEA is working on "best practices" for set-back distances of wind farms. The province is working with municipalities and planning districts to adopt development policies, and zoning, regulations to deal with the anticipated wind-energy proposals, and specific local bylaw approval processes.

7. What about the safe operation of turbines? I have been told that wind turbines are not safe – that they throw ice and experience blade failures.

ICING:

A. While turbine blades can develop ice build-up under certain conditions, the set-back distances typically adopted by local municipalities are sufficient to protect the public.

B. When icing conditions do occur, the ice build-up slows the turbine down. Any kind of interference is detected by the control system on the turbine, causing the turbine to stop its rotation. Wind-farm operations crew will often shut the turbines down in the event of ice buildup.

C. Recent risk assessment studies, conducted by CanWEA, show that the risk of someone being hit by ice from a turbine (when the person is between 50 to 250 metres from the turbine's base), is in the range of 1 in 137,500,000 years.

BLADE FAILURE:

The main causes of blade failure include:

- human interference with a control system, causing over-speed
- lightening strike
- manufacturing defects

Studies demonstrate that blade failure (or blade loss) is extremely rare, and the safety risk – particularly outside the immediate area under the turbine – is so low it's insignificant.

8. I have heard I won't be able to spray my crops. Is that true?

A. Most farmers use ground-based applicators, when required. However, during very wet periods, or for some specialty crops, aerial application is essential to ensure high yields are realized.

B. When it's necessary to spray crops, Transport Canada will allow aerial application, as long as the pilot feels it's safe to fly. St. Leon project owner Algonquin Power has been co-operating with aerial applicators, by ensuring that turbines are turned off when aerial spraying is occurring (during periods when the wind is calm).

C. Other developers in Manitoba have also expressed a willingness to co-operate with farmers and aerial applicators to promote safe farming.

9. I heard wind-generated electricity is unreliable and only operates about 40 per cent of the time. Is there any truth to this?

A. No power plant operates at 100 per cent of its installed capacity 100 per cent of the time. Although the St. Leon Wind Energy project only produces about 40 per cent of its installed capacity it's exposed to enough wind for the turbines to generate some electricity about 90 per cent of the time.

B. In comparison, hydroelectric generating stations produce about 65 to 75 per cent of their installed capacity.

C. Wind forecasting methods are continually improving, and over the long term wind is quite predictable. Turbines are operational 98 per cent of the time, allowing the remaining two per cent to be used for scheduled maintenance or severe weather conditions.

10. I have heard property values may decline in an area with a wind farm. Is this true?

A. It's difficult to predict what will happen to property values in an area with wind-farm development. However, an extensive national study, conducted by the American Wind Energy Association in 2003, found that living near a wind farm did not harm property values – in fact, in some cases, values increased. This is because landowners with turbines on their property received annual payments.

B. Similar studies conducted in Canada in 2010 by John Simmons Realty Services Ltd., in the municipalities of Chattam-Kent, Ontario reveal that - "In the study area, where wind farms were clearly visible, there was no empirical evidence to indicate that rural residential properties realized lower sales prices than similar

residential properties within the same area that were outside the viewshed of a wind turbine."

C. As well, due to the significant tax contributions wind farms make, homeowners in a rural municipality (RM) may benefit from either lower property taxes or higher levels of service.

11. Why are wind farms located in high-quality agricultural land?

A. Southern Manitoba has a world-class wind resource and some of the richest farmland in North America. The quality of the wind resource and access to transmission lines are two of the factors that determine where a wind project is located.

B. Locations for wind farms are chosen for the quality of their wind resource, not for the quality of their land for agriculture. Situating a wind farm in an area with a high-quality wind resource ensures lower energy costs for customers and improved profits for developers and potentially higher land owner payments. To put this in context:
   - If 1,000 MW of wind was developed, the total area would represent about two per cent of the arable (agriculturally suitable) land in Manitoba.
   - In St. Leon, each turbine and access road represents one acre of assessed land. With 63 turbines and one substation in 50,560 acres of project land (prior to expansion), the wind farm takes up less than two per cent of the total amount of land.
   - Within one project area – the turbines, substations and roads to turbines only occupy about three to five per cent of the land. Therefore, their impact on the land is barely significant.
   - As a rule, developers place turbines in areas that will maximize energy production for the owners, and minimize disruptions for the landholders and their farms. (For example: Access roads are built to ensure tractors can easily drive over them.)
   - Farmers in rural Manitoba remain one of the most supportive groups of advocates for wind-farm development.

12. What happens to my property taxes if I have a turbine on my land?

A. In nearly every case, the owner of the wind farm pays the taxes for the tower and associated land.

B. However, as the landowner, you are legally responsible for ensuring that the property taxes on your land are paid. To address this issue, the landowner and the owner of the wind farm will commonly enter into a legal agreement stating that the wind-farm owner will pay the property taxes.

13. How will the turbines interfere with television and other communications signals?

A. Large wind turbines installed at wind farms can interfere with radio or television signals, but only if the turbine is directly in the line of sight. Proper placement of the turbines, and sufficient set-back distances, often address this concern.

B. In some cases, you may need to improve a signal (ex: change from antennas to a satellite) or install relays. Both are common practices.

C. If the problem persists, it should be the responsibility of the developer to solve it.

14. How much subsidy is provided to the wind farm by the Province or Manitoba Hydro?

A. None. Neither the Province, nor Manitoba Hydro, provides any subsidy.

15. How are landholders compensated?

A. Landholders are generally compensated a fixed amount for each turbine on their property, and a variable payment based on the amount of electricity generated.

B. Some agreements offer only a variable payment for electricity generation.

C. Community members who don't have any turbines on their property, but live in the project area, may also get some type of compensation.

A. There are usually compensations for crop damages during construction and land holders that have buildings and substations also receive monetary compensation

B. There may also be grants available to the community to create and support local projects and programs desired by the community.

16. Can these payments vary?

A. Yes. A number of factors influence the amount a landholder receives.

- Developers all have their own compensation packages with their landowners and communities. (*As a result, it's essential that landholders thoroughly understand the compensation package and any possible restrictions on their properties. Due to the long-term commitment, landholders should seek independent legal advice before entering into an agreement.)*
- Because different wind farms have different wind regimes, interconnection costs and construction costs, compensation varies from project to project.
- Some turbines are more productive than others.
- The size of the turbines is also a factor. Bigger turbines generate more power, produce more revenue and should result in greater compensation.
- Each community or group of landholders may have their own ideas on how revenues are shared.