

Harvesting the Wind in St. Leon Manitoba

A new opportunity for renewable energy in Manitoba

Green energy soars to new heights

The 99-megawatt (MW) wind energy project in St. Leon occupies over 9,000 hectares of land (23,000 acres) and is approximately three kilometres from a Manitoba Hydro transmission line and substation – the interconnection point for the electricity to enter the transmission grid.

The wind farm consists of 63 turbines, each 80 metres high, equipped with three 41-metre blades. At its highest point, a single turbine (with blades) reaches about 120 metres, or roughly 34 storeys, into the air.

The wind farm is situated on the Pembina Escarpment, which rises above the surrounding plains, exposing the turbines to the prevailing prairie winds. Combined, the 63 turbines produce enough electricity to meet the needs of 35,000 homes, such as the city of Brandon.

MANITOBA:
The perfect location
to harness the
power of wind



Wind is the fastest growing energy source in the world. Wind is also a resource Manitoba has in abundance, and it is putting the town of St. Leon on the environmental map as the site of the province's first and one of Canada's largest wind farms.

Clean Energy Powers a Green Economy

Good for the environment

Wind is a very clean source of energy. Generating wind power doesn't produce emissions or hazardous waste. On the contrary, wind energy reduces greenhouse gas (GHG) emissions and contributes to Manitoba's reputation as a Canadian hub for clean, renewable energy.

- A 99-megawatt (MW) wind farm has the capability to reduce 370,000 tonnes of carbon dioxide per year.
- A wind farm this size has the same positive environmental impact as taking 70,000 cars off the road or planting 1.7 million trees.

Good for the economy

In addition to the environmental benefits it provides, the St. Leon wind farm also generates significant economic activity, such as:

- over \$200 million in capital expenditures to construct the wind farm
- about \$30 million in federal support through the Wind Power Production Incentive
- \$12 million in provincial sales tax
- approximately \$20 million in property taxes and \$14 million in provincial income tax to be generated by the wind farm over 25 years
- \$10 million in revenue to local landowners over 25 years
- local job creation
- tourism

Community commitment - a key source of energy

St. Leon is a close-knit, proud, farming community of approximately 120 residents. The St. Leon wind farm crosses two rural municipalities, Lorne and Pembina. Bordering the towns of St. Leon, Altamont, Somerset and Manitou, the wind farm rests on the Pembina Escarpment, a picturesque area known for its rolling hills and many small lakes. Fertile soils provide residents with a rich agricultural bounty consisting of wheat and canola, as well as hog and other livestock production.

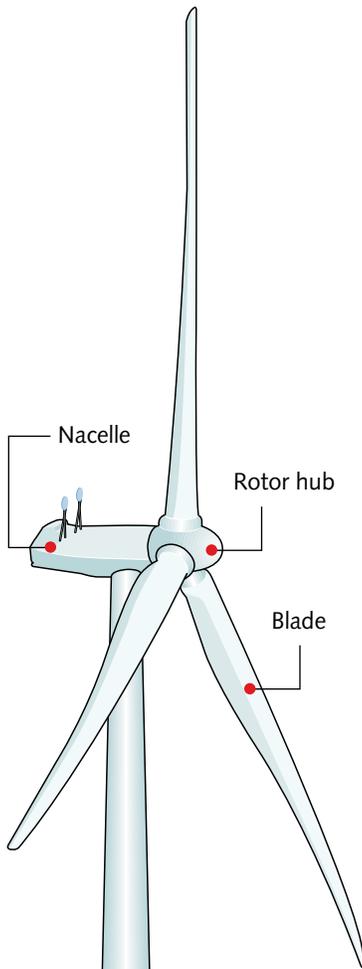
A true Manitoba success story

Fifty landowners, speaking three mother tongues - French, English and German - participated in countless community meetings and worked with the project developer to make the wind farm a reality for St. Leon. It's a legacy for their children and grandchildren, who will reap the rewards of their innovative spirit for years to come.

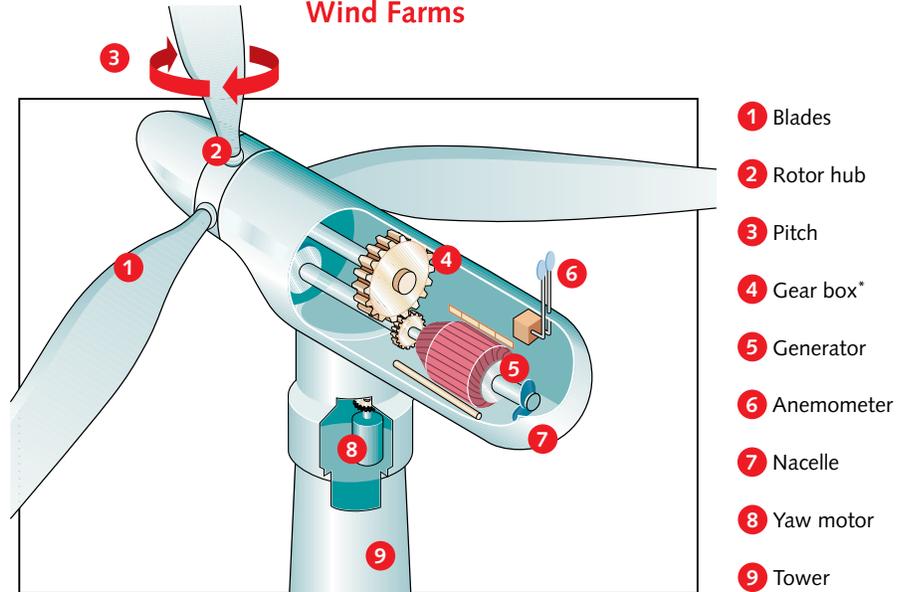


How does a wind turbine work?

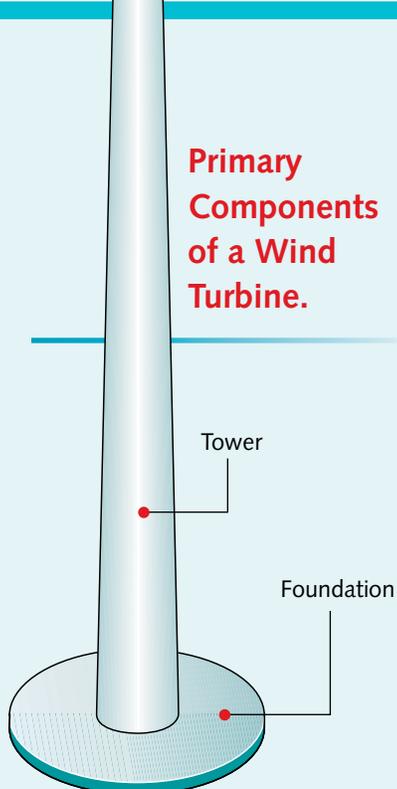
In the past decade, wind technology has come a long way and the wind turbines in St. Leon represent some of the most advanced technology in the world. The turbines are getting bigger, the towers higher, and the technology better. This means it's possible to generate greater amounts of electricity from the same wind resource, making it competitive with other forms of energy production.



Primary Components of a Turbine common on Canadian Wind Farms



* Some turbine designs are "direct drive" and require no gearbox.



Primary Components of a Wind Turbine.

The wind turbines are made up of five major sections:

1. **The foundation** extends 10 to 15 metres underground.
2. **The tower** is a hollow steel column constructed in four sections for easier transport.
3. **The nacelle** sits on top of the tower and houses the gearbox, generator and control system. The nacelle swivels to keep the blades in the best position to catch the wind.
4. **The blades** are made of carbon fibre and balsa wood, and are built using the same technology used in yacht building. In fact, from the inside, they look like the hull of a ship. The 41-metre blades rotate to maximize the effect of the wind.
5. **The rotor hub** is attached to the nacelle and holds the blades in place.

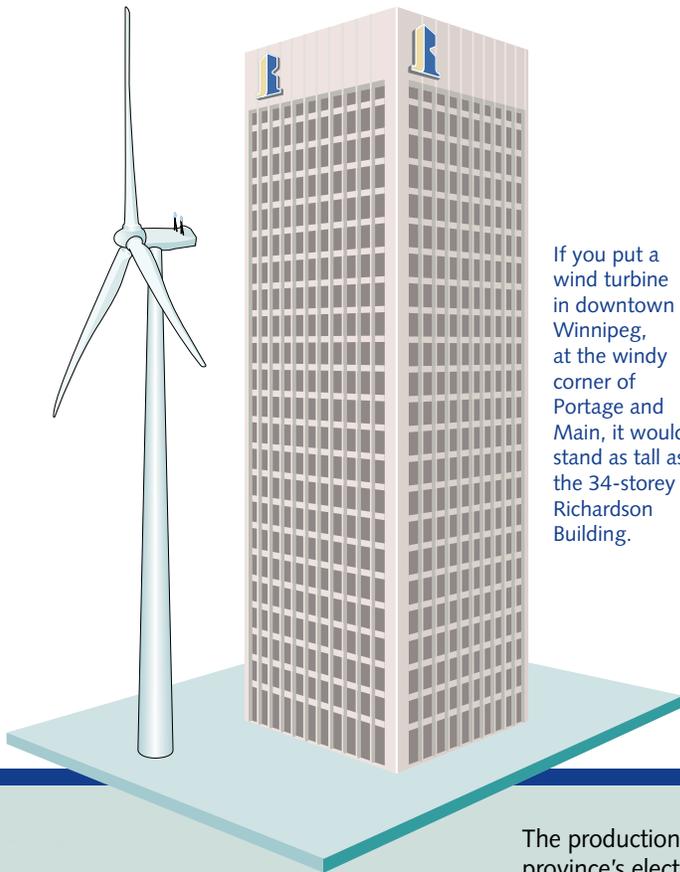
Power is generated in the nacelle. As the blades turn, they make a series of powerful magnets spin inside large coils of wire. Even though the blades only turn 14 times per



minute, a gearbox increases the speed so the magnets are spinning past the coils of wire more than 1,200 times per minute. Moving the magnets past the coiled wire causes electrons to move, creating electricity.

Cables carry the electricity down the inside of the towers, and then underground, to a nearby substation. That's where it enters the Manitoba Hydro transmission grid.

Fascinating facts about the St. Leon wind farm



If you put a wind turbine in downtown Winnipeg, at the windy corner of Portage and Main, it would stand as tall as the 34-storey Richardson Building.

- Less than five per cent of the total area of the wind farm is used for access roads, so 95 per cent of the farmland can still be used to grow traditional crops like wheat and canola.
- The base of each turbine is four metres in diameter and 10 to 15 metres deep.
- One turbine assembly weighs about 220 tonnes.
- Seven-hundred and sixty (760) loads of concrete were used to build the 63 foundations and the substation for the wind farm.
- There are 320 steps up a ladder to get to the top of the nacelle.
- The turbine components were built in Denmark and shipped to Texas. The components were then loaded onto huge flatbed trucks and hauled up to Manitoba.
- As the 41-metre blades sweep through the air, they cover an area the size of a football field.
- During extreme cold (-33°Celsius) or high winds, the turbines may temporarily shut down.
- The turbines operate at wind speeds between 12.6 and 90 kilometres per hour.
- On average, the turbines generate electricity about 90 percent of the time.

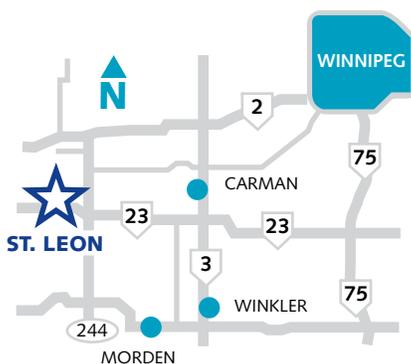
Generating clean power and success for all Manitobans

The production of wind power and hydroelectricity go hand in hand. Currently, almost all the province's electricity is generated by water. In a hydroelectric system, a reservoir can store water when the wind is blowing and release water to generate electricity when the wind is calm.

All power generated by the St. Leon wind farm is sold to Manitoba Hydro under a 25-year power purchase agreement. A 230 kilovolt (kV) transmission line and substation located near the wind farm makes interconnection access particularly convenient.

The St. Leon wind farm provides diversity to Manitoba Hydro's generation capabilities and, as one of the lowest-cost generators of wind energy in Canada, provides value for Manitoba Hydro, and ultimately, for all Manitoba residents. Project benefits extend beyond traditional economic activity. The innovative plans for the St. Leon wind farm were created with an eye to the future. The wind developer worked with the community to ensure agricultural, environmental, heritage and sustainability issues were addressed.

The wind farm, known as St. Leon Wind Energy, is owned by **Algonquin Power Income Fund**, which has interests in a diverse portfolio of power-generating and infrastructure assets. The company specializes in wind project financing and partnerships for wind development, operations and project management.



St. Leon, Manitoba

The site of the 99-megawatt wind farm is near and around the town of St. Leon, Manitoba, approximately 150 kilometres southwest of the city of Winnipeg, Manitoba.

For more information, visit these websites:

Province of Manitoba:

www.manitoba.ca

Algonquin Power:

www.algonquinpower.com

Manitoba Hydro:

www.hydro.mb.ca