

Alberta Wind Market Profile



Wind Energy in Canada

Wind energy is one of the fastest growing major sources of new electricity around the world, including Canada.

More wind energy has been built in Canada over the last decade than any other form of electricity generation, with installed capacity growing by an average of 20 per cent per year. Canada is a global leader, ranking eighth in the world for total installed onshore wind energy capacity.

Despite this progress, Canada has barely scratched the surface of its wind energy potential.

Wind Energy in Alberta

Interest in wind energy is a growing in Alberta, providing the most cost-competitive source of new electricity generation to power communities and commerce. **Alberta ranks third in Canada with an installed wind energy capacity of 1,483 MW.**

Meeting approximately seven per cent of Alberta's electricity demand in 2017,¹ wind energy helps to diversify both Alberta's electricity generation mix and its energy economy.

The electricity produced by the province's windfarms is equivalent to the amount needed to power approximately 380,000 average-sized homes.

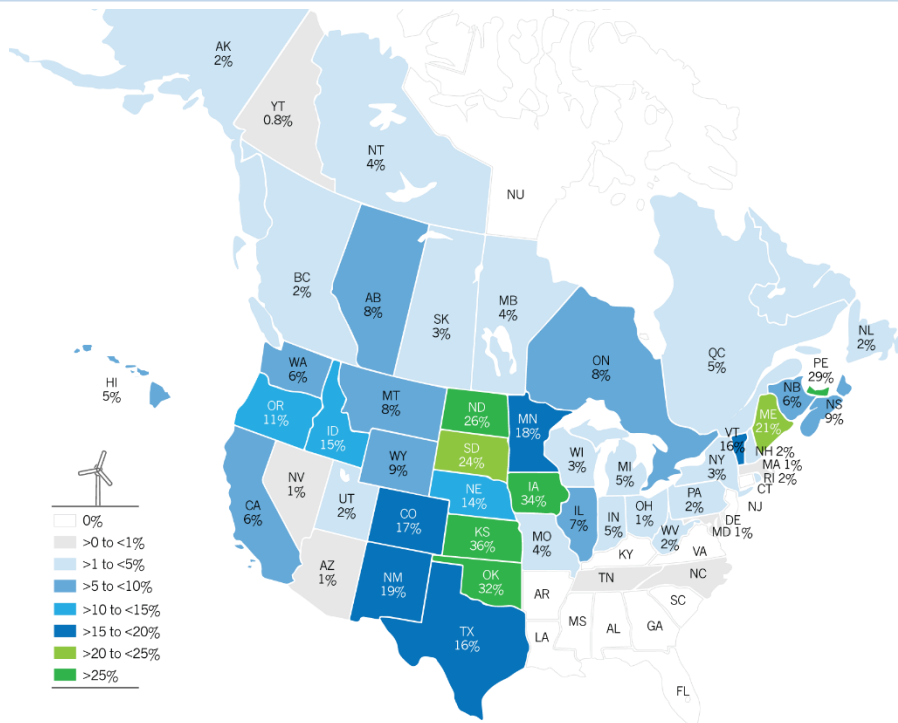
Part of a Modern and Reliable Electricity System

Alberta's high-quality wind resources represent a huge opportunity to generate more low-cost and clean energy, while ensuring a sufficient and reliable supply of affordable electricity.

It is a myth that equal amounts of back-up power, such as natural gas or hydro generation, must be available to manage the variability of wind energy generation. Whether or not there is wind electricity on the grid, a level of reserve power is always maintained to manage existing grid variability. The incremental reserve power required to manage the additional variability from wind represents only a small fraction of the total amount of wind energy added to the grid.

The Alberta Electric System Operator (AESO) recently assessed the impact of adding more renewable generation to provincial supply. It determined that variable sources could meet 30 per cent of provincial electricity demand by 2030 with no requirement for additional back-up or storage.²

This is consistent with a 2016 study by GE Energy Consulting with input from grid operators, which assessed the impact of increasing wind energy to meet 50 per cent of Alberta's electricity demand by 2025. Even in this much more aggressive scenario, the additional back-up power required from other types of generation would be as low as 2.4 per cent of total wind generating capacity.³



Wind energy in Alberta already meets about seven per cent of electricity demand and has room to grow. In many jurisdictions, larger proportions of wind energy are being reliably and cost-effectively integrated into the electricity supply. In fact, in six U.S. states and one Canadian province, wind energy already reliably meets more than 20 per cent of electricity demand.

Sources: American Wind Energy Association, 2018; Statistics Canada, 2017

¹ StatsCan 2017

² IESO Dispatchable Renewables and Energy Storage, 2018

³ GE Energy Consulting, Pan-Canadian Wind Integration Study, 2016



More Investment, Diversification and Stability

Alberta's energy resources drive the provincial economy, and the sector is well-positioned to grow further and diversify. Alongside continued development of its oil and gas resources, **Alberta is increasingly proving its leadership in renewable energy development** – most notably of its high-quality wind resources.

And while the world continues to rely on conventional energy sources, much larger investments are projected in renewables in the years to come. **By one estimate, US\$8.4 trillion will be invested globally in wind and solar energy by 2050 – almost three quarters of all new power generation investment.**⁴ Alberta has the resources and expertise to capture a meaningful share of that international investment. Doing so will also help diversify and expand its vitally important and increasingly multi-faceted energy sector.

The 2017 *Alberta Wind Energy Supply Chain Study* estimated the social and economic benefits associated with meeting 30% of provincial electricity demand with renewable energy.

That diversification of electricity supply is expected to drive \$8.3 billion of investment in the province, and a range of community benefits (as summarized below). These benefits would be widely dispersed, in forms such as local government tax revenues and stable lease revenues for farmers and landowners.

Lowest Cost Option for New Electricity in Canada

In December 2017, a competitive electricity-supply auction in Alberta yielded the lowest-ever rate paid for wind energy in the country, a weighted average of \$37 per MWh. Furthermore, with wind energy costs falling so steeply, some new wind energy facilities have already surpassed yet another milestone – they have begun to produce power even more cost-effectively than many existing generating facilities⁵.

As with many other renewable energy technologies, there are no fuel costs for wind energy which means stable pricing over the long-term.

Canada's wind energy industry has...



Attracted more than **\$23 billion in investment**



Created nearly **58,000 person years of employment** in construction and operations



Directly benefited more than **295 communities** in **12 provinces and territories**, including involvement with **35 Indigenous communities**



Manufactured blades, towers, and other components in the wind turbine supply chain

Alberta Wins by Developing Wind Energy

If Alberta were to move to 30 per cent renewable electricity – with wind energy providing the large bulk of the new green generation – it could result in significant economic benefits:

28,000

person-years of direct, indirect and induced employment

\$25.5 million

annual municipal property taxes

\$3.6 billion

local spending in project development and construction

\$13.5 million

annual land lease payments

⁴ Bloomberg New Energy Outlook 2018

⁵ Energy Innovation Policy and Technology, 2019



Reducing Emissions in Alberta's Electricity System

As Alberta develops its clean renewable wind energy resources, the province can continue to reduce GHG emissions in the electricity sector.

Wind generated electricity is free of air pollutants, particulate matter, and waste of any kind; and it requires significantly less water than conventional power plants.

Studies have demonstrated that wind energy is a safe way to generate electricity, and the weight of both scientific evidence and lived experience indicates wind turbines do not harm human health.

Wind Energy in Alberta

37 Wind Farms

901 Wind Turbines

1,483 MW Installed Capacity

12 % of National Installed Capacity

Source: CanWEA, as of December 2018

Blackspring Ridge Wind Farm in Vulcan County

A wind farm this size:

- Reduces Alberta's GHG emissions by approximately 600,000 tonnes a year – that's the equivalent of taking 120,000 cars off the road.
- Reduces water consumption by 960 million litres a year, relative to natural gas generation – equivalent to the volume of 320 Olympic-sized swimming pools.



Visit canwea.ca for more facts, infographics and success stories related to wind energy in Alberta.

Get the Facts!

Fact: Wind energy is the lowest-cost option for new electricity supply

Fact: Wind energy is providing significant economic benefits to local communities in Alberta

Fact: Wind energy is part of Alberta's broader energy advantage and expertise, and a key opportunity to attract new investment

Fact: Alberta has enormous and high-quality wind energy potential, opening the door to significant further growth and benefits

Fact: Public opinion polling in Alberta shows that [74% of Albertans think that the Provincial Government should be taking steps](#) to increase the amount of electricity generated from renewable sources.⁶

⁶ ThinkHQ, conducted March 2019

Alberta Wind Farms

Alberta is the third-largest wind energy producer in Canada, with a current total installed capacity of just under 1,500 megawatts. Concentrated in the southern part of the province, where the winds blow strongest, these facilities generate extensive amounts of emissions-free electricity, along with significant taxes, landowner revenues and other economic benefits.

Project	Location	Year Commissioned	Capacity (MW)	Number of Turbines	Provincial Riding
Ardenville Wind Farm	Fort McLeod	2010	69	23	Livingstone-Macleod
Blackspring Ridge Wind Project	Vulcan County	2014	298.8	166	Cardston-Siksika
Blue Trail	Fort McLeod	2009	66	22	Livingstone-Macleod
Box Springs Wind Project	Medicine Hat	2014	6	3	Brooks-Medicine Hat
Bull Creek Wind Farm	Municipal District of Provost	2015	29.16	17	Drumheller-Stettler
Castle River Wind Farm (phase 1)	Cowley Ridge	1997	0.6	1	Foothills
Castle River Wind Farm (phase 2)	Castle River	2000	9.9	15	Foothills
Castle River Wind Farm (phase 3)	Castle River	2001	33.5	44	Foothills
Castle Rock Ridge	Pincher Creek	2012	75.9	33	Livingstone-Macleod
Chin Chute Wind Farm	Taber	2006	30	20	Taber-Warner
Cowley North	Pincher Creek; Cowley North; Sinnott	2001	19.5	15	Livingstone-Macleod
Ghost Pine Wind Farm	Kneehill County	2010	81.6	51	Olds-Didsbuy-Three Hills
Halkirk Wind	Town of Halkirk	2012	149.4	83	Drumeller-Stettler
Kettles Hill phase I	Pincher Creek	2006	9	5	Livingstone-Macleod
Kettles Hill phase II	Pincher Creek	2007	54	30	Livingstone-Macleod
Lundbreck Wind Farm	Lundbreck / Pincher Creek	2001	0.6	1	Livingstone-Macleod
MacLeod Flats	Fort McLeod	2004	3	1	Livingstone-Macleod
Magrath	Magrath	2004	30	20	Cardston-Siksika

Project	Location	Year Commissioned	Capacity (MW)	Number of Turbines	Provincial Riding
McBride Lake	McBride Lake / Willow Creek	2003	75.24	114	Livingstone-Macleod
McBride Lake East	Fort McLeod	2001	0.66	1	Livingstone-Macleod
Old Man River Wind Farm	Pincher Creek	2007	3.6	2	Livingstone-Macleod
Oldman 2 Wind Farm	Pincher Creek	2014	46	20	Livingstone-Macleod
Optimist Wind Energy Wind Farm Project	Pincher Creek	1993	0.15	1	Livingstone-Macleod
Optimist Wind Energy Wind Farm Project	Pincher Creek	2004	0.75	1	Livingstone-Macleod
Sinnott Wind Farm	Pincher Creek	2001	6.5	5	Livingstone-Macleod
Soderglen Wind Farm	Fort McLeod	2006	70.5	47	Livingstone-Macleod
Summerview 2 Wind Farm	Pincher Creek	2010	66	22	Livingstone-Macleod
Summerview Wind Farm	Pincher Creek	2002	1.8	1	Livingstone-Macleod
Summerview Wind Farm	Pincher Creek	2004	68.4	38	Livingstone-Macleod
Taber Wind Farm	Taber	2007	85.1	37	Taber-Warner
Waterton Wind Turbines	Hillspring	1998	0.6	1	Cardston-Siksika
Waterton Wind Turbines	Hillspring	1998	1.2	2	Cardston-Siksika
Waterton Wind Turbines	Hillspring	2000	0.66	1	Cardston-Siksika
Waterton Wind Turbines	Hillspring	2001	0.66	1	Cardston-Siksika
Waterton Wind Turbines	Hillspring	2002	0.66	1	Cardston-Siksika
Weather Dancer	Pincher Creek	2001	0.9	1	Livingstone-Macleod
Wintering Hills	Near Drumheller	2011	88	55	Olds-Didsbury-Three Hills