PEMBINA institute

Alberta's Renewable Electricity Program

What is the Renewable Electricity Program?

The volatility of electricity prices in a deregulated market like Alberta's make revenues from renewable energy too uncertain for investors to finance renewable projects. In contrast, if electricity prices are too low, a gas-fired generator can shut the plant down and sell the gas on the market to maintain a revenue stream. Renewable energy producers need long-term contracts to provide a level of certainty. The Renewable Electricity Program (REP) uses a competitive *contract-for-difference* process.

What is a contract for difference?

Alberta's REP uses competitive contracts for difference, or "indexed renewable energy credits process," which are designed to ensure lower capital costs and consequently lower electricity prices. Renewable energy producers with the lowest bids are awarded long-term contracts. If the wholesale price is below that bid price, the government will use carbon levy revenues to pay the renewable energy generator the difference. If prices exceed the bid price the generator will pay the difference, returning profits to Albertans if power prices rise.

The Alberta Government has held three rounds of procurement under REP. The results of the first round were announced in December 2017, and the results of rounds 2 and 3 in December 2018.

Alberta's renewable energy resources

Alberta has some of the best wind and solar resources in Canada. Our solar resources are equivalent to those of Rio de Janeiro and Miami.[1] Even solar resources in the north of the province are as good as the solar resources found in Germany, a global leader in solar energy.[2] Similarly, Alberta's wind resources are amongst the best in the country.

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[1] Paula McGarrigle, *Alberta's Solar Value Chain Opportunity*, presented at Solar Energy Society of Alberta, November 29, 2018, Calgary. https://www.solaralberta.ca/sites/default/files/events/documents/Solar%20Supply%20Chain%20Final%20presentation%20web.pdf

[2] Ibid

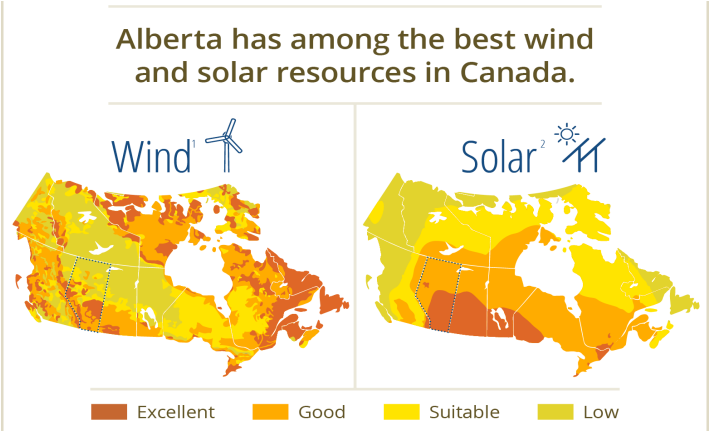

Figure 1. Map of renewable resources in Canada[3]

Renewables are currently among the cheapest options for electricity, with costs continuing to fall. Between 2025 and 2030, new wind and solar facilities are expected to be cheaper than existing coal and gas units.

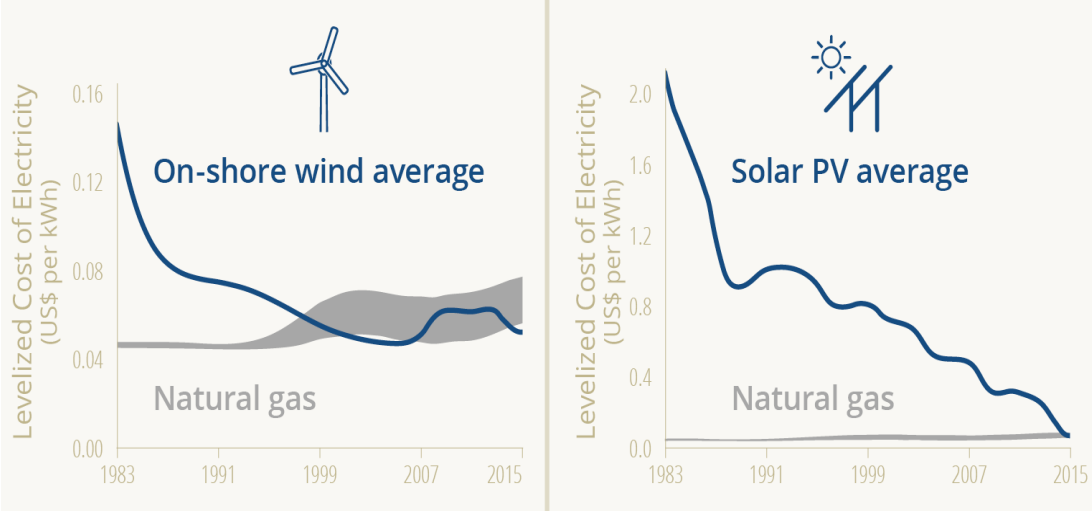

Figure 2. Cost of renewable energy natural gas-fired electricity[4]

What REP means for electricity bills

The REP projects will help prevent electricity prices from rising. In Alberta's deregulated market, the system operator chooses electricity from the lowest-bidding power producers first, working its way up to more expensive bidders until the demand is met. The most expensive

[3] Sara Hastings-Simon, Barend Dronkers, Steven Cretney, *Wind and Solar in Alberta* (Pembina Institute, 2016). http://www.pembina.org/pub/wind-solar-alberta

[4] Ibid

generator chosen set the price at which all selected producers are paid. As renewables have no fuel costs to produce energy, they bid at $0/MWh, and are selected first. The price is set hourly.

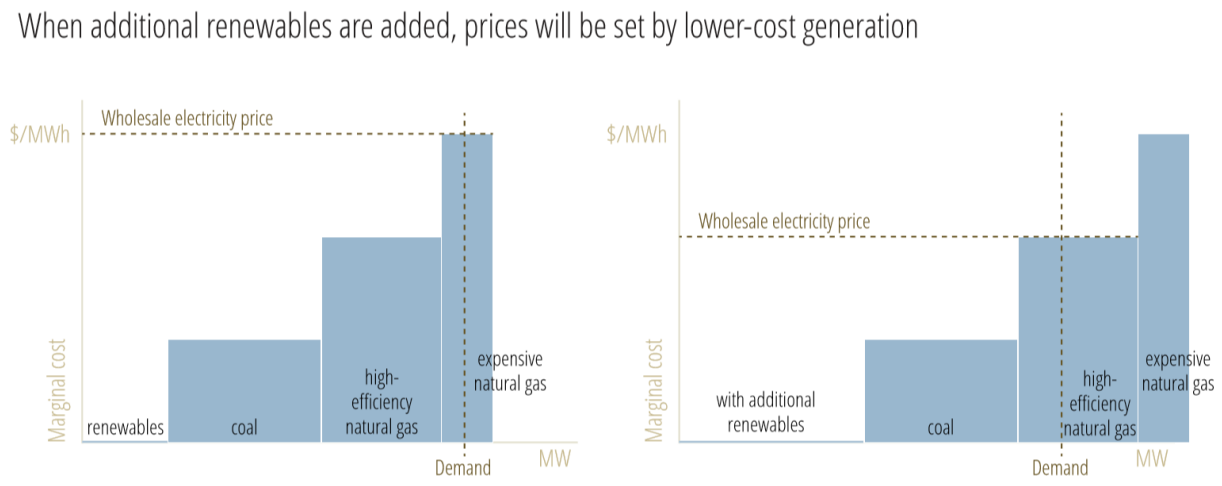

Figure 3. When cheaper energy options are able to meet demand, electricity prices fall [5]

What REP means for the communities where renewable energy projects will be built

Locating wind projects requires extensive consultation and is determined through agreements between the producer and landowners. More investment in renewable energy means more activity for local businesses as well as additional revenue for landowners through lease payments. These projects will also add tax revenue to municipalities and provide opportunities for new infrastructure required by the project and community, such as roads, bridges and high-speed internet[6]. REP 2 also requires bidders to propose projects with a minimum 25% Indigenous equity ownership.

What REP means for workers

Renewable energy projects involve a variety of jobs, including mechanical, electrical, civil, design engineers, welders, technicians and construction workers.[7] The wind farms near Medicine Hat, Pincher Creek, and Hanna, being built as a result of the REP 1, can create 740 jobs. Reaching the goal of 30% renewable electricity by 2030 will create more than 6,000 extra

[5] Sara Hastings-Simon, *Increasing renewables on Alberta's power grid*, 2016. http://www.pembina.org/reports/faq-2-renewables.pdf

[6] Binnu Jeyakumar, *Wind Energy: Sustainable Environment, Sustainable Communities – Discussion: Economies* (Pembina Institute, 2017). http://www.pembina.org/pub/wind-energy-sustainable-environment-sustainable-communities

[7] Delphi Group, *Alberta Wind Energy Supply Chain Study*, 2017. https://canwea.ca/wp-content/uploads/2017/09/Delphi-AB-Wind-Supply-Chain-Study-Final-Report.pdf

jobs.[8] The REP 2 requirement for a 25% minimum Indigenous equity ownership could result in employment opportunities in Indigenous communities.

How REP affects Alberta's GHG emissions

Wind and solar facilities have one of the lowest lifecycle environmental footprints of any electricity-generating technology (Figure 6). Introduction of an additional 700 MW - as per the procurement REP 2 and 3 targets – would result in a reduction of 1,270 kt of CO_2 equivalent.[9]

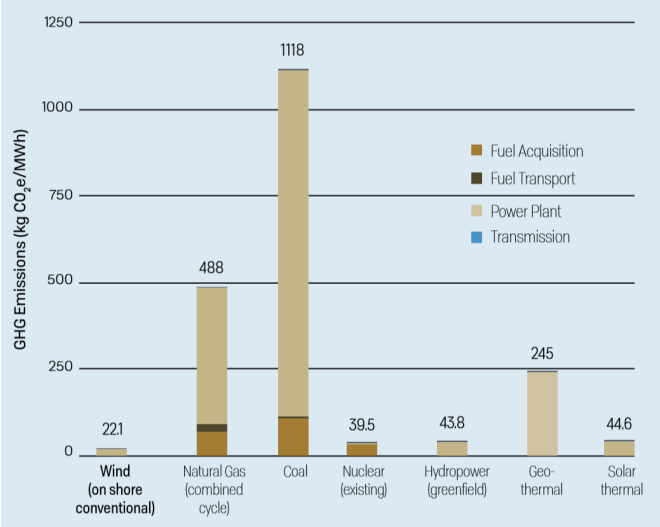

Figure 4. Life cycle greenhouse gas emissions for wind compared to other electricity generation

What REP means for the electricity grid

According to the Alberta Electric System Operator, our electricity supply is not at risk as Alberta transitions to 30% renewable electricity by 2030 and phases out coal.[10] Every generator on the grid has a backup option. This is how the grid provides power reliably, because even coal or gas power plants routinely shut down for maintenance periods and suffer unexpected outages. Wind production can be forecast with enough accuracy to plan around fluctuations.[11]

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[8] Government of Alberta, "Renewable Energy Program." https://www.alberta.ca/renewable-electricity-program.aspx

[9] Calculation based on the Grid Displacement Factor found in the *Carbon Offset Emission Factors Handbook* from the Government of Alberta (2015). https://open.alberta.ca/dataset/dd23dec0-e408-49b7-8bdc-151cc1ce58f5/resource/18f3a5f5-6370-467b-be5a-664330014723/download/2015-carbonemissionhandbook-mar11.pdf

[10] Alberta Electric System Operator, *Dispatchable Renewables and Energy Storage*, 2018. https://www.aeso.ca/assets/Uploads/AESO-Dispatchable-Renewables-Storage-Report-May2018.pdf

[11] Amory Lovins, "Amory's Angle: Ramping Up Renewable Electricity." https://www.rmi.org/wp-content/uploads/2017/05/2014—Amorys-Angle-Ramping-Up-Renewable-Electricity.pdf

What REP means for transmission lines

As with all new electricity generation, total costs may increase if new renewable energy needs new transmission infrastructure. But Alberta has already made significant investment in transmission infrastructure and it is expected that significant levels of new wind can be developed without the need for more transmission infrastructure. With the existing and planned transmission lines, the transmission system can integrate approximately 4,300 MW of renewable energy resources.[12]

How the growth of renewables are related to coal retirement

Coal plant retirement began well before the REP. Coal-fired power stations are becoming increasingly uneconomic, in addition to presenting negative health impacts from air pollution. In 2012, the federal government limited coal plant life to 50 years. In 2016, Alberta legislated a provincial coal phase-out by 2030, accelerating the retirement of six of 18 units. The REP ensures some of the energy gap created by retiring coal plants is filled by renewable energy.

[12] Binnu Jeyakumar, *Wind Energy: Sustainable Environment, Sustainable Communities*, "Discussion: Economy", 2017. http://www.pembina.org/pub/wind-energy-sustainable-environment-sustainable-communities