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RENEWABLE & ALTERNATIVE ENERGY (SOURCES)

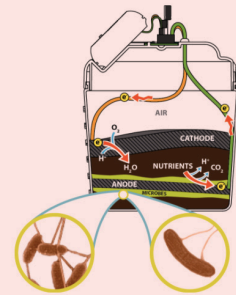


EXPLORE SOME REAL EXAMPLES OF RENEWABLE AND ALTERNATIVE ENERGY PROJECTS IN ALBERTA.

FUEL CELLS (Microbial & Hydrogen)

MICROBIAL FUEL CELL

Did you know that bacteria found in soil can be used to generate electricity? Microbial Fuel Cell technology allows bacteria to digest sugars and release electrons, generating an electric current. This technology is used in water treatment plants to clean wastewater and generate electricity.

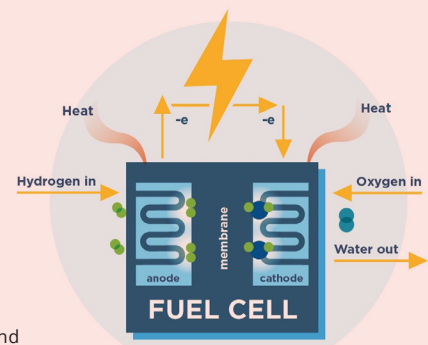


HYDROGEN FUEL CELL

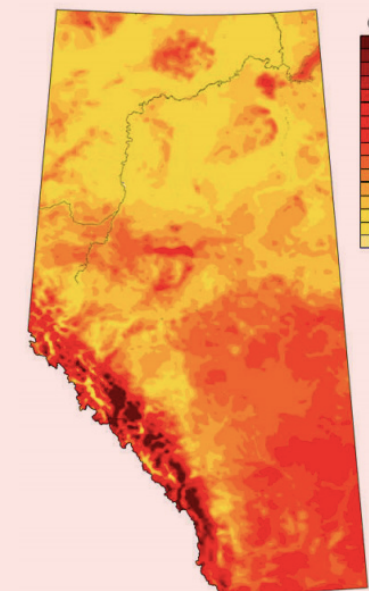
Hydrogen Fuel Cells use hydrogen and oxygen to produce electricity, heat and water, through an electrochemical reaction. The fuel cells produce electricity efficiently without releasing greenhouse gases. To operate, a Hydrogen Fuel Cell needs a constant supply of hydrogen. Hydrogen can be obtained by separating water into its two main elements (hydrogen and oxygen) through a process called electrolysis. Hydrocarbons like natural gas and gasoline also contain hydrogen, which can be separated out through a process called reforming (which means adding heat).

Blue Hydrogen refers to hydrogen that is made from a non-renewable resource such as natural gas.

Green Hydrogen refers to hydrogen that is made from a renewable resource such as water.



In October 2020, the Alberta provincial government released its "Natural Gas Vision and Strategy", which aims to see Alberta operate large-scale hydrogen production facilities by 2030, and export hydrogen globally by 2040.

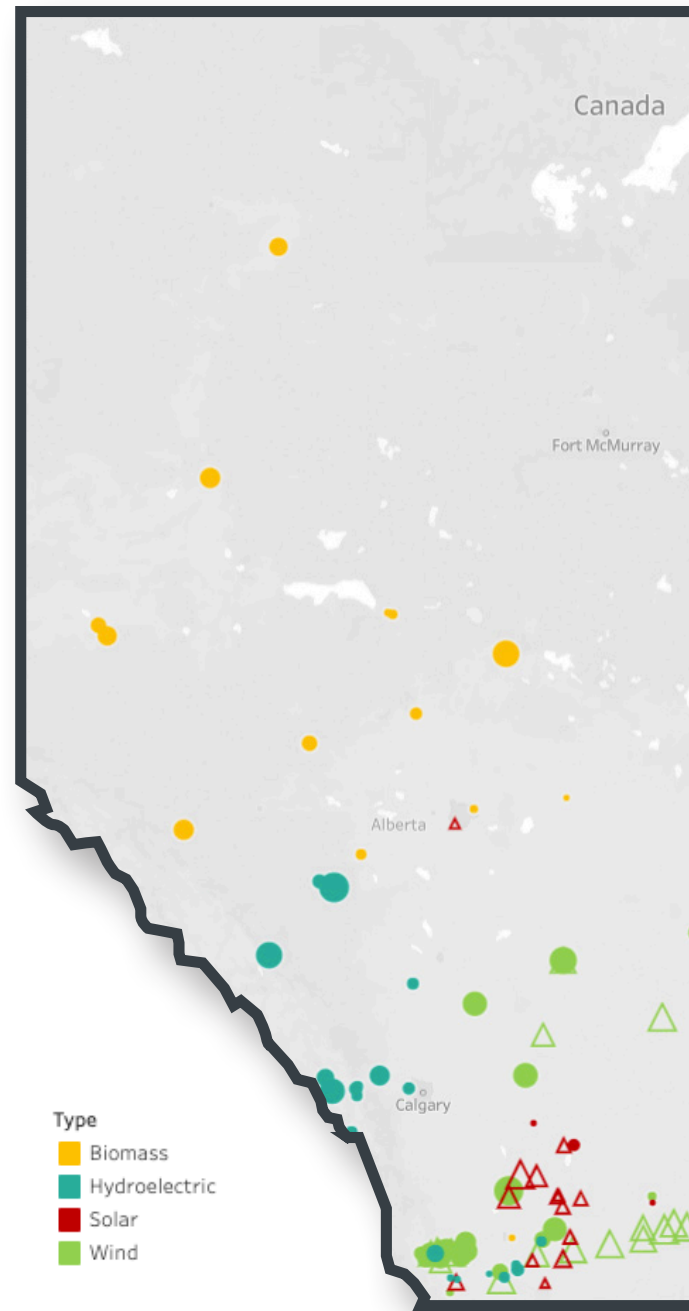


WIND

Alberta has over 900 wind turbines, and wind energy is the fastest growing form of renewable electricity generation in the province.



Built in 1993, Cowley Ridge (located near Pincher Creek) was Canada's first commercial wind farm. Map of wind speeds at a height of 50m. Southern Alberta has the highest wind energy potential. (Source: Canadian Wind Energy Atlas).

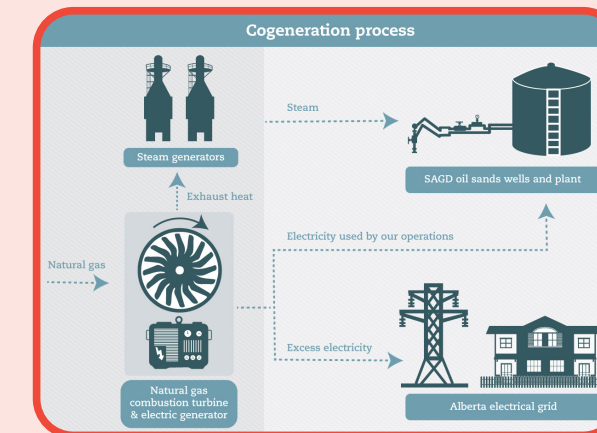


- Type**
- Biomass
 - Hydroelectric
 - Solar
 - Wind
- Status**
- ▲ In Development
 - In Operation

Canadian Renewable Energy Project Map by Future Energy Systems

NATURAL GAS COGENERATION

In a cogeneration system, heat and electricity are both produced from the same source. For example, natural gas can be burned to produce steam that powers a turbine, generating electricity. Meanwhile the exhaust heat from the turbine is used to create steam which can be injected into wells to extract more natural gas. Cogeneration systems reduce energy waste.



Cenovus uses a cogeneration system at its natural gas extraction sites. Electricity is generated for the electricity grid, and the steam byproduct is used to extract additional natural gas from the ground through Steam-Assisted Gravity Drainage (SAGD). This system reduces their overall greenhouse gas emissions.



Imperial's Strathcona cogeneration unit captures heat produced during electricity generation and uses it to produce steam that is used in refining. The cogeneration unit has decreased the amount of electricity the plant needs from Alberta's electricity grid, and reduced its overall greenhouse gas emissions.

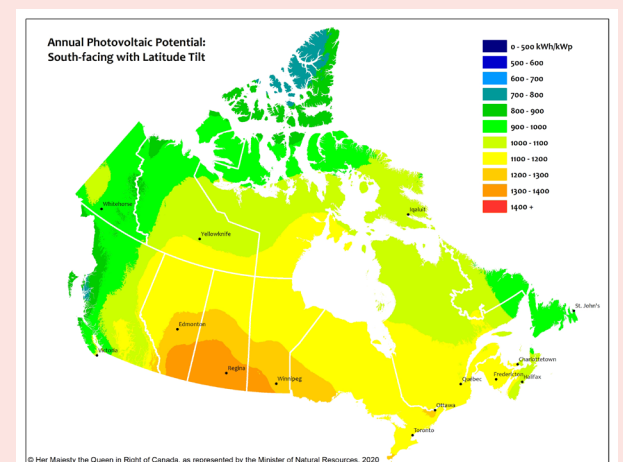
SOLAR

Solar energy is on the rise in Alberta! In Alberta, most buildings with solar panels are still connected to the electricity grid. This means that even when the sun isn't shining, electricity is taken from the grid to power the building, and when an excess amount of solar electricity is being generated, it is sold back to the grid.



At 465 megawatt (MW), Greengate Power's Travers Solar Project near Vulcan, Alberta will be the largest solar farm in Canada. Construction will be finished in 2022 and it will power around 100,000 Albertan homes.

Right: Map of solar potential across Canada. Alberta and Saskatchewan have the highest solar potential. (source: Natural Resources Canada)



BIOMASS

Biomass is any organic material (i.e. wood chips, food waste, cow manure, etc.) that can be burned or turned into gas to generate electricity.



Whitecourt Power takes any waste wood deemed unusable from Millar Western's saw mill and pulp mill operations to generate electricity.



Lethbridge Biogas LP operates an anaerobic digestion facility that takes livestock manure, agricultural processing residues, and grocery store organics and turns it into electricity.