Clean Energy and Pathways to Net Zero

A WIL Digital Initiative

What is Green Energy?

When talking about energy sources, people will sometimes use the term "green energy." However, when talking about green energy, we quickly run into a problem. What does "green energy" mean? This may seem like a small issue, but even little differences in definition can lead to big misunderstandings.

So, is there a difference between green, clean, and renewable energy?

Described below are some useful definitions that generally capture what these different terms mean.

Renewable Energy

A natural energy source that does not run out in response to human consumption. The energy source replenishes itself fast enough to keep up with our consumption.
Examples of renewable energy sources include:

- Hydro energy
- Bioenergy (biomass)
- Wind energy
- Solar energy
- Geothermal energy
- Ocean energy
- Biogas
- Tidal energy

The Cleveland Dam in North Vancouver, BC.

Green Energy

A type of renewable energy whose sources and technologies have the lowest holistic environmental impact.
Examples of green energy sources include:

- Wind energy
- Solar energy
- Geothermal
- Biogas
- Some forms of bioenergy (biomass)
- Low-impact small hydroelectric (other hydroelectric debatable)
- Tidal Energy
- Some forms of hydrogen energy (green hydrogen)
- Nuclear (debatable)

The Pincher Creek wind farm in Alberta generates 292 MW of renewable and green electricity. Pincher Creek is one of Canada's strongest wind power regions. Source: Adobe Stock

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LESSON 1 OF 1

Energy Uses and Markets

HOME

Lighting buildings and homes is one of the basic ways that we use energy. But other uses are less obvious.

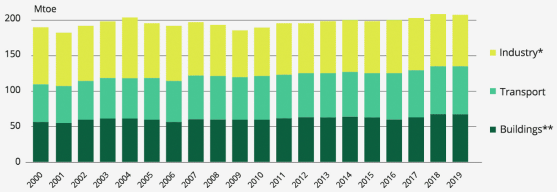
Energy Uses

The energy sector serves a variety of human needs, many of them very basic. Most of us use electricity to light our homes and cook our food. We use fuel to drive our cars and heat our homes. However, a lot of energy is used in ways that may be less obvious.

Energy Markets

Energy markets are divided into three broad categories. These categories are residential, industrial, and transportation. While the residential and transportation markets may be more familiar to most of us, the industrial market drives most of Canada's energy demand.

Figure 2.6 Total final consumption by sector in Canada, 2000-19

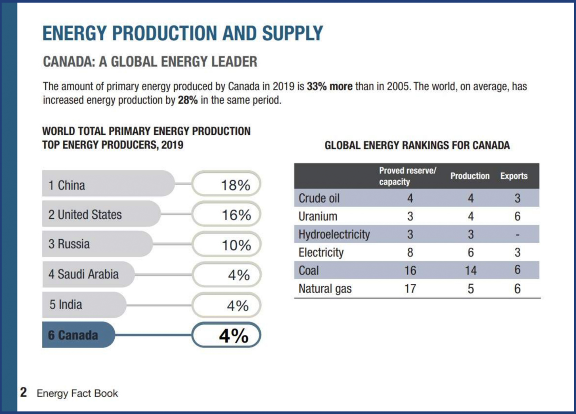


Total final consumption by sector in Canada, 2000–2019. Source: International Energy Agency (IEA).

Domestically, the industrial market is the largest consumer of energy. It accounts for 34% of Canada's energy demand.

Canada's Energy Production

In the global energy market, Canada has a distinct advantage. Canada is one of the few countries that produces more energy than it needs. Because of this, Canada exported 44% of the energy it produced in 2020. It also ranked sixth globally in energy production. Currently, energy accounts for 10.2% of Canada's GDP and 23% of its total exports.



ENERGY PRODUCTION AND SUPPLY

CANADA: A GLOBAL ENERGY LEADER

The amount of primary energy produced by Canada in 2019 is **33% more** than in 2005. The world, on average, has increased energy production by **28%** in the same period.

WORLD TOTAL PRIMARY ENERGY PRODUCTION
TOP ENERGY PRODUCERS, 2019

1 China	18%
2 United States	16%
3 Russia	10%
4 Saudi Arabia	4%
5 India	4%
6 Canada	**4%**

GLOBAL ENERGY RANKINGS FOR CANADA

	Proved reserve/ capacity	Production	Exports
Crude oil	4	4	3
Uranium	3	4	6
Hydroelectricity	3	3	-
Electricity	8	6	3
Coal	16	14	6
Natural gas	17	5	6

2 Energy Fact Book

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LESSON 1 OF 1

Energy Sources and Storage

HOME ↑

Niagara Falls, Canada. Flowing water is a powerful source of energy. Source: Adobe Stock.

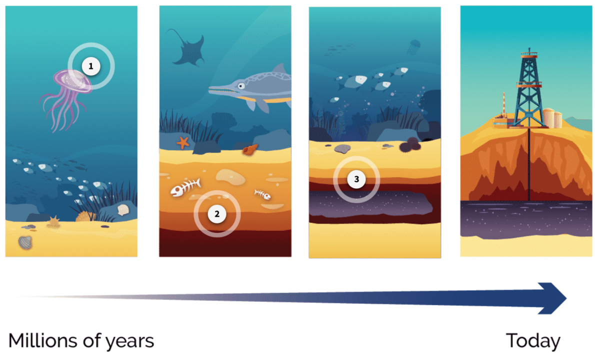
When it comes to energy, we must focus on two related topics: energy sources and energy storage. To produce energy, we need a source to draw upon. Yet without the ability to store energy, much of it would go unused.

To begin, let us first look at the different kinds of energy sources and how important they are in Canada's energy portfolio.

Fossil Fuels – Coal, Natural Gas, and Oil

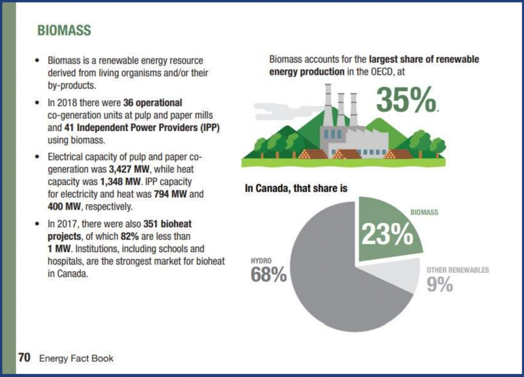
Fossil fuels are natural sources of energy. They form from the remains of dead plants and animals which are then buried in the Earth's crust.

Please click the numbered hotspots to learn more about the formation of fossil fuels.



Bioenergy Stats

- Second largest source of renewable energy in Canada.
- Biomass provides 23% of Canada's renewable energy production.
- 77 bioenergy plants producing 5,969 megawatts of installed capacity.
- Most bioenergy capacity is in provinces with large forestry operations—British Columbia, Ontario, Quebec, Alberta, and New Brunswick.



BIOMASS

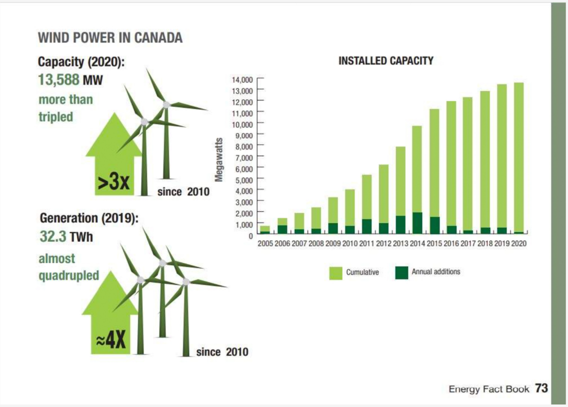
- Biomass is a renewable energy resource derived from living organisms and/or their by-products.
- In 2018 there were **36 operational** co-generation units at pulp and paper mills and **41 Independent Power Providers (IPP)** using biomass.
- Electrical capacity of pulp and paper co-generation was **3,427 MW**, while heat capacity was **1,348 MW**. IPP capacity for electricity and heat was **794 MW** and **400 MW**, respectively.
- In 2017, there were also **351 bioheat projects**, of which **82%** are less than **1 MW**. Institutions, including schools and hospitals, are the strongest market for bioheat in Canada.

Biomass accounts for the **largest share of renewable energy production** in the OECD, at

In Canada, that share is

Wind Stats

- Wind power is the cheapest way to generate electricity in Canada.
- More wind capacity has been installed over the past decade than any other energy source.
- Wind was responsible for 14,301 megawatts of installed capacity in 2021 compared to 1998 when 60 wind turbines were generating 27 megawatts of installed capacity (growth of 530 times in 24 years).



WIND POWER IN CANADA

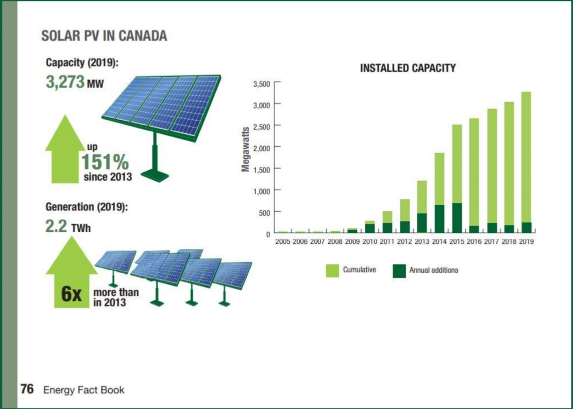
Capacity (2020):
13,588 MW
more than tripled

Generation (2019):
32.3 TWh
almost quadrupled

INSTALLED CAPACITY

Solar Stats

- In 2019, solar power accounted for 3,273 megawatts of installed capacity.
- Solar generating capacity is increasing rapidly. The nation’s solar capacity in 2019 was 151% higher than in 2013.



SOLAR PV IN CANADA

Capacity (2019):
3,273 MW

up
151%
since 2013

Generation (2019):
2.2 TWh

6x more than in 2013

INSTALLED CAPACITY

Funded by the
Government
of Canada
Canada

The Information and Communications Technology Council (ICTC) is a neutral, not-for-profit national centre of expertise with the mission of strengthening Canada's digital advantage in the global economy.