

Generating Stations, 2007

Abstract

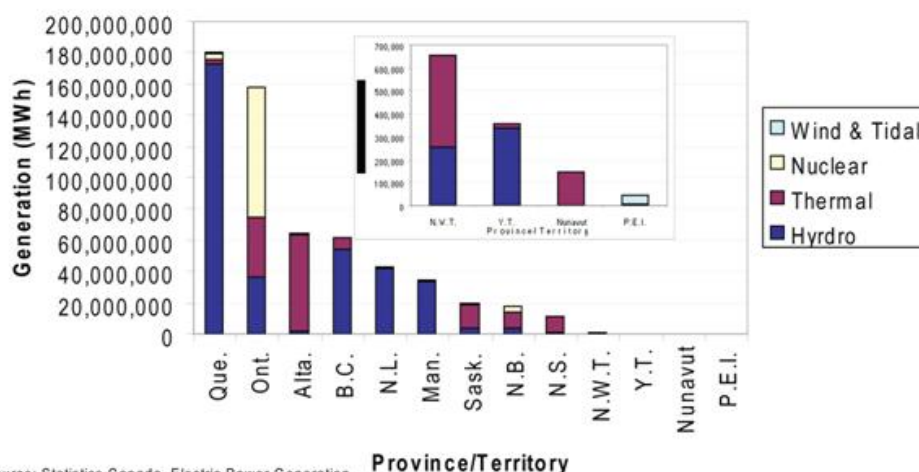
A generating station is an industrial facility built and operated to generate electricity. The map shows the 916 generating stations (power plants) operating in 2007. There were 479 hydroelectric stations, 375 thermal plants (combustion, internal combustion and steam), 7 nuclear plants, 54 wind turbines and 1 tidal power plant.

In 2006, 592 008 gigawatt-hours (GWh) of electricity were generated at hydroelectric, thermal, nuclear, wind and tidal generating stations. Different technologies are used to generate electricity; most electricity is produced by a pressurized gas or liquid that turns a turbine, which in turn operates a generator. In the case of hydroelectric power, it is water that falls or flows through the turbine. Wind power is produced when wind turns a wind turbine. Tidal power is created using the ebb and flow of tides to run the turbine.

Technologies for thermal electricity generation include coal-, oil- or gas-fired steam turbine; nuclear-powered steam turbine; combustion turbine; and internal combustion. In a steam-turbine system, a fuel is combusted in a boiler to heat water, creating high-pressure steam that is forced through the turbine. A nuclear-powered steam turbine system works similarly, except that the heat from the nuclear reaction is used to create the steam that drives the turbine. In a combustion-turbine system, a liquid or gaseous fuel is combusted, creating hot, pressurized combustion gases that are forced through a turbine. An internal-combustion system is similar to that found in an automobile: fuel is combusted in cylindrical chambers, turning a crankshaft that operates a generator.

Quebec and Ontario, at 30.4% and 26.7% respectively (see Figure 1), were the largest producers of electrical energy in 2006, followed by Alberta (10.8%) and British Columbia (10.4%). Quebec and British Columbia were the largest generators of hydroelectric power, followed by Newfoundland and Labrador, Ontario and Manitoba. Hydroelectricity is the main source of power generation in Canada, accounting for 59% of total supply, followed by thermal and nuclear. Alberta and Ontario were the leading generators of thermal electric energy, while Ontario generated 90% of Canada's nuclear power. Most wind energy was generated in the three Prairie Provinces and in Quebec. Wind-generated electricity accounted for 0.4% of the total in 2006. There is one tidal-power generation plant, at Annapolis, Nova Scotia.

Generation of Electrical Energy, 2006



Source: Statistics Canada. Electric Power Generation Transmission and Distribution 2006. Statistics Canada – Catalogue no. 57-202-X.

Figure 1: Generation of Electrical Energy, 2006

Source: Statistics Canada. Electric Power Generation Transmission and Distribution, 2006

Fuels used to generate electricity in Canada include light fuel oil, heavy fuel oil, diesel, natural gas, wood and coal. Coal is the predominant source of fuel for thermal-electric power generation in Canada, accounting for 77% of electricity generated at thermal-electric generating stations in 2006. Alberta and Ontario were the largest users of fuels for the generation of electricity, at 45.5% and 25.8%, respectively. Domestic demand for electricity was 477 507 GWh in 2006. Industrial use of energy was at 234 695 GWh, compared to residential use at 148 631 GWh.

There are several large-scale hydroelectric generating sites in Canada, including the La Grande complex on the Quebec side of James Bay, the Churchill Falls station in Labrador, the Manicouagan-Outardes complex on the Quebec North Shore, the Sir Adam Beck station on the Niagara River in Ontario, the Nelson River development in Manitoba, the Peace River complex in northern British Columbia and the Columbia River complex in southern British Columbia.

Canada and the United States have developed a remarkable electrical trading system over the last half century, resulting in one of the world's largest and most interconnected systems. The system includes major connections across the Canada–United States border and an extensive co-operative arrangement for managing transmission-system reliability. Canada and the United States supply almost all of each other's electricity imports. The direction of this trade, which depends on the location and the time of year, helps to balance supply and demand through the most efficient use of available resources. Canada is a major supplier of electricity to New England, New York, the Upper Midwest, the Pacific Northwest and California.

The regional flow and magnitude of electricity exports from Canada to the United States are shown in Figure 2.



Figure 2. Canada–United States Electricity Flows (Exports), 2007

Source: Natural Resources Canada. 2009.

The regional flow and magnitude of electricity imports from the United States to Canada are shown in Figure 3. below.



Figure 3. Canada–United States Electricity Flows (Imports), 2007

Source: Natural Resource Canada. 2009.

Map Sources

Generating Stations, 2007

Statistics Canada. 2007. Electric Power Generating Stations, 2007. Statistics Canada.

References

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Statistics Canada. 2004. Energy in Canada, 2004. Statistics Canada, catalogue no 16-201-XIE.

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Related Web sites (1999 – 2009)

Other

Canadian Hydropower Association
<http://www.canhydropower.org/>

