Above Photo: Halifax, Nova Scotia
SOURCE: COMMUNICATIONS NS

Electricity Use and Generation Options

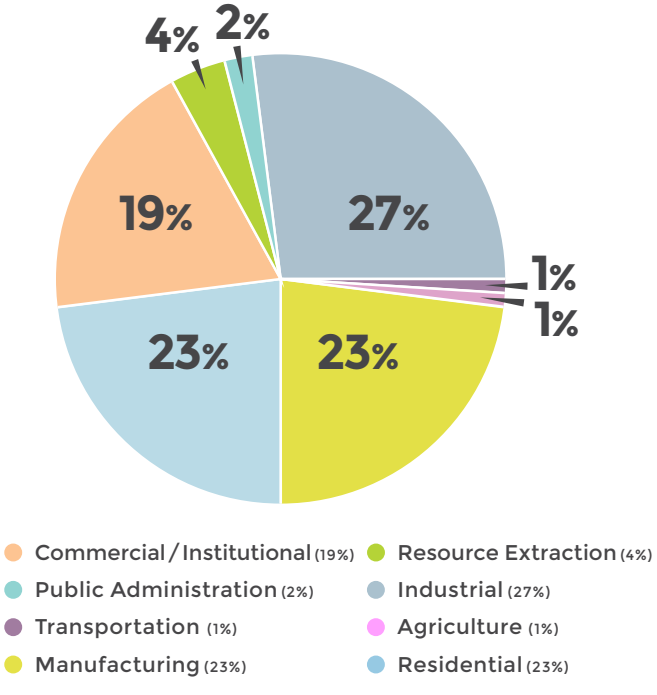
How do we use electricity in our daily lives?

We already consume a lot of electricity every day in our workplaces, schools and homes, and while we are now using it more efficiently, future projections indicate that consumption will increase.

Based on World Bank data on electricity usage, Canada is among the highest per capita consumers of electricity,[1] at over 16 MWh. We surpass ten other countries with the highest total GDP (gross domestic product). Our consumption is greater than Japan and Germany combined, and is exceeded only by Norway and Iceland.

Electricity is generated from various primary energy sources, renewable and non-renewable; as a secondary form of energy, it is conveniently distributed to users. Let's consider how we use electricity, and our choices in how it is generated.

Chart 2A: Canadian Electricity Demand by Sector



SOURCE: STATISTICS CANADA, ENERGY STATISTICS HANDBOOK, 2012: *HTTP://WWW.STATCAN.GC.CA/PUB/57-601-X/57-601-X2012001-ENG.HTM*

1 *http://data.worldbank.org/indicator/EG.USE.ELEC.KH.PC*

What are the primary sources of electricity in Nova Scotia?

Coal

Many of the mines that provided coal for electricity generation in Nova Scotia have closed. Only 20% of coal supplied to Nova Scotia Power is local; the remainder is imported at higher cost, typically from the USA or Colombia.

Natural Gas

As a cleaner-burning fossil fuel, natural gas for electricity generation has been in demand. Nova Scotia Power has converted one thermal generating station to use natural gas.

Nuclear

Although there is no nuclear generation in Nova Scotia, it exists elsewhere in Canada, including New Brunswick, which is connected to Nova Scotia through a transmission line.

Oil

Until the 1970s, a lot of our electricity was generated from imported oil. Nova Scotia coal then became a cheaper local alternative. Reduction in oil use is expected to continue.

Biomass

Organic matter, like wood and wood waste, can be burned to generate electricity. Most production is small-scale, but larger biomass plants have recently been added to the grid in Nova Scotia.

Hydro

Nova Scotia has had hydroelectric generation since the early 20th century, and it will continue to play an important role in meeting electricity demand. The Maritime Link, a 500 MW transmission line from Newfoundland to Nova Scotia, will allow importation of hydro-generated electricity from the Lower Churchill Project.

Solar

Active solar energy generation is mostly off-grid in Canada. Nova Scotia is examining broader uses for solar generation, and small-scale solar projects are on the increase.

Wave & Tidal

One of the few tidal plants in the world is in Nova Scotia; the 20MW Annapolis Tidal Power Plant opened in 1984. Nova Scotia is making significant investment in tidal energy research and plans for projects large and small.

Wind

The pace of wind energy development in Nova Scotia remains strong. Many projects have recently been constructed or are under development. As of March 2015, there was 350 MW of installed capacity from wind generation in the Province.

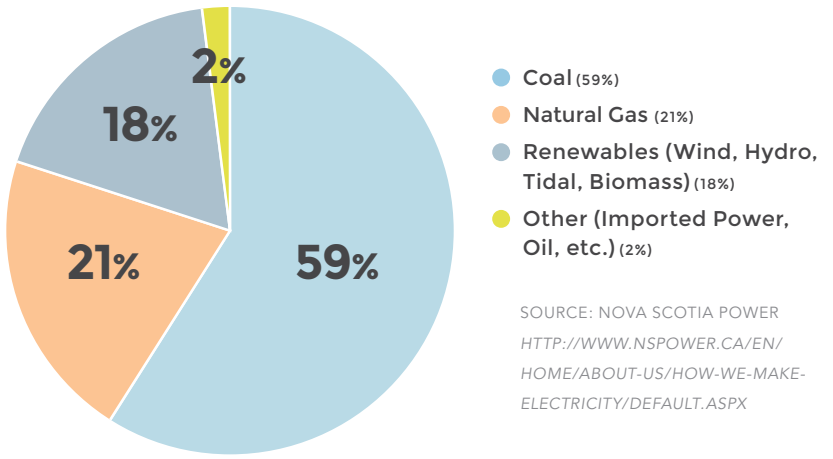
SOURCES:

- NATIONAL ENERGY BOARD: *HTTP://WWW.NEB-ONE.GC.CA/CLF-NSI/RNRGYNFMTN/NRGYRPRT/NRGYFTR/2013/NRGFTR2013-ENG.HTML#S8;*
- CANADIAN ELECTRICITY ASSOCIATION: *HTTP://WWW.ELECTRICITY.CA/MEDIA/PDFS/ENVIRONMENTALLYPREFERRABLEPOWER/2-POWERGENERATIONINCANADA.PDF;*
- *NOVA* SCOTIA POWER: *HTTP://WWW.NSPOWER.CA/EN/HOME/ABOUT-US/HOW-WE-MAKE-ELECTRICITY/DEFAULT.ASPX*

How is electricity generated in Nova Scotia?

Thermal generating stations using fossil fuels and renewables (wind, tidal, hydro, biomass) generate our electricity. Nova Scotia Power owns and operates its own electricity generation, renewable and non-renewable, and purchases renewable electricity from other power producers throughout the Province. It also imports electricity through a transmission line connecting our province to New Brunswick. It is expected that the Maritime Link Project will allow importation of more renewable electricity by 2017.

Chart 2B: Generation Mix, Nova Scotia (as of 2012)



SOURCE: NOVA SCOTIA POWER
HTTP://WWW.NSPOWER.CA/EN/HOME/ABOUT-US/HOW-WE-MAKE-ELECTRICITY/DEFAULT.ASPX

Thermal generation (coal, natural gas, oil, and biomass) are dispatchable sources of electricity, meaning that electricity can be added to the grid as needed. Wind, tidal and solar sources are non-dispatchable - they are intermittent - at times they do not produce electricity. Intermittent generation creates challenges in planning and operating our electrical system.

In March 2015, Nova Scotia had approximately 350 MW of wind energy capacity. More wind energy projects are in the planning stage or under construction, including a large project of 100 MW and several smaller COMFIT projects. Like tidal and solar, wind energy is a non-dispatchable source of electricity. The integration of both dispatchable and non-dispatchable sources of electricity into the existing electrical grid is a key consideration in planning additional wind energy projects. This was one outcome of the Electricity System Review (April 2015).[2]

Get to Know Wind Energy

Environment Canada reports that coal-fired sources supply only about 15% of Canada's electricity, but these are responsible for 77% of greenhouse gas emissions from the electricity sector.

In 2012, federal regulations set performance standards for 2015 that will result in emission limits and eventual phasing-out of coal-fired generation facilities.[3]

As of June 2014, the federal and provincial governments finalized an equivalency agreement containing changes to provincial laws that allow Nova Scotia to opt out of federal regulations.[4]

Nova Scotia's Greenhouse Gas Emissions Regulations were revised to extend existing electrical emission caps to the years 2021–2030.[5]

2 *http://energy.novascotia.ca/electricity/electricity-system-review*

3 *http://laws.justice.gc.ca/eng/regulations/SOR-2012-167/*

4 *www.gazette.gc.ca/rp-pr/p1/2014/2014-06-28/html/reg3-eng.php*

5 *www.novascotia.ca/just/regulations/regs/envgreenhouse.htm*

SOURCE: COMMUNICATIONS NS

Lingan, Nova Scotia

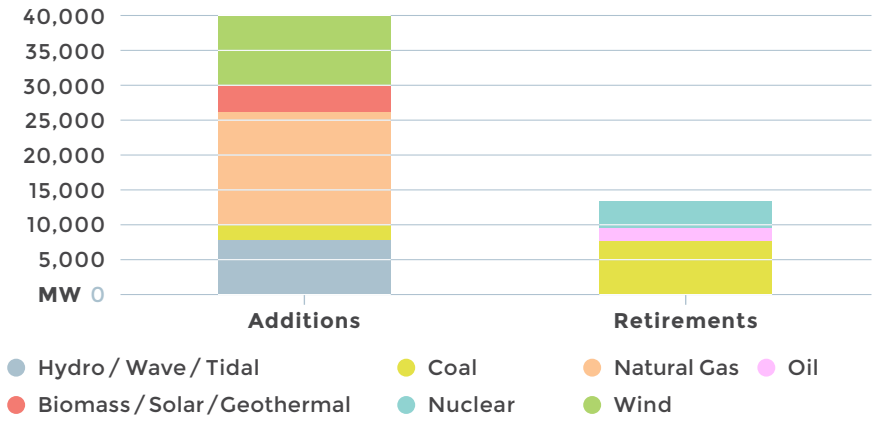
What is the future for electricity generation in Nova Scotia?

Electricity generation in Nova Scotia began with renewable electricity in the form of hydro dams in the mid-19th century. They were followed by large fossil fuel thermal generating stations which used oil, then coal, and are now shifting to natural gas. At one time, Nova Scotia coal provided as much as 80% of our electricity. Now the trend is toward renewable electricity; hydro still exists, but wind and biomass are already "mainstay" replacements, while tidal and solar are in the development stage.

Since the 2010 Renewable Electricity Plan[6], the major shift toward renewables has been in wind energy. Large and small projects have been constructed and are supplying electricity to the grid, and many more are being developed.

The National Energy Board[7] projects that total electricity generation capacity in Canada will increase by an average of 1% annually. Use of fossil fuels that we relied on in the past is expected to decline with the shift to renewables and cleaner fossil fuels. Aging generation facilities will need to be replaced for reliability, economic and/or environmental reasons. Renewables will increase to compensate for reductions in fossil fuel generation and supply additional demand. This Canadian trend is expected in Nova Scotia as well.

Chart 2C: Projected Changes to Electricity Generation by 2035 in Canada



We have choices in Nova Scotia. Moving toward local renewable sources will help stabilize electricity prices in the future and provide energy security. This will help protect Nova Scotians from the volatility of international fossil fuel pricing and the regulation and possible future costs of greenhouse gas emissions. Wind is an important part of this renewable electricity mix.

6 *http://energy.novascotia.ca/sites/default/files/renewable-electricity-plan.pdf*

7 *www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/nrgyftr/2013/nrgftr2013-eng.html#s8*