CONCEPT 3

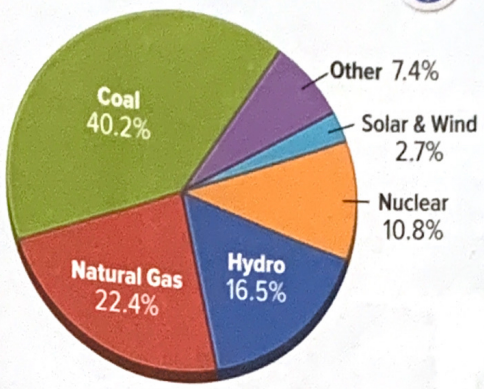
Renewable energy sources provide sustainable options for generating electrical energy.

Activity

Comparing Energy Sources

The graph on the right compares the percentage of different energy sources used worldwide. Use the graph to answer the questions that follow.

1. Identify the percentage of the world's electrical energy that is generated by the following energy sources.
   a) hydro **b)** nuclear **c)** fossil fuels **d)** wind and solar
2. What might the "other" sources on this graph refer to?



Sources Used for World Electrical Energy Production

3. How do you think this graph would change if it showed energy sources used in **a)** Canada **b)** B.C. Provide your answers in the form of a graph.

Electrical energy is always generated from another source of energy. The energy sources you learned about in Topic 3.1 are classified based on whether they are renewable or nonrenewable.

- **Nonrenewable energy sources** are not replaceable in a human lifetime. Fossil fuels are a nonrenewable energy source. Coal or natural gas is used to generate electrical energy in most provinces in Canada. The other nonrenewable energy resource is uranium (nuclear reactions), which is used to generate electricity in nuclear power plants. Since a human lifetime is so short in comparison, once these resources are used up, they are gone for good. As a result, nonrenewable energy sources are not a sustainable way to generate electrical energy.

nonrenewable energy source an energy source that is non-replaceable in a human lifetime

- **Renewable energy sources** are produced on a continual basis or can be replenished fairly quickly. They are not at risk of being used up over the course of a human lifetime. Renewable energy sources include sunlight, wind, river flow, tides and waves, geothermal sources, and biomass. They provide sustainable options for generating electrical energy.

renewable energy source an energy source that is available on a continuous basis

Connect to Investigation 3-K on page 266

WAC Bennett Dam (2730 MW)

Located on the Peace River, this massive 183 m high, large-scale hydroelectric dam provides most of B.C.'s electrical energy. However, several controversies surrounded the building of the dam. These included concern over negative environmental impacts when 350 000 acres of forested land was flooded, creating Williston Lake. The flooding also displaced residents of the area, including members of the Tsay Keh Dene First Nation.

The Klemtu Small-scale Hydro (1.7 MW) and Solar Project (0.023 MW)

A small-scale hydro generating station off Baron Lake and photovoltaic cells on the roof of the Kitasoo Community School in Klemtu help the entire Kitasoo/Xai'xais community. Electrical energy generated by these projects reduces the isolated community's reliance on diesel generators.

Williams Lake Biomass Plant (68 MW)

This is the largest biomass generating station in North America. Before the biomass plant was built, the Williams Lake Valley was experiencing poor air quality. Burning wood waste from the forestry industry in beehive burners was polluting the air. The biomass plant solves the problem and generates electrical energy at the same time.

Meager Mountain Geothermal Potential (200 MW)

Molten rock rises to just a few kilometres below B.C.'s Coast Mountain range. At average temperatures of 200-300°C, the molten rock holds great potential to heat water, producing steam to turn turbines to generate electrical energy. In fact, the Coast Mountains have the greatest geothermal potential in all of Canada. Meager Mountain in Upper Lillooet Provincial Park has the potential to generate electrical energy for over 90 000 homes annually.

Race Rocks Tidal Energy Project (0.65 MW)

The Race Rocks Tidal Energy Project is located southwest of Victoria in the Race Rocks Ecological Reserve. This small-scale demonstration project was installed in 2006. It is the first operating tidal current turbine in Canada. The turbine transforms the kinetic energy of tidal currents into electrical energy. The project also acts as a testing ground for further research into tidal technology.

Fort Nelson

WAC Bennett Dam

Klemtu

Williams Lake

Meager Mountain

Race Rocks

Renewable and Nonrenewable Energy Sources in British Columbia

The map in **Figure 3.33** shows a few ways that renewable and nonrenewable energy sources are used to generate electrical energy in B.C. on a large and small scale.

Fort Nelson Gas Plant (47 MW)
This natural gas generating station provides electrical energy to most homes and businesses in and around Fort Nelson.

Bear Mountain Wind Park (144 MW)
Sitting on a ridge looking over Dawson Creek, Bear Mountain Wind Park is the first wind park to provide electrical energy commercially in B.C. It consists of 34 wind turbines. Each turbine is 78 m high. The local initiative is a source of pride for the community. The wind park site is also used for recreational activities like hiking and cross-country skiing, as well as cattle grazing.

SunMine Solar Energy Project (1 MW)
SunMine is B.C.'s largest solar project. Located just outside of Kimberley, over 4000 photovoltaic cells are mounted on 96 solar trackers. These trackers follow the Sun's movement through the sky over the course of the day. The project received much of its funding from B.C.'s Innovative Clean Energy (ICE) Fund program. It can generate electrical energy for about 250 homes at peak production.

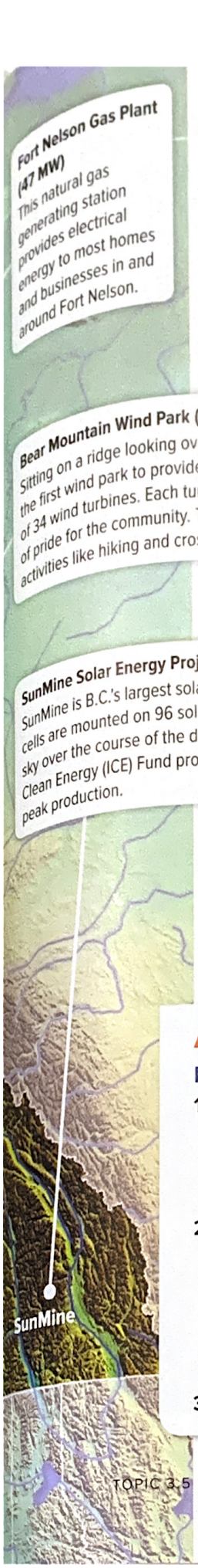


Figure 3.33 This map shows several renewable and nonrenewable energy projects in B.C. Note that 1 MW (megawatt) is equal to a million watts.
Which initiatives on this map make use of renewable energy sources? Which ones use nonrenewable energy sources?

Activity

Map It!

1. Choose a renewable or nonrenewable energy source that interests you. Research the source to find out where it is currently being used to generate electrical energy in B.C. If it is not being used, choose another source.
2. Research the source further to answer the following questions.
   a) Is the source renewable or nonrenewable?
   b) What are the pros and cons of using it to generate electrical energy?
   c) Where and how is the source being used in B.C.?
   d) One other question you have about the source.
3. Record your answers and add them to a map of the province as directed.