



LEARNING INQUIRIES

MAPPING CANADA'S ENERGY

TIME: 30 MINUTES (CAN BE DIVIDED INTO TWO CLASS PERIODS)

DEVELOPED BY: CANADIAN GEOGRAPHIC EDUCATION



OVERVIEW/FOCUS QUESTION

Students will learn the locations of Canada's energy facilities and transmission lines and pipelines by exploring Energy IQ's Interactive Energy Map.

SUBJECT/TOPIC

**ENERGY PRODUCTION
AND TRANSMISSION**

GRADE LEVEL

4-6

LEARNING GOALS

Students will:

- Analyze an interactive map to learn about energy facilities and transmission lines and pipelines in Canada.
- Explain where energy facilities and transmission lines and pipelines in Canada are located.
- Reflect on the reasons facilities and transmission lines and pipelines are in specific locations.

MATERIALS NEEDED

- Computers with internet access
- Interactive Energy Map worksheet (1 per student or pair)
- Pens or pencils

CONNECTION TO THE CANADIAN GEOGRAPHY FRAMEWORK

CONCEPTS OF GEOGRAPHIC THINKING

- Spatial significance
- Patterns and trends
- Interrelationships

INQUIRY PROCESS

- Interpret and analyze
- Evaluate and draw conclusions
- Communicate

GEOSPATIAL SKILLS

- Foundational elements
- Technologies

LESSON DESCRIPTION

MINDS ON

Students will review the types of energy produced in Canada and discuss how Canada's energy gets to different places across the country.

ACTION

Students will explore the Energy IQ Interactive Energy Map using a worksheet to guide them.

CONCLUSION

Students will share what they have learned and discuss Canada's energy history and future.

LESSON IMPLEMENTATION

MINDS ON

As a group, discuss with students what they already know about the types of energy produced in Canada. Explain that Canada produces both renewable and non-renewable energy. Renewable types of energy produced in Canada include wind, solar, biomass, and hydroelectricity. Tidal and geothermal are also types of renewable energy but will not be examined in this lesson plan as they represent a very minor part of energy production in Canada. Non-renewable types of energy include coal, natural gas, crude oil and nuclear. Today, students will learn where energy facilities for different types of energy are found in Canada.

Ask students how they think energy is transported and distributed across the country.

- Students may have heard about pipelines or they may have seen power lines in their neighbourhood. Power lines can either be transmission lines or distribution lines. After electricity has been generated (e.g., at a hydroelectric dam), it is transported at a high voltage to where it is needed by transmission lines. The high voltage reduces the amount of electricity that is lost as it travels over long distances. Once the electricity arrives at its destination, a transformer changes it to a lower voltage and distribution lines carry the electricity the rest of the way to homes and businesses.
- Pipelines are used to transport oil and natural gas and are usually built underground.
- Students may have also heard about ships and trains transporting energy sources like coal, petroleum products, and liquefied natural gas (LNG).

Write students' answers on the board and discuss the benefits and drawbacks of the different methods of transportation in different regions of Canada. Ask students how energy sources might be loaded or unloaded in the different transmission methods. Ask students what factors might affect the transmission methods (e.g., pipelines in the North are built above ground due to permafrost).

Explain to students that they will be exploring three types of transmission methods in Canada that are outlined on the Energy IQ Interactive Energy Map: natural gas pipelines, oil pipelines, and electricity transmission lines.

ACTION

In this activity, students will be using the online [Energy IQ Interactive Energy Map](#) to explore different energy types and energy transmission methods across Canada.

Divide students into pairs. Distribute the Interactive Energy Map worksheet (one per pair). Assign each pair an energy type (wind, hydroelectricity, solar, biomass, crude oil, natural gas, nuclear and coal). This will be the layer they turn on in the interactive map.

Review the instructions on the worksheets with students and then have them follow the worksheet to guide them through their exploration of the map. Review any terms that might be unfamiliar to students, such as urban, rural, and layer.

Instruct students to go to the [Energy IQ website](#) and click on the Energy Map tab. Encourage students to think carefully about the questions and answer in full sentences using geographic terms (e.g. cardinal directions, province and territory names, names of waterways).

CONCLUSION AND CONSOLIDATION

As a group, discuss with students what they learned about energy facilities. Why do they think energy facilities are located in certain areas in Canada? Ask them what they learned while exploring the pipelines and transmission lines that crisscross Canada. Did students discover any lines close to their city that they did not realize were there?

Now, discuss with students what they think this map would have looked like in Canada's past. How might it be the same and/or different? Now, ask students what they think this map might look like in the future. What changes might happen and why? What changes would students hope to see and why?

Teachers can collect students' worksheets for assessment.

EXTEND YOUR GEOGRAPHICAL THINKING

- Learn about how energy is produced and transmitted by exploring individual energy types on the [Energy IQ website](#).
- Invite a spokesperson from an energy facility to speak with the class about the importance of these facilities in Canada.

MODIFICATIONS

- Fill out the Interactive Energy Map worksheet as a class.
- Demonstrate for students how to navigate the map and complete the worksheet for one energy type as a class before allowing them to do it in pairs.
- The number of questions can be increased or decreased depending on students' needs.
- Extension: Have students research and present on an energy facility in Canada.
- Extension: Have students research tidal and geothermal facilities in Canada and fill out the worksheet using these energy types (tidal and geothermal energy are not currently produced on a commercial scale, but there are experimental projects in Canada).

ASSESSMENT OPPORTUNITIES

- Teachers can use the discussions in the Minds On and Conclusion sections to guide teaching.
- Teachers can make observational notes of students' answers during discussion periods.
- Teachers can collect students' worksheets for assessment.

SOURCES AND ADDITIONAL RESOURCES

- Visit the [Energy IQ website](#) for information on Canada's energy production and transmission.
- [Watch this video](#) of a hydroelectric generating facility from Hydro-Québec.
- Learn about wind turbines in [this video](#) from Super Simple Play.
- Explore [provincial and territorial energy profiles](#) from Canada Energy Regulator.
- Watch this Energy IQ [video](#) about Moving Energy.
- Learn about how [coal](#), [hydroelectricity](#), and [nuclear](#) energy are produced.

STUDENT ACTIVITY SHEETS

INTERACTIVE ENERGY MAP WORKSHEET

Name(s) : _____

PART 1: ENERGY TYPES

Energy type: _____

- Go to the website energyiq.canadiangeographic.ca. Click on the “Energy Map” tab.
- When you see the map, click on the “Energy Type” layer and select your energy type.
- Choose which facilities you would like to explore or click “All facilities.”
- Explore the information on the map to answer the following questions.

1. In which provinces and/or territories can you find your energy type?

2. Which province, territory and region of Canada has the most facilities?

Why do you think this is?

3. In the top-right corner of the map, there are two boxes labelled “Map” and “Satellite.” Click on “Satellite” to switch to the satellite view on the map.

What do you notice about where the facilities are located? Are they in urban or rural areas? Are they near water or another natural resource?

INTERACTIVE ENERGY MAP WORKSHEET

PART 2: ENERGY TRANSMISSION

- Go back to the map view by clicking the box “Map” in the top-right corner of the map.
- Take off the “Energy Type” layer by clicking your energy type to deselect it.
- Click on the “Energy Transmission” layer and select a type you would like to explore.
- Explore the information on the map to answer the following questions.

Energy transmission type: _____

1. In which area of Canada do you find the most transmission lines/pipelines?

2. Are there areas in Canada that have no transmission lines/pipelines and, if so, why would that be?

3. In the top-right corner of the map, there are two boxes labelled “Map” and “Satellite.” Click on “Satellite” to switch to the satellite view on the map.

What do you notice about where the transmission lines/pipelines run? Are they in urban or rural areas? Are they near water or another natural resource?
