Canadian Geographic EDUCATION

ENERGY IQ

LEARNING INQUIRIES

PRIMARY AND SECONDARY SOURCES OF ENERGY

TIME: 60-75 MINUTES

DEVELOPED BY: CANADIAN GEOGRAPHIC EDUCATION

OVERVIEW/FOCUS QUESTION

Students will learn about primary and secondary energy and explore ways in which primary energy is converted into secondary energy.

SUBJECT/TOPIC

ENERGY, SCIENCE

GRADE LEVEL

7-9

LEARNING GOALS

Students will:

- Define primary and secondary energy.
- Explain how primary energy is transformed into secondary energy.

MATERIALS NEEDED

- Pencil
- Lined paper
- Coloured pencils/markers/paint (depending on project)
- Devices with Internet access for research
- Primary and Secondary Energy Sources graphic organizer

CONNECTION TO THE CANADIAN GEOGRAPHY FRAMEWORK

CONCEPTS OF GEOGRAPHIC THINKING

- Patterns and trends
- Interrelationships

INQUIRY PROCESS

- Acquire geographic resources
- Communicate
- Reflect and respond

GEOSPATIAL SKILLS

- N/A

LESSON DESCRIPTION

MINDS ON

Students will discuss the difference between primary and secondary energy.

ACTION

Students will research an energy source in Canada and learn about how it is converted into secondary energy and create a diagram, poster or flowchart to demonstrate.

CONCLUSION

Students will present their projects.

LESSON IMPLEMENTATION

MINDS ON

Ask students to think about different energy types in Canada (crude oil, hydroelectricity, nuclear, natural gas, coal, wind, solar, biomass, geothermal, and tidal). Ask students to think about where energy comes from. How do we get electricity to power devices? Where does gasoline come from? Now, ask students if they have ever heard of primary and secondary energy. Pair students up and ask them to brainstorm what they think these two terms mean. As a class, discuss students' answers.

Explain that primary energy includes energy sources found in their natural state, such as coal, crude oil, natural gas, wind, etc. Secondary energy is the result of the transformation of primary energy sources. For example, crude oil (primary energy source) is transformed into the secondary energy source of gasoline.

Ask students if they would classify the following energy types as primary or secondary energy sources:

- Electricity (*secondary*)
- Crude oil (*primary*)
- Natural gas (*primary*)
- Petroleum products (*secondary*)
- Biomass (*primary*)
- Liquid biofuel (*secondary*)
- Wind (*primary*)

ACTION

Students will now have the opportunity to learn about the different energy sources in Canada and explore how these sources are converted into secondary sources of energy that we can use to power our homes, fuel our cars, and create the products that we use every day.

Divide students into nine groups, assigning each group a different energy source in Canada: Crude oil, natural gas, coal, nuclear, hydroelectricity, wind, biomass, solar, and tidal and/or geothermal.

Each group should research their energy source, what secondary energy sources can be converted from this primary source and how that conversion happens. How are these energy sources transformed into the energy we use every day? For example, how does water get transformed into electricity? Students should explore the Energy IQ website and fact books as a starting point and do further research if needed. Encourage students to use the Primary and Secondary Energy Sources graphic organizer to begin their research.

In their groups, have students create an infographic, poster or flowchart, illustrating how their energy source starts as primary energy, is converted into secondary energy, and what those secondary energy sources are.

CONCLUSION AND CONSOLIDATION

Once students have completed their research and projects, allow time for students to share what they have learned with their classmates. Have students present their projects to the class. Ask them to brainstorm as a class ways in which they use secondary energy source(s) every day.

Once each group has presented, have a class discussion about Canada's energy story. Ask students what surprising facts they learned and what the future of Canada's energy may look like.

EXTEND YOUR GEOGRAPHICAL THINKING

- Have students explore the Energy IQ interactive energy map to learn more about energy production and transmission in Canada.
- Invite an expert from the energy industry into the class to speak about how energy is converted into usable energy.

MODIFICATIONS

- The way students demonstrate their learning can be adapted for student needs.
- Projects can be completed individually.
- Extension: Students can create a model to demonstrate how primary energy becomes secondary energy for specific energy sources.

ASSESSMENT OPPORTUNITIES

- Teachers can take observational notes of students' ideas during discussions.
- Students can share their projects with another group or the teacher for feedback.
- Teachers can assess the final copies of projects.

SOURCES AND ADDITIONAL RESOURCES

- Visit the Energy IQ website for more information about energy.
- Learn about electricity and its generation through the government of Canada's Electricity Facts website.
- Watch *Life of a plastic bottle* video.
- Watch Learning Junction's *Fossil Fuels / Types and Formations* video for examples of how coal, crude oil and natural gas are used by humans every day.
- Learn about Petroleum in Real Life and the everyday objects that are made from petroleum.

STUDENT ACTIVITY SHEETS

PRIMARY AND SECONDARY ENERGY SOURCES

PRIMARY ENERGY SOURCE	CONVERSION METHOD	SECONDARY ENERGY SOURCES