

Lesson Five: Global Energy Expo



Overarching inquiry question(s)

How has energy shaped our societies today and which ones should we be investing in for the future?

Target age group: Secondary (Grades 8–12)

Curricular competencies (listed in brief)

- Questioning and Predicting
- Critical thinking (about global energy use)
- Synthesizing information through research to create a non-biased position on an energy source
- Communicating ideas for a position through oral and written work
- Drawing conclusions from the evidence



Summary (learning & pedagogical outcomes, goals, & activities in brief)

Our societies today are shaped by our access to energy and how we've transformed it for transportation, industries, buildings, and personal use. How we produce and use energy has shifted immensely over time in both source and amount. [According to Our World In Data](#), in 1800 we used roughly 5,600 terawatt-hours globally, mostly from biomass (wood, peat, dung), and in 2021 we used roughly 176,000 terawatt-hours, with oil and gas comprising the greatest proportion. How has this shift occurred and what does the future of energy look like?

In this lesson, students will be guided through the data on energy sources, consumption, and use before putting on their own Energy Expo wherein they will represent different energy sectors and investors. Doing so will help students dive into how the energy sector is changing globally as well as the various innovations that are taking place in different sectors. The Energy Expo provides students with an opportunity in groups to examine the data for their sector or role, draw conclusions about the trends, and create a presentation/pitch for investors. Students will apply critical thinking and communication skills as they role-play during the Energy Expo, either for their own class or for other classes in the school.

While different parts of this lesson could be completed within a single class, this lesson is best done over several days — an overview day for learning and to establish the Energy Expo criteria, a day or two for gathering data and setting up the expo, and a day for presenting and reflecting. There is also an extension lesson on Indigenous energy transitions leadership.

Specific terminology

Bias: When a prejudgment or belief from an individual or organization affects the argument shared about a topic. Sources that are strongly biased often do not provide credible sources for their facts.

Credible: Someone or something that is worthy of being believed

Disinformation: False information that is deliberately created to mislead people, often spread through social media or biased websites

Additional Key Information

1. Use the PPT provided (**Energy Use Trends: Canada and World**) to inform yourself and your students about the current global trends in energy use (see Part 1 in Activity).

2. In addition, here are some key quotes from [IEA report for Canada in 2022](#) about Canada's energy and emissions:

Canada already has one of the cleanest electricity systems in the world (led by hydropower), with over 83% of production from non-emitting sources, and aims to increase that to 90% by 2030.

The dominant role that hydroelectricity plays in several Canadian provinces, along with the fact that many hydro projects in Canada are large and have sizable reservoirs, will also significantly assist with the integration of variable generation, as wind and solar generation are poised for growth.

The role of nuclear energy is recognised as fundamental to achieving and sustaining Canada’s climate change goals and the technology is seen as a long-term source of baseload electricity supply.

Energy production and use in Canada accounts for over 80% of the country’s GHG emissions, with fuel combustion in energy industries (including oil and gas extraction, electricity and heat generation, and refining) representing 26%, transportation 26%, buildings 13%, manufacturing industries 9%, and fugitive emissions 7% of overall emissions. Canada’s electricity system is 83% non-emitting and among the cleanest in the world, with heavy dominance of hydropower as well as an important role for nuclear. Considerable variation in electricity generation profiles across jurisdictions means that increased interconnectivity across regions will be crucial to ensuring balanced progress across provinces and territories to meet national targets.

Improving the rate of energy technology innovation will be critical to enable the deep decarbonisation across sectors required to achieve net-zero emissions by 2050. To this end, Canada is actively advancing a number of technologies, most recently announcing additional support for carbon capture, utilisation, and storage (CCUS); hydrogen; and small nuclear small modular reactors (SMRs), with a view to serving as a supplier of energy and climate solutions to the world.

Source:

IEA. (2022). *Canada 2022: Executive Summary*. IEA: Paris. <https://www.iea.org/reports/canada-2022>, License: CC BY 4.0

Suggested materials:

- Student reflection journals
- Energy Use Trends: Canada and World PPT
- Energy Expo Research Notes worksheet
- Credible Sources Checklist
- Comparison Table for Energy Expo Participants

Opening

- 1. Concept brainstorm:** Start by writing on the board “renewable” and “non-renewable.” If your class is unfamiliar with these terms, you may wish to provide a definition or at least quickly brainstorm different sources of renewable energy. Are all renewable sources net zero? This is something to have your students ponder. (In short, the answer is ‘no’ — see biomass/biofuels).
- 2. Journal prompt:** In one minute, write down all the different ways you use energy in your typical day. Now look over that list. In the next 30 seconds, highlight which ones are from renewable sources and which are from non-renewable sources.
 - Option 1: Now, in the next minute, answer this question by writing or sharing: *If you had to reduce or give up some of the energy you consume, which ones would you choose and to what extent would you reduce?*
 - Option 2: Now imagine that you lived on this land 300 years ago (roughly 1720s — perhaps as an Indigenous person, a fur trader, or an early New France immigrant). What energy sources would you use in a typical day at this time and how do they compare to those of today?
- 3. Circle opportunity:** Allow each student to reflect and share one thought they had while doing this journaling exercise.

Activity

The activity in this lesson is divided into two parts and suggested to occur over two–four days.

1. Understanding global energy trends and transitions
2. Global Energy Exposition: See following activity framework on how to divide class, specific goals, timeline, & option

Part 1: Questioning and understanding global energy trends and transitions

Refer to **Energy Use Trends: Canada and World** PPT, where there are a few key graphs from Our World in Data, in order to guide understanding of the data, maps, and graphs and to encourage questioning. Our World in Data provides interactive graphs, and you are encouraged to share these graphs with students, ideally in an interactive way (either together through a presentation or as part of an individual activity). You may wish to explore the site and select your own graphs.

Main messages from the graphs in PPT

- » Global energy consumption is rising and has specific periods (biomass, coal, oil and gas growth, and now renewables).
- » Per capita, Canada is the largest energy consumer in the world.
- » Carbon dioxide levels have grown exponentially, and we’ll have to make swift action to reduce emissions to allow for only 2°C warming and even swifter action to maintain 1.5°C of warming.

- » Globally, there is a divide between energy-poor countries which do not meet their energy needs and those that do but produce too many emissions.

Part 2: Energy exposition

Now that students have an idea of some of the trends, they are going to put on an Energy Exposition (Expo). In small groups, students will take the roles of representatives from an energy company (dedicated to a specific power source). Students will then create some sort of visual/oral presentation to be featured in their expo booth to educate other participants about the reality of the industry and current trends. *Encourage students to be realistic and non-biased*, even though some industries are biased to protect their earnings.

Steps

- 1.Choosing energy sources and groups:** Separate students into groups of three/four and designate an energy source that they will research. Be sure to include a variety of non-renewable (oil, gas, coal, nuclear) and renewable energy sources (see Article 3 for definitions of safe-bet sources like wind, solar & hydro, as well as wild-card sources of energy such as small modular nuclear, geothermal, nuclear fusion, and green hydrogen) as well as others such as modern biofuels.
- 2.Researching and presenting:** Give students a class or two to find information on their energy type and its trends and to format their presentation (e.g., visuals on a poster or table work best, but a laptop screen could work if time is short). This topic is a great one for teaching about credible sources of information, as the energy industry includes some entrepreneurs and climate-science deniers who are biased and may be deliberately spreading disinformation to support their industry or beliefs.
 - **Worksheets:**
 - » Students can use the handout **Energy Expo Research Notes** worksheet to guide their research notes.
 - » Use the **Credible Sources Checklist** to guide students in finding credible and unbiased sources.
- 3.Presentation day:** Set up for the first few minutes of class; then have other classes come learn or have students alternate between sharing information and mingling and asking questions. This will take most of the class if you want to give time for all students to mingle and learn. Maybe provide some gentle ‘mood setting’ conference music? Snacks? Door prizes? Student presenters should have ‘breaks’ to mingle with other presenters to learn about each of the energy sources.
 - **Templates:** See **Comparison Table for Energy Expo Participants** for a fillable table for mingling students to compare each energy source.
- 4.Optional:** Provide an exit question or get students to vote on which energy sources they think will provide the greatest potential for the future.

Closing & Debriefing: Circle opportunity

Allow time for each student to reflect on the expo and reflect on the second part of this lesson’s overarching inquiry question: *Which energy sources should we be investing in for the future?*

Have students try drawing conclusions about the best sources of energy and how we should use energy (how much and in what way) to preserve a stable climate.

Extension Lesson: Energy Access, Autonomy, and Transition in Canadian Indigenous Communities

Background

As is outlined in one of the graphs from this lesson, energy use, although growing exponentially and contributing to the climate crisis through greenhouse gas emissions, is less accessible to many communities around the world, and there are many who are considered to be in [energy poverty](#).

In Canada, one way this inequity in energy access exists is through lack of access to reliable energy in remote communities. Many of the reserves for Indigenous people do not have access to the electrical grids of towns and and thus must be **self-sufficient**. Many still rely on diesel generators for their communities. For this reason and others such as the need for **energy sovereignty**, many communities are switching to renewable energy sources.

“There are currently 197 renewable energy projects associated with Indigenous communities in Canada, however very few are controlled by Indigenous communities.” ([Indigenous Climate Hub](#))

Terminology:

- **Energy self-sufficiency:** When a community or building does not need to buy, connect to, or import energy from an external company or electrical grid to meet its needs — especially important for remote communities that do not have an electrical grid.