



RECORD-SMASHING RENEWABLE ENERGY PROJECTS

ELEMENTARY RESOURCES



A wind farm near Crowsnest Pass, Alberta. Photo source: Danita Delimont, Getty Images.

BACKGROUND INFORMATION

- There are numerous different forms of renewable energy. Some of the most common forms currently used to generate the electricity we use every day are (phys.org):
 - **Solar:** Panels made up of crystalline silicon cells convert sunlight into electricity.
 - **Wind:** Windmills drive electricity-generating turbines.
 - **Hydroelectricity:** The pressure of running water—usually in large waterways like rivers—turns electricity-generating turbines.
 - **Geothermal:** The heat from magma streams or hot water springs beneath the earth is tapped to drive electricity-generating turbines.
 - **Wave or tidal:** The movement of the oceans—underwater currents, surface waves, or tides going in and out—is used to drive electricity-generating turbines.
 - **Biomass:** Energy from waste plant matter (such as wood chips or the unused plant parts from farm harvests) or animal waste. The material is burned using clean-burning technology that produces minimal greenhouse gas emissions, or it is broken down through other processes like anaerobic digestion, which uses bacteria.

The heat produced by the process is used to generate electricity.

- Canada is the third-largest producer of hydroelectric energy in the world. More than 59 per cent of the electricity generated in Canada comes from our waterways. ([Natural Resources Canada](http://NaturalResourcesCanada))
- Wind energy currently produces about five per cent of Canada's electricity—around 10,000 megawatts, which is enough power for three million homes. ([Canadian Wind Energy Association](http://CanadianWindEnergyAssociation))
- Biomass is Canada's third largest source of renewable energy. Approximately 1.3 per cent of Canadian electricity is generated this way. ([Natural Resources Canada](http://NaturalResourcesCanada))
- Roughly 12 per cent of Canada's electricity is still generated from burning coal, a non-renewable resource. Alberta, Saskatchewan and Nova Scotia produce over half their electricity from coal. Burning coal is a major contributor to climate change-causing greenhouse gas emissions. ([Canadian Encyclopedia](http://CanadianEncyclopedia))
- Approximately 15 per cent of Canada's electricity is generated by nuclear power. ([World Nuclear Association](http://WorldNuclearAssociation))

NOTE TO EDUCATORS

The following activities are designed to stimulate a current events discussion. Generative in nature, these questions can be a launching point for additional assignments or research projects.

Teachers are encouraged to adapt these activities to meet the contextual needs of their classroom.

In some cases, reading the article with students may be appropriate, coupled with reviewing the information sheet to further explore the concepts and contexts being discussed. From here, teachers can select from the questions provided below. The activity is structured to introduce students to the issues, then allow them to explore and apply their learnings. Students are encouraged to further reflect on the issues.

Core Skill Sets:



These icons identify the most relevant core skills students will develop using this resource. Learn more about the WE.org Learning Framework at www.weday.com/weschools.

KEY TERMS

Renewable energy—Electricity created from a source (e.g. water, wind, sunshine) that is not depleted when it is used.

Energy farm (E.g. solar farm or wind farm)—A facility that creates energy using a large number of electricity-generating devices such as solar panels or wind turbines that are all clustered in one location.

Watt—A unit of measurement for the transfer of energy, or conversion of energy from one form to another. A megawatt is one million watts. A gigawatt is one billion watts.

THEMES AND COURSE CONNECTIONS

- **Themes:** Environment, Global Issues, Socially Conscious Living, Technology, Team Building
- **Course Connections:** Language, Science, Social Studies, The Arts

MATERIALS

- Front board
- Student journals or note paper
- Writing utensils

SPECIFIC EXPECTATIONS AND LEARNING GOALS

Students will:

- Develop and express responses to issues and problems
- Reassess their responses to issues on the basis of new information
- Participate in active group work and class discussions
- Communicate effectively in writing, orally or visually
- Demonstrate the ability to think critically
- Develop, express and defend a position on an issue

MAP IT

Have students locate the different regions mentioned in the article to gain an understanding of the expanse and involvement of this issue.

- Australia
- Canada
- China
- Kenya
- Morocco
- Pakistan
- U.K.

DISCUSS

1. Do you think our energy demands are sustainable? Why or why not? Do you think it is possible to get our future energy from sources we don't know of yet? If so, what might be some examples of energy source we have yet to think of?
2. List the places mentioned in the Global Voices article where renewable energy sources are being used and locate them on a world map. Are you familiar with other renewable energy projects? If so, please share. (E.g., Niagara Falls hydro, wind farms in PEI, etc.)
3. What do you think the world would look like if we used only clean energies? What do you think low energy houses of the future will be like? How might the technology used be different across the country? How might it differ seasonally?

DIVE DEEPER

Begin by providing students with an introduction to types of energy. Explain that everything we do is connected to energy in one form or another. We cannot always see energy, touch it or hold it but energy is everywhere. Energy takes many forms including, but not limited to: *Thermal energy* (or heat) boils water, keeps us warm and drives engines. *Chemical energy* fuels automobiles and airplanes. *Caloric energy* fuels our bodies. *Electrical energy* drives many small machines and keeps lights glowing. Energy is essentially the ability to do work and perform tasks and all the energy we use comes from the Earth's natural resources.

Electricity is generated by using energy from natural resources, like coal or natural gas. The burning of coal, oil or gas, also known as "fossil fuels," are the most common natural resources used to generate electricity. The problem is that fossil fuels can't be replaced and are harm as they pollute the environment.

Source: www.energyquest.ca.gov/

Write the term "Renewable Energy" on the board.

Ask students to share examples of what they think renewable energy means. Write their examples and/or thoughts on the board to create a large word web.

Inform students that renewable resources refers to the natural resources that can be replenished in a short period of time. Renewable energy is naturally occurring since it is made from resources that can be used without needing to be replaced like wind, water and sunshine. Renewable energy is also "clean" or "green" energy because it does not pollute the air or harm the environment.

Source: www.energyquest.ca.gov/

Hold a class discussion with the following questions:

- How do fossil fuels and other non-renewable resources affect our environment?
- Do you think solar power plants, wind farms and thermal energy will solve our future energy needs? Why or why not?
- As the world modernizes how will the demand for energy increase in the future? How will the increase be managed? Explain.
- What are the environmental benefits of renewable energy?

Organize the class into groups of 3 to 4 students. Ask students to imagine what present day would be like if there were no electricity. Have them choose one of the following activities to depict a day without electricity:

- As a group students can develop a timeline to describe what a typical day without electricity might look like.
- As a group students can create a storyboard (comic book panels) by drawing what a typical day without electricity might look like. Small captions can be included.

To help facilitate the activity give students a few tips:

- Consider how you would feel and what you would do
- Separate parts of the day (morning, afternoon, evening, night)
- Is it a day during the week or weekend?

Give students 10-15 minutes to brainstorm their ideas and another 20-25 minutes to complete the task. Place the necessary materials in the centre of the classroom to provide easy access to materials while they are working.

Once each group has completed the task have them take turns presenting. To complete the lesson, ask students to cut out a circle and draw continents to represent Earth. Have them write or describe in the outline one way they will help conserve energy. Collect their write-up and display them on a wall.