The Eco-Energy Squad

Reporter's Notebook

Student: _____

Teacher: _____

School: _____

Class number: _____

Learning about energy
and the environment!

Hydro Québec

E² at a Glance

Emma Erwin

Investigative Reporter

Ethan Everett

Reporter stuck in the Tundra

Elliott Evans

Disorganized Anchorman

We All Use Energy!

Your investigation

You may forget it sometimes, but your whole life depends on energy! First, there's the energy your body uses to breathe, to think, to see and to move. That energy comes mainly from the food you eat, which your body digests and processes.

But there's also the energy we use every day to make our lives easier and more comfortable. Modern societies get that energy from two main sources: electricity and fossil fuels.

→ Want to find out more about these forms of energy? One, two, three, play!

1) Match day-to-day activities with the form of energy used.

2) Play the miming game and see how things have changed since electricity was first discovered.

Notes on Fossil Fuels

Definition of fossil fuels

Fossil fuels are called "fuels" because they can burn.

They are referred to as "fossil" because they form deep in the ground over tens of millions of years through the decomposition of organic matter from plants or animals.

Examples of fossil fuels

Oil (also called "petroleum"), coal and natural gas are examples of fossil fuels. Gasoline and fuel oil (heating oil) are oil by-products.

Matching Game

→ **Write the correct letter under each illustration**

A) Things that use electricity
B) Things that use fossil fuels
C) None of the above

Miming

Activity:

→ **The main differences between *now* and *before* electricity was discovered:**

Investigation 2

The Planet's in Trouble!

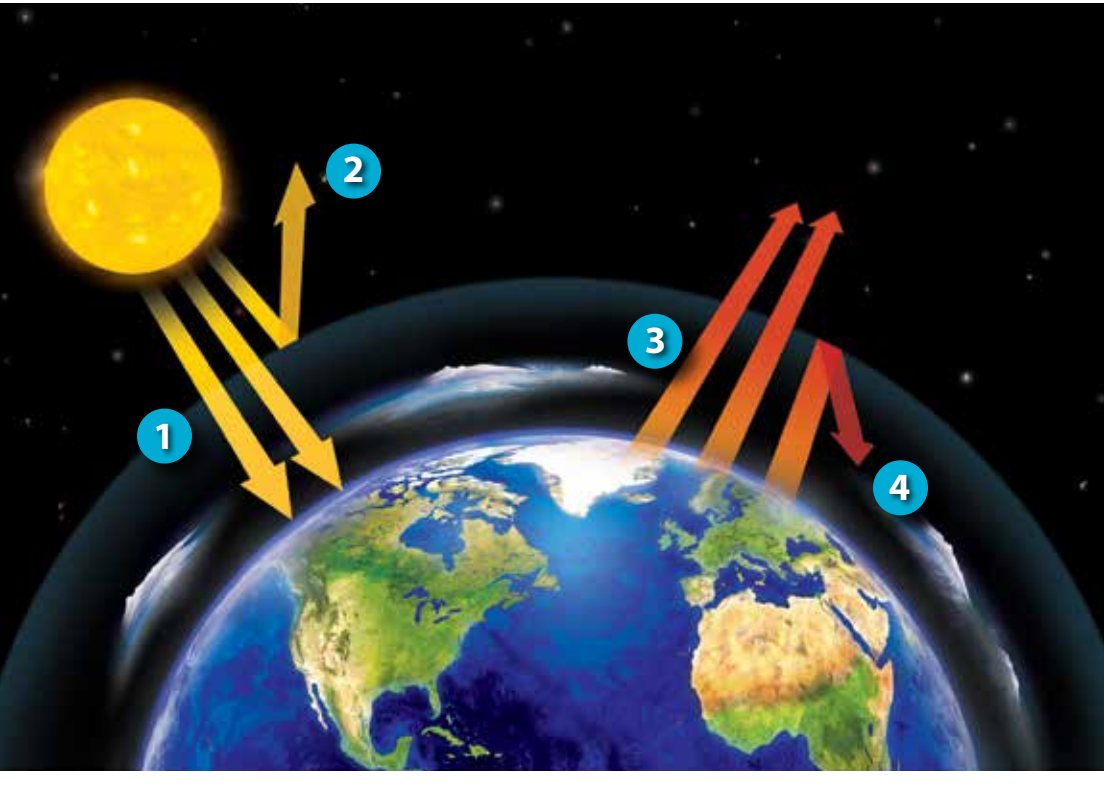
Your investigation

Using energy has a big impact on the environment. In addition to producing air and water pollution, it can contribute to the greenhouse effect and global warming.

→ Read the e-mail from Ethan Everett and an article from the *Planet Express!* newspaper to learn more.

After reading them carefully, answer the questions on pages 9 and 10.

Illustration of the Greenhouse Effect



1. Solar energy passes through the atmosphere.
2. Some of the energy is reflected back out to space.
3. Earth's surface is heated by the rays and radiates the heat back out to space.
4. Greenhouse gases in the atmosphere trap some of the heat.

In Québec, cars are the main source of greenhouse gas emissions, followed closely by industry and heating with natural gas and fuel oil.

Source: *www.msc.ec.gc.ca/education/scienceofclimatechange/understanding/greenhouse_gases/images/fig1_e.html*

The Impact of Human Activity on the Environment

Use the article you read in *Planet Express!* to answer the following questions.

Subject of article:

Characters and location:

Is the impact related to global warming?

❒ Yes ❒ No

According to the article, the affected aspects of the environment are:

❒ Human health ❒ Ground

❒ Lifestyle ❒ Air

❒ Animal life ❒ Water

❒ Plant life

Summarize the environmental impact described in the article.

Report Guidelines

1. Assign roles

- A TV anchor who sits in the studio
- A reporter in the field
- An interviewee
- An eyewitness or eyewitnesses

2. Prepare and present your report

The anchor:

- Introduces the subject
- Names the people involved and shows where the country is located on the world map
- Invites viewers to listen to the field report

The reporter:

- Describes the issue
- Tells viewers he or she has met with one of the people mentioned in the article, and introduces him or her
- Asks the interviewee questions about the environmental impact

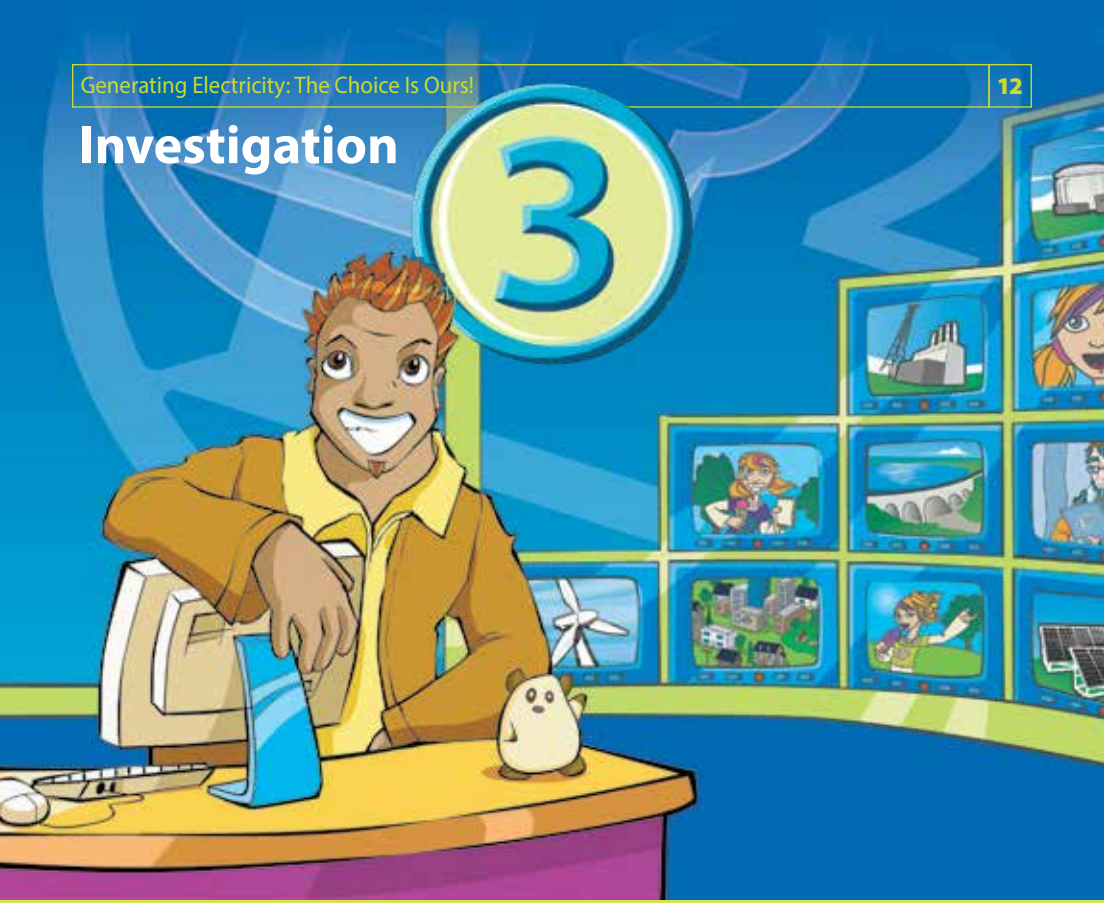
The interviewee:

- Speaks about the impact on him- or herself and the environment

The eyewitness:

- Describes what he or she experienced, saw or heard

Investigation 3

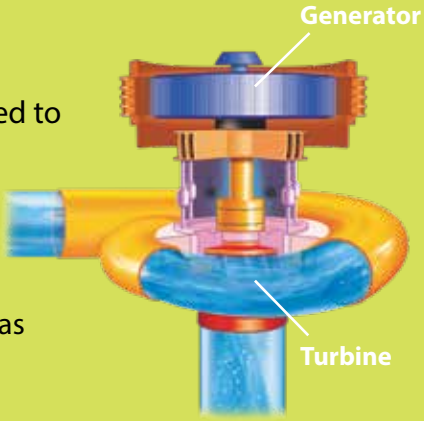


Generating Electricity: The Choice Is Ours!

Your investigation

The most common way of producing electricity is to drive a turbine connected to a generator. Various forces can be used to drive the turbine, including:

- falling water
- steam pressure produced by water heated using fossil fuels (oil, natural gas or coal) or nuclear fission



The term "power source" refers to the various **sources** of a specific form of energy and the **means** used to generate, transmit and use that energy.

There are currently five major power sources in the world: fossil fuels, hydroelectricity, nuclear power, solar power and wind power.

To assess the **strengths** and **weaknesses** of each power source, we have to ask the following questions:

- How available is the resource in question?
- How much does it cost to generate electricity?
- What is the environmental impact?
- Is the resource renewable?

→ Elliot Evans has invited you to play The Great E^2 Challenge to learn more. The game will help you evaluate the strengths and weaknesses of the main power sources used to generate electricity.

1) Read the definitions of the power sources and evaluation criteria on pp. 14 and 15 of your Reporter's Notebook carefully.

2) Play The Great E^2 Challenge and evaluate the power sources by placing the markers in the right spots on the game board.

The Five Main Power Sources Used to Generate Electricity

Power source	To generate electricity, this power source uses:
 Hydroelectricity	the force of falling water
 Wind Power	the force of blowing wind
 Nuclear Power	the force of the steam produced by water heated by nuclear fission
 Fossil Fuels	the force of the steam produced by water heated by burning oil, coal or natural gas
 Solar Power	energy from the sun

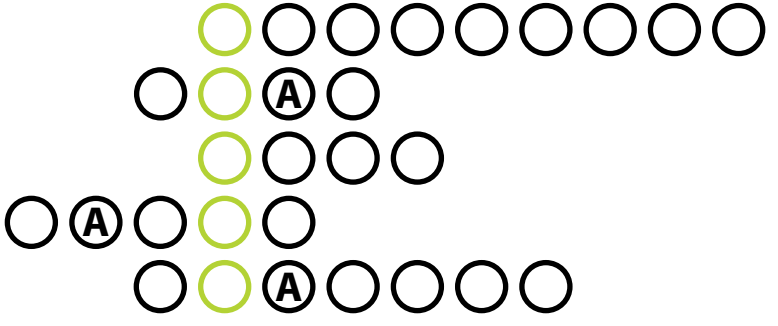
Criteria for Evaluating Power Source Strengths and Weaknesses

Criterion	Description
 **Availability**	Is the power source able to provide the required *quantity* of energy *when* the need arises? *Currently, some power sources cannot produce enough energy to meet people's needs when they arise. In the evenings, for example, when people make dinner, watch TV and do the laundry, electricity consumption is particularly high.*
 **Cost**	Can the power source be used to generate electricity at a reasonable price? *Our choice of power source has to take account of generating costs, which depend on the cost of the resource itself, the equipment used, the transportation involved and operating costs. These costs can vary over time.*
 **Environmental Impact**	Does using the power source harm the environment? *Some power sources have only minor repercussions on the environment, while others are serious threats.*
 **Renewability**	Is the resource at risk of being used up? *Some power sources involve resources that are non-renewable. One day, there won't be any left.*

The Resource Game

In the horizontal lines below, you'll find five resources used to produce …
The missing word is hidden in the green column.

*To give you a head start, we've given you all the **A**'s.*



Power Source Evaluation Table

At the end of the game, reproduce the results of your "Great E^2 Challenge" power source evaluation below.

	Availability	Cost	Environmental Impact	Renewability
Hydroelectricity				
Wind Power				
Nuclear Power				
Fossil Fuels				
Solar Power				

In your opinion, which of these power sources are least harmful for the environment?

Power Sources Used Around the World

The following table shows the power sources used to generate electricity in various countries in 2002.

	Fossil Fuels	Hydro-electricity	Nuclear Power	Other Renewable Energies
Africa				
Algeria	98.78%	0.22%	0%	0%
Democratic Republic of the Congo	0.34%	99.66%	0%	0%
Egypt	82.76%	0%	16.96%	0.27%
South Africa	92.90%	1.15%	5.83%	0.12%
Asia				
China	80.94%	17.31%	1.60%	0.15%
India	84.86%	11.26%	3.15%	0.73%
Japan	62.39%	7.87%	27.05%	2.69%
Saudi Arabia	100%	0%	0%	0%
Vietnam	47.87%	52.13%	0%	0%
Europe				
Denmark	80.62%	0.08%	0%	19.30%
France	9.27%	11.33%	78.42%	0.98%
Germany	62.26%	4.17%	28.54%	5.03%
Norway	0.40%	99.31%	0%	0.29%
Russia	64.14%	20.64%	14.86%	0.36%
Spain	58.60%	9.91%	26.02%	5.47%

	Fossil Fuels	Hydro-electricity	Nuclear Power	Other Renewable Energies
North America				
Canada	26.65%	59.67%	13.36%	1.45%
Québec	**0.96%**	**96.68%**	**2.27%**	**0.09%**
Mexico	80.57%	12.13%	4.55%	2.75%
United States	70.60%	6.84%	20.17%	2.39%
Oceania				
Australia	91.24%	7.48%	0%	1.27%
New Zealand	28.01%	61.98%	0%	10.01%
South America				
Argentina	48.06%	43.78%	6.64%	1.52%
Brazil	9.39%	82.09%	4.42%	4.10%

Notes:

Fossil fuels: coal, natural gas and oil

Hydroelectricity: water

Nuclear power: uranium

Other renewable energies: solar power (sun), wind power (wind), geothermal power (Earth's heat), biomass (organic matter) and tidal power

Sources:

The World Factbook 2007,
CIA, US Government

Annual Energy Outlook 2006,
Energy Information Administration,
Department of Energy, US Government

Human Development Report 2006,
United Nations Development Programme (UNDP)

Kyoto Protocol
Entry into force: February 2005

Riddles
Power Sources

Use the following clues to find the hidden power sources, piece by piece.

My first is the opposite of old.
And my second is something you grasp right away.

My whole is a power source _____

My first is the underside of your new running shoe.
And my second means "is" when you're not one, but two.

My whole is a power source _____

My first is a warm, friendly greeting you say.
When you first feel my second, you head indoors to play.
And there are always 24 of my third in a day.

My whole is a power source _____

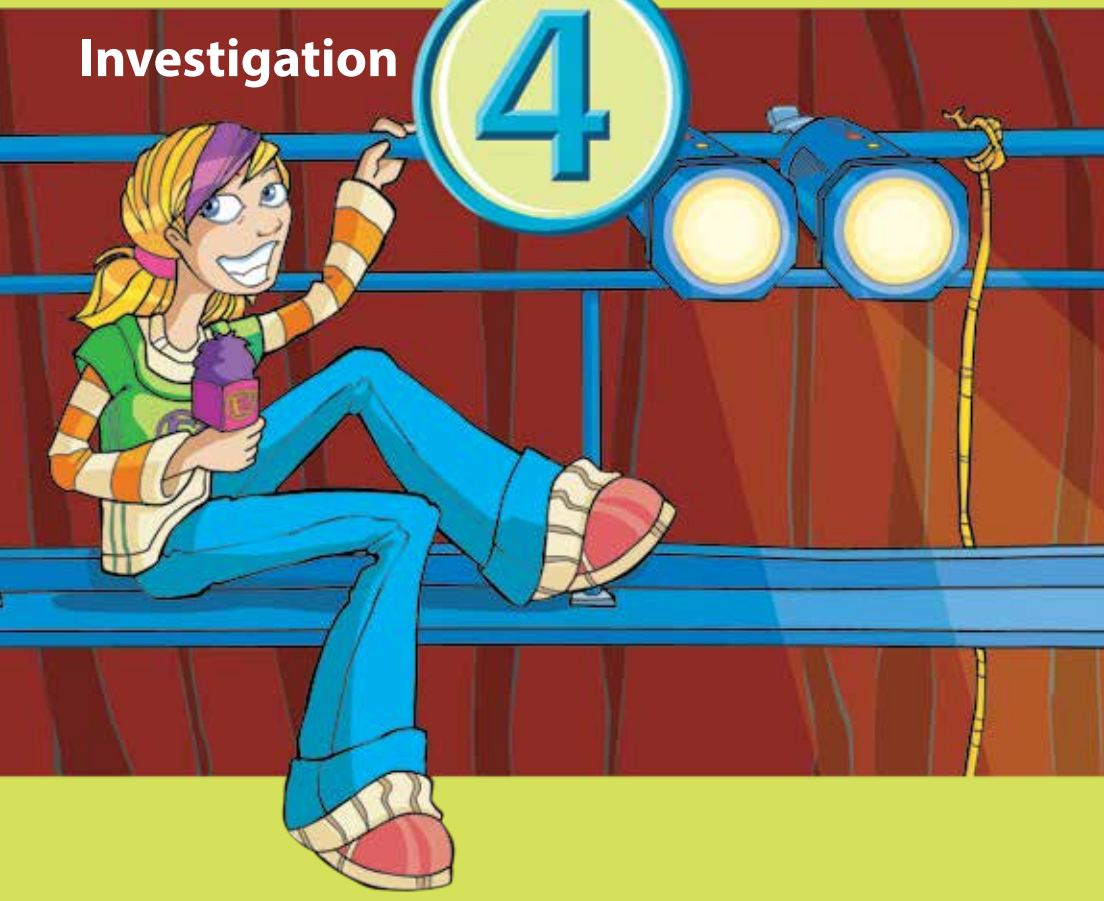
My first is the note following do, re and mi.
My second sits between r and t.
My third describes someone who's sick as can be.
My fourth comes along after c, d and e.
My fifth is a pronoun that's the opposite of "me."
And my sixth is a consonant you'll find in "lily".

My whole is a power source _____

My first is a verb that's better than "lose."
My second's a consonant that begins the word "dues."
My third is the sound of a punch that leaves a bruise.
And my fourth is my second of Riddle no. 2!

My whole is a power source _____

Investigation 4



Gustville: Looking for the Perfect Solution!

Your investigation

Emma Erwin has got some inside information about four scenarios under consideration to meet Gustville's energy needs.

→ Elliott Evans has asked you to analyze the scenarios using the Power Source Evaluation Table in Investigation 3 (p. 17 of your Reporter's Notebook).

Determine which power source or combination of power sources Enercorp International should choose.

Analysis of Four Energy Scenarios for Gustville

Answer the following questions about the four energy scenarios, using the Power Source Evaluation Table in Investigation 3.

Which scenario did you choose?

Why did you choose that scenario?

Illustrate your choice on the map.

Solutions for Saving Energy

Make a note of the ways that you and your teammates found to save energy.

1)

2)

3)

4)

5)

6)

7)

8)

9)

Investigation 5

Everyone Gets a Say!

Your investigation

Enercorp International has decided to go ahead with its energy development project and is in the process of organizing public consultations.

Public consultations are an opportunity to present the project, listen to citizens' concerns and answer their questions. Whenever possible, solutions are found to mitigate the project's negative effects on the environment.

Emma Erwin has invited you to take a quiz on public consultations to learn more about how they work.

Citizens' Concerns and Solutions

What purpose do public consultations serve?

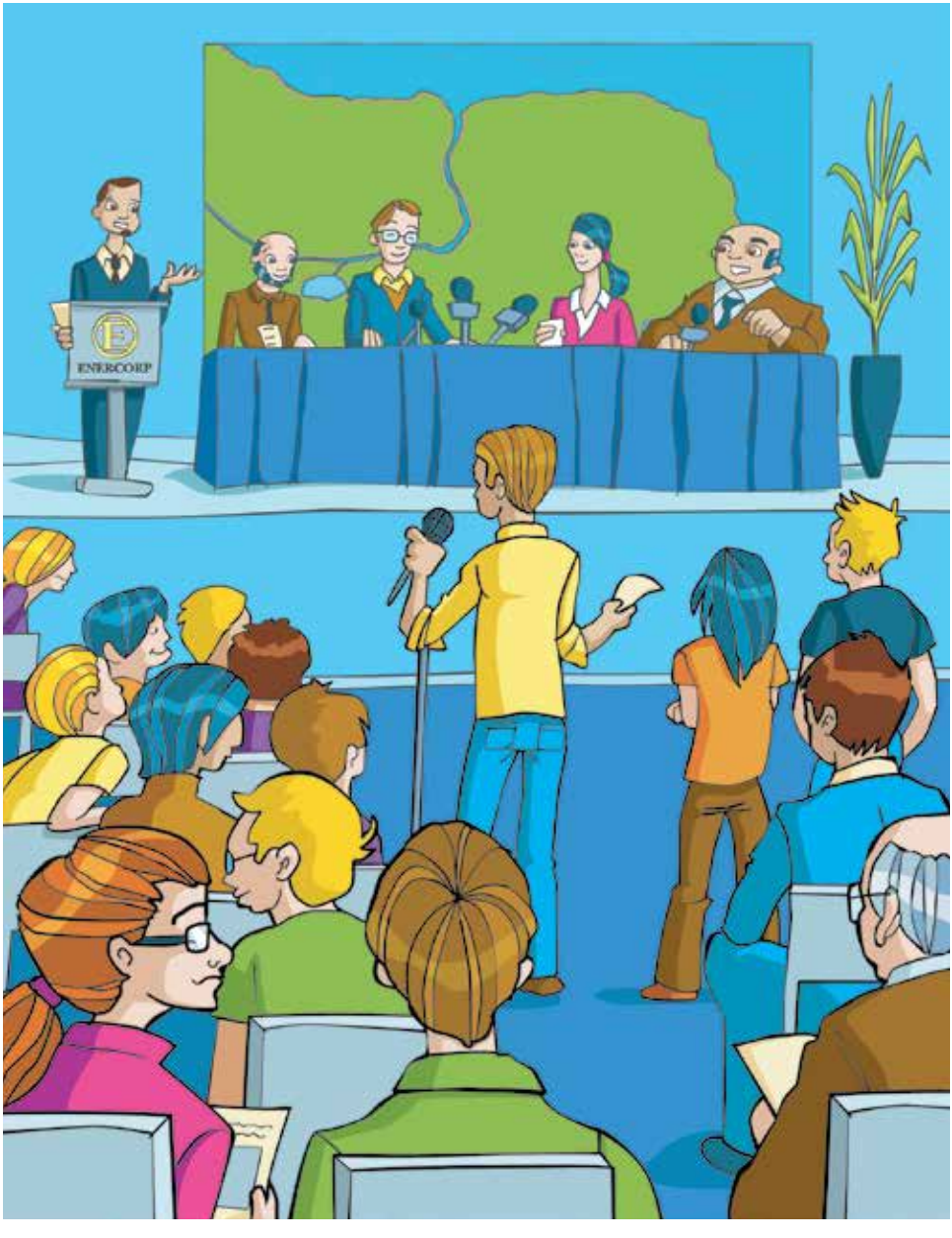
- Present the energy project
- Listen to citizens' concerns
- Answer their questions
- Announce or find solutions that help mitigate the project's impact on people and the environment

Who attends them?

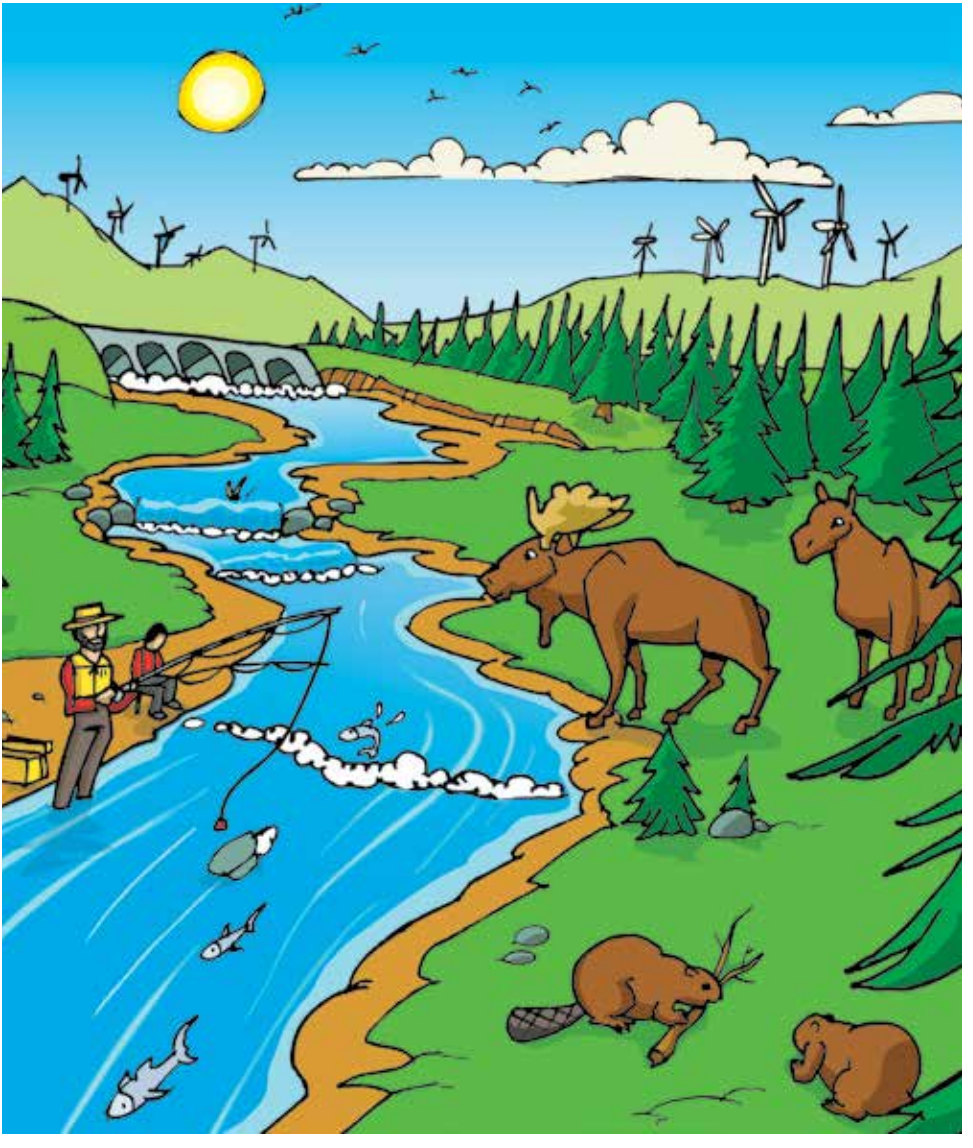
- Representatives of project developers
- Ordinary citizens
- Residents (people who live in the area)
- Vacationers (people who have a cottage and spend their vacations in the area)
- Business people
- Environmentalists
- Hunters and fishers
- Municipal officials
- Farmers
- Nature lovers
- Representatives of Aboriginal people, etc.

The Public Consultation

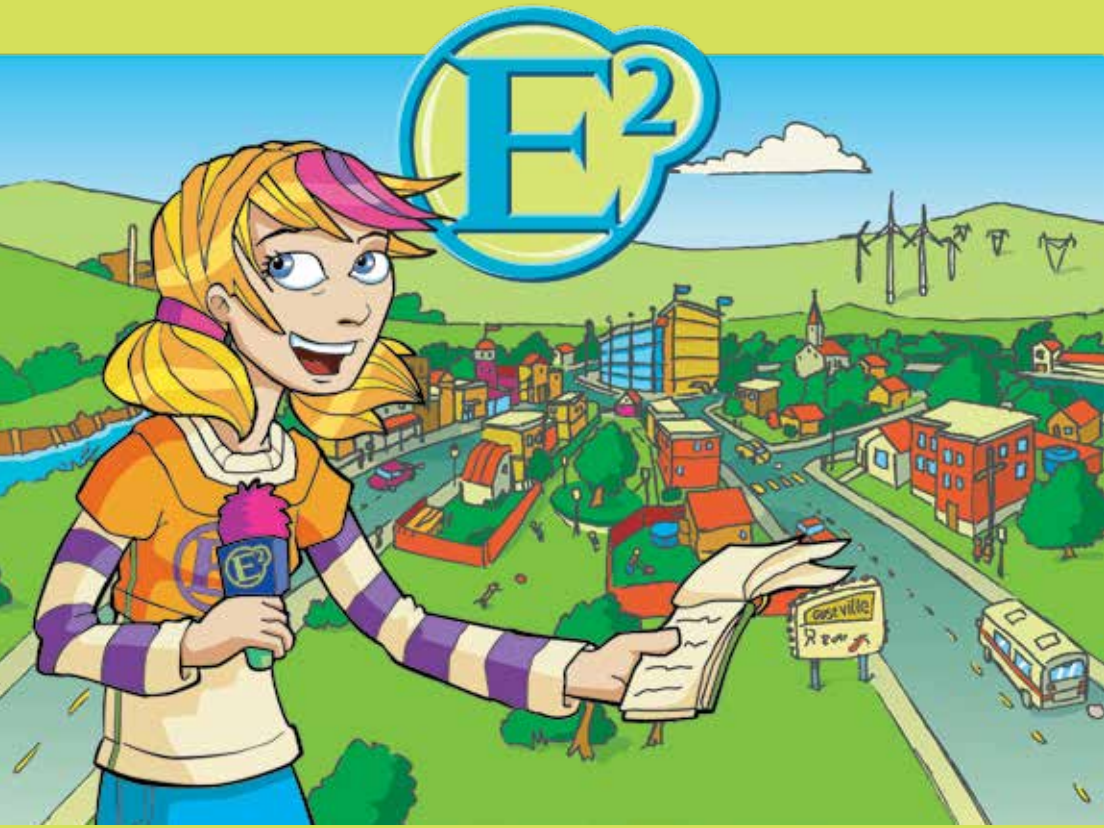
A new project for the Gustville community



Enercorp International's project in the Gustville environment



What would *your* question be?



The E² Special Report

Your last mission

You've learned a lot about energy and the environment. Now it's time to put it all together.

→ Elliot Evans has invited you to produce a special report to try to answer the following question: **How can we use energy without jeopardizing the planet?**

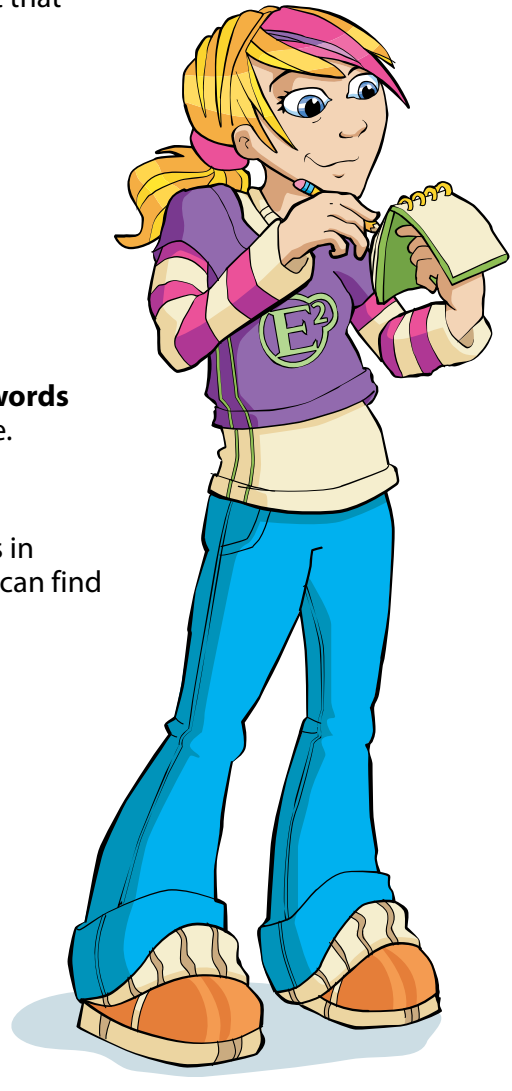
Your job is to find some solutions!

Producing a Report on Energy and the Environment

Your last mission

It's time to produce a written report that answers the following question:

How can we use energy without jeopardizing the planet?



Your report must meet the following criteria:

- It must include an **interview**.
- Your report must be about **250 words** long, or one double-spaced page.

For a helping hand, follow the steps in the **Reporter's Manual**, which you can find in the next few pages.

Reporter's Manual

1. Choose your information sources

- Refer to the reporting plan on the next page.
- Find information sources for each point you cover.
- Use the notes you took during each investigation.
- Use other sources, like dictionaries, encyclopedias, the Internet (especially Hydro-Québec's site), newspaper and magazine articles, and interviews with friends, teachers, parents and experts.

Reporting Plan

→ **Title**

Find a compelling *title,* a short phrase that tells the reader what your report is about.

→ **Introduction**

Write a paragraph that presents your topic and the points you are going to cover in the *development* section.

→ **Development**

Write one paragraph for each point you want to cover.

Here are three points you could write about:

- the reasons why we use energy
- the impact of using energy on the planet and its inhabitants
- possible ways to preserve the environment

You can add a subtitle in bold above every paragraph to identify your subject.

→ **Conclusion**

Write a final paragraph that summarizes the content of your report and expresses your own opinion on the topic.

2. Gather new information

- Collect new information and organize it under each section of your plan as you go.
- Look for useful pictures, photos or illustrations and keep them with your report.
- Prepare your interview questions.
- Conduct an interview with the individual of your choice (you will have to explain why you chose that particular person).
- Use ideas from your readings and the most interesting excerpts from what your interviewee(s) had to say.
- Don't forget to write down where all the information you gather comes from (titles and page numbers of documents, Web site addresses, names of people, and so on).

3. Write your report

Here are a few tips:

- Rephrase the information you collect in your own words.
- If you use direct quotes or excerpts from other sources, put them in quotation marks and indicate the source.
- Combine the information you have gathered into a meaningful structure.
- Write short, energetic sentences and use simple words.
- Pay attention to your punctuation.
- If you're using photos or illustrations, insert them in the proper place. You could also make a drawing, scan it and insert it into your report.

4. Revise your report

Make sure that:

- The report sticks to the plan you developed.
- You have provided sufficient information to make your point.
- The connections between ideas are clear.
- Your report is consistent and follows a logical order.
- Your readers will understand the words you used.

5. Proofread your report

Make sure that:

- Every word is spelled correctly.
- All verbs are in the appropriate tense.
- Your sentences are well structured.
- Your punctuation is correct.

Glossary

Dam
A barrier constructed across the bed of a waterway to prevent the flow of water. In the case of a hydroelectric generating station, a dam also creates a vertical drop or channels water through a vertical drop, driving the turbines.

Dike
A bank of earth or a barrier built around a reservoir or along a waterway to hold back water.

Environmentalist
A person concerned with protecting and preserving the environment.

Flooding
The act of permanently inundating a piece of land, such as a valley following the creation of a reservoir.

Fossil fuel
Any fuel formed in the earth by the decomposition of plant and animal matter over millions of years. The main fossil fuels are oil, coal and natural gas.

Generating station
A power plant equipped with the facilities required to produce electricity.

Global warming
An increase in the average temperature of the Earth's surface as a result of the rising concentration of greenhouse gases in the atmosphere.

Green energy
A source of energy that has only a small impact on the environment.

Greenhouse effect
A warming of the atmosphere caused by the presence of certain gases (commonly called "greenhouse gases"), which trap heat like the glass roof in a greenhouse. The main greenhouse gases (GHGs) are water vapor, carbon dioxide and methane.

Hydro pole
A pole supporting an overhead power line.

Hydroelectric power plant
A power plant that harnesses the energy of water to generate electricity.

Nuclear power plant
A power plant that harnesses the energy of nuclear fission to generate electricity.

Power source
The various sources of a specific form of energy and the means used to generate, transmit and use that energy.

Renewable energy
A source of energy that is naturally and indefinitely renewed or regenerated.

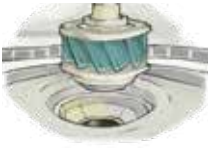
Structure
Any device (hydro pole, tower, etc.) that holds or supports an overhead power line.

Thermal power plant
A power plant that burns fossil fuels to generate electricity.

Tower
A large metal structure that supports the wires of a high-voltage power line.

Transformer
A device used to drop or boost voltage.

Turbine
A machine that transmits the mechanical energy of a fluid (water, compressed gas, steam, etc.) to the generator, driving the rotor and producing electricity.



Watthour
A unit used to measure electrical energy.

Wind power plant
A power plant that harnesses the energy of wind to generate electricity.

Find out more at:
www.hydroquebec.com/terminologie/index.html
www.hydroquebec.com/learning/index.html

Notes