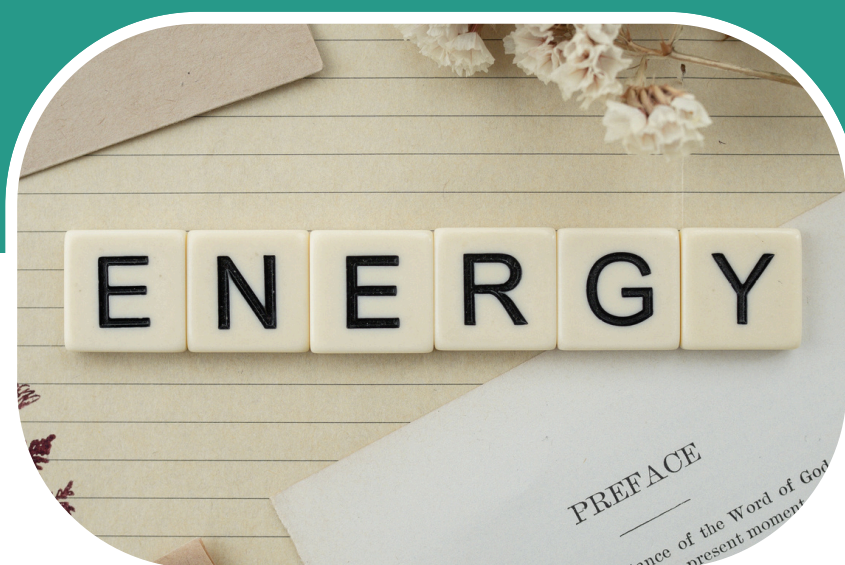


Climate Champions: Energy Revealed

Energy Education Activities
Grades 3-8



*The binder and kit are made possible through the generous support of
TD Friends of the Environment Foundation*



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Introduction

The ***Climate Champions: Energy Revealed Education Activities for Grades 3-8*** is designed to be used in combination with the ***Climate Champions: Energy Revealed Education Kit***.

The following activities were selected from over 30 lessons in GreenLearning's award-winning Energy Revealed program, which explores ways to make energy visible in schools and at home. This program features a suite of free activities, videos and digital tools to turn your learners into future energy managers!

Whether learners are using installed energy metering technology, plug-in energy metering technology, such as handheld watt meters, or no technology at all, Energy Revealed will help learners become energy efficiency experts. After completing the following activities with your learners, we encourage you to [register for GreenLearning's Energy Revealed Challenge](#). This challenge tasks students with either hosting an Energy Out Event or completing an Energy Investigation. Educators can submit the actions and energy savings plan for their chance to win up to \$1,000 in the Energy Revealed Challenge and be recognized for their work on GreenLearning's website.

For more free lessons, videos and digital tools relating to energy efficiency and climate action, please visit <https://programs.greenlearning.ca/energy-revealed-juniors>.

If you have any questions throughout your learning, please do not hesitate to contact us by email.

We look forward to seeing your work in the Energy Revealed Challenge,

The GreenLearning Team
programs@greenlearning.ca

Educator Guide

The following binder outlines 6 activities, complete with **lesson plans, backgrounders and handouts** you can use to guide students through their energy learning. The watt meters provided in the Climate Champions: Energy Revealed Education Kit can be used in addition to or in place of energy metering technology throughout the activities.

In addition to the lessons provided, you can check out over 30 activities available for grades 3-8 at <https://programs.greenlearning.ca/energy-revealed-juniors>. Once you have completed the learning, we encourage you to take our environmental challenge: Energy Revealed and host either an **Energy Out Event or complete an Energy Investigation**.

Make sure to check out <https://greenlearning.ca/webinars-events> to keep up to date on all of our free, virtual professional development opportunities. There, you can also view recordings of past energy sessions, which are available anytime.

As part of the Climate Champions program you may have signed up to participate in one of our live "Speak for the Trees" workshops. If you are using this binder outside of that program and would like to begin exploring energy efficiency with your learners, you can visit <https://greenlearning.ca/webinars-events> to participate in a free, pre-recorded classroom workshop titled "Speak for the Trees." This session can be used to kick off your energy unit by guiding you and your learners through key energy concepts and terms in a fun, engaging and interactive 45-minute session.

All materials in this binder are available in digital format at greenlearning.ca.

What are you waiting for? Let's conserve energy!

Activity 1:

Extra Energy Investigation



Objectives: Learners will investigate the energy usage of an identified device in the school they don't normally think about. Note: if you are using circuit level energy metering technology you will need to make sure it is monitoring the desired device for this activity.

Learning Outcomes: By the end of this activity, learners will:

- Use circuit level metering technology to understand the energy usage of a device in their school they don't normally think about.

Materials: Installed Energy Metering Technology

Curriculum Connections: <https://programs.greenlearning.ca/canada-curriculum-connections>

Time: 2.5 - 5 hours

Activity

Step 1:

- Log into the energy metering technology software and discuss the energy being used in that area.
- Have learners think about the different types of energy being used in the monitored areas that you don't normally think about and create a list of these things to increase energy use awareness.

Activity 1: Extra Energy Investigation

- For example, think of the hand dryers in the bathrooms, vending machines, etc.

Step 2:

- Take a look at the list of the items the class brainstormed and see which ones are being monitored by the technology. Discuss as a class which one you would like to investigate.

Step 3:

- Discuss how you want to investigate the chosen electrical device's energy use.
- Then, decide how you are going to test the electrical device.
- For example, are you going to look at the device's use throughout a day, week etc.?

Step 4:

- Research that electrical device and come up with some ideas for what would be considered an energy efficient example of the identified electrical device.
- For example, what would be considered an energy efficient vending machine?
- Record the data as discussed to get an idea of the energy use of the device.

Note: When you are recording the data make sure your graph is at a scale where you can see the difference in energy.

Extension Activities

- Research the difference between electric hand dryers and paper towel. Which ones do you think are the most energy efficient (take into consideration the energy it takes to produce the paper towels)?
- Senior level learners can research life cycle impacts of products, highlighting concepts like embedded energy (energy going into production of a good) and environmental impacts, such as the impact of paper towel waste on land use

Activity 2: Total Energy vs Total Cost



Objective: Learners will calculate how much energy an identified object expends.

Learning Outcomes:

By the end of this activity, learners will:

- Investigate and describe relationships between humans and their environments, and identify related issues and scientific questions.
- Analyze personal and public decisions that involve consideration of environmental impacts, and identify needs for scientific knowledge that can inform those decisions.

Materials:

- Laptop
- Plug in or Circuit level Energy Metering Technology
- Copies of the 'Total Energy vs Total Cost' Worksheet

Curriculum Connections: <https://programs.greenlearning.ca/canada-curriculum-connections>

Time: 2 - 3 hours

Activity 2: Total Energy vs Total Cost

Activity

Step 1:

- Think about an area in the school with electrical devices that you would like your learners to focus on. If you have circuit level energy metering technology an area that is being monitored would be ideal.
- Once you have identified the space ask your learners to make a list of the electrical devices in that chosen area.
- Have learners take a look at their list and decide which one specific device they would like to focus on

Step 2:

- Have learners determine the number of watts their device uses, this can be done using your circuit level energy meter technology, or by using plug in energy meters. Alternatively, learners can look up the wattage online.

Step 3:

- Next, calculate the device's watt hours. To do this, the learners will want to multiply the unit's wattage by the number of hours they use it. By doing this they will find the watt hours of energy used each day.

E.g., A typical laptop uses 50 watts when in use. If you use it for 5 hours a day the total number of watt hours is 250. (50 watts x 5 hours = 250 watt hours).

Step 4:

- The next step is to convert the watt hours to kilowatt hours. To do this, simply divide the watt hours by 1000.

E.g., $250/1000 = 0.25$ kWh per day.

Step 5:

- Now they will want to calculate usage over a month to find out the cost (since electric bills are based on monthly usage). Simply take the kWh per day and multiply them by 20 school days in a month.

For our example, that would be $0.25 \text{ kWh per day} \times 20 \text{ days} = 5 \text{ kWh per month}$.

Activity 2: Total Energy vs Total Cost

Step 6:

- The last step is to figure out the cost. To do this you will have to figure out how much the school is being charged a kWh. This will depend on your energy provider, but for this example let's say it's 9.79 cents/kWh (based on Enmax's fixed rate for 2024). To get the cost, you take your total and multiply it by the energy cost.

For our example that would be $5\text{kWh} \times \$0.0979 = \0.49

Step 7:

- Calculate the number of kilograms of GHGs produced in one year by using the formula: $a \text{ kWh} \times b \text{ kg CO}_2\text{e/kWh} = c \text{ kg CO}_2\text{e}$. Note – b in this case is 0.82 for Alberta. This is known as the emission factor.

Note – You can also use GreenLearning's Electrical Energy Calculator to help calculate the kilowatt hours used in one year, the cost of electricity in one year, and the amount of GHGs produced in one year for all provinces and territories.

Activity 2: Total Energy vs Total Cost



Worksheet

Name: _____

Observed Device

My chosen device to investigate:

Watts my device uses:

of watt-hours my device uses:

of kWh my device uses:

of kWh per month my device uses:

of kgs GHGs my device produces:

Activity 3:

Energy Efficient Lighting



Objective: In groups, learners investigate the cost of energy to light a classroom or a room in a house. Using the Energy Calculator on the Energy Revealed website and a series of worksheets, learners calculate the dollars as well as the number of kilograms of greenhouse gases that it takes to light a room. They consider how they could adopt energy-saving strategies, then track that activity for one week and calculate the savings in greenhouse gases.

Learning Outcomes:

By the end of this activity, learners will:

- Investigate and identify bulb types and wattage, and make connections with energy use
- Calculate and think critically about energy use in a given room and resulting greenhouse gas emissions
- Extrapolate findings from potential savings in one room for a week to that of all the rooms in the building for a week, a month or even a year
- Establish opinions about the importance of conserving energy and reflect on personal strategies for sustained behaviour change

Materials:

- Internet-enabled device
- Energy and the Environment: The Impacts of Our Energy Use Backgrounder
- Worksheet 1: Collecting Baseline Data

Activity 3: Energy Efficient Lighting

- Worksheet 2: Taking Action to Save Energy
- Worksheet 3: Calculating Energy Savings
- A variety of bulbs – i.e., compact fluorescent, fluorescent tube, halogen, incandescent, LED
- Energy Calculator

Curriculum Connections: <https://programs.greenlearning.ca/canada-curriculum-connections>

Time: 5 hours

Activity

Step 1: Warm Up Activity

- As a group, discuss how energy is used in our homes and schools. Frame the discussion around energy use in schools or homes depending on them. Give learners time to think about the questions you pose and let them generate the answers themselves:
 - How many lights do you think there are in your house? How many in your school? What's your best guess?
 - Does lighting the school use more energy than a home? Why or why not?
 - How much do you think it costs to pay for one day of school lighting?
 - What are the daily lighting needs for your classroom or a room in your house? When do lights need to be on? When could they be off? What activities don't need lighting?
 - Are room lights brighter than the sun?
- Through questions and a display of different bulbs, lead learners in a discussion about lighting, electrical energy and wattage:
- What types of bulbs are these and what do you know about them? How do they differ?
- How would you describe the lighting in this classroom or room?
- Explain to learners that energy is needed to provide lighting in a classroom or any room. The goal of this activity is to identify how lighting is used in our lives, and to understand what would happen if the way we currently use lighting is changed through choices and actions.

Activity 3: Energy Efficient Lighting

Step 2: Reviewing Concepts

- Using the backgrounder Energy and the Environment, introduce the concept of greenhouse gas emissions and the impact of energy use on the environment.

Step 3: Collecting Baseline Data

- Distribute the Worksheet 1: Collecting Baseline Data to learners. Complete the worksheet together, demonstrating how to perform each calculation. Help students identify the kilowatts versus watts by using other examples of units that are related to one another by a factor of 1,000 (e.g., kilometers versus meters, kilograms versus grams, bytes versus kilobytes). For additional information around fundamental concepts of energy, check out the activities [Knowing Energy](#) in the Energy Revealed program. Completing the worksheet will likely generate some discussion around:
 - What does wattage mean? How does this relate to energy use?
 - When are the room lights on?
 - When and how is the school cleaned or prepared for students?
 - What might cause the lights to be on before or after a school day?
 - How does natural light change throughout the school year and how does that impact the way we use lighting in our classroom?
 - How can we find out how much lighting is used when we are not here?
 - In order calculate the greenhouse gas emissions caused from the use of lighting in the given classroom, use the Energy Calculator provided on the Energy Revealed website. By entering the watts and minutes per day used, the calculator will provide kilowatt hours, greenhouse gas emissions and cost of using that electricity.

Step 4: Taking Action to Save Energy

- Distribute the Worksheet 2: Taking Action to Save Energy to learners. As a class, discuss the possibilities for reducing energy use in classroom. Work together to decide what actions the class will take to reduce energy use. Have learners work individually or in pairs to complete the worksheets. Below are some questions that can help navigate the discussion:
 - Ask learners if they found some types of light bulbs consuming less energy compared to others.
 - If that was the case, should the class look at replacing light bulbs that consume less energy, such as LED lights? How would that impact the energy use and the resulting GHG emissions?
 - What other actions can be taken to reduce energy? Are there behaviour changes that can be implemented?

Activity 3: Energy Efficient Lighting

Step 5: Calculating Energy Savings

- Distribute the Worksheet 3: Calculating Energy Savings to learners. Then explain to the class that they will now track the action plan completed in step 3 by collecting data about what was done to reduce energy consumption and the reduction in GHG emissions as a result. Reviewing pages 1 – 3 of the worksheet together, decide together how data will be collected for the next five weekdays.
- Over the next week, check in with learners daily to ensure good data collection and ask that they complete the questions accompanying the worksheet.
- One week later, discuss the results using the questions from the worksheet.
- Then continue on to exploring what will be the impact if all the classrooms in the school (or in the house) took the same actions. Using the last table (page 4) in the Worksheet 3, have students complete the calculations to record the impact of collective action.

Step 6: Conclusions

Ask students to debrief the results:

- How did you feel about our mission?
- What happened that was surprising for you?
- What did you discover about lighting?
- What did you learn about electrical energy?
- What are the benefits of tracking?
- What did you learn about greenhouse gases?
- How are greenhouse gas emissions significant?
- What do you think some impacts of NOT conserving energy for lighting might be?
- What if you could change something? What would you do differently and why?
- What is your vision for wise energy use for Canadians? How did you come up with that?
- What is next? What would you do?
- How should we celebrate our work?

Extension Ideas:

- Celebrate your success. Celebrate the results realized from your actions and the benefits of reducing greenhouse gas emissions. Involve learners in deciding how to mark the occasion. Every aspect of the event could involve energy conservation in some way. To remind learners what it is they are conserving, you could celebrate outdoors.

Activity 3: Energy Efficient Lighting

- Collaborate with another class. Pair with another educator in your school or district and conduct this activity at the same time to realize collective impact.
- Take on another room. Adapt the worksheets to that you can assess, plan and take action elsewhere, such as:
 - In one room or throughout a home or business
 - In other classrooms of the school
- Create an energy savings campaign. Have learners develop a campaign to inspire






Activity 3: Energy Efficient Lighting



Worksheet 1 Collecting Baseline Data

1. Research

Look at the different bulbs in the room to determine what kinds are there. Read the label on each bulb to determine the number of watts it uses. Then circle the bulb type on the chart given on the worksheet.

Compact fluorescent	
	38 watts
	23 watts
	20 watts
	13 watts
	10 watts
Incandescent	
	150 watts
	100 watts
	75 watts
	60 watts
	40 watts
Fluorescent	
	40 watts
	28 watts
Halogen	
	40 watts
	32 watts
	24 watts
LED	
	6 watts
	7 watts
	8 watts

2. Collect Data

Count the number of bulbs of each kind and record it on the worksheet.

	bulbs
X	watts
	watts

3. What does it take to light the room?

Calculate how much energy is needed to power the lights by multiplying the bulbs and watts.

4. How long are the lights on?

Estimate how many hours the classroom or the room lights are on each week and record it on the worksheet.

	hours
X	watts
	watt-hours

6. Convert watt-hours to kilowatt-hours

	watt-hours
/	1000
	kilowatt-hours

5. What does it take to light the room for a week?

Calculate how much energy is needed to power the lights for a week by multiplying the hours and watts.

7. How many kilograms of greenhouse gas emissions is that? Demonstrate how to use the Energy Calculator.

	kilowatt-hours	X	MULTIPLIER	=		Kg GHG
--	----------------	---	------------	---	--	--------



Taking Action to Save Energy

ACTION		ACTION	

Activity 3: Energy Efficient Lighting | Worksheet 2 Continued

Okay, now what? What's our plan?






3. For each checkmark on the previous page, describe how you will make it happen.

ACTION	HOW?	WHO?	WHAT DO WE NEED?	HOURS/WEEK SAVING
			+	
			+	
			+	
4. Add each of your plan's action savings. Use the total house saved to calculate your kg GHG savings on page 3.				=
				hours

Activity 3: Energy Efficient Lighting | Worksheet 2 Continued

5. Research

Look at the different bulbs in the room to determine what kinds are there. Read the label on each bulb to determine the number of watts it uses. Then circle the bulb type on the chart given on the worksheet.

Compact fluorescent	
	38 watts
	23 watts
	20 watts
	13 watts
	10 watts
Incandescent	
	150 watts
	100 watts
	75 watts
	60 watts
	40 watts
Fluorescent	
	40 watts
	28 watts
Halogen	
	40 watts
	32 watts
	24 watts
LED	
	6 watts
	7 watts
	8 watts

6. Collect Data

Count the number of bulbs of each kind and record it on the worksheet.

	bulbs
	watts
	watts

7. What does it take to light the room?

Calculate how much energy is needed to power the lights by multiplying the bulbs and watts.

8. How long are the lights on?

Estimate how many hours the classroom or the room lights are on each week and record it on the worksheet.

	hours
	watts

9. What does it take to light the room for a week?

Calculate how much energy is needed to power the lights for a week by multiplying the hours and watts.

10. Convert watt-hours to kilowatt-hours

	watt-hours
/	1000
	kilowatt-hours

11. How many kilograms of greenhouse gas emissions is that? Demonstrate how to use the Energy Calculator.

	kilowatt-hours	X		MULTIPLIER	=		Kg GHG
--	----------------	---	--	------------	---	--	--------

Activity 3:

Energy Efficient Lighting



Worksheet 3

Calculating Energy Savings

What Did We Save?

1. Collect data. For one week, record only new times when your class turned off the lights.

MONDAY Time on/Time off	min.	TUESDAY Time on/Time off	min.	WEDNESDAY Time on/Time off	min.	THURSDAY Time on/Time off	min.	FRIDAY Time on/Time off	min.
/		/		/		/		/	
/		/		/		/		/	
/		/		/		/		/	
/		/		/		/		/	
/		/		/		/		/	
/		/		/		/		/	
ADD		+		+		+		+	
TOTAL MINUTES =									
CONVERT TO HOURS =									

2. Calculate the time the lights are off. Add the minutes for each day. Then add these together for a weekly total.

3. Convert minutes to hours. Convert weekly minutes to hours by dividing by 60 minutes per hour.

4. Research

Look at the different bulbs in the room to determine what kinds are there. Read the label on each bulb to determine the number of watts it uses. Then circle the bulb type on the chart given on the worksheet.

Compact fluorescent	
	38 watts
	23 watts
	20 watts
	13 watts
	10 watts
Incandescent	
	150 watts
	100 watts
	75 watts
	60 watts
	40 watts
Fluorescent	
	40 watts
	28 watts
Halogen	
	40 watts
	32 watts
	24 watts
LED	
	6 watts
	7 watts
	8 watts

5. Collect Data

Count the number of bulbs of each kind and record it on the worksheet.

	bulbs
X	watts
<hr/>	
	watts

6. What does it take to light the room?

Calculate how much energy is needed to power the lights by multiplying the bulbs and watts.

7. How long are the lights on?

Estimate how many hours the classroom or the room lights are on each week and record it on the worksheet.

	hours
X	watts
<hr/>	
	watt-hours

9. Convert watt-hours to kilowatt-hours

	watt-hours
/	1000
<hr/>	
	kilowatt-hours

8. What does it take to light the room for a week?

Calculate how much energy is needed to power the lights for a week by multiplying the hours and watts.

10. How many kilograms of greenhouse gas emissions is that? Demonstrate how to use the Energy Calculator.

	kilowatt-hours	X		MULTIPLIER	=		Kg GHG
--	----------------	---	--	------------	---	--	--------

Was Our Mission Successful?

Review your results using the following questions:

1. How do you feel about the savings your class achieved?

2. How does the saving compare with your goals?

3. What was challenging about taking action?

4. What worked well?

5. What is the most valuable discovery you made on your mission?

Activity 4: Exploring Our Energy Ethics



Objective: Through an interactive group activity, learners take a position on several environmental issues based on their own personal ethics. They consider the different opinions of their classmates and weigh the importance of factual evidence. As learners hear other perspectives and learn new information, they discover that their own views and values may change.

Learning Outcomes:

By the end of this activity, learners will:

- Understand different perspectives on energy and environment issues
- Share views related to statements that deal with ethical issues about energy and the environment
- Consider the opinions of classmates
- Reflect on their own ethics related to choices about energy and the environment

Materials:

- Energy and the Environment: The Impacts of Our Energy Use Backgrounder (referenced in Activity 3)
- Five sheets of poster board to use as signs. Write one of the following phrases on each sheet: Strongly Agree, Agree, Don't Know, Disagree, Strongly Disagree.
- Tape to mark places on a large circle on the classroom floor for the change-your-place lead-in activity. You need as many places as you have learners

Activity 4: Exploring Our Energy Ethics

Curriculum Connections: <https://programs.greenlearning.ca/canada-curriculum-connections>

Time: 1.5 hours

Activity

Step 1: Change Your Place

- Ask learners to form a circle so that each person is standing on a place marker. You stand in the middle of the circle and explain that this activity is called “Change Your Place.” Explain that the person in the middle of the circle will make a change-your-place statement that is true about themselves. Everyone standing on a place marker for whom that statement is also true must then move and find another place on the circle. The person in the middle must try to find a place on one of the markers too. The person who does not find a place on the circle markers is left in the middle and will start another round by making a new statement.
- Demonstrate how it works by making the first true statement. For example, you might say “Change your place if you are the youngest person in your family” or “Change your place if you are wearing blue socks.” Everyone, you included, who is “the youngest person” or “wearing blue socks” must now move to find a new place in the circle. One person will be left in the middle.
- The person in the middle starts again, “Change your place if...” Continue until at least 4 or 5 learners have had a turn in the middle.
- Take a few minutes to debrief by asking learners for their comments on the activity

Step 2: Take a Stand

- Explain that the class will now do a similar activity, one that requires each person to “Take A Stand.” This time, learners listen to a statement and make decisions about where they stand on it.
- Place the five signs in different places in the classroom — in a line or in different corners of the room. Tell the learners that you will read an opinion statement to them. After you read the statement, learners must stand in front of the sign that most closely represents their view on the statement: either Strongly Agree, Agree, Don’t Know, Disagree, or Strongly Disagree. Tell learners that they must be prepared to explain why they chose to stand where they do.

Activity 4: Exploring Our Energy Ethics

- Select from the opinion statements included at the end of this lesson plan or create your own. After you read a statement, ask learners to stand in front of a sign, and then ask individuals (or groups of learners standing in the same place) to explain why they are standing where they are. Give equal time to representatives of different sides of the issue, and allow many learners to speak.
- Ask learners if their positions have changed after hearing different views on an issue. Invite them to move to a different sign if and when their opinions change. If learners move, ask volunteers to explain why they changed their opinion.
- To encourage discussion, read one of the facts that accompanies a statement. You can read the fact aloud, or have a learner do so. Ask if any learners want to change their place after hearing the new information, and then ask for volunteers to explain how the information influenced their view.

Step 3: Conclusion

- After exploring three or four take-a-stand statements, debrief the activity with discussion questions:
 - Which statements were most challenging to take a stand on? Why?
 - What influences your position on a statement?
 - How do our views determine our actions?
 - How do our views have environmental consequences?
 - What are effective ways to communicate our views on issues?
 - How might your perspective differ from that of people from other cultures, of different ages, places and times?
- Ask learners to reflect individually on what they learned through this activity. Have them write in their journals or create drawings about their energy ethics. Ask them to reflect on the statements, facts and different perspectives and to express their own ethics about energy and the environment.

Teaching Tips

This activity asks learners to express their opinions on challenging and sometimes controversial issues. Ensure that a safe learning environment exists so that all learners feel free to express their views. Remind learners that there is no right or wrong opinion: what is important is that they listen and respect one another's views. Explain that the process of understanding and reflecting on our views and values is a process of formulating our ethics.

Extension Ideas

- **Invite learners to research an opinion statement.** Ask learners to select a statement or create their own upon which to do some additional work. Encourage them to research the arguments on both sides and write an article, create an image or make a presentation about the different perspectives and their own view as well.
- **Work with learner-generated statements.** Ask learners to write their own opinion statements, incorporating local issues and debates, and then complete the activity again. Learners could also provide the statements for another class to use.
- **Defend a position.** Assign learners a position on an energy and environment statement that they must defend. Stage a debate or have learners write a convincing speech on the statement.
- **Conduct interviews.** Ask learners to interview other learners, teachers, parents and/or community members using opinion statements from the list provided or statements that learners generate themselves. Encourage learners to track the number of people who agreed and disagreed with the statements and why.

Opinion Statements & Related Facts

1) Everyone is responsible for protecting the environment.

2) Automobile makers should be required to make all vehicles as fuel-efficient as possible.

○ Facts:

- About 60% of the oil that the world consumes is used to power transportation vehicles, and half goes to passenger cars and light trucks. If we continue to consume as much oil as we are now, the U.S. Department of Energy says that the world will run out of conventional oil in 40 years.
- The average fuel efficiency of new vehicles has gotten worse by 13% in the last 10 years, largely due to the popularity of the SUV.

3) Communities across Canada should use only renewable sources, such as wind, solar or micro-hydro to meet their energy needs.

○ Facts:

- If your family could use only renewable energy for all of your energy needs, you could help reduce the amount of emissions in the air each year by 20,000 pounds of carbon dioxide, 70 pounds of sulphur dioxide and 50 pounds of nitrogen oxide.
- Fossil fuels still account for more than 85% of the world's primary energy consumption. The most significant greenhouse gas is carbon dioxide, which comes mainly from burning fossil fuels — coal, oil, natural gas — to generate energy.

4) Jobs are more important than the environment.

- Fact:
 - Conventional energy projects like oil and gas development or large-scale hydroelectric projects do not create that many jobs: only seven jobs for every million dollars invested. For the same investment, renewable energy projects created 60% more jobs.

5) No matter what kind of energy we use, we must conserve energy.

6) Science and technology will solve many of our energy and environmental problems.

- Facts:
 - By using the “off the shelf” energy-efficient technologies that are available today, we could cut the cost of heating, cooling and lighting our homes and workplaces by up to 80%.
 - Albert Einstein said, “We can’t solve problems by using the same kind of thinking we used when we created them.”

7) To reduce the energy used to produce and transport food, grocery stores should sell only locally grown foods.

- Facts:
 - The average fruit or vegetable travels more than 1,500 miles before it gets to your plate. Buying locally means food does not have to travel as far, which means less greenhouse gas emissions, and less of a contribution to global warming.
 - Buying locally often costs more money because food is produced on a smaller scale. However, buying locally supports local farmers and the local economy.

8) There should be a law that states that all household appliances must be as energy efficient as possible.

- Facts:
 - Compact fluorescent lamps use 75% less energy than incandescent lamps for the same amount of light, and they last up to eight times longer.
 - An ENERGY STAR® refrigerator is at least 10% more efficient than the minimum government energy efficiency standards.
 - Refrigerators are twice as efficient (or 200% more efficient) than they were 25 years ago; dishwashers are 62% more efficient, and washing machines are 56% more efficient. Clothes dryers are about the same as they were.

Activity 4:

Exploring Our Energy Ethics



Assessment Rubric

Thinking	Level 4	Level 3	Level 2	Level 1
Demonstrates an understanding of appropriate listening behaviour by adapting active listening strategies to suit a variety of situations, including work in groups	Demonstrates a highly developed understanding of appropriate listening behaviour by adapting a wide variety of listening strategies	Demonstrates a well-developed understanding of appropriate listening behaviour by adapting a variety of listening strategies	Demonstrates some understanding of appropriate listening behaviour by adapting up to two listening strategies	Demonstrates limited understanding of appropriate listening behaviour
Demonstrates an understanding of appropriate speaking behaviour in a variety of situations, including paired sharing and small- and large-group	Demonstrates a highly developed understanding of appropriate speaking behaviour	Demonstrates a well-developed understanding of appropriate speaking behaviour	Demonstrates some understanding of appropriate speaking behaviour	Demonstrates a limited understanding of appropriate speaking behaviour
Communicates orally in a clear, coherent manner, presenting ideas, opinions and information in a readily understandable form	High degree of effectiveness; communicates with a wide variety of supporting details	Considerable effectiveness; communicates with a variety of supporting details and ideas	Some effectiveness; communicates with a few supporting details and new ideas	Limited effectiveness; communicates in a simple and understandable form
Application	Level 4	Level 3	Level 2	Level 1
Analyzes human use of energy and natural resources and the impact of this use on society and the environment	Demonstrates a high degree of application skills by extensive analysis	Demonstrates effective use of application skills by a complete analysis	Demonstrates limited effective use of application skills by partial analysis	Demonstrates limited effective use of application skills by unfinished analysis

Activity 5: Walk a Mile



Objective: By exploring the concept of an ecological footprint, learners learn that simple lifestyle choices have a meaningful impact on the planet. Learners create a paper foot of their own Carbon Critter. After answering a series of questions about its energy use, they calculate its ecological footprint online to see the impact of its lifestyle choices and energy use on the environment.

Learning Outcomes:

By the end of this activity, learners will:

- Understand the concept of an ecological footprint
- Explore the relationship between everyday lifestyle choices and energy consumption
- Consider the impact of our own lifestyle choices and energy consumption on the planet

Materials:

- Internet-enabled device
- Energy and the Environment: The Impacts of Our Energy Use Backgrounder
- What are Carbon Critters Driving? Handout
- A paper foot of a Carbon Critter as an example for learners
- Heavy paper or card stock
- Coloured markers

Activity 5: Walk a Mile

Curriculum Connections: <https://programs.greenlearning.ca/canada-curriculum-connections>

Time: 2 hours

Activity

Step 1: What Even is an Ecological Footprint?

- Introduce the idea that even when we do not know the definition of something, we can usually make a good guess at its meaning by looking at individual words and parts of words.
- Have learners write the words and phrases that they think are related to ecological footprint.
- Ask learners to work in small groups to exchange their ideas and develop a one-line definition.
- Provide learners with a definition from another source for comparison. For example, your ecological footprint is an estimate of how much productive land and water is needed to support the way you live. For other definitions, see the backgrounder, Energy and the Environment: The Impacts of Our Energy Use.
- Guide a discussion about the similarities and differences between the definitions to establish a shared understanding.
- Record questions and key points that come up during the discussion so that you can refer to them throughout the lesson.

Step 2: Make Carbon Critters

- Explain that learners will be creating a creature, called a Carbon Critter, and imagining what it would be like to live like that creature (i.e., that they will be exploring what it would be like to walk a mile in someone else's shoes).
- Hand out paper and have each learner draw an outline of a foot and ankle for their critter. Provide an example of a cut-out foot and ankle for their reference.
- Ask learners to imagine the lifestyle of their critter. Review the meaning of each of the lifestyle categories: food, shelter, goods and services, and mobility. Ask them questions to prompt them to think about the various possibilities.
- Ask learners to give their critter a name that relates to its lifestyle and its views on energy and the environment. Tell them to write the name on the ankle of the critter's foot (e.g., Gizmo Guy, Power Pit).

Activity 5: Walk a Mile

- Have learners summarize their critter's lifestyle, including what food they eat and products they buy, how they get around, and what their homes are like. They can record their descriptions on the paper foot below the critter's name, under the following headings:
 - FOOD: How often does your critter eat animal-based products (e.g., meat, fish, dairy) each week? In a week, how often is the food your critter eats processed, packaged and imported?
 - SHELTER: What is the size of your critter's home? (Use units of square metres or substitute with something learners are familiar with, such as a classroom). What type of home is it (detached, apartment, environmentally designed, etc.)? Does it have electricity or not?
 - GOODS & SERVICES: How much waste does your critter produce compared to others? How many kilograms of garbage does your critter produce per week?
 - MOBILITY: How does your critter get from place to place? How much does your critter travel by public transit, motorbike, car, bicycle, plane and on foot? How often does your critter drive alone versus with someone else? How many litres of gasoline does the critter's vehicle use for every 100 kilometres driven? (Refer to the handout, "What are Carbon Critters Driving?" at the end of this lesson).
- Have learners visit <https://www.footprintcalculator.org/> to calculate the ecological footprint for their critter. They enter basic information about their critter's lifestyle, and the site calculates its ecological footprint. Learners learn how many more planet Earths we would need if everyone lived like their Carbon Critter. Tell learners to record that number (the number of Earths) upside down on the back of their critter's foot.
- Tell learners to also record the results, by category, from the online ecological footprint summary page onto their critter's foot.
- As a class, review the significance of the results. Discuss how the categories used to calculate an ecological footprint relates to our own lifestyles.

Step 3: Conclusion

- To help learners form conclusions about the connections between lifestyle, energy, impacts on the environment and the role of daily choices, lead a class discussion using some of the following questions:

Activity 5: Walk a Mile

- What did you think about the size of the ecological footprint of your Carbon Critter?
- How does this compare to the amount of land that is actually available for each person on Earth?
- How do you feel about the number of Earths required to support the lifestyle of your Carbon Critter (if everyone in the world lived that way)?
- When you compare the ecological footprint of different Carbon Critters, what activities seem to cause the biggest increase to the footprint? How would you explain that?
- How are Carbon Critters similar to us?
- How do Carbon Critters impact our world?
- How could you explain why Carbon Critters aren't very concerned about their impact on the world?
- What advice would you give the people who make the laws that govern Carbon Critters?
- What message could you give to Carbon Critters that you think they would listen to?
- What do you think it will take for Carbon Critters to reverse their impact on the earth?
- How do the ideas in this activity relate to our energy uses and choices?

Teaching Tips

To familiarize yourself with the concept of an ecological footprint, explore this learner-friendly website: <http://basecampearth.org/exp2/index.htm>

Calculate your own ecological footprint using this online calculator:

<https://www.footprintcalculator.org/> It won't take much time: you simply answer 13 questions about your energy use, and then you can see your footprint and learn about its implications. For other links and more information about ecological footprints, refer to the backgrounder, [Energy and the Environment: The Impacts of Our Energy Use](#).

Activity 5: Walk a Mile

Extension Ideas

- **Use an online Lead In.** Working alone or in pairs, have learners explore the concept of an ecological footprint at the Base Camp Earth website, <http://basecampearth.org/exp2/>. This learner-friendly site reflects the work of four secondary school learners who spent four days studying ecological footprints via the e-community. You may want to direct your learners with a focus question.
- **Expand the Main Activity.** Let learners make informed decisions about what their Carbon Critters drive by sending them to the Natural Resources Canada website where they can choose from a list of more than 1,000 car models: <https://fcr-ccc.nrcan-rncan.gc.ca/en>.

Did You Know?

To support their current lifestyle, the average Canadian requires 8.17 hectares of productive earth; the average American requires 8.22 hectares. Based on the current human population and bio-productive space, nature can provide and sustain only about two hectares of land for every person in the world. If everyone lived like people in North America, we would need about four more planets!

Activity 5:

Walk a Mile



Learner Handout

What are carbon critters driving?

Top Picks for CARBON CRITTERS with BIG Feet

Make/Model	Type of Vehicle	Consumption of fuel L/100km	Emission of CO ₂ (kg per yr.)*
Bugatti Chiron	Two-seater	21	9,660
Lamborghini Aventador	Two-seater	21	9,660
Ferrari GTC4Lusso	Minicompact	18	8,280
Ford Shelby GT500 Mustang	Sub-compact	16	7,360
Rolls-Royce Dawn	Compact	16	7,360
Rolls-Royce Wraith	Mid-sized	16	7,360
Buick Regal TourX	Small station wagon	10	4,600
Ram 1500 TRX	Pick-up	19.8	9,108
GMC Sierra	Pick-up	15	6,900
Mercedes-Benz AMG G65	SUV	20	9,200

*We are assuming these cars are driving 20,000 km per year at a rate of 2.3 kg of CO₂ per litre of gasoline consumed.

Activity 5: Walk a Mile | Learner Handout Continued

Top Picks for CARBON CRITTERS with SMALL Feet

Make/Model	Type of Vehicle	Consumption of fuel L/100km	Emission of CO ₂ (kg per yr.)*
Mazda MX-5	Two-seater	8	3,680
Polestar 1 (PHEV)	Two-seater	5	2,300
BMW i4 (EV)	Sub-compact	2	0
Tesla Model 3 (EV)	Mid-sized	1.8	0
Volvo V90	Station wagon	9.5	4,370
Volkswagen Golf	Compact	8.7	4,002
Mitsubishi Mirage	Sub-compact	6	2,760
Hyundai Elantra	Compact	6	2,760
GMC Sierra 1500 Crew Cab	Pick-up	10	4,600
Toyota Prius	SUV	4.8	2,280

*We are assuming these cars are driving 20,000 km per year at a rate of 2.3 kg of CO₂ per litre of gasoline consumed.

*EV Cars don't emit CO₂, but according to a study the manufacturing of the battery emits around 17.5 tons of CO₂.

Activity 5: Walk a Mile



Assessment Rubric

Knowledge & Understanding	Level 4	Level 3	Level 2	Level 1
Demonstrate an understanding of the importance of being physically active, and apply physical fitness concepts and practices that contribute to healthy, active living	Demonstrates thorough understanding of content	Demonstrates considerable understanding of content	Demonstrates some understanding of content	Demonstrates limited understanding of content
Thinking & Investigation	Level 4	Level 3	Level 2	Level 1
Evaluate the effects both beneficial and harmful of various technologies on human body systems	Uses critical/creative thinking processes, skills, and strategies with a high degree of effectiveness	Uses critical/creative thinking processes, skills, and strategies with considerable effectiveness	Uses critical/creative thinking processes, skills, and strategies with some effectiveness	Uses critical/creative thinking processes, skills, and strategies with limited effectiveness
Communication	Level 4	Level 3	Level 2	Level 1
Communicate orally in a clear, coherent manner, presenting ideas, opinions, and information in a readily understandable form	Communicates for different audiences and purposes with a high degree of effectiveness	Communicates for different audiences and purposes with considerable effectiveness	Communicates for different audiences and purposes with some effectiveness	Communicates for different audiences and purposes with limited effectiveness

Activity 6: Can You Observe How To Conserve?



Objective: Learners will research a chosen topic on how conserving energy will impact the school.

Learning Outcomes:

By the end of this activity, learners will:

- Utilize GreenLearning's Spiral Inquiry Model to answer the question: How can conserving energy impact your school?
- Collaborate amongst peers to develop their own focus question(s) and inquiry plan

Materials:

- Pen and paper
- Energy Metering Technology (Optional)

Curriculum Connections: <https://programs.greenlearning.ca/canada-curriculum-connections>

Time: 7-10 hours

Activity 6: Can You Observe How To Conserve?

Activity

Step 1: Spark (A Learner Investigation)

- Begin by getting familiar with GreenLearning's Spiral Inquiry Model found here: <https://programs.greenlearning.ca/course/spiral-inquiry-model>
- Pose the question "How can conserving energy impact your school?"
 - We all know we should turn the lights off in a room that we aren't using, but why? If you took the time to save as much energy as possible, what impact would that have?
 - Here, learners will focus on researching one way their school can conserve energy.
- Working with a partner, have learners brainstorm ideas as to simple ways everyone can conserve energy (think of at school, at home, in and around the community).
 - For example:
 - Turning off lights when not in use
 - Using energy in off-peak hours
 - Plugging in electricity only when needed
- Next, discuss why conserving energy is important:
 - Saves GHG's from being emitted
 - Cost savings, etc.
- Using the above discussions, have the learners share their ideas and discuss different ways the school can save energy.
 - Post the ideas around the room. Add any ideas that come out of the discussion.

Step 2: Hypothesize and Plan

- Focus:
 - Working as a class or in small groups, have learners decide on the focus of their inquiry. Use the Spark discussion and activities to help you decide. Revisit the brainstorming activity and class discussion and encourage learners to think about what they would like to investigate.
 - Here is a list of possible suggestions, but encourage learners to keep their own interest in mind and make sure to pursue something that interests them: lighting use, heating/cooling use, computer use.
 - Senior learners may want to investigate: weather stripping, insulation, renewable energies, energy efficient appliances.
 - If available, have learners think about how they can use the energy metering technology to help with their investigation.

Activity 6: Can You Observe How To Conserve?

Inquiry Question. The learners are now ready to move on to create the group's inquiry question or questions.

1. Have each group meet and discuss what they have taken away from the class brainstorming and discussions.
 - a. What interests the group?
 - b. What would be the most relevant to your school?
 - c. What topics would help the group understand their findings?
2. The inquiry question needs to investigate both what energy conservation steps the school should take and what the impact will be.

It could be stated as a hypothesis using "If _____", then _____" language. For example, "If we turn the light off (in a determined space) then we can reduce the school's cost by x and save y GHGs"

- o Remember! While you are conducting your inquiry, you may need to modify your question or hypothesis. Make it something that is testable and workable within the time you have.

Plan. Next, have each group plan each step of their inquiry.

Check In. Have the learners fill out part 1 of the learner worksheet.

Step 3: Explore and Research

Research. Have each group gather and review information needed to answer their question or to test their hypotheses.

Record. Record information and remember to remind them to keep track of their sources. If available, have learners create the appropriate reports in the energy metering technology software. Have each group **evaluate** the information they have collected:

- o Does it answer their question or test their hypothesis? Does it raise more questions – if so, how can they be answered?

Reflect. Have learners reflect on and discuss their preliminary findings and observations to compare these to their previous knowledge. They may need to clarify and modify their focus question(s) and inquiry plan.

Check In. Have each group fill out the worksheet (check in #2) as a group and hand it in.

Activity 6: Can You Observe How To Conserve?

Step 4: Analyze and Check

- Have each group **compare**, sort and **classify** their information. Describe characteristics and note patterns.

Conclude. Have each group draw conclusions about their questions and hypotheses.

Check In. Have the learners fill out the worksheet (Check in #3) as a group and hand it in.

Step 5: Communicate

- Now the groups are ready to turn their knowledge into action.

Communicate

- Have each group communicate their inquiry findings to the class and other. They should think about what message they want to get across and tailor that message to the audience. Ideas include a YouTube video, PowerPoint presentation, research blog, web pages on school site, podcast, meme, rap (or other style poem or song), skit or play, poster or other artwork, infographics, etc.
- The audience does not have to be just the class. Have the learner think of other people who can benefit from learning what was discovered:
 - Junior learners- maybe in feeder schools
 - School council (possible with a small request for funding to help your action project)
 - Parents
 - Display in a local mall
 - Part of a school assembly for Earth Day or other occasions
 - Experts who helped your research
 - Share on social media

Activity 6: Can You Observe How To Conserve?

Act. Throughout the research, learners have probably come across many calls to action. They likely also have many ideas for what you and your class could do to inform your school or community about your school's energy use.

- There are many suggestions classes have for energy education including:
 - Campaign to stop idling in school parking lots
 - Meeting with local politicians/school boards about issues
 - Speaking at public meetings
 - Awareness Fair
 - Developing and passing around petitions
 - Take part in organized learner action competitions

Plan. Developing a plan is a good way to start. We would love to see it!

Activity 6: Can You Observe How To Conserve?



Worksheet

Name (s) : _____

Part 1: Hypothesize and Plan

1. What is the general focus of your Inquiry?

2. Why did your group choose this focus?

3. What is your Inquiry Question? (Note: this can be modified later if necessary)

Activity 6: Can You Observe How to Conserve? | Worksheet Continued

4. What are your early thoughts on the next three steps of the Spiral Inquiry?

5. What additional help do you need from the educator?

Part 2: Explore and Research

1. What are three key facts about your Inquiry that you have discovered?

2. Does your group have a complete record of all your resources?

3. Does your Inquiry Question need to be modified?

Activity 6: Can You Observe How to Conserve? | Worksheet Continued

4. What additional research is left?

5. What local experts are you thinking of consulting?

6. What additional help do you need from the educator?

Part 3: Analyze and Check

1. Have you sorted out your information?

2. What are the patterns you see when you analyze it (highlight two or three)?

Activity 6: Can You Observe How to Conserve? | Worksheet Continued

3. What are one or more conclusions that you can draw from your data?

4. What are your early thoughts on the actions that can be taken in this area?

5. How would you encapsulate the message your research in one or two sentences?

6. What additional help do you need from the educator?

Energy Revealed Challenge

Congratulations on completing the Energy Revealed activities and learning about energy efficiency and climate action! Your learners are now ready to take real world action by hosting and tracking the impact of their **Energy Out Event or Energy Investigation**.

Register for GreenLearning's Energy Revealed Challenge at <https://programs.greenlearning.ca/take-the-energy-revealed-challenge> or scanning the QR code.



Once you register, click on the [challenge package](#) to get started!

Annual grand prizes for the challenge are:

1st Place: \$1,000

2nd Place: \$500

3rd Place: \$250

All submissions for the challenge will be celebrated on GreenLearning's Challenge Showcase page. To view past submissions for the Energy Revealed Challenge visit <https://programs.greenlearning.ca/submission-showcase>.

If you have any questions about registering, completing or submitting for the challenge please contact GreenLearning at programs@greenlearning.ca.



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