

Energy Efficient Lighting



Activity
Energy Revealed
Grade Level: 4-7

Main Objectives

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

Length of Activity

5 hours

Materials List

Internet-enabled device
Energy and Environment: The Impacts of Our Energy Use Backgrounder

Worksheet 1: Collecting Baseline Data
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

Step 1: Warm-up Activity

- a. 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?
- b. 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.

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

- a. Distribute Worksheet 1: Collecting Baseline Data to the 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?
- b. In order calculate the greenhouse gas emissions caused from the use of lighting in the given classroom, use [GreenLearning's Energy Calculator](#). 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 Worksheet 2: Taking Action to Save Energy to the 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?

Step 5: Calculating Energy Savings

- a. Distribute Worksheet 3: Calculating Energy Savings to the 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.
- b. Over the next week, check in with learners daily to ensure good data collection and ask that they complete the questions accompanying the worksheet.
- c. One week later, discuss the results using the questions from the worksheet.
- d. Then continue to explore what the impact would be 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: Conclusion

- a. 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

1. **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.
2. **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.
3. **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
 - In other rooms of the school
 - In several schools in the community
4. **Create an energy savings campaign.** Have learners develop a campaign to inspire action at home, in other classrooms, throughout the school, among many schools.