

Everything About Energy

(in Essex County, Ontario)

Education Program

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Everything About Energy – Lesson Plan

Purpose

- To teach students about energy and its relation to climate change, as well as how we use energy locally here in Essex County.
- To encourage students and their families to be mindful of their own energy use through the completion of a home energy audit and application of energy saving strategies.

Applicable Curriculum Expectations – Ontario Grade 6 Science Curriculum

- Unit: Understanding Matter and Energy
 - o Overall Expectation: 1. evaluate the impact of the use of electricity on both the way we live and the environment.
 - o Specific Expectations: 1.2 assess opportunities for reducing electricity consumption at home or at school that could affect the use of non-renewable resources in a positive way or reduce the impact of electricity generation on the environment.

Resources Required

- iPads, computers, or any other technology your school has available (These will be needed for a short Kahoot at the beginning of the lesson on Day 1, preferably there should be enough available for each student to have their own).
- Enough cardboard boxes for each student/pairs of students to have one – these will be used for an activity on Day 2 and should be about the size of a tissue box. Students could be asked to bring in their own box in a few days in advance.**
- Basic craft materials – coloured paper, scissors, glue, etc. (whatever is easily available at your school). Students should be asked to bring in any extra crafting materials that they would like to use for the activity on Day 2. Encourage students to use recycled items only; no single use plastics, glitter, beads, etc.**
- Enough copies of the **Energy Audit Worksheet** for each student, copies of the **Energy Audit (paper version)** for any student that doesn't have computer access at home.
- **It is acceptable to use a computer or other remote method to conceptualize this activity, if in-person crafting is not possible.

Lesson Plan

Day 1 – Kahoot, Video Lesson, At-Home Activity

- **Introductory activity – Kahoot (approx. 10 minutes)**
 - o Kahoot – 11 questions
 - o General questions about energy, specific questions that students will learn about later in the lesson.
 - o Link to Kahoot: <https://create.kahoot.it/share/everything-about-energy-kahoot/82f4e320-e0e3-4e41-ad6e-4bde2a304f4e>
- **Video Lesson (20-25 minutes with discussions)**
 - o [Click this Link to see the video on ERCA's YouTube Channel](#)
 - o Topics – How energy is used globally and how our energy use impacts climate change, energy use in Essex County, energy saving tips and tricks.
 - o Two discussions included in lesson – at these points you will be asked to pause the video and discuss the question with your class.
 - o Discussion 1: Can you think of any ways that climate change is impacting us locally?
 - o Discussion 2: What are some cool and easy ways to save energy?

- **After Video**

- Discuss what was learned and how it can apply to students, ask for thoughts (Ex. did anything you learned surprise you? What did you know already and what was new? What did you learn that can help you save energy at home?)
- Explain homework – Since students now know how to save energy, they will be completing an energy audit at home to see how energy efficient they already are (how many ‘energy points’ they can earn). Tell students that this audit is just a baseline, and that they shouldn’t prepare their house before doing the audit (turning off all the lights, unplugging computers) in order to earn more points. This audit is to see how energy efficient they are right now, so they can work on improving.
- Hand out energy audit worksheet and review, hand out paper energy audits for students without computer access at home.
Link to online energy audit: <https://www.surveymonkey.com/r/NL3RKX2>
- Introduce challenge – Tell students to imagine that they are building their dream house. What would they include (discuss)? They can be creative, anything is possible. Then, tell them to imagine that somebody has offered to build them this house, but with a catch – it must be energy efficient (they will have to use the strategies from the video, as well as tips and tricks they learn from doing their energy audit. Students will be in charge of transforming a tissue box/other small cardboard box into a model of their dream home using whatever supplies the school can provide and anything they want to bring in from home (try to encourage using recycled materials). When they are finished, they will be presenting their house to the class and talking about its awesome energy efficient features. An example photo of a model house is included.
- Depending on how much time you have, feel free to have students start brainstorming their house design for the rest of the class.

Day 2 – Building Activity

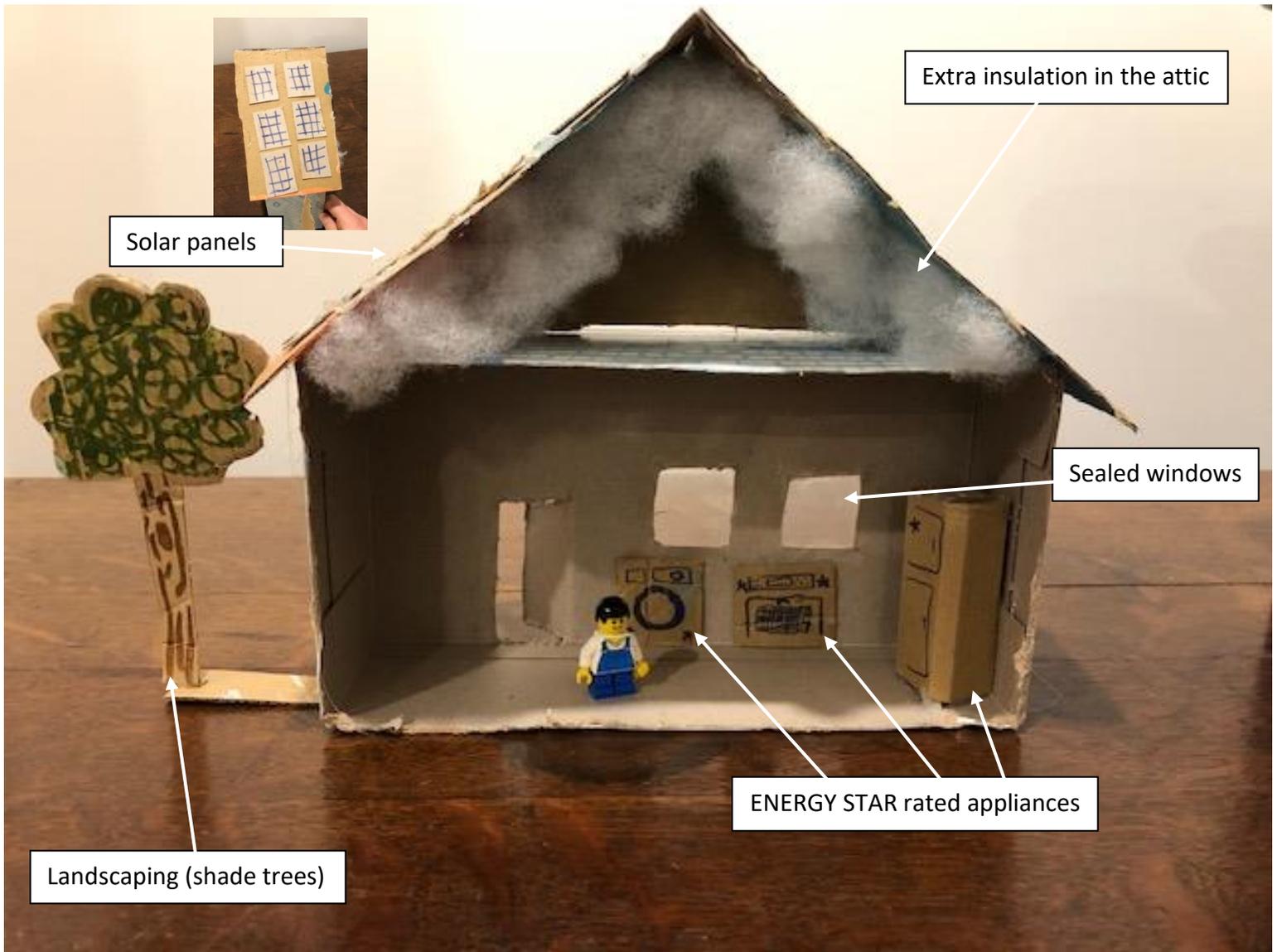
- **Energy-Efficient Dream House Challenge**

- Discuss energy audit homework – have students share scores. Talk about what they were doing well at home and where they were wasting some energy.
- Time to build! Students can work in pairs or independently, depending on how many boxes were brought in/preference. Encourage using recycled materials only, and avoid single-use plastics, glitter, beads, etc. If distance learning or other challenge prevents physical building, encourage students to use a computer or other remote method to conceptualize their design.

- **Wrap-up**

- At the end of class – have students share their ‘dream house’ with the class and talk about how it saves energy.
- Have students take their model home and talk to their parents about why they should save energy/cool tricks that they learned!
- **Feel free to take more than one class for construction, depending on your schedule and how interested students are in the project.**

Energy Efficient Dream House – Example



Some of these features are discussed in the lesson, you will learn about the rest as you complete your energy audit!

Energy Audit Worksheet

Now that you've learned about saving energy, it's time to see what your energy use is like at home! When you get home tonight you will be completing an energy audit to see how energy efficient your home is and learn about ways to improve.

Energy Audit Instructions

1. At home, hop on your computer and follow the link below to get to the energy audit survey (if you don't have access to a computer at home, ask your teacher for a paper copy)
Link: <https://www.surveymonkey.com/r/NL3RKX2>
2. Complete the survey! Some of the questions are a bit tricky to answer and you might have to ask your parent/guardian for help. Try to be as accurate as possible, but don't worry if you have to make an educated guess.

After the Audit

3. Look at your results. Do they surprise you?
What is your "energy efficiency rating" (fraction or percentage)? _____
4. Scroll down (or look back at the questions on the paper copy). On the online version, you'll be able to see all the survey questions, and the answers that would have earned you the most points are highlighted (on the paper version, points are shown in brackets beside each answer). What are some things you could do to earn more points? **Write down at least 3.**
Ex. I lost some points because we leave lights on when we don't need them. I could increase my score by turning out the lights.

Preparation for Construction – Energy Efficient Dream Home

5. So, now you know some strategies that help you save energy. Time for the fun part! Tomorrow in class, you will be constructing a model of your "energy efficient dream home" using tips and tricks you've learned throughout the lesson and the ideas you wrote down in question 4. The building will be done at school. **All you need to do is bring in a cardboard box around the size of a tissue box.** You can also bring in any building materials that you would like to use – try to use recycled materials if you can! Have fun with your model, and be creative!!

Energy Audit – Paper Version

(circle the most accurate answer to each question, add up your point total at the end)

1. Saving electricity is a great way to conserve energy at home, and one way to save electricity is to turn out the lights!

Take a walk around your house. Are there lights on in rooms that nobody is using?

- All the lights are on in my house! (0pts)
- A few rooms in my house have lights on when they aren't being used. (2pts)
- There are only lights on in the rooms that are being used. (4pts)
- I have the superhuman ability to see in the dark. Who needs lights?! (4pts)

2. Keeping your house warmer in the summer and cooler in the winter can save energy used by your furnace/air-conditioner.

Check your thermostat. What temperature is your house set at?

- It's cold outside, and my house is 24°C (75°F) or higher. (0pts)
- It's cold outside, and my house is 21-23°C (70-74°F). (2pts)
- It's cold outside, and my house is 20°C (69°F) or lower. (4pts)
- It's hot outside, and my house is 24°C (75°F) or higher. (4pts)
- It's hot outside, and my house is 21-23°C (70-74°F). (2pts)
- It's hot outside, and my house is 20°C (69°F) or lower. (0pts)

3. Programming your thermostat allows you to automatically turn off your furnace/air-conditioner when you aren't home. This can save you a lot of energy, because you aren't heating/cooling your house when you don't need to.

Is your thermostat programmable?

- Yes (4pts)
- No (0pts)

4. The more panes of glass your windows have, the less air-conditioned or heated air is able to escape through cracks.

What type of windows do you have?

- Single pane windows (1pt)
- Double pane windows (2pts)
- Triple pane windows (4pts)

5. LED and CFL lightbulbs use a lot less electricity and give off less heat than incandescent bulbs.

What kinds of lightbulbs are in your home?

- No CFL or LED lightbulbs (only incandescent) (0pts)
- A few CFL/LED lightbulbs (1pt)
- A mix of CFL/LED lightbulbs and incandescent ones (2pts)
- Mostly or only CFL/LED lightbulbs (4pts)

6. Ask your parent/guardian about how often your furnace and air filters have been changed over the past year. Changing the filters in these systems often removes dust, allowing them to work more efficiently.

How often did you change these filters?

- 0 times (0pts)
- 1-3 times (2pts)
- 4+ times (4pts)

7. Your refrigerator uses a lot of electricity to keep food cold. If the door isn't sealed properly, that cold air can escape, causing it to use more energy than necessary to keep cool. Open the door to your fridge and place a piece of paper halfway in, halfway out. Close the fridge, then try to remove the paper.

What happened?

- It was easy for me to remove the paper (1pt).
- The paper was tricky to remove, but I was able to do it (2pts).
- I couldn't remove the paper (4pts).

8. Insulation is essential for saving energy. The more air-conditioned air that you keep in your house, the less energy you have to use to heat/cool your home. Somewhere that tends to lose a lot of heat in your house is your attic.

How insulated is the attic of your house?

- No insulation (0pts)
- Thin insulation (2pts)
- Thick insulation (4pts)

9. Landscaping around your house can actually save you energy! If you have large trees in your yard, they shade your house in the summer, keeping it cooler. In the winter, the leaves fall off and sunlight is allowed into your windows, warming up your house.

Do you have trees around your house?

- I have no trees around my house – we are always in constant sunlight! (0pts)
- There are a few trees nearby, but they aren't big enough to offer much shade. (2pts)
- There are some big trees nearby that shade my house in the summer. (4pts)
- I live in a forest!! (4pts)

10. Bonus Points! Check off any of these answers that apply to you!

- Computers and devices are fully turned off and unplugged when not in use. (4pts)
- I have at least one ENERGY STAR certified appliance. (2pts)
- My water heater is set to 49°C (120°F) or lower. (2pts)
- I hang up my clothes regularly instead of using a dryer. (2pts)
- I make some of my own energy using solar panels, a wind generator (windmill) or another renewable energy source. (4pts)

TOTAL ENERGY-SAVING POINTS = _____ / 50