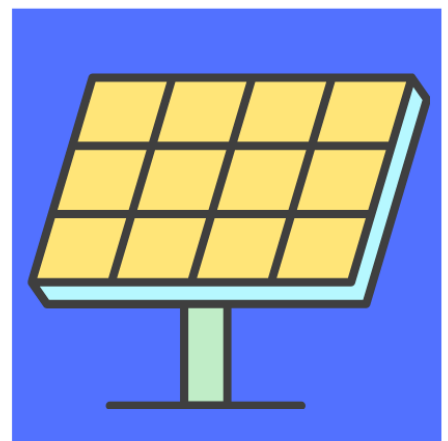




Solar Power and Energy Calculations

Lesson Plan



Solar Power and Energy Calculations

Learning Objectives

- I can calculate the energy production of solar panels and apply this knowledge to real world problems.
- I can describe uses for solar energy and how it helps the environment.
- I understand how solar panels work and different factors that might affect them.

Grades

This lesson plan was written to be flexible and used with a variety of grades. It was written with grade 5 to 8 in mind.

Materials

- EOS Solar Energy PowerPoint (Contact EOS Eco-Energy at eos@nb.aibn.com to obtain a copy or visit: <https://eosecoenergy.com/en/projects/education/>.)
- Copies of Solar Energy Worksheets for the class (see the following pages).
- Optional: solar panel or classroom model (contact EOS for a classroom model, or a local solar installer).

Instructions

- Preparation:
 - Arrange students in small groups of 3 to 4.
 - Distribute Solar Energy worksheet (see following pages).
- Start by projecting the Solar Energy PowerPoint. On **slide two**, a video will play automatically, zooming in on Johnson's Mills Interpretive centre near Dorchester, NB.
- **Slide three** - Give students time to write down their observations and questions about the video. Add their questions and observations to the board and discuss what different students noticed.
- **Slide four** - Ask students to make a prediction about how much energy the solar panels in these photos produce on a sunny day. Encourage students to discuss with each other and then share as a group. Their predictions do not have to be in kilowatts or in exact terms. Encourage them to consider if it will be a small amount of energy, a lot of energy, or enough energy to power something familiar they can think of.
- **Slide five** - Talk students through [how solar panels work](#). This is a good chance to use a solar panel model or example, or to talk with a guest speaker. This [Bill Nye video](#) is American but provides a good explanation of how household solar panels work.
 - For older grades there are several videos which delve deeper into the chemistry of how solar panels work:
 - [What is Solar Power - National Geographic](#) (1:45)
 - [How do Solar Panels Work?](#) (1:09)
 - [How do Solar Panels Work? - TedEd](#) (4:58)
- **Slide six** - Discuss examples of energy use and compare different activities and power needs.
- **Slides seven to nine** - Questions about solar panels are provided on the slides. In small groups, students work to determine the energy that those solar panels produce. This will require students to:
 - Determine the number of solar panels
 - Multiply the number of solar panels by the energy produced daily
 - Consider what factors might affect the solar panels, for example weather, time of year/position of the sun, cloud cover, direction that the solar panels face etc.
- **Slides seven and eight** - Students are asked to calculate how many solar panels the roof in the picture could hold and how much energy the roof would generate. Students will need to:
 - Calculate the area of the roof (width x length) (excluding the side of the roof which doesn't face the sun)
 - Calculate the area of a solar panel (width x length)
 - Determine how many panels would fit on the area of the roof (area of roof/area of panels)
 - Multiply the number of solar panels by the energy produced daily

- **Slide nine** - Calculate the number of panels needed to power the average household energy use of a Canadian family.
 - Divide the energy usage by energy produced by solar panels.
- **Slides 10 to 12** - Answers are provided.
- Review the student predictions from earlier in the class and see which predictions were close.
- At the bottom of the worksheet, there is space for students to consider why solar energy is important and to brainstorm ways we can use solar energy. Student responses can be used to have a discussion about renewable energy, opportunities for renewable energy in their homes and town, and energy usage.

Extensions and other solar panel lesson plans

- <https://www.jpl.nasa.gov/edu/teach/tag/search/solar+energy>
- <https://tapintoteenminds.com/3act-math/solar-panels/>
- https://www.teachengineering.org/lessons/view/cub_solarenergy_lesson01
- https://www.teachengineering.org/activities/view/cub_environ_lesson09_activity1
- <http://www.stelr.org.au/wp-content/uploads/2018/05/Mathematics-of-solar-panels.pdf>
- <https://www.nationalgeographic.org/encyclopedia/solar-energy/>
- <https://getrede.ca/school-energy-consumption/>

Solar Energy Worksheet

Name: _____

What do you notice or wonder about this photo?

How much energy do you think is produced by these panels on a sunny day? (a lot, a little, some)

Question 1: Calculate the solar energy produced by this set of solar panels in one day

Question 2: Calculate how many solar panels this roof could hold and how much energy the panels would generate in a day?

How many panels could this roof hold?

How much energy would these panels produce in one day?

If the average Canadian home uses 30kWh per day, how many solar panels would meet this home's needs?

Do you think solar is energy important and how do you think we could use solar power?

This lesson plan was created by Amelia Moore, Bachelor of Education Student Intern

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We would like to acknowledge that our work is done on the traditional, unceded territory of the Mi'kmaq.

For more information on any of the lesson plans, please contact EOS Eco- Energy:

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