



## ELEMENTARY SCHOOL 2020-2021

### Energy Efficiency & Conservation

#### Lab Activity: 4<sup>th</sup> – 5<sup>th</sup> grade



**Title:** Benefits of Solar Energy – Building Solar Ovens

**Objective:** Students will identify the benefits of solar energy and how solar panels harness the power of the sun. Students will build solar ovens.

**Materials:**

- Cardboard pizza box (the kind delivered pizza comes in)
- Aluminum foil
- Clear tape
- Plastic wrap
- Black construction paper
- Ruler, wooden spoon or stick
- Graham crackers, chocolate bars, marshmallows

**Estimated Time Needed:** 90 minutes

**Background Information & Vocabulary:** The sun is the source of almost all energy on Earth explaining that the sun is a large ball of burning gas in the center of the solar system. The energy that the sun produces is called solar energy. Solar energy is a renewable source of energy and using it for our daily needs prevents the depletion of the limited non-renewable energy sources on Earth. *Fun Fact:* More energy from the sun hits the earth in one hour than the ENTIRE world uses in a year.

**Solar Ovens Explained:** Rays of light are coming to the earth at an angle. The foil reflects the light ray and bounces it directly into the opening of the box. Once it has gone through the plastic wrap, it heats up the air that is trapped inside. The black paper absorbs the heat at the bottom of the oven, and the plastic wrap keeps it from escaping out the sides of the oven. Solar ovens reach about 200° F on a sunny day, and it will take longer to heat things than a conventional oven. Although this method will take longer, it is very easy to use, and it is safe to leave alone while the energy from the sun cooks your food.

**Procedures:** (for students)

2. Watch TED ED video– [How do solar panels work?](#)
3. Elicit ideas for how solar ovens work and some pros and cons for using solar ovens to cook.
4. Build a solar oven at home.
  - Cover the inner side of the top and bottom of the box with aluminum foil so that it will reflect rays from the sun. To do this, tightly wrap foil around it, then tape it to the back, or outer sides.
  - Line the bottom of the box with black construction paper where the s'mores will be placed—black absorbs heat. Tip: *Place the black paper in the sun while constructing the solar oven to “pre-heat” the oven.*
  - Place the s'mores ingredients in the box.
  - Use clear plastic wrap to create an airtight window for sunlight to enter into the box. Do this by opening the box and taping a double layer of plastic wrap over the inside of the box as seen in the picture above. Leave about an inch of plastic overlap around the sides and tape each side down securely, sealing out air.



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- The best hours to set up your solar oven are when the sun is high overhead - from 11 am to 3 pm. Take it outside to a sunny spot and adjust the flap until the most sunlight possible is reflecting off the aluminum foil and onto the plastic-covered window. Use a ruler, wooden spoon, or stick to prop the lid at the right angle.
- Reposition your solar oven when needed, so that it faces direct sunlight. You should check periodically on your oven to make sure it is in the sun. Make sure that the foil-covered flap is reflecting light into the box through the plastic-covered window.
- Wait until the chocolate gets soft and the marshmallows are warm and toasty. Then peel back the plastic, combine the s'mores together and enjoy your warm, tasty treat from the sun!

#### **Guiding Questions:** (for teachers)

- Where do people get their energy from? How about plants?
- Why do plants, machines, and people need energy?
- Where would it be beneficial to use solar energy? Think about access to electricity.
- Can you identify other types of energy besides solar energy?

**Evaluation:** Take pictures of the solar oven and have students create a solar oven recipe to share with a friend.

\* Lesson taken in part from [Solar United Neighbors SUN patch program](#)

#### **Benchmarks:**

##### *4<sup>th</sup> Grade:*

- SC.4.E.6.3 Natural Resources
- SC.4.E.6.5 Tools and Technology
- SC.4.E.6.6 Florida Resources
- SC.4.P.10.2 Investigate & Describe Forms of Energy
- LAFS.4.W.3.7 Conduct Short Research Project

##### *5<sup>th</sup> Grade:*

- SC.5.P.10.1 Investigate & Describe Basic Forms of Energy
- SC.5.P.10.2 Investigate and Explain Energy's ability to cause motion or create change
- SC.5.P.10.4 Investigate & Explain Electrical Energy
- LAFS.5.W.3.7 Conduct Short Research Projects



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#### Additional Resources:

- [Definition of Energy](#) for kids Britannica
- [Solar United Neighbors Youth Activity Toolkit](#)
- [What is Solar Energy?](#) - Video
- [Florida's Natural Resources](#) - List

**Extension:** *EcoRise Sustainable Intelligence* [Energy: Lesson 3.3: Solar Boxes](#). In this lesson, students learn about the greenhouse effect and how excessive greenhouse warming on a global scale is affecting weather patterns around the world. They create solar boxes to simulate normal and excessive greenhouse effects and discuss how temperature is dependent upon environmental conditions.

Access the [Energy](#) lesson and resources, along with 159 more lessons by enrolling today at [www.ecorise.org/si](http://www.ecorise.org/si)  
Questions? Email us at [support@ecorise.org](mailto:support@ecorise.org)



EcoRise inspires a new generation of leaders to design a sustainable future for all. Our school-based program empowers more than 100,000 youth each year to tackle real-world challenges in their schools and communities by teaching eco-literacy, design, and social innovation.

#### SUSTAINABLE INTELLIGENCE CURRICULUM

Through a partnership with Dream in Green, Miami K-12 teachers now have access to EcoRise's Sustainable Intelligence (SI) curriculum at no cost! SI is an engaging, ready-to-use, K-12 curricula that guides students in building a foundation of environmental literacy and sustainability knowledge across seven eco-themes.

SI introduces students to the challenges and opportunities surrounding sustainability and invites them to develop real-world solutions. Through hands-on activities, design challenges, and eco-audits, students cultivate 21st-century skills such as creative problem solving, collaboration, and systems thinking while fostering leadership, empathy, and mindfulness.

The SI curriculum includes:

- ✓ **160 lessons in both English and Spanish**, including lesson plans, slideshows, videos, activity sheets, assessments, technology tools, and extension opportunities.
- ✓ **Real-world application** and hands-on design projects, including school and home Eco-Audits and Green Design Labs.
- ✓ **Alignment** to the Next Generation Science Standards.

