



Solar Energy

Lesson Plan

Season 2, Episode 3: (0:00–13:33)

bit.ly/steamcamp-s2-ep3

Explore how energy from the sun is collected in solar panels and travels to homes and businesses with the help of NV Energy.

Nevada Academic Content Standards/Next Generation Science Standards:

MS-PS3-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Materials

- Pizza box
- Pencil
- Ruler
- A few sheets of black construction paper
- Newspaper or grocery ads
- Scissors
- Foil
- Plastic wrap
- Strong tape
- Stopwatch or clock
- Oven mitts
- S'more ingredients, like graham crackers, large marshmallows, and chocolate squares

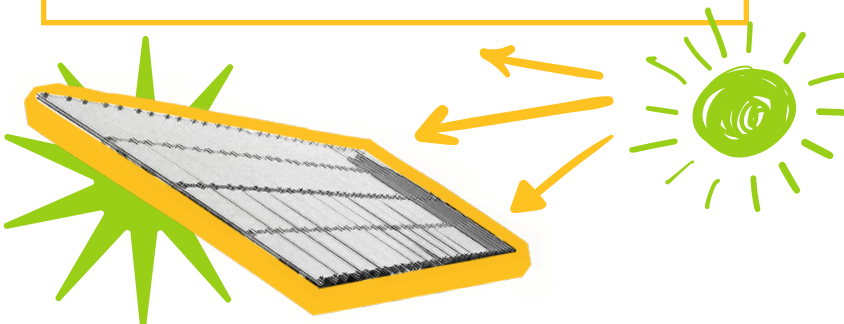
Engage:

Share the beginning of the program with students. After Carter asks, "How do we make electricity from the sun?" pause the program and ask your students the same question. Write this essential question down and record student responses to reveal students' current knowledge, connections to the topic, and further questions they have.

Explain:

Introduce the words: **solar panels**, **solar cells**, **solar farm**, **transmission line**, **substations**, **distribution line**, **transformer**.

- Have students guess their meaning and record their ideas.
- Ask students to listen for the words as they watch the video clip, featuring members of the NV Energy team.
- When they hear one of the words, encourage students to make a gesture, such as wiggling their fingers.





Solar Energy

Lesson Plan

Season 2, Episode 3: (0:00–13:33)

bit.ly/steamcamp-s2-ep3

Explain, continued:

Pause the video at key spots to ask questions that strengthen comprehension and help children make connections.

- After Patricia's segment, pause the video and ask students:
 - Where is energy from the sun collected? (in solar panels)
 - What part of the solar panel converts the sun's energy to electricity? (a solar cell)
 - What is a solar farm? (where many solar panels are together in one place)
- After Scott's segment, ask students:
 - What is voltage? (the force that pushes electrons away from the solar farm)
 - How are high voltage transmission lines like highways/freeways? (electricity travels at high speeds through them)
- After John's segment, ask students:
 - Why do we have substations? (they lower the voltage of electricity to a safe level to use in our homes and businesses)
 - How do engineers stay safe when working in substations? (by wearing hard hats, safety glasses, fire resistant clothing, and safety shoes)
- After Courtney's segment, ask students:
 - How does electricity travel from the substation to neighborhoods? (through distribution lines, either overhead or underground)
 - What is a transformer? (it makes electricity safe for your home)
 - Where are transformers located in your neighborhood? (overhead on distribution lines or in a box on top of the ground)
 - Why shouldn't you play on or around transformer boxes? (because electricity travels through them and you can get electrocuted)

Reflect on the new knowledge students have acquired.

- Revisit the essential question and have children answer it by incorporating the vocabulary words; ask children to share any new information they have acquired or additional questions they have.
- Have students draw a picture of how solar electricity travels from the solar farm to their home. Rewatch the video to help students create their illustrations, as necessary. Label the solar farm, transmission line, substations, distribution line, and transformer.

Explore:

Use the at-home activity segment to guide students through the scientific inquiry process to create and test their solar oven.

Observe and notice/Ask questions: Share the video segment in which Jessica outlines directions for creating a solar oven and conducting the investigation, then pause the video. What do students notice and wonder about the way the solar oven was constructed?



Solar Energy Lesson Plan

Season 2, Episode 3: (0:00–13:33)

bit.ly/steamcamp-s2-ep3

Explore, continued:

Plan and predict: Have students gather the materials needed to make their solar ovens and construct them by following the directions in the video. How will they know when their s'more is cooked? What time of day do they think is best to conduct the investigation? Have them decide how to best position the solar oven outside — --should the foil face toward or away from the sun? How long do they think it will take to cook their s'more?

Investigate/collect data: Place the s'more in the oven and have students check it every 10 minutes (or sooner, if it's a hot day) and take notes or draw pictures of the changes they observe. For safety, adults should remove the s'more from the oven. It will be hot, so be sure to use oven mitts! How long did it take to cook their perfect s'more?

Draw conclusions/share ideas: As students celebrate their hard work by eating their s'mores, discuss how the solar oven works:

- What was the purpose of the foil flap?
- Why did they add plastic wrap to the opening?
- How does the black paper act like a solar panel? What does adding the newspaper do? Why?
- How would using the solar oven at a different time of the year or location affect the results?

Help students make connections between anything they learned in the video and the outcomes of this activity. What new questions do students have?



Extend:

View the book talk with Shana, a local Young People's Librarian. If possible, check out the books Shana shared with students:

- **Solar Power (Pogo: Green Planet)** by Rebecca Pettiford
- **Solar Story: How One Community Lives Alongside the World's Biggest Solar Plant** by Allan Drummond

Encourage students to continue exploring measurement, proportion, and scale by accessing the following PBS KIDS resources:

- **Ready Jet Go!: Rovers and Solar Power:** bit.ly/readyjetgo-solarpower
- **Zoom: Cooking Cookies with Solar Power:** bit.ly/zoom-solarpower

Share:

Visit vegaspbs.org/steamcamp to upload photos or videos of student projects, or share them with us on social media by tagging [@vegaspbs](https://twitter.com/vegaspbs).

Keep in mind, if you are submitting a video, make sure we can see what students are doing and hear what they are saying! Also, please keep videos to one minute or less.