

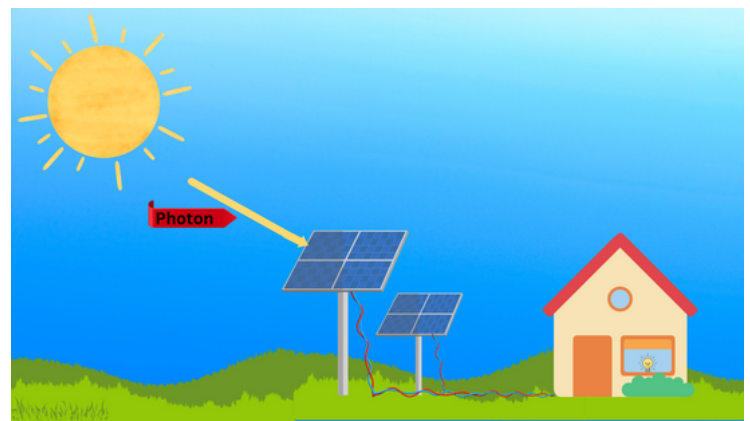
# Solar Powered House STEM Project

## Overview

In the cardboard solar-powered house project, you get to design and build a small cardboard house with a special panel on the roof that uses the sun's energy to light up a tiny LED light inside. You'll learn about how the sun's energy can be turned into electricity, and you'll get to use your creativity and problem-solving skills to make your house look really cool!

## Materials Needed

- Cardboard boxes
- Scissors
- Ruler
- Pencil
- Mini solar panels with wire attached to an LED light
- Glue or tape
- Markers or paint (optional)



## Procedures

1. Introduce the project and provide yourself with the materials listed above.
2. Plan the length and width of your small house and decide where you want to place the solar panel on the roof.
3. Draw a diagram that shows the sun's rays traveling in the air and reaching your small home with a solar roof. Label the photons, the solar panel, and describe how the energy changes from sunlight into electricity.
4. Using cardboard boxes, cut and assemble the small home according to your plan. You can add windows, doors, and any other decorations with markers or paint.
5. Attach the mini solar panel to the roof of your cardboard house with wires. The LED light that is attached to the wire should go inside the house.
6. Place your completed house in direct sunlight, and observe how the solar panel captures the energy from the sun and converts it into electricity to light up the LED light.
7. Write a reflection paper about your project's performance and effectiveness. Describe any challenges you encountered, how you overcame them, and what you learned about solar energy and energy conversion.

# Three Dimensional Assessment

For this project, your teacher will grade your work in three areas to see how well you've learned about science and engineering. The first area is about what you know – your teacher will look at your understanding of how solar panels work and how they can turn sunlight into electricity. The second area is about how you think – your teacher will look at how you used critical thinking and problem-solving skills to design and build your cardboard house. Finally, the third area is about what you did – your teacher will look at how well you followed the instructions and used the materials to build your house and connect the solar panel. By looking at all of these areas, your teacher will be able to give you a grade that shows how well you understand and can apply the NGSS 3D standards.

## Disciplinary Core Ideas

### Grade 1 (Exceeds expectations):

Student shows an in-depth understanding of the scientific concepts involved in energy conversion from sunlight to electricity. They demonstrate a clear understanding of the relationship between the solar panel, photons, and electricity, and how this energy is used to power the LED light in their cardboard house.

### Grade 2 (Meets expectations):

Student shows a solid understanding of the scientific concepts involved in energy conversion from sunlight to electricity. They demonstrate a general understanding of the relationship between the solar panel, photons, and electricity, and how this energy is used to power the LED light in their cardboard house.

### Grade 3 (Needs improvement):

Student shows a limited understanding of the scientific concepts involved in energy conversion from sunlight to electricity. They demonstrate a basic understanding of the relationship between the solar panel, photons, and electricity, but struggle to explain how this energy is used to power the LED light in their cardboard house.

## Crosscutting Concepts

### Grade 1 (Exceeds expectations):

Student demonstrates a high level of critical thinking and problem-solving skills, and applies crosscutting concepts such as energy, cause and effect, and systems thinking to their cardboard house project.

### Grade 2 (Meets expectations):

Student demonstrates some critical thinking and problem-solving skills, and applies crosscutting concepts such as energy, cause and effect, and systems thinking to their cardboard house project.

### Grade 3 (Needs improvement):

Student demonstrates limited critical thinking and problem-solving skills, and struggles to apply crosscutting concepts such as energy, cause and effect, and systems thinking to their cardboard house project.

## Science and Engineering Practices

### Grade 1 (Exceeds expectations):

Student demonstrates a high level of skill in planning, designing, and building their cardboard house. They follow the scientific method, collect data, and make informed decisions to refine their project.

### Grade 2 (Meets expectations):

Student demonstrates some skill in planning, designing, and building their cardboard house. They follow the scientific method, collect data, and make informed decisions to refine their project.

### Grade 3 (Needs improvement):

Student demonstrates limited skill in planning, designing, and building their cardboard house. They struggle to follow the scientific method, collect data, and make informed decisions to refine their project.