

# STEM Connections

## Solar Power

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## How do we use solar energy?

Photovoltaic devices transform sunlight into electrical energy. A single photovoltaic device is known as a cell. An individual PV cell is usually small, typically producing about 1 or 2 watts of power. These cells are made of different semiconductor materials and are often less than the thickness of four human hairs. Photovoltaic cells are connected together in chains to form larger units known as panels. This way they can produce various amounts of electric energy.

Solar energy is green and pollution-free. It can work in remote areas that are not connected to the main grid. The use of solar energy also reduces our carbon footprint and makes our living environment better.

An innovative example of using solar energy is photovoltaic-powered vehicles (cars, bikes, buses, planes etc). Such vehicles do not need petrol but can run only on energy coming from the sun. Today, the most common example of solar power is rooftop solar panels. They become very popular because they can provide electric energy for an entire home.

There is no doubt that solar energy will continue to play a key role in the world. With more and more breakthroughs in the solar power field, we will see new inventions in the future.

## How to make your own solar updraft tower

**Suitable year groups:** Year 5 and Year 6 (health and safety risks), Year 7, Year 8, Year 9

### **Learning Objectives:**

- To recognise sources of power and electricity (KS2)
- To recognise the Sun as a source of power (KS2)
- To understand the process of energy transfer from the sun to the can to the air inside it (KS3)
- To understand the different methods of generating electricity including renewable sources (KS3)
- To understand how light travels and how intensity can change (KS3)

### **Materials Required:**

- Two tin cans
- Sellotape or glue
- Two paper clips
- 1 push pin
- A4 Paper
- Pom pom balls (optional)

**Time estimated** 30 minutes

### **Step by Step Instructions for the solar updraft tower:**

1. Prepare two empty tin cans. Carefully wash the tin can and open the other side of the can as well.

2. Stick the two empty tin cans by using sellotape.



3. Unfold the two paper clips.

4. Using sellotape, stick the unfolded paper clips. Once it is done, stick the edges of the unfolded paper clips to each side of the emptied tin can.



5. Use sellotape to stick the push pin with the unfolded paper clip. Make sure that the push pin is taped in the center of the unfolded paper clip.

6. Fold the paper windmill. More detailed instructions below



7. Carefully attach the paper windmill in the center, taped side down.



8. For safety reasons and to make your own solar updraft tower more attractive, add the pom pom ball or something similar to the top of the push pin.



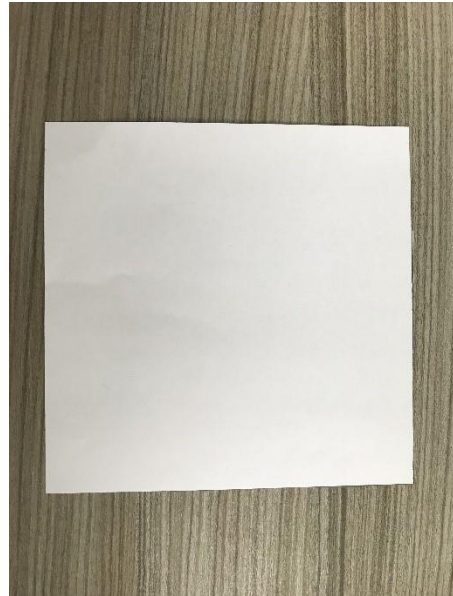
9. Prepare two books or boxes that have a similar height and place them under the solar updraft tower. It is to allow the air to flow.



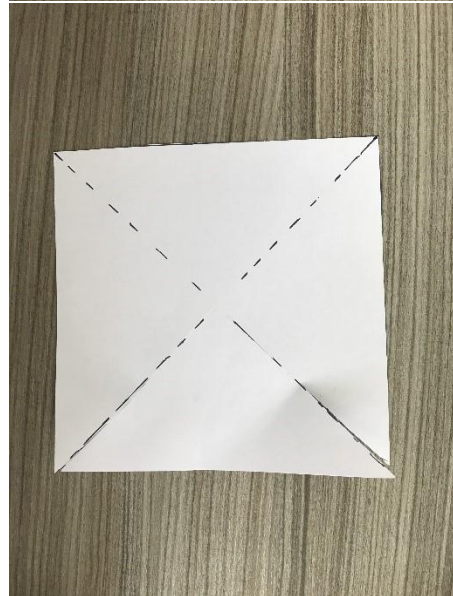
10. Place the tower under sunlight. Once the tin can is heated sufficiently by the sunlight, the pinwheel will spin. As the sunlight heats the air inside the cans causing a convective updraft.

**Step by Step Instructions for the paper windmills:**

1. Prepare 15 x15cm size (equal to 6" x6") of paper or cut the A4 size of the paper to this size.



2. Draw a line from the corners of the squares diagonally. Cut along these 4 lines nearly to the center of the square. Leave about 0.5 cm uncut.



3. Bring a corner of each of the 4 triangles to the center and use glue or sellotape to hold them in place.





## Ideas to explore this concept further

- Would a paper tower work instead of tin cans?
- What if the tower was painted black?
- What would happen if the pinwheel was bigger or smaller or made of a different material?
- What would happen if you used more cans?