

Practical Activity



Now that you've learned how biomass power works, it's time to use your own plant matter to demonstrate the energy stored in it!

You will need:

- Plastic drinks bottles (washed and emptied)
- Balloons (not inflated)
- Sticky tape
- Marker pen
- Kitchen scales
- Different types of plant matter, like:
Fruit, vegetable peel, grass cuttings or fallen leaves and petals.
- Measuring jug.

Step 1: First, separate your plant matter into different categories that you'd like to test, e.g. fruit and vegetable peel and garden waste. Label your bottles with these categories.



Step 2: Weigh your plant matter, so that you are putting the same amount in each bottle. 50g per bottle should be fine. Then, top up your bottle with water – use the same amount of water for each bottle.

Step 3: Attach the balloon over the open top of the bottle, and tape it in place so that gases can't enter or escape.

Step 4: Watch what happens over the next week. What happens to the balloon? Feel the bottles – do they feel hotter? Is there a temperature difference between the different bottles? Decomposing plant matter releases energy, including heat energy. The heat you feel is a result of the energy having been transferred from chemical energy, which had been stored in the plant matter, to thermal energy. This is why we can use biomass for the power that we all need.

Practical Activity

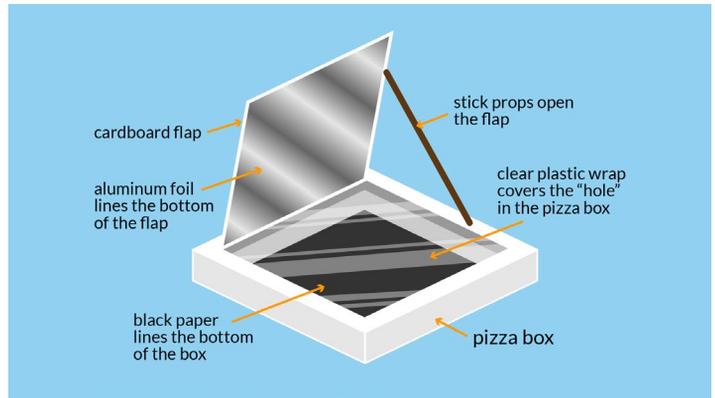


Now that you've learned how solar power works, it's time to design and build your own model demonstrating the power of the sun's energy! You will need to think like an engineer to design, assemble, test, and improve your model.

You will need:

- Pencil and paper
- Small cardboard box (e.g. a pizza box)
- Any clear plastic
- Straw or stick
- Aluminium foil
- Scissors
- Glue or sticky tape
- Optional:
black card or paint.

Step 1: Before you start making your model, it is important to plan what you will do. Use your pencil and paper to sketch a 'solar oven' that can hold some food and has a lid that reflects light onto the food. Use the pictures here for inspiration!



Step 2: Make your model. Make sure that the foil reflects sunlight into your 'oven', if you have black card or paint, make the base of your oven black. Why do you think a black surface will improve the oven? Place your food on the black base and cover the top of the box in clear plastic (e.g. Cling-film). The lid must be kept open.

Step 3: Test your oven! Use food that you'd like to melt, like marshmallows onto biscuits or chocolate (yum!). Place your oven in sunlight and regularly check it. What happens?

Step 4: Experiment! What would happen if you placed your oven inside another foil-lined box? What about if you added more foil-lined 'lids' reflecting sunlight into the oven?

Practical Activity



Now that you've learned how wind power works, it's time to design and build your own wind turbine model! You will think like an engineer to design, assemble, test, and improve your model.

Task: Make a moving model of a wind turbine. This is something that spins when air flows over it, either the wind outside or the moving air from a desk fan or hairdryer.

You will need:

- Pencil and paper
- Some plastic or cardboard to make the blades
- Straws (paper or plastic)
- A paper cup
- Something that can act as a wheel (e.g. a milk bottle top)
- Scissors
- Glue

Step 1: Before you start making your model, it is important to plan what you will do. Use your pencil and paper to sketch a basic wheel that will spin when air flows over it. Make sure you include a mechanism for the blades to be able to turn! Use the picture as a starting idea:



Step 2: Make your model. Make sure that air can flow over your model turbine. Does your model work? Do the blades turn? How fast does your model turbine turn?

Step 3: Improve your model. Go back to your design sketches and add any improvements to the design. Can you make it spin faster or more smoothly? Does the angle, pitch or number of the blades have an affect.

Step 4: Experiment! What happens to the speed of your turbine if you increase the amount of wind or air passing over it? Try using different ways of blowing air over the turbine, use a fan or a hairdryer or even take it outside if it's a windy day!

Extension: if you have a small motor at home, you could try making a wind turbine that actually generates electricity!

Practical Activity



Now that you've learned how tidal power works, it's time to design and build your own model demonstrating the power of the tides! You will think like an engineer to design, assemble, test, and improve your model.

You will need:

- A pencil and paper.
- A container filled with water to create tides (the water will need a way to be released), you could also use a sink or a bath to do this.
- Material to make a model turbine (if needed). This could include straws, scissors, glue and plastic/cardboard to make blades.

Step 1: Before you start making your model, it is important to plan what you will do. You will need to find or create something that will spin underwater. You may have already built a suitable model in previous challenges or may have something lying around your home (see picture)!



Step 2: Make your model and put it into your container of water. Make sure that water can flow over your model turbine. Does your model work underwater? How fast does your model turbine turn? Try releasing some water from your container to test your model.

Step 3: Improve your model. Go back to your design sketches and add any improvements to the design. Can you make it spin faster or more smoothly?

Step 4: Experiment! What happens to the speed of your turbine if you increase/decrease the flow of water out of the container? More or less water flows? What happens if the water pours out quickly or slowly?

Practical Activity

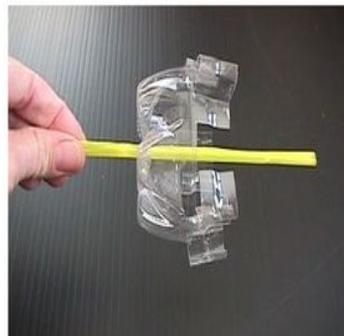
Now that you've learned how hydroelectric power works, it's time to design and build your own power plant model! You will think like an engineer to design, assemble, test, and improve your model.

You will need:

- Pencil and paper
- 2 plastic bottles (empty and washed)
- Straws (paper or plastic)
- Scissors
- Glue
- Cocktail sticks



Step 1: Before you start making your model, it is important to plan what you will do. Use your pencil and paper to sketch a basic wheel that will spin when water flows over it. How will it catch the water? Use the picture as a starting idea:



Step 2: Make your model. Make sure that water can flow over your model turbine and not get trapped, which would stop it from spinning. Does your model work? How fast does your model turbine turn?

Step 3: Improve your model. Go back to your design sketches and add any improvements to the design. Can you make it spin faster or more smoothly?

Step 4: Experiment! What happens to the speed of your turbine if you increase the volume of water? What happens if the water flows from a greater height?