



Science
Age 11-13

Make a solar kettle

- Energy
- Sustainability
- Climate change



Learning
through
Landscapes

Previous learning required

- An understanding of the terms **renewable energy** and **solar power**
- Experience of accurately reading a thermometer

Learning outcomes

- To investigate the renewable energy source of solar power and understand how it can be harnessed

Equipment

- Tall and medium assorted plastic bottles
- Smaller bottles to fit inside the larger bottles
- Short length of hose or inner tube
- Black paint
- Tape and scissors
- Aluminium foil
- Stop clock and thermometer
- Sunshine

Activity

1. Paint a small bottle black and insert a piece of hose or inner tube into its neck, using tape to secure it if necessary.
2. Cut the bottom off a medium bottle, ensuring it is tall and wide enough to sit over the small bottle. Make sure it is stable when standing on the ground.
3. Cut the bottom off a large bottle, ensuring it is tall and wide enough to sit over the medium bottle.
4. Cover one side of the inner surface of the large bottle with aluminium foil.

5. Stack the medium bottle and then the large bottle over the top of the small bottle, ensuring that the hose or inner tube pokes through the neck of the large bottle.
6. Replace the large bottle's base, using tape to hold it in place.
7. Fill the small bottle with water via the hose or inner tube. The solar kettle is now ready to use in the school grounds.
8. Position the solar kettle in a sunny position with the foil surface furthest away from the sun, so it reflects the heat inwards.
9. Use a thermometer to measure the temperature of the water via the hose or inner tube at regular intervals, recording the data in a table.

Check for understanding

- Discuss the similarities between the solar kettle design and solar panel design with your pupils.
 - Solar panels comprise a series of **photovoltaic** (PV) cells which are made from layers of semi conducting material. **Photovoltaic** simply means the cells convert photons of sunlight into electricity.
 - In addition to the PV cells, a solar panel has a glass casing that offers durability and protection. Under the glass, the panel has an additional glass layer for insulation and a protective, reflective back sheet which protects against heat dissipation and humidity inside the panel. The exterior surface has an anti reflective coating to maximise sunlight absorption by the PV cells.

If you would like to develop your outdoor learning knowledge and skills, take a look at our range of training courses: itl.org.uk/outdoor-learning-training