Renewable Energy – Module 2

Discover more about renewable energy

What are variable energy sources?

Can energy be stored?

Make a solar powered Fairground ride

Fairground Ride

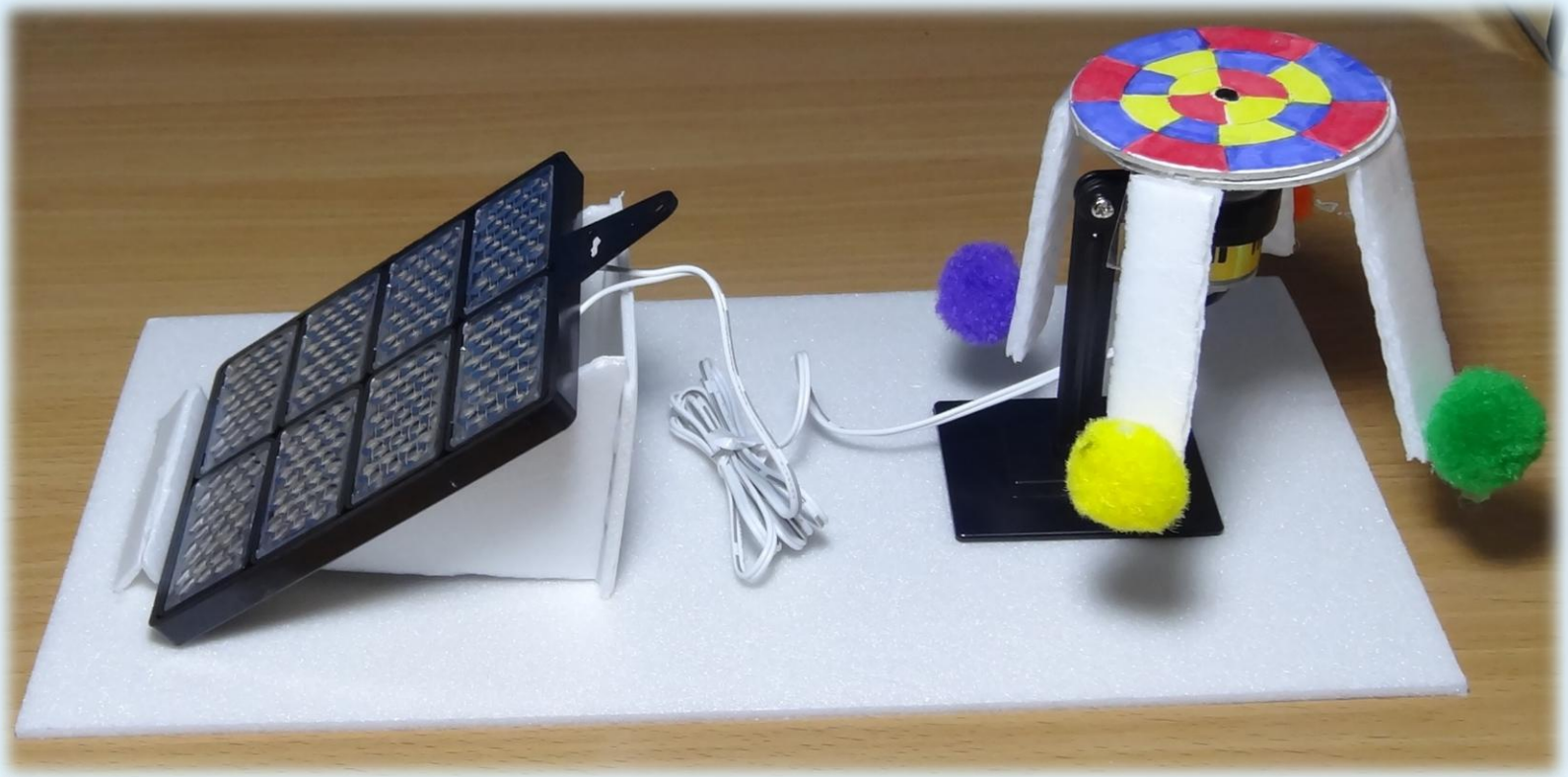
What is renewable energy?

- Most of our energy comes from burning fossil fuels which causes climate change.
- Fossil fuels are non-renewable – they get used up.
- We can use energy from clean sources such as the sun, the wind and water which do not get used up.
- These are renewable energy sources.

But what if the wind doesn't blow?

- Wind and solar power are variable resources.
- You want the wind to blow and the sun to shine.
- What about when the wind doesn't blow?
- You could use variable resources when available, reducing your fossil fuel usage.
- You could store energy, e.g. in batteries.

Make a solar powered fairground ride

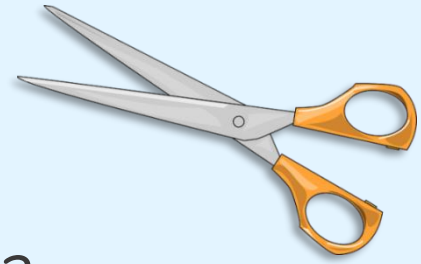


STEM Learning Objectives

- **S**cience: *Forces* (effects of gravity and air resistance) and *Electricity* (construct a simple electrical circuit, recognise common conductors and insulators).
- **T**echnology – use a range of tools and equipment to perform practical tasks.
- **E**ngineering – design of rotating equipment.
- **M**aths – draw circles and know that diameter is twice the radius.

Work Safely

Look at the tools and equipment. Can you spot any potential hazards?

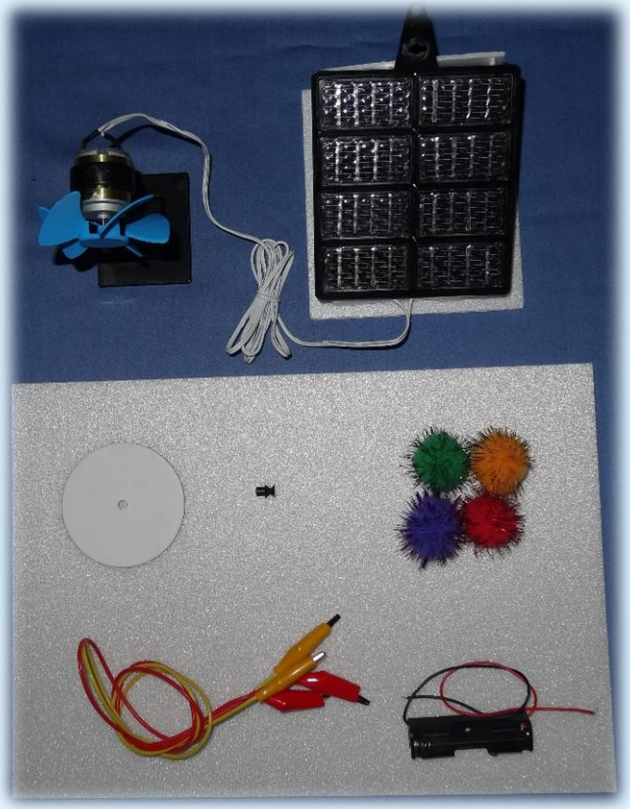


Can you think of ways to reduce the risks?

Collect your materials

You will need:

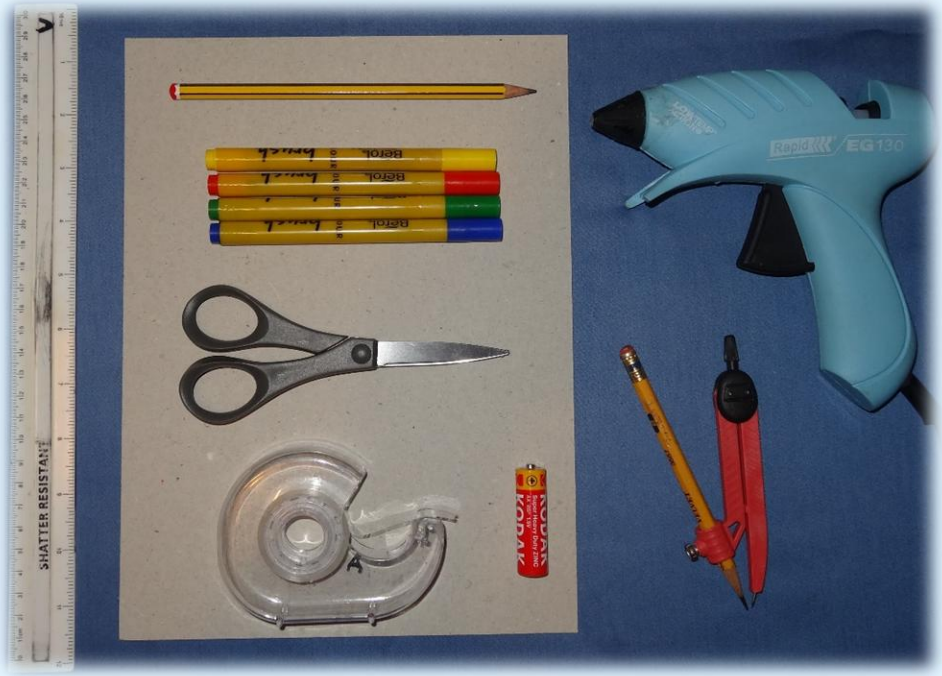
- A solar energy kit (pedestal fan completed in module 1)
- A sheet of polystyrene foam
- A card disc
- A motor pulley
- Four pompoms
- Two crocodile leads
- A battery holder



Assemble your tools and consumables

You will need:

- A ruler
- A sheet of card
- A pencil
- Coloured felt tip pens
- A pair of scissors
- Transparent sticky tape
- A cell (battery)
- A cool melt glue gun
- A pair of compasses



Prepare the motor

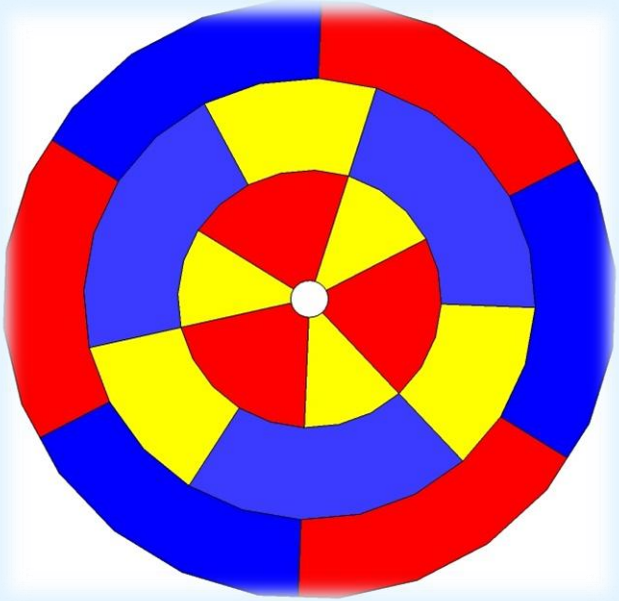
- Pull the propeller off the motor shaft.
- Replace it with the motor pulley - the nose of the pulley must face away from the motor as shown.
- Use the plastic spanner from the solar energy kit to loosen the nut slightly on the motor stand.
- Turn the motor so the shaft faces vertically upwards.
- Re-tighten the nut.

Make the base

1. Cut a base 12 cm x 25 cm from the polystyrene foam.
2. Glue the solar panel stand to one end, facing outwards.
3. Glue the motor stand to the other end. The motor should be on the side furthest away from the solar panel.

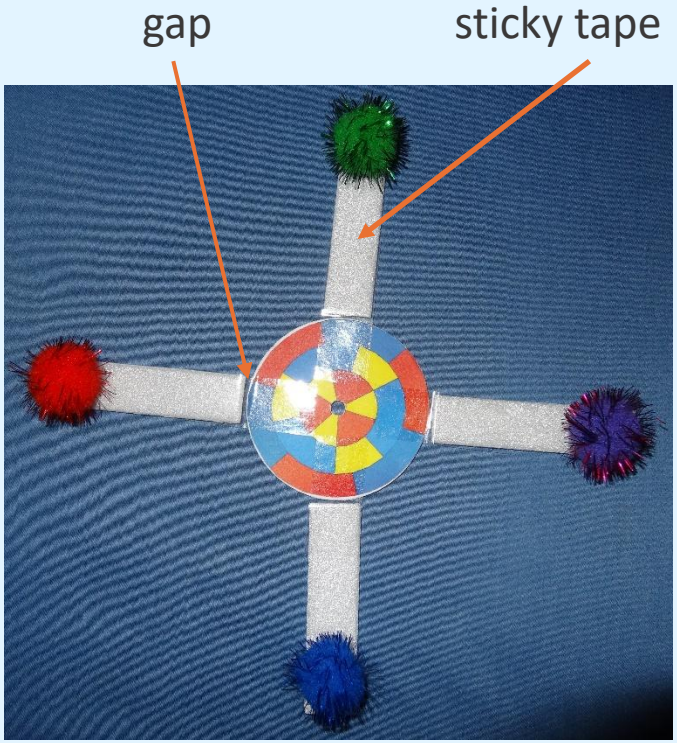
Colour in the card disc

1. Hold the card disc firmly on the sheet of card.
2. Use the compasses to draw two concentric circles of 3 cm and 5 cm diameter on the card disc.
3. How do you know what radius to set the compasses at?
4. Colour the concentric rings in alternating colours.
5. When the disc spins the colours appear to mix – try to predict what colours you will see.



Make rotating part of fairground ride

1. Cut four strips of polystyrene foam 1.5 cm x 7 cm.
2. Glue the four pompoms (passengers) on.
3. Use transparent sticky tape to attach the strips to the disc.
4. Make sure there is a gap between the strip and disc - the sticky tape must act as a hinge so the strips can hang down when the ride is stationary and fly out when the ride is rotating.



Complete the fairground ride

1. Slide the card disc onto the nose of the motor pulley.
2. If it is loose then glue it on.
3. Make sure the wires aren't in the way of the ride turning.
4. Orientate the panel so that it is facing the sun.
5. Watch what happens to the ride.

How does the ride work?

1. Watch what happens to the passengers as the ride speeds up.
2. What would happen if the strips weren't attached firmly?
3. What force pulls the passengers downwards?
4. Why do the passenger fly out to the sides?
5. What force slows them down?
6. Did you predict the colour mixtures correctly?

Try controlling the ride

- Try slowing the ride down or stopping it by covering the solar panel with your hand.
- What proportion of the solar cells need to be covered up to prevent the ride form starting at all?

What if the sun doesn't shine?

Power your fairground ride with a battery.

- Remove the motor contacts from the solar panel.
- Fit the cell into the battery holder.
- Clip one crocodile lead from the red wire from the battery holder to one of the motor contacts.
- Why do you need to clip onto the metal end of the wire, not the plastic cover?
- Clip the other crocodile lead from the black wire to the other motor contact
- What happens if you swap the clips over?

What did you learn?

- What is renewable energy?
- Name a ‘variable’ renewable energy resource.
- How could you store energy for when you need it?
- What forces are acting on the passengers as the fairground ride rotates?
- Name a material which conducts electricity.
- Name a material which is an insulator (does not conduct electricity).
- Which tools did you use to construct your fairground ride?
- What else did you learn?