

# NATURAL RESOURCES

## Activity NR06

### Theme

Class activity (CA). The class makes a wind turbine to lift a euro coin using the power of the wind.

### Objectives

To demonstrate the power of the wind and how it is harnessed, to develop awareness of renewable energy.

### Curricular Strands

SESE, Science and Geography–  
Environmental awareness and care

SESE, Science–Energy and forces; Forces;  
Science and the environment

**Skills** Questioning, observing, predicting,  
sorting, identifying, designing and making

### Time

40 minutes to make, 15 minutes to try out

### Links to Green Schools

Considering how using renewable energy improves our environment.

# Euro power!

## → A WIND POWERED MONEY LIFTER

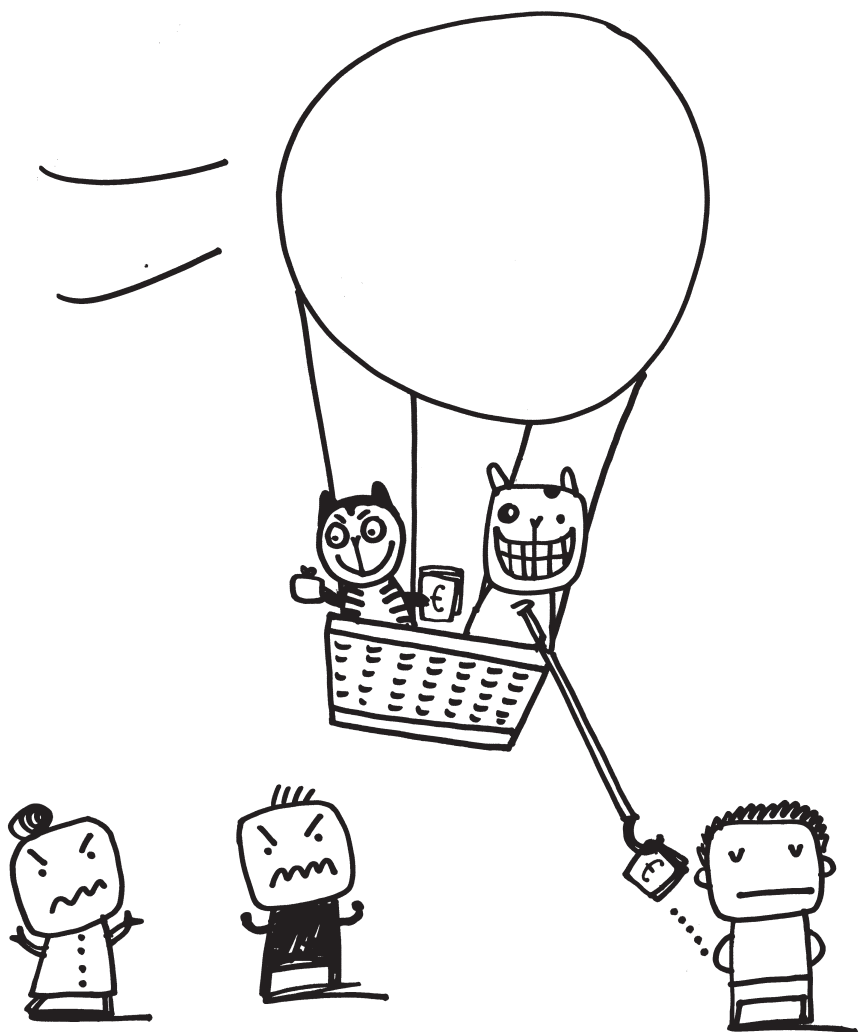
### WHAT YOU NEED

For each group:

- A two litre plastic drinks bottled (rinsed)
- A sheet of stiff paper or card 20cm x 20cm
- A pencil with an eraser (the pencil should have a round, not hexagonal, cross section)
- A cup of sand or soil
- A thumb tack
- Two rubber bands
- 20 cm of thread
- Some sticky tape
- A one euro and a two euro coin

### WHAT YOU DO

- 1 Ask the class do they know what kind of energy we use to make the lights go on. Elicit the response 'electricity'.
- 2 Explain that to make electricity in Ireland we burn fossil fuels in power stations. Fossil fuels are coal, gas, oil and peat.

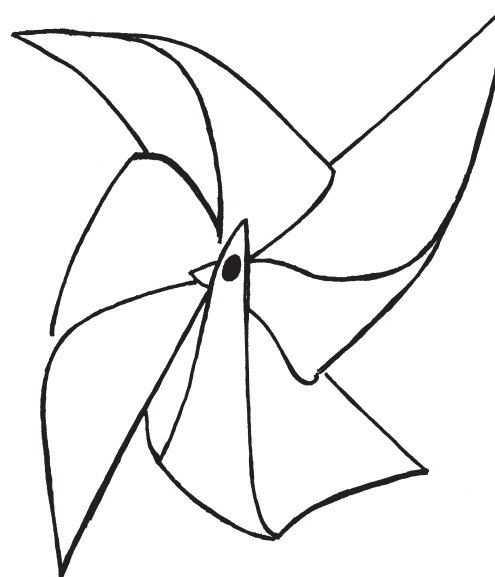
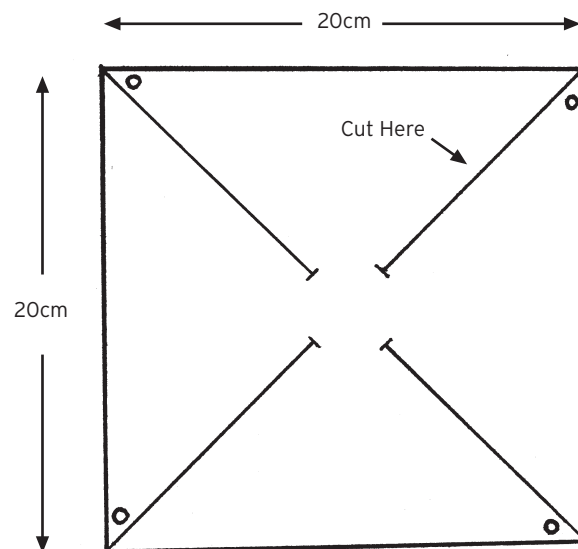


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- 3 Ask the class to imagine what happens when a piece of coal is burnt. What rises up from the burning coal? Elicit the response 'smoke'. Do the students think this smoke is good for the environment? The smoke (dust and gases) travels through the chimneys of our power stations, up through the sky and into the Earth's atmosphere.
- 4 Some gases released from burning fossil fuels cause what is known as the greenhouse effect (also called global warming or climate change). This effect occurs because the gases trap the heat of the sun in the atmosphere. Scientists are now very worried about the environmental damage that could be caused by the Earth heating up over a short period of time. Likely effects include storms, flooding and coastal erosion.
- 5 Burning fossil fuels is not the only way to make electricity. In Ireland we also make electricity using water and wind power (at the moment this only accounts for 5%).
- 6 The class today are going to design and make their own wind turbine. They are going to capture energy from the wind and use it to lift a weight.
- 7 Divide the class into groups. Each group can make a wind turbine to test.

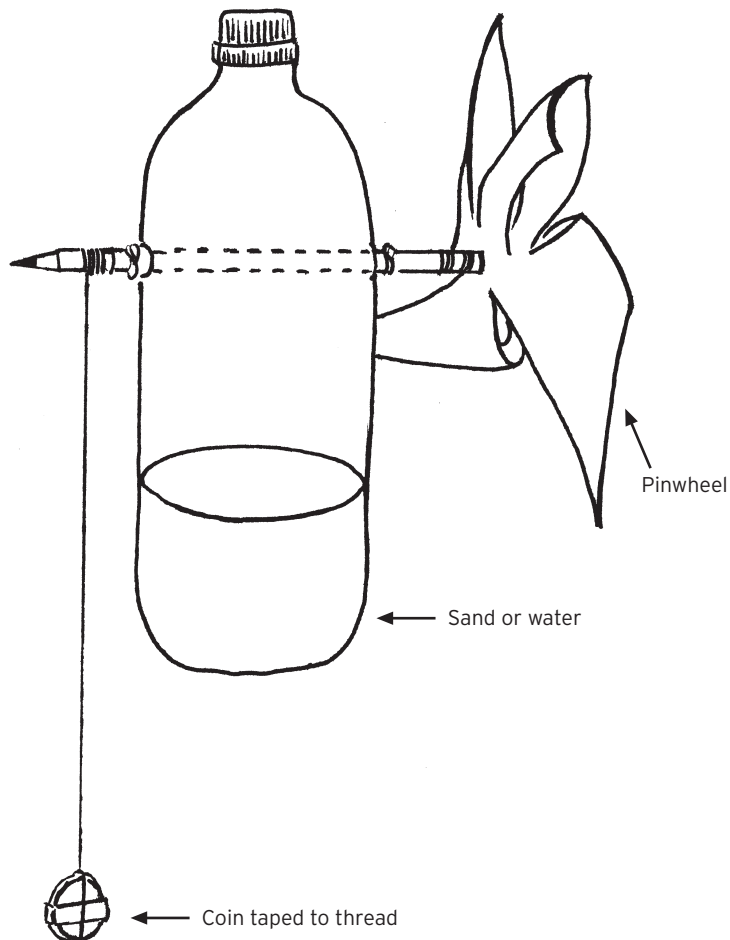


- 8 Mark the piece of card as shown in the diagram, cut slits along each diagonal from the corner until about 2cm from the centre, and then curve in the corners marked with dots and pin the four marked points together at the centre with the thumb tack.
- 9 Stick the tack firmly into the pencil eraser to secure the pinwheel onto the pencil. Push the tack in as deeply as it will go.

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- 10** Cut two holes at the same height in the bottle on opposite sides, about 20cm from the bottom of the bottle. Put sand, soil or something else heavy in the bottom of the bottle to stabilise it (you can cut the top off the bottle to make this easier). The teacher should do all the cutting.
- 11** Wrap a rubber band several times around the pencil about 3cm from the eraser.
- 12** Put the pencil through the bottle, and wrap the second

rubber band around the pencil on the far side from the pinwheel. The rubber bands are to stop the pencil from coming out, and should be around 3mm from the bottle on each side, giving a little room for the pencil to move about.

- 13** Secure the thread to the pencil about 1cm out from the bottle on the non-pinwheel side, using a little sticky tape.
- 14** Rotate the pencil a few times to roll the thread up a little. Now put your windmill on a table near the edge (secure to

the table with blu-tac if required), and tape a one euro coin to the end of the thread hanging down over the edge of the table. Wrap the thread around the coin a few times before taping the thread to the coin.

- 15** By blowing on the pinwheel, the students should be able to lift the coin up, showing how wind power can be used to do a task of lifting a weight. The principle is the same for wind turbines generating electricity; wind is used to rotate the turbine and this energy is converted to electricity.

## Questions

- 1** Was it hard work to lift the coin?
- 2** What happens if you try a heavier weight to lift? Try again with the two euro coin, and then with both coins together.
- 3** Why does the machine need to be so well secured and stable?
- 4** What have you learned about how real wind turbines you see on hillsides have to be built?

## Go further

- 1** The investigation could be done outside on a breezy day to see if the wind can move the wheel as well as students' breath.
- 2** Older students could be asked to design a similar machine that uses water power to move the coin.