

A science poster

1 Read the poster. Why is solar power important?

Solar energy

How we use solar energy

Photovoltaic (PV) systems or 'solar cells' change sunlight directly into electricity. PV cells are used in calculator and watch batteries, in roof panels, and in arrays of panels used to generate electricity in power plants.

Solar thermal power plants collect and store heat. They use big mirrors to reflect and concentrate the sunlight. Receivers collect the solar energy and turn it into steam. The steam powers a generator that creates electricity.



How to experiment:

Make your own steam power



Take a shallow tin container, paint the inside matte black and insulate the bottom and sides of the outside with cotton wool. Then pour in a little water. Cover the pan with a pane of glass, and put it outside in direct sunlight. The water will boil and give off steam.

What's the history?

A US inventor from Philadelphia called Frank Shuman built the world's first solar thermal power station in Maadi, Egypt in 1913. Shuman's plant used parabolic troughs to power a 45–52 kilowatt engine that pumped around 22,000 litres of water per minute from the Nile River to nearby cotton fields. Shuman used his plant to irrigate agricultural land for two years, but it could have been used to operate an electricity-generating turbine instead. Unfortunately, when the First World War broke out in 1918, the Maadi plant was broken up for scrap metal. It wasn't until the 1970s that people became interested in solar power again.



Egypt's energy crisis

Egypt is experiencing a serious energy crisis with parts of the country experiencing up to six power cuts a day. The blackouts have disrupted businesses leading to decreased production and unemployment. One of the reasons for this is that Egypt's electricity network struggles during the summer, when people switch on air conditioning as temperatures rise to 40°C. In addition, Egypt's gas-fuelled power stations cannot meet the demands of a rapidly increasing population. However, plans have been announced recently to open more power stations and move away from gas.



Plans for renewable energy



One solution for Egypt is solar energy. The country is ideally suited for the exploitation of solar energy because of the large amount of sunshine and very low rainfall. What's more, 90 per cent of the country is desert – so there is plenty of space to set up solar energy plants. However, despite this, renewable energy currently accounts for only a small percentage of Egypt's total output compared to some other countries, although the government hopes that 20 per cent of Egyptian electricity will be generated by renewable energy by 2020. This solar power could not only produce more electricity for domestic and industrial use, but also benefit agriculture. Solar-powered desalination units could be built along its long Mediterranean and Red Sea coastlines to generate large quantities of fresh water which would enable Egypt to make more land available for agriculture.

Industry leaders

Solar power worldwide is on the increase. Many nations have already invested significantly in it to provide an alternative to other energy sources. The world leader in solar power is Germany, followed by China, Italy, Japan and the United States. You might not think that the United Arab Emirates would be interested in it, because of their oil supplies, but they have built a 100-megawatt solar-thermal plant in Abu Dhabi that now powers thousands of homes in the country.



2 Read the poster again. Choose the correct answers.

- 1 Solar energy can be used _____.
a to power steam **b** to generate electricity **c** to store heat
- 2 The first solar energy plant was built _____.
a before the First World War **b** after the First World War **c** in the 1970s
- 3 Shuman's engine could have produced electricity instead of _____ a water pump.
a generating **b** powering **c** irrigating
- 4 Egypt is planning to open _____.
a fewer power stations **b** more gas-fired power stations
c more power stations
- 5 In the future, Egypt may use solar energy to create _____ and make fresh water.
a climate change **b** electricity **c** agricultural land

3 Answer the questions about the text.

- 1 Which processes are used in a solar thermal power plant to transform sunlight into electricity?

- 2 Why didn't Shuman's solar power station inspire people to develop his ideas further?

- 3 What problems do Egypt's energy providers currently face?

- 4 In what ways is Egypt an excellent candidate for producing solar energy?

- 5 What is perhaps surprising about the fact that Germany is one of the top producers of solar energy?

4 Answer the questions with your own ideas.

- 1 Which methods of energy production does your country use?
Has this changed over the last ten years?

- 2 What are the advantages and disadvantages of using gas and oil as energy sources?

- 3 Can you describe another type of environmentally friendly energy production which is not mentioned in the text?
