

Energy Sources and the Trends in their Uses 3

Q:1 Wind and tides are energy sources that are used to generate electricity.

(a) Complete each sentence by putting a tick (☑) in the box next to the correct answer.

(a) (i) The wind is a non-renewable energy source.

a constant energy source.

an unreliable energy source.

(1 mark)

(a) (ii) The tides are a renewable energy source.

a constant energy source.

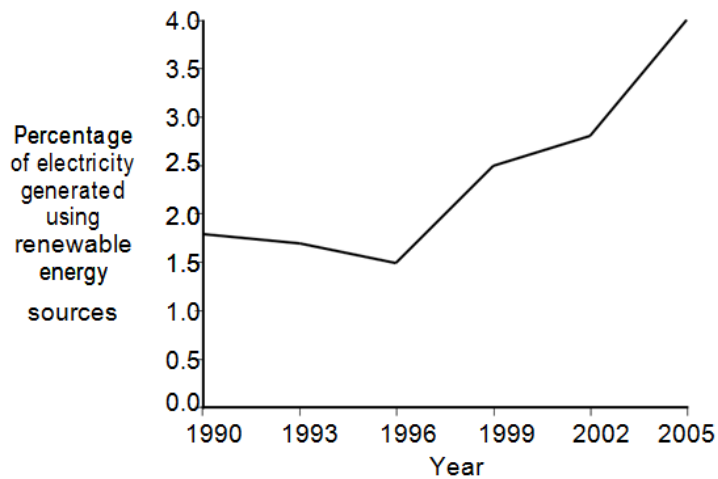
an unreliable energy source.

(1 mark)

(b) If wood is to be used as a renewable energy source, what must be done each time a tree is chopped down?

(1 mark)

(c) In the UK, electricity is generated using renewable and non-renewable energy sources. The graph shows the percentage of electricity generated using renewable energy sources between 1990 and 2005.



Complete the following sentence by drawing a ring around the correct answer in the box.

In 2015, the percentage of electricity generated using renewable energy sources is most likely to be

greater than 4 %.
equal to 4 %.
less than 4 %.

(1 mark)

Q:2(a) Solar energy is a renewable energy source used to generate electricity.

(a) (i) What is meant by an energy source being renewable?

(1 mark)

(a) (ii) Name two other renewable energy sources used to generate electricity.

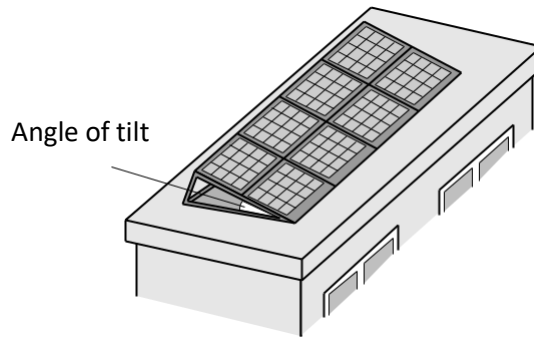
1 _____

2 _____

(1 mark)

(b) A householder uses panels of solar cells to generate electricity for his home.

The solar cells are tilted to receive the maximum energy input from the Sun.



The data in the table gives the average energy input each second (in J/s), to a 1 m² area of solar cells for different angles of tilt and different months of the year.

Month	Angle of tilt			
	20°	30°	40°	50°
February	460	500	480	440
April	600	620	610	600
June	710	720	680	640
August	640	660	640	580
October	480	520	500	460
December	400	440	420	410

(b) (i) Use the data in the table to describe how the average energy input to the solar cells depends on the angle of tilt.

(2 marks)

(b) (ii) The total area of the solar cell panels used by the householder is 5 m². The efficiency of the solar cells is 0.18.

Use the equation in the box to calculate the average maximum electrical energy available from the solar cell panels each second in June.

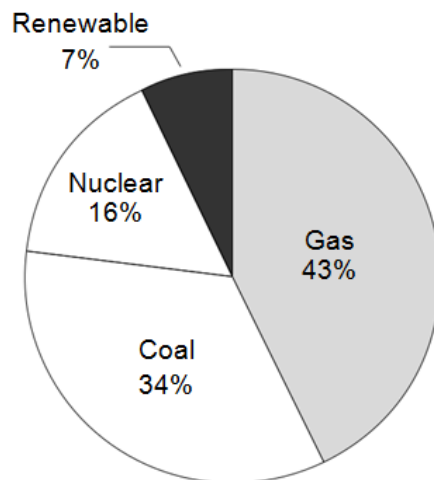
$$\text{efficiency} = \frac{\text{useful energy transferred by the device}}{\text{total energy supplied to the device}}$$

Show clearly how you work out your answer.

Maximum energy = _____ joules/second

(3 marks)

Q:3 a) The pie chart shows the proportions of electricity generated in the UK from different energy sources in 2010.



(a) (i) Calculate the percentage of electricity generated using fossil fuels.

Percentage = _____ %

(1 mark)

(a) (ii) The pie chart shows that 7% of electricity was generated using renewable energy sources.

Which one of the following is not a renewable energy source?

Tick (☑) one box.

Oil

Solar

Wind

(1 mark)

(b) Complete the following sentence.

In some types of power station, fossil fuels are burned to heat _____ to produce steam. (1 mark)

(c) Burning fossil fuels releases carbon dioxide into the atmosphere.

Why do many scientists think adding carbon dioxide to the atmosphere is harmful to the environment?

Tick (☑) one box.

Carbon dioxide is the main cause of acid rain.

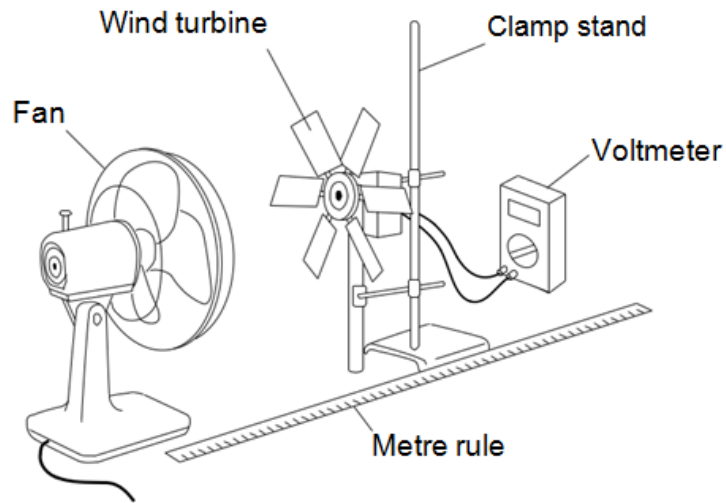
Carbon dioxide causes global warming.

Carbon dioxide causes visual pollution.

(1 mark)

Q:4(a) A student investigated how the number of blades on a wind turbine affects the output voltage of the turbine.

The student used the apparatus shown in the diagram.



The fan was used to turn the wind turbine.

(a) (i) The fan was always the same distance from the wind turbine. Why?

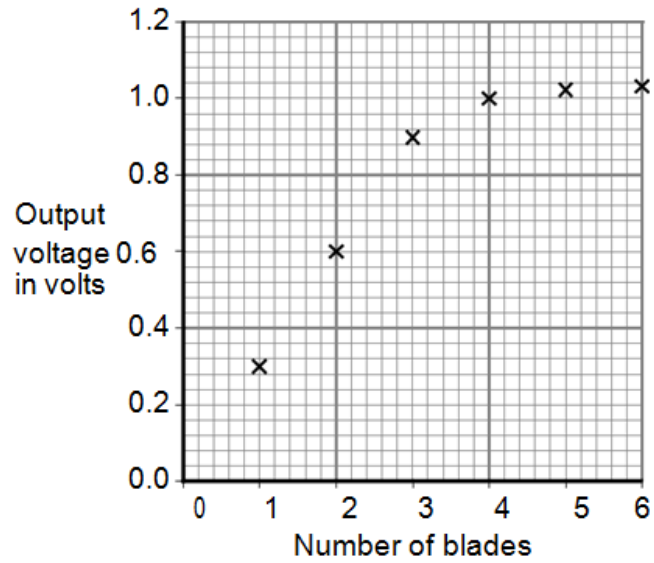
(1 mark)

(a) (ii) After switching the fan on, the student waited 20 seconds before taking the voltmeter reading.

Suggest why.

(1 mark)

(a) (iii) The student changed the number of blades on the wind turbine. The student's results are shown in the scatter graph.



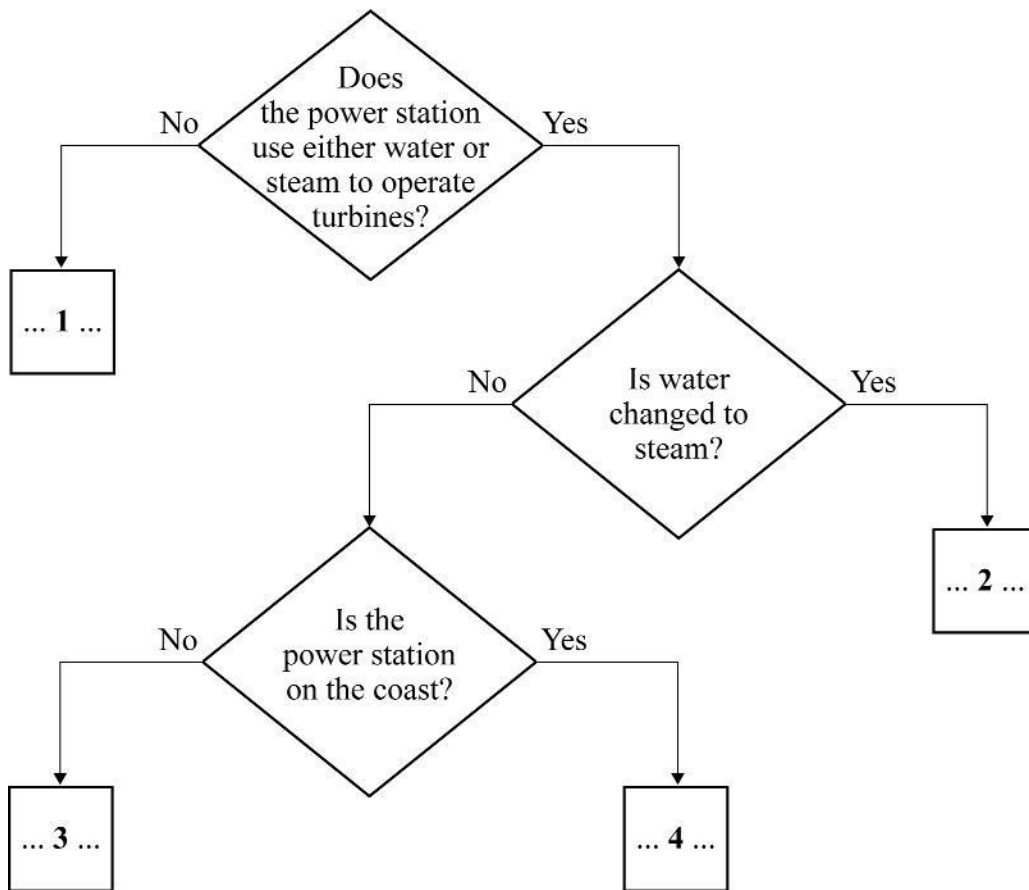
What conclusion can be made from the results in the scatter graph?

(2 marks)

Q:5 This question is about different types of power station which produce electricity.

Match the types of power station, A, B, C and D, with the numbers 1– 4 in the flow chart.

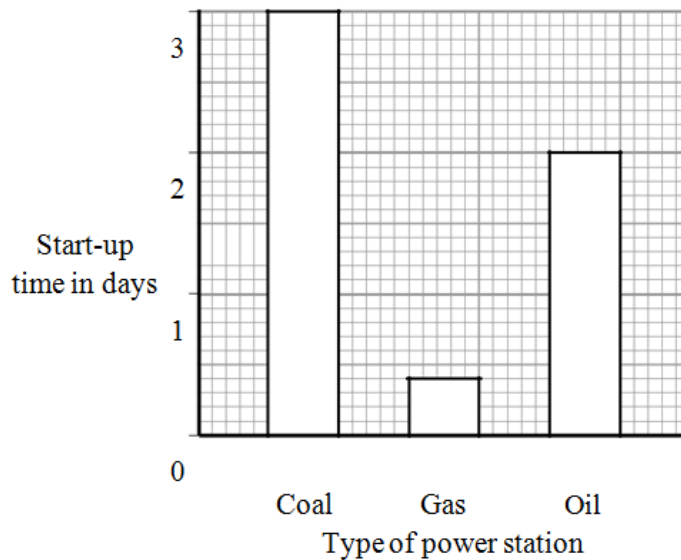
- A hydroelectric
- B nuclear
- C wind
- D tidal



(4 marks)

Q:6 Much of the world's electricity is generated in power stations that burn fossil fuels.

(a) The bar chart shows the start-up times for the three types of fossil fuel power station.



Which of these power stations would take the longest to start generating electricity?

(1 mark)

(b) Which two of the following statements are good reasons for using fossil fuels to generate electricity?

Put a tick (☑) in the box next to each of your choices.

Supplies of fossil fuels are limited.

Fossil fuels can be used to generate electricity at any time.

Fossil fuels are non-renewable.

A few large power stations can generate the electricity for a million homes.

Burning fossil fuels produces carbon dioxide.

(2 marks)

(c) Electricity can be generated using energy from the wind.

(i) Why does a wind-powered generator not produce carbon dioxide?

(1 mark)

(ii) Which form of energy is transferred from the wind to generate electricity?

Draw a ring around your answer.

heat kinetic light sound

(1 mark)

(iii) Many people say that wind-powered generators are a good idea because:

“when the wind blows they generate electricity” “they produce no pollution”

“they generate electricity cheaply”

But not everyone wants more wind-powered generators to be built.



What reasons may be given by the people who think that wind-powered generators are not a good idea?

(2 marks)

Q:7 (a) Different energy sources are used to generate electricity.

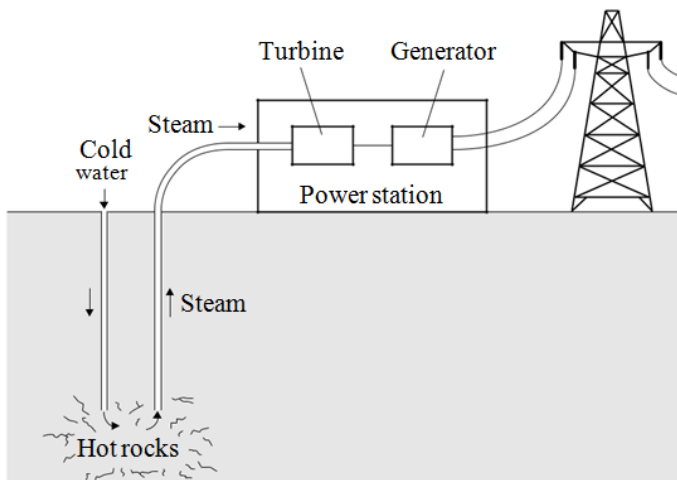
Which two of the energy sources in the box are likely to be used up first?

Draw a ring around each of your answers.

gas oil Sun tides waves wind

(2 marks)

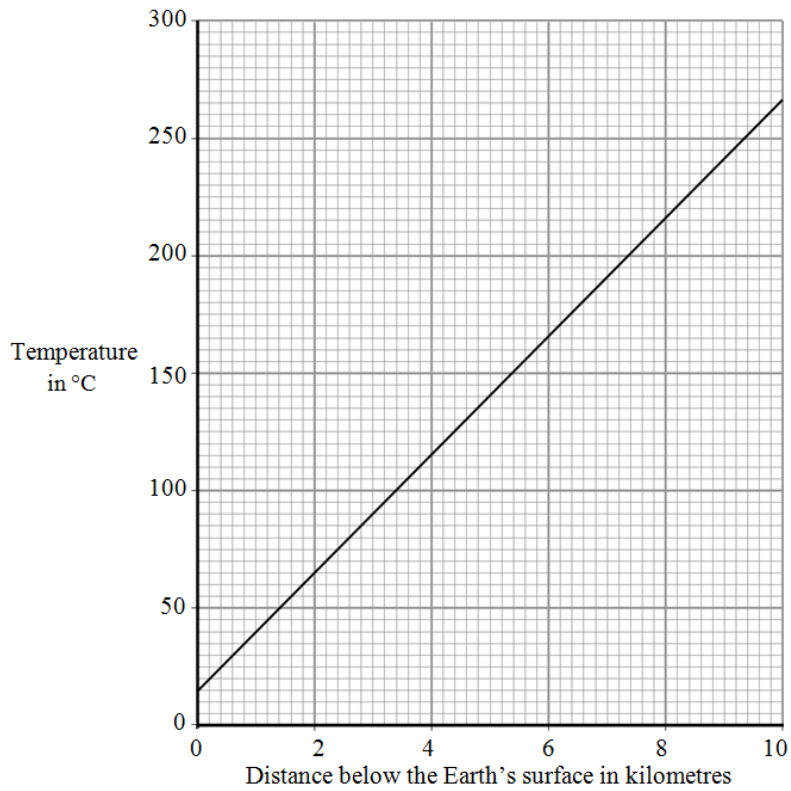
(b) The diagram shows a geothermal power station. Hot rocks in the Earth's crust heat water to produce steam. The steam is used to drive turbines that turn electrical generators.



How is the way in which a geothermal power station generates electricity the same as the way in which a coal burning power station generates electricity?

(1 mark)

(c) The graph shows how the temperature of the rocks in the Earth's crust depends on how far the rocks are below the Earth's surface.



Estimate the temperature of the rocks 5 kilometres below the Earth's surface. Show clearly how you have used the graph to get your answer.

Temperature = _____ °C

(2 marks)

(d) Scientists have estimated that one quarter of the world's electricity could be generated using geothermal energy.

Give one reason that scientists might use to persuade a government to spend large amounts of money building geothermal power stations.

(1 mark)

TOTAL MARKS=35