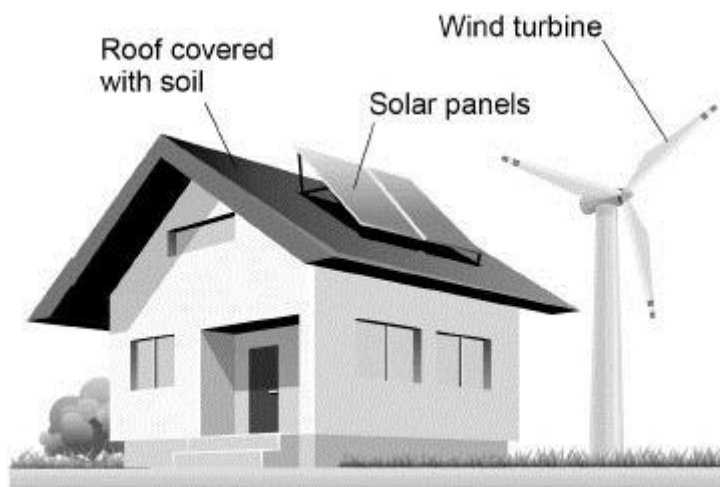


Q1.

An eco-house is designed to be environmentally friendly.

The diagram below shows a picture of an eco-house.



- (a) The solar panels and a wind turbine are used to generate electricity for the eco-house.

Solar and wind are both renewable energy resources.

What does renewable energy resource mean?

Tick (✓) **one** box.

It can be replenished as it is used.

It is unreliable.

It has no fuel costs.

It produces no greenhouse gases.

(1)

- (b) Biomass, nuclear and natural gas are three other energy resources.

Complete the table to show whether each energy resource is renewable or non-renewable.

Tick (✓) **one** box for **each** energy resource.

Energy resource	Renewable	Non-renewable
Biomass		

Nuclear		
Natural gas		

(2)

- (c) Moving air makes the wind turbine spin.

The wind turbine generates electricity which is used to charge a battery.

Complete the sentences.

Choose answers from the box.

chemical	electrical	gravitational	kinetic
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When the wind turbine spins faster there is an increase in its _____ energy.

Charging the battery increases the _____ store of energy of the battery.

(2)

- (d) The roof of the eco-house is covered with soil.

Covering the roof with soil decreases the thermal conductivity of the roof.

What are the advantages of having a roof with a lower thermal conductivity?

Tick (✓) **two** boxes.

Less energy is needed to heat the house.

The rate of energy transfer by conduction is greater.

The roof is a better insulator.

The roof is less likely to leak.

Weather will have a greater effect on the temperature of the house.

(2)

- (e) The average power transferred to the solar panels by sunlight is 26 000 W

Calculate the average energy transferred to the solar panels in 30 seconds.

Use the equation:

$$\text{energy transferred} = \text{power} \times \text{time}$$

Average energy transferred to solar panels = _____ J

(2)

- (f) Write down the equation that links efficiency, total power input and useful power output.

(1)

- (g) The solar panels on the roof of the eco-house have an efficiency of 0.15

The average power input to the solar panels is 26 000 W

Calculate the average useful power output from the solar panels.

Average useful power output = _____ W

(3)

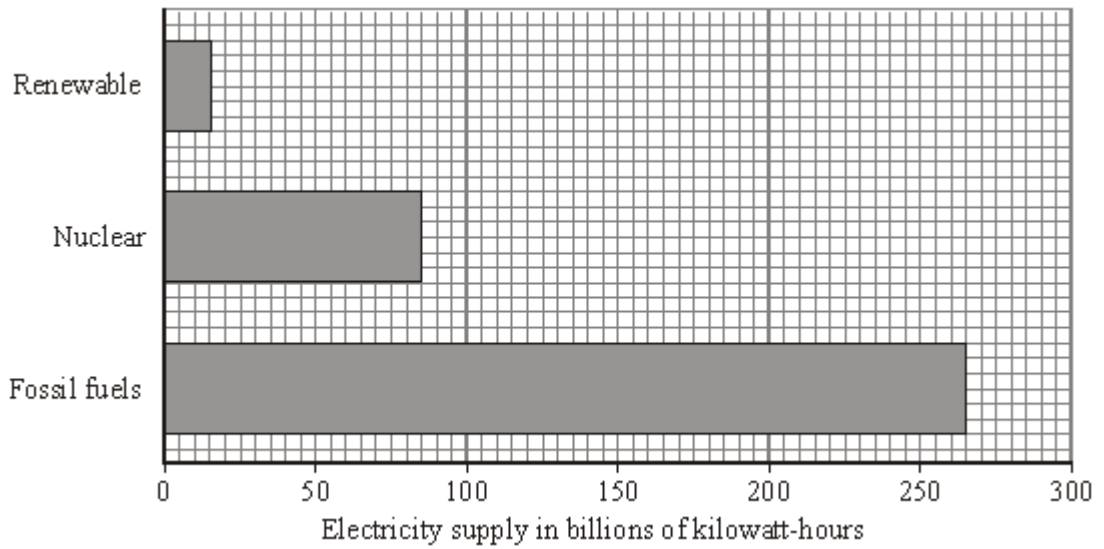
- (h) Explain why it is a good idea for the eco-house to have both a wind turbine and solar panels.

(2)

(Total 15 marks)

Q2.

The bar chart shows the different energy sources used to generate the UK's electricity in 2007.



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

Name **one** more renewable energy source used to generate electricity.

(1)

(ii) Complete the following sentence by drawing a ring around the correct line in the box.

Using less fossil fuels to generate electricity will

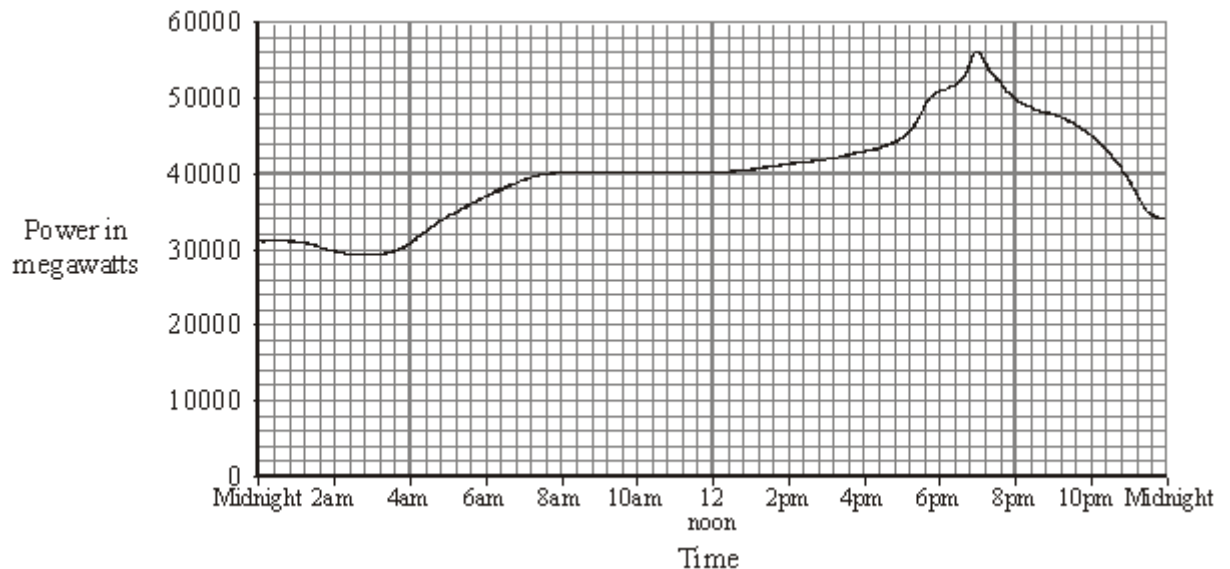
decrease
not change
increase

the

amount of carbon dioxide emitted into the atmosphere.

(1)

(b) The graph shows how the demand for electricity in the UK varied over one day in the winter.



- (i) Describe how the demand for electricity varied between 4.00 am and 10.00 am.

(2)

- (ii) Which type of power station has the fastest start-up time?

Draw a ring around your answer.

coal natural gas nuclear oil

(1)

(Total 5 marks)

Q3.

- (a) Different energy sources are used to generate electricity.

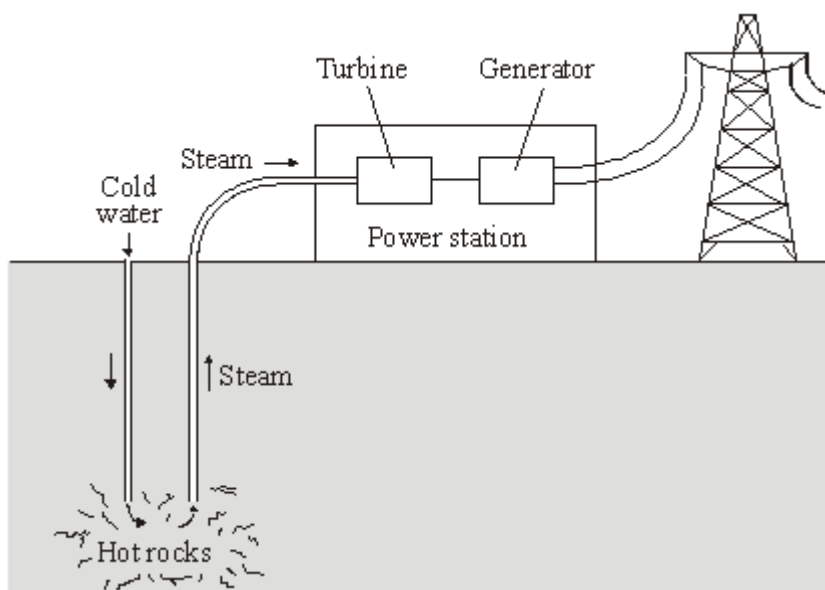
Which **two** of the energy sources in the box are likely to be used up first?

Draw a ring around each of your answers.

gas	oil	Sun	tides	waves	wind
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(2)

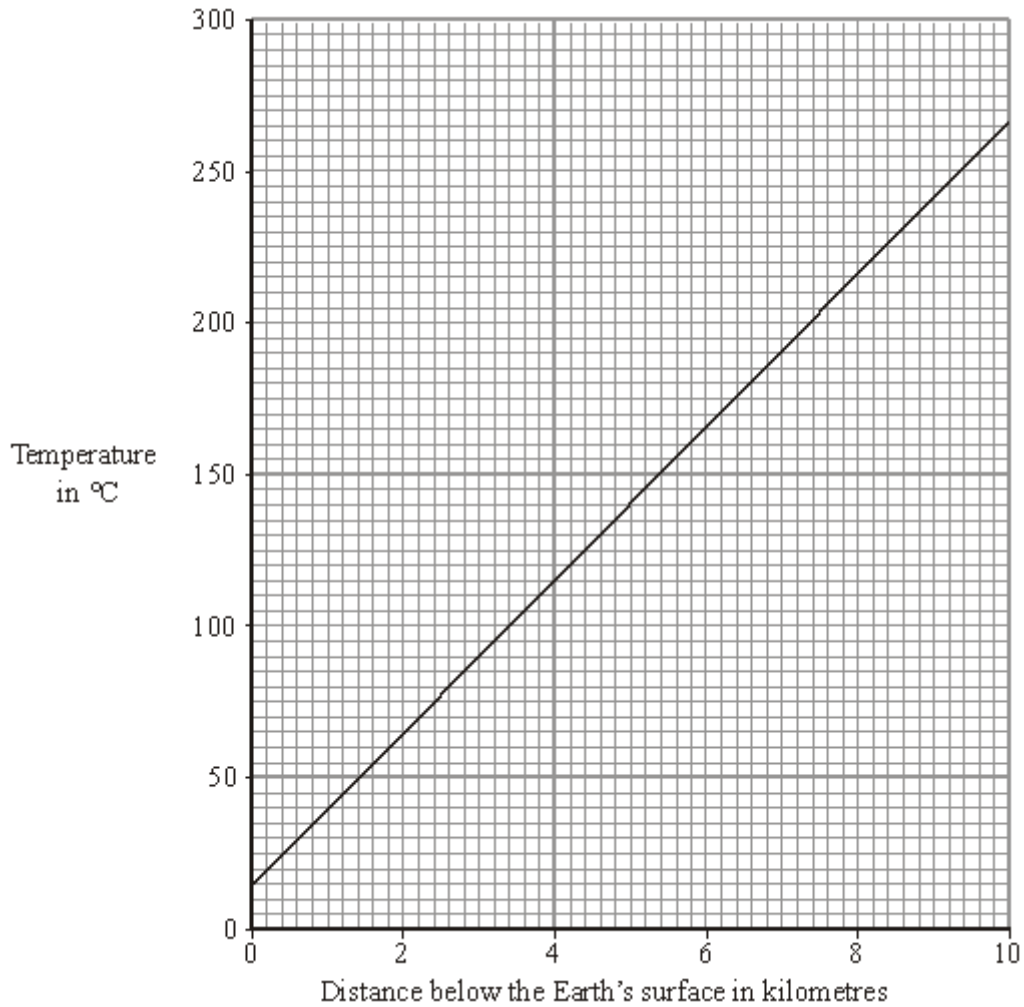
- (b) The diagram shows a geothermal power station. Hot rocks in the Earth's crust heat water to produce steam. The steam is used to drive turbines that turn electrical generators.



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)

- (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)

- (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.

