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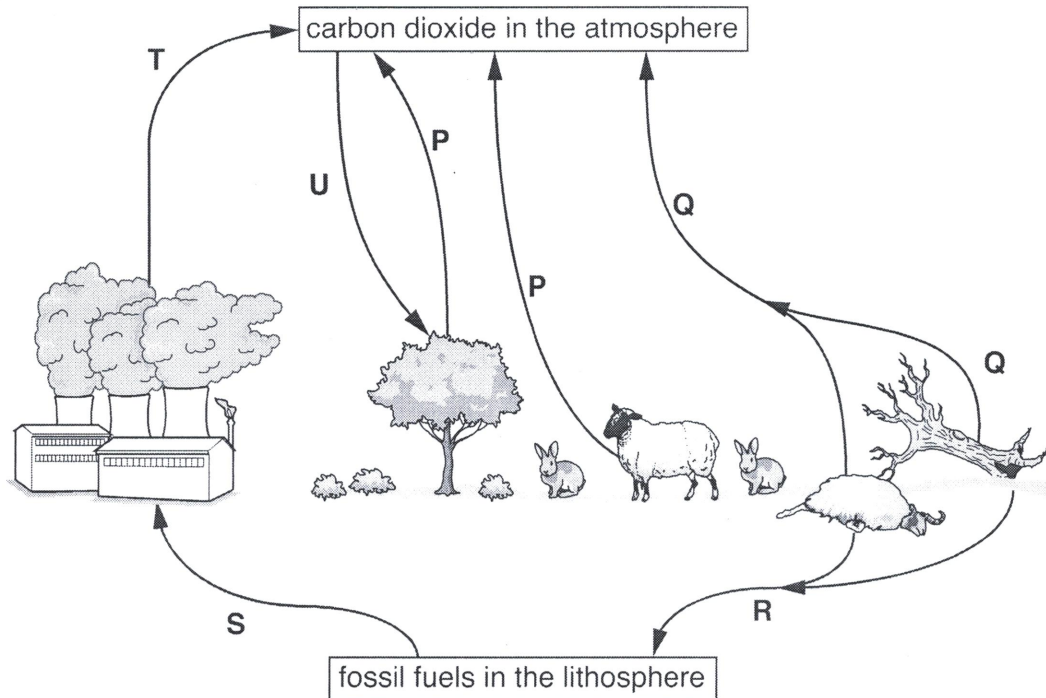
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ENVIRONMENT MANAGEMENT

TOPIC-FOSSIL FUELS-Formation

4 The diagram shows some processes in the carbon cycle.



(a) Complete the table using letters **P** to **U** from the diagram.

process name	letter
combustion
decomposition
fossilisation
mining and pumping
photosynthesis
plant and animal respiration

[3]

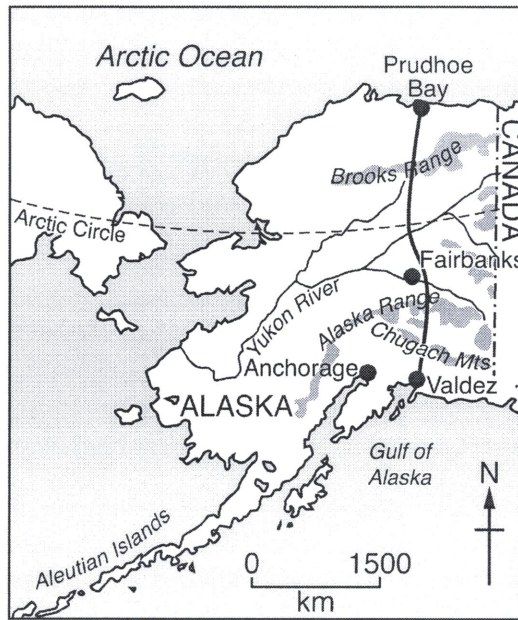
(b) Describe how coal is formed.

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..... [3]

(c) Suggest **four** ways that supplies of fossil fuels could be conserved.

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..... [4]

- (ii) Look at the map below, which shows information about oil in Alaska. Use information from the map to complete the paragraph below.



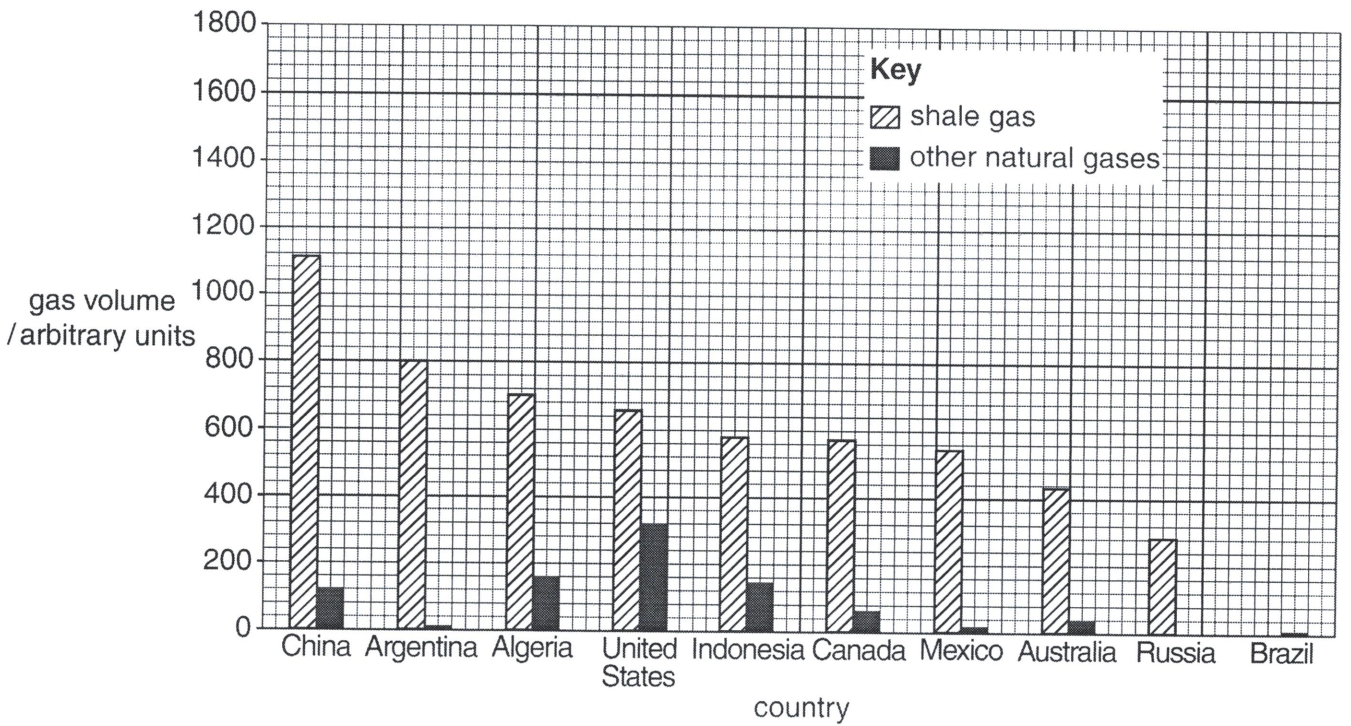
Key

- settlement
- · - · - · - international boundary
- route of pipeline
- highland
- ⤿ river

In 1968 oil was discovered in northern Alaska. A pipeline was built to transport the oil. The pipeline runs from in the north to on the south coast of Alaska. Here the oil is taken away to markets by supertankers. The pipeline crosses the River and passes close to the town of Fairbanks. In total the pipeline is 1241 km long. [3]

- (iii) Suggest why the pipeline was built rather than transporting the oil from the north of Alaska by sea in supertankers.

.....
 [1]



(i) Complete the bar graph for Russia and Brazil using information from the table and the key. [1]

(ii) Some countries are starting to extract shale gas.

Which country would have the largest percentage increase in its available gas when it starts to extract shale gas? Circle your choice. [1]

- Argentina Australia Brazil Mexico Russia**

(iii) Explain your answer to (b)(ii).

.....
[1]

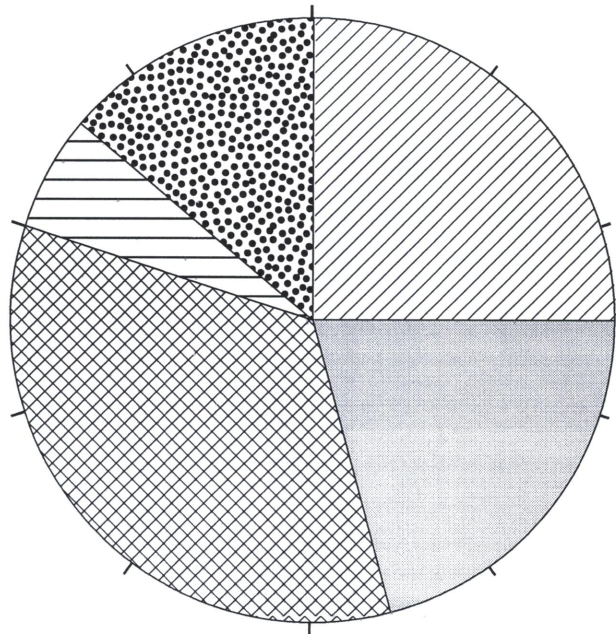
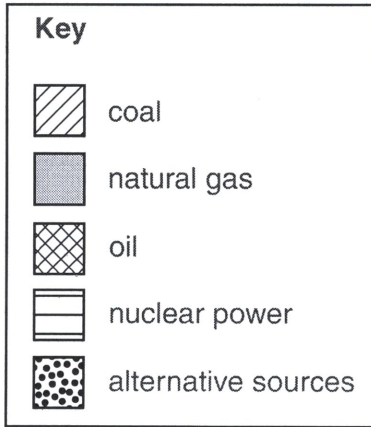
(c) Fossil fuels will eventually be used up.

Explain how fossil fuels can be made to last longer.

.....

[3]

1 (a) Look at the graph below which shows the percentage of world energy that came from different sources in 2013.



(i) State the energy source that was used most in 2013.

.....[1]

(ii) Calculate the percentage of world energy that came from fossil fuels in 2013.

Space for working.

..... % [1]

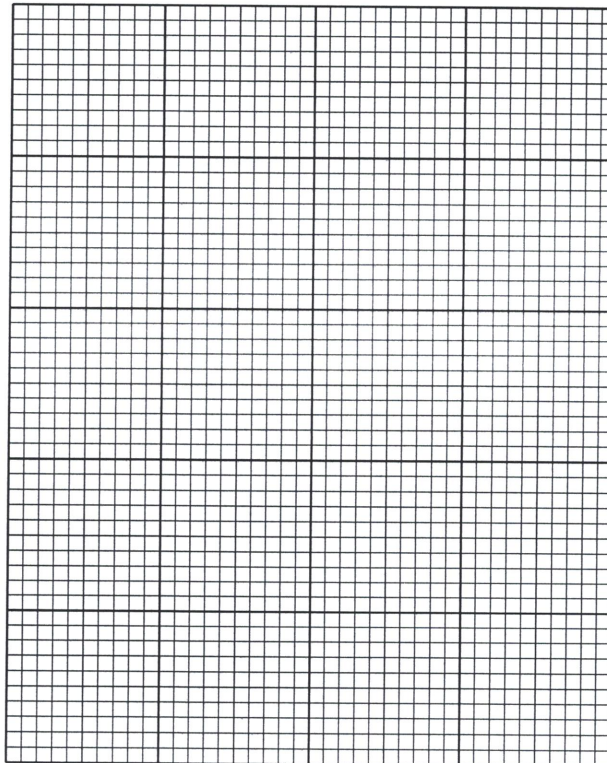
(iii) Using evidence from the graph, describe the contribution that alternative energy sources made to world energy in 2013.

.....

 [2]

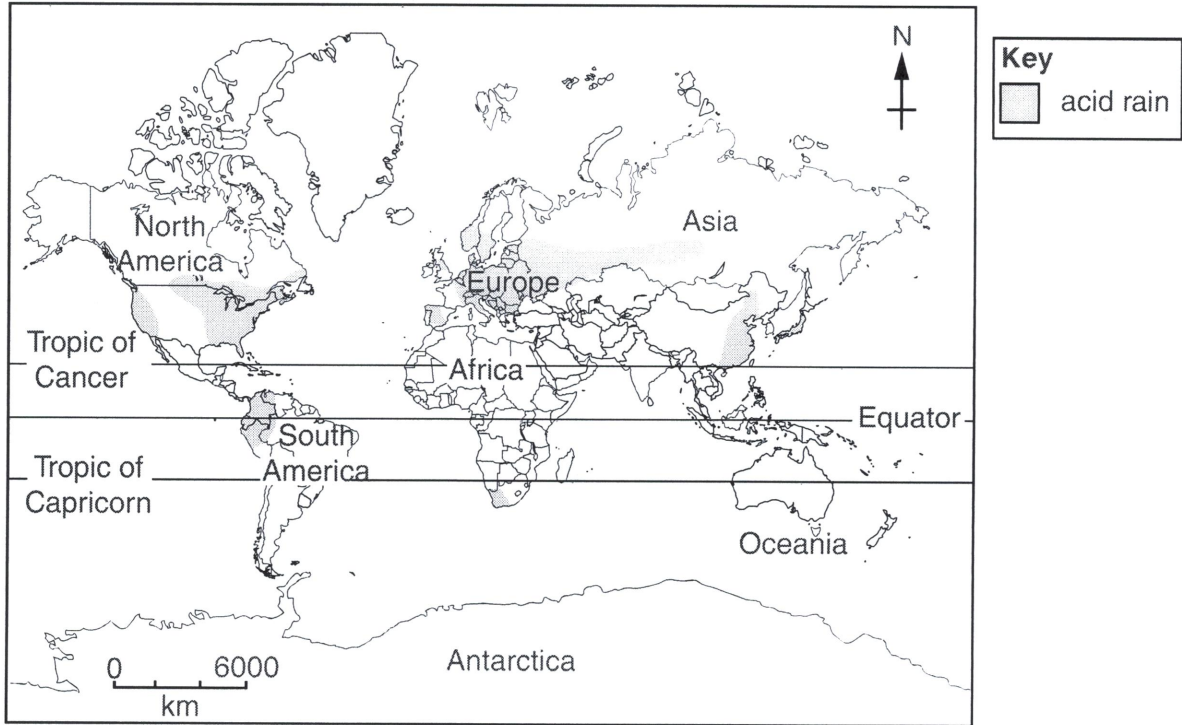
- (iii) The table shows information about how fossil fuels are used to generate electricity in the United States of America. Draw a bar graph on the grid below using the data in the table. Label your axes.

fossil fuel	percentage of electrical production
oil	2
gas	25
coal	42



[4]

(d) Look at the map below, which shows a world distribution of acid rain.



(i) Using the map, state the name of **two** continents which are affected by acid rain.

1

2

[2]

(ii) Using the map, identify **one** continent that is not affected by acid rain. Suggest a reason for this.

continent

reason

.....

[2]

(iii) Explain how acid rain is formed.

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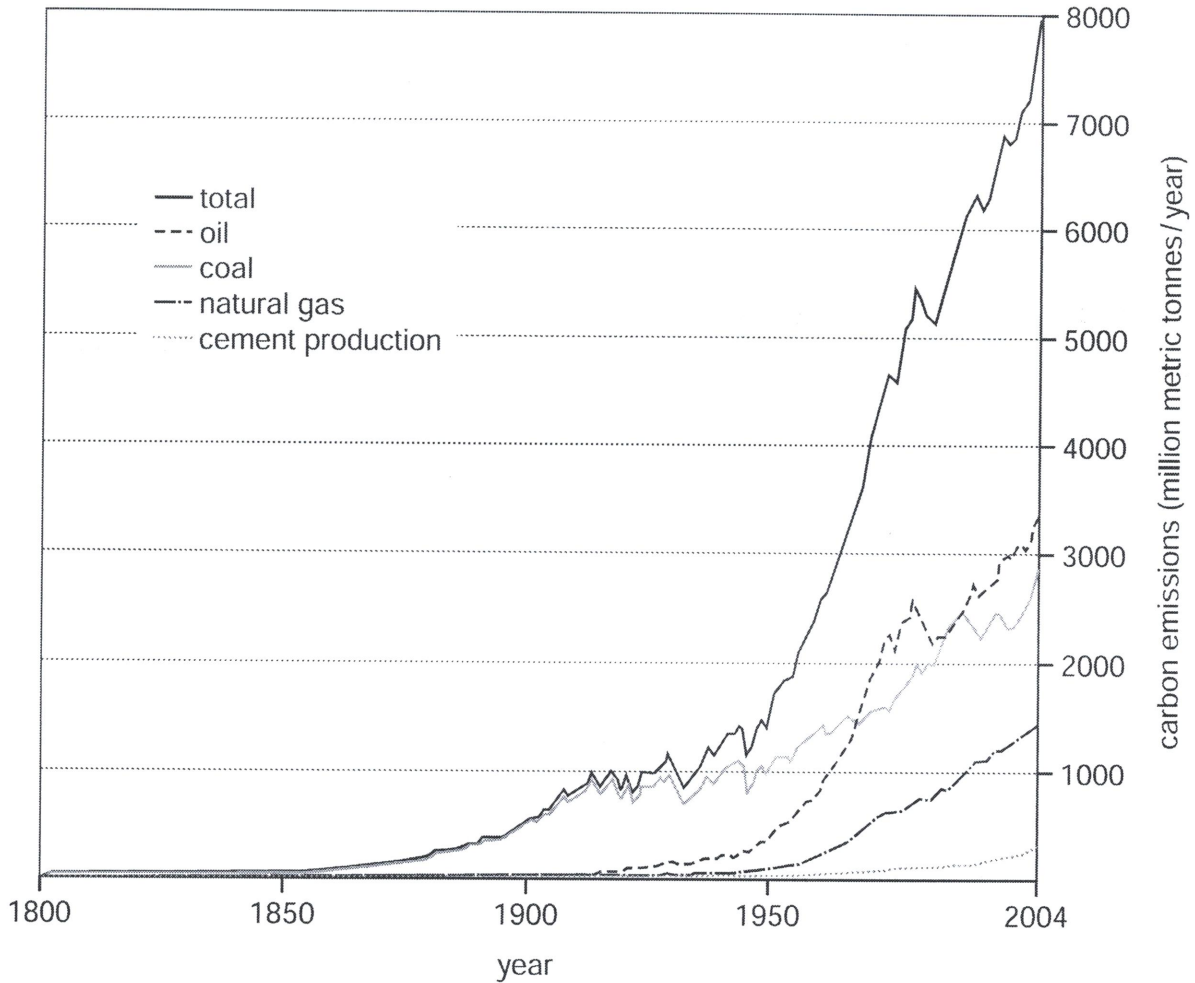
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[4]

2 The graph below shows the total global carbon emissions from non-living sources between 1800 and 2004.

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(a) (i) Cement is produced from rocks made of calcium carbonate. What was the total carbon emission in 2004 from cement production?

..... [1]

(ii) When did carbon emissions from natural gas begin?

..... [1]

(iii) Why did pollution from natural gas begin after that from coal and oil?

.....

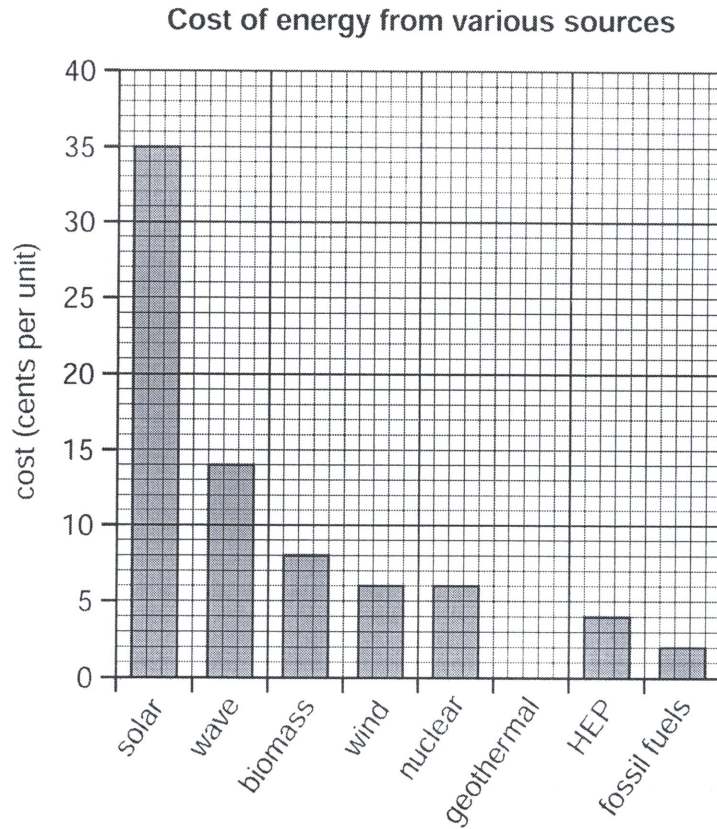
 [2]

(iv) Which of the sources of carbon emissions is not a fossil fuel?

..... [1]

(b) Carbon, in the form of carbon dioxide in the atmosphere, is a pollutant. For this reason alternatives to fossil fuels are sometimes used. The graph below shows the cost of various alternatives to fossil fuels.

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Use



(i) Geothermal energy costs 5 cents per unit. Complete the graph for geothermal energy. [1]

(ii) Which of the alternatives to fossil fuels on the graph produces carbon dioxide?
..... [1]

(iii) Using the graph and your own knowledge state and explain the advantages and disadvantages of solar and geothermal energy as alternatives to fossil fuels in the future.

.....

 [3]

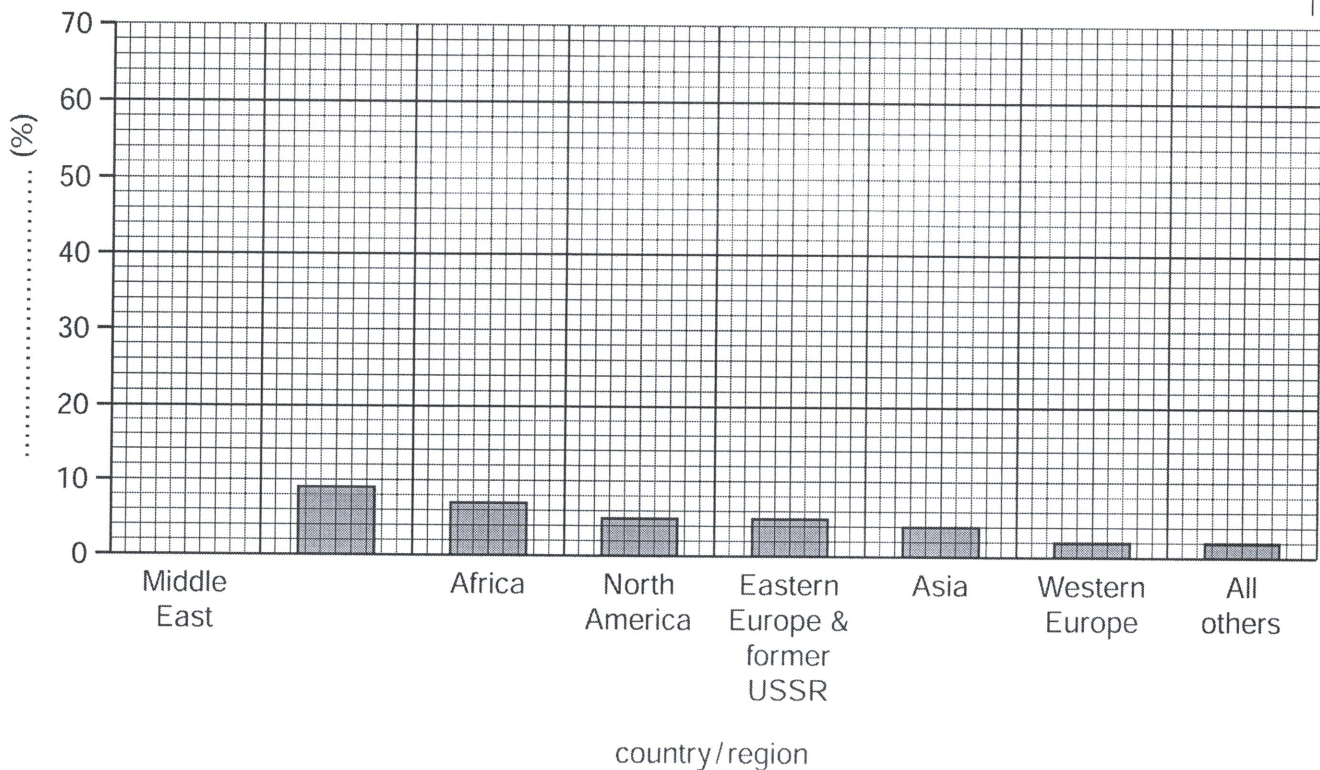
3 The table below shows the location and relative sizes of all the known oil reserves around the world.

region	percentage of total world oil reserve
Middle East	
Central and South America	9
Africa	7
North America	5
Eastern Europe and former USSR	5
Asia	4
Western Europe	2
All others	2

(a) (i) Calculate the percentage of world oil reserves in the Middle East.

..... % [1]

(ii) Complete the graph below by adding the data for the Middle East, a suitable title for the Y-axis and the missing region. [3]



(iii) Give an advantage and a disadvantage of the majority of oil being located in the Middle East.

.....
.....
.....
..... [2]

(b) Oil and coal are both fossil fuels. The table below shows the percentage of electricity generated from coal in nine countries or regions.

country/region	percentage of electricity obtained from coal
South Africa	93
China	82
Australia	80
India	75
USA	51
South Korea	36
Europe	30
Russia	30
Japan	22

(i) What percentage of electricity is provided from sources **other** than coal in China?

..... [1]

(ii) Suggest why there is such variation in reliance on coal.

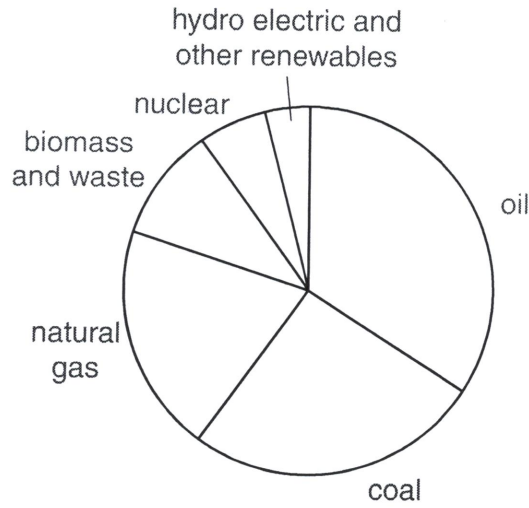
..... [1]

(iii) Suggest **two non-fossil fuel** alternatives to coal that these countries may use.

.....
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..... [2]

2 (a) Look at the graph showing the importance of different energy sources in 2009.

World energy consumption by source (2009)



(i) On the graph, shade in the sectors showing energy from fossil fuels. [1]

(ii) Describe what the graph shows about the importance of fossil fuels for world energy consumption in 2009.

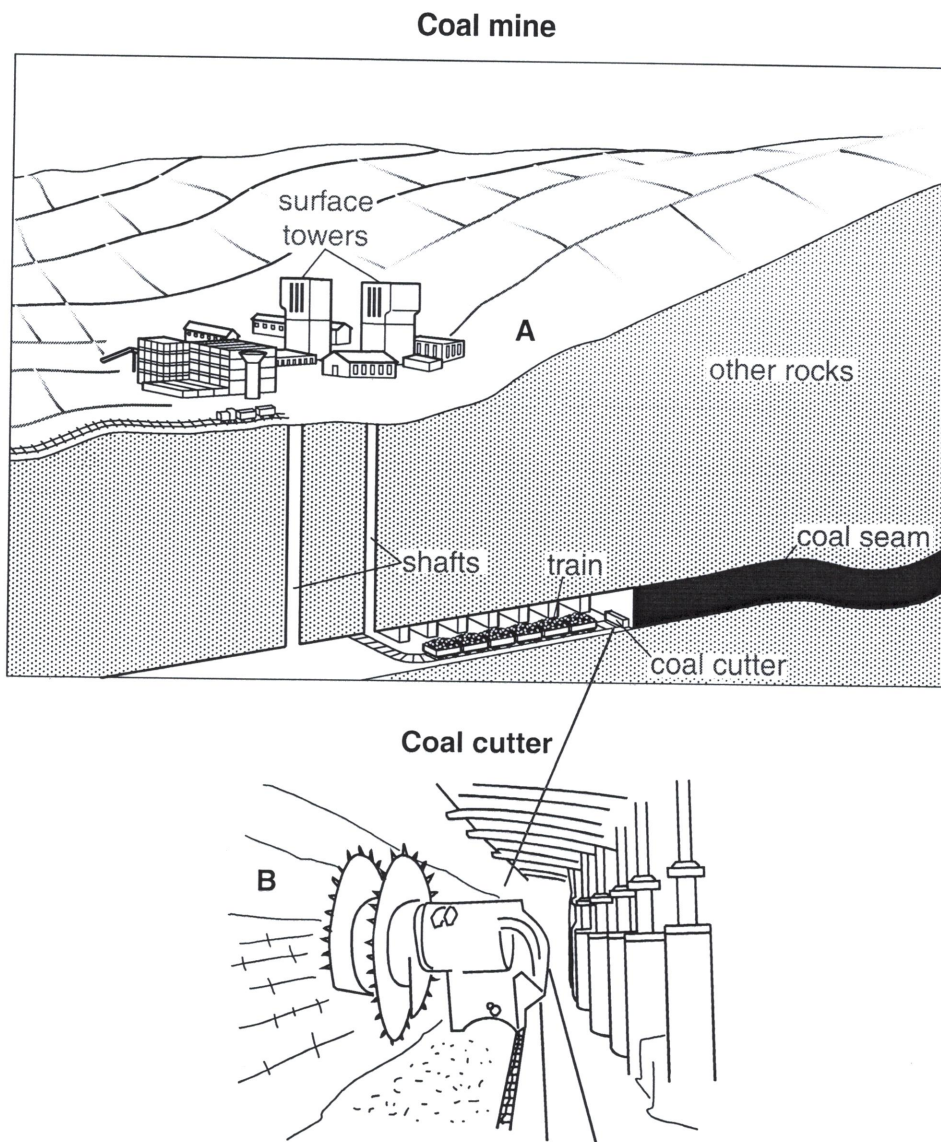
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..... [2]

(iii) Approximately what percentage of total world energy consumption in 2009 came from coal?

..... [1]

(b) Look at the diagrams which show one method used for mining coal.

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Examiner's
Use



(i) What is the purpose of the shafts and towers shown on diagram A?

.....

 [2]

(ii) Using both diagrams, describe how the coal is being mined.

.....

 [3]

(iii) Would you describe this as an old or a modern coal mine? Explain your answer.

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..... [2]

(c) Mining is dangerous work. Read this newspaper report about what happened in a Chinese coal mine in March 2010.

123 workers trapped by flooding

The vast Wangjialing coal mine in northern China is estimated to have 2.3bn tonnes of coal reserves, including over 1 billion tonnes of proved reserves. Yesterday underground water rushed into the mine where 261 people were working. Only 138 managed to escape the flood waters.

25 people died in a coal mine fire in central China. Last November, 108 men were killed when an explosion blasted through a coal mine belonging to another state owned company. 2009 was a bad year; there were two other explosions which killed more than 50 workers.

China's coal mines are well known for being some of the world's most dangerous. Earlier this month,

Safety standards are often ignored to try to meet the ever rising demand for coal. Coal supplies 70 per cent of China's energy needs.

(i) State the four different reasons for the loss of life in China's coal mines, mentioned in the newspaper report.

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..... [2]

(ii) Explain why the dangers of working in opencast coal mines are less than in deep mines.

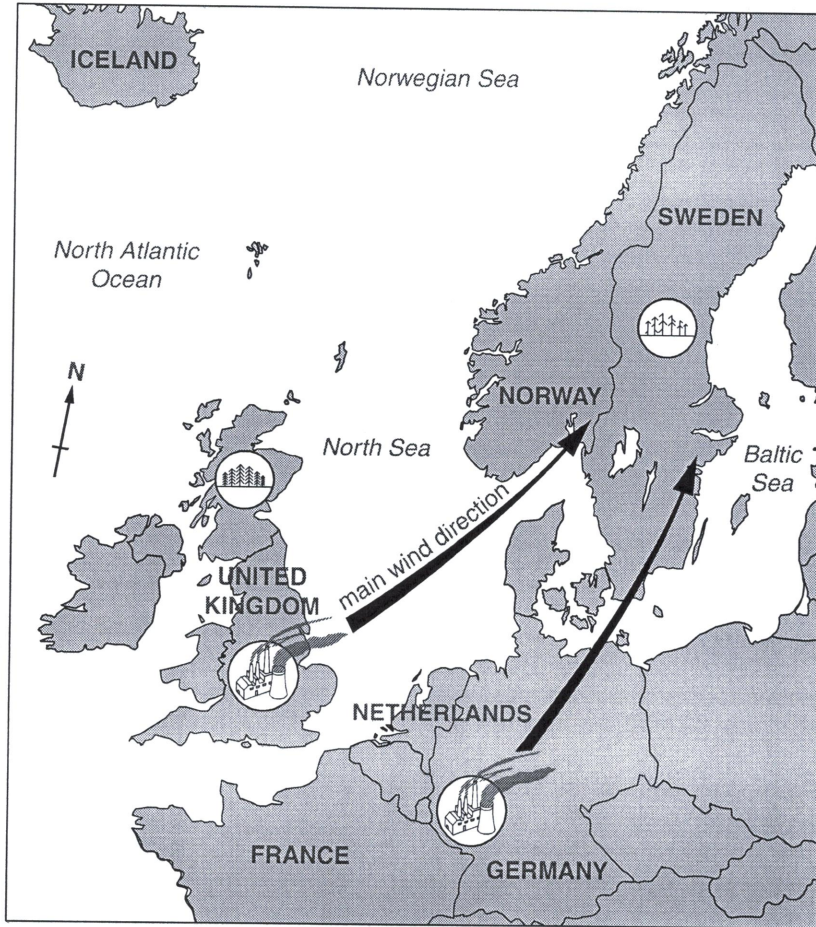
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..... [3]

- (d) (i) Coal is often said to be a dirty fuel compared with other fuels. One type of pollution, for which coal fired power stations are blamed most, is acid rain. Name the gases from coal fired power stations which cause acid rain.

..... [2]

- (ii) The map shows acid rain and its effects in part of Europe. It was most serious in the 1970s.

Acid rain in northern Europe



How does the map show that acid rain can be an international problem?

..... [1]

- (iii) Explain fully why the trees in the north of the UK on the map are shown in a different way from those in Sweden.

..... [3]

(e) (i) The problem of acid rain in northern Europe is less now than it was in the 1970s. Describe what has been done to reduce the problem of acid rain pollution from coal fired power stations.

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..... [2]

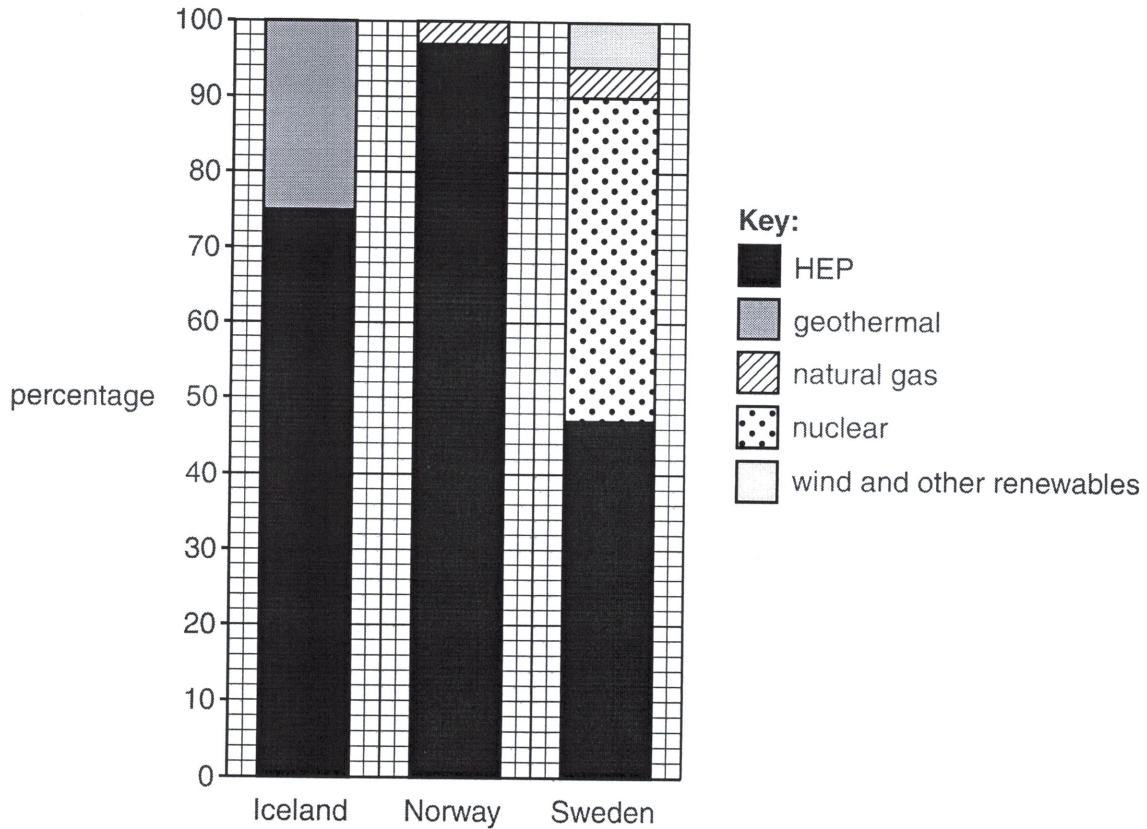
(ii) Why is finding a solution to acid rain and other types of air pollution slower because they are international problems instead of just being a national problem?

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..... [3]

(f) Look at the divided bar graphs showing how electricity is produced in three north European countries. (They are named on the map of acid rain).

For
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Use

Percentage of electricity production by source in Iceland, Norway and Sweden (2008)



(i) How much of Iceland's electricity comes from renewables?

.....[1]

(ii) Look back to the pie graph of world energy consumption in **part (a)**.

How important are renewables for electricity production in these three north European countries compared with their importance in total world energy consumption?

.....

[3]

5 Energy for use by human communities comes from either renewable or non-renewable sources.

(a) The major non-renewable energy resources are fossil fuels.

(i) Name the **three** main fossil fuels
.....
..... [2]

(ii) Explain why these are called fossil fuels
.....
..... [1]

(b) Non-renewable resources will eventually be used up.

There are two solutions to minimise this problem:

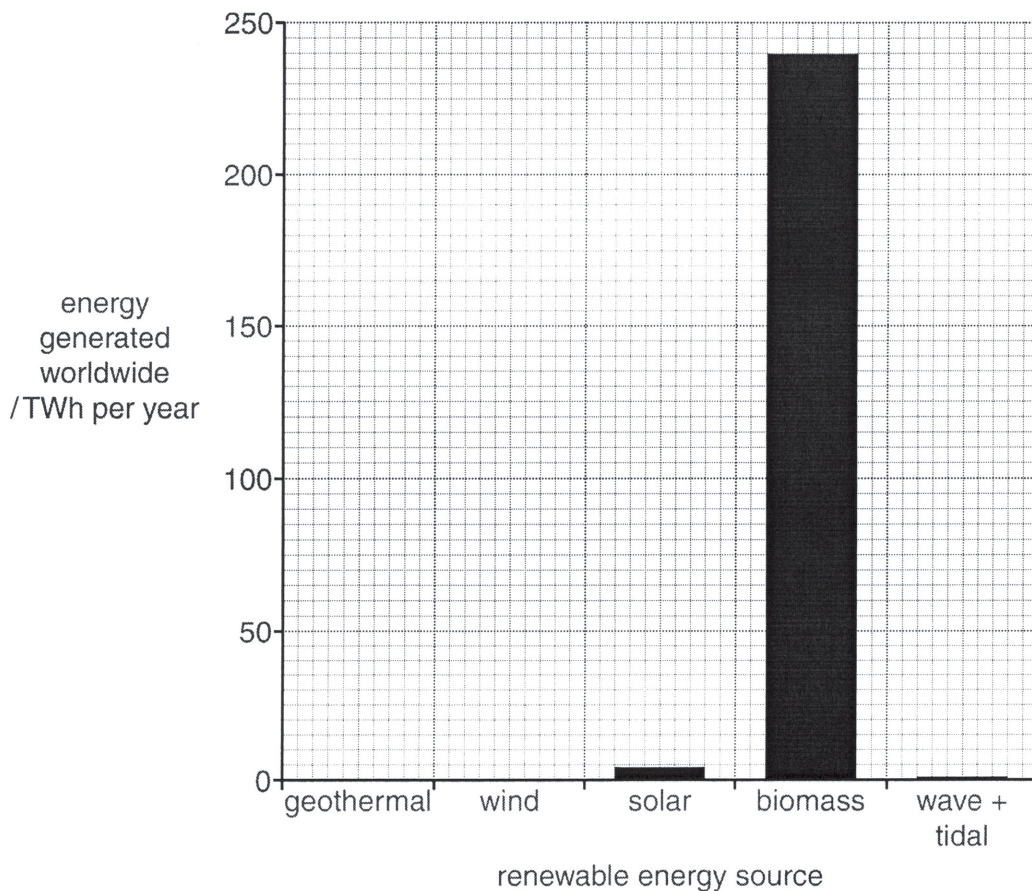
- increased efficiency in the use of fossil fuels
- new technologies

Some of the new technologies will involve the use of renewable energy sources. The table shows the energy generated from some renewable sources in 2010.

source	TWh per year
geothermal	60
wind	130
solar	4
biomass	240
wave and tidal	1
TOTAL	435

An estimate of the potential energy generation from these sources is 300 000 TWh per year.

(i) Complete the graph below for geothermal and wind power.



Your answer should give a complete bar graph. [1]

- (ii) Calculate, from the information above, the percentage of the estimated potential energy generation that we currently generate from these five energy sources combined.

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Show your working.

.....[2]

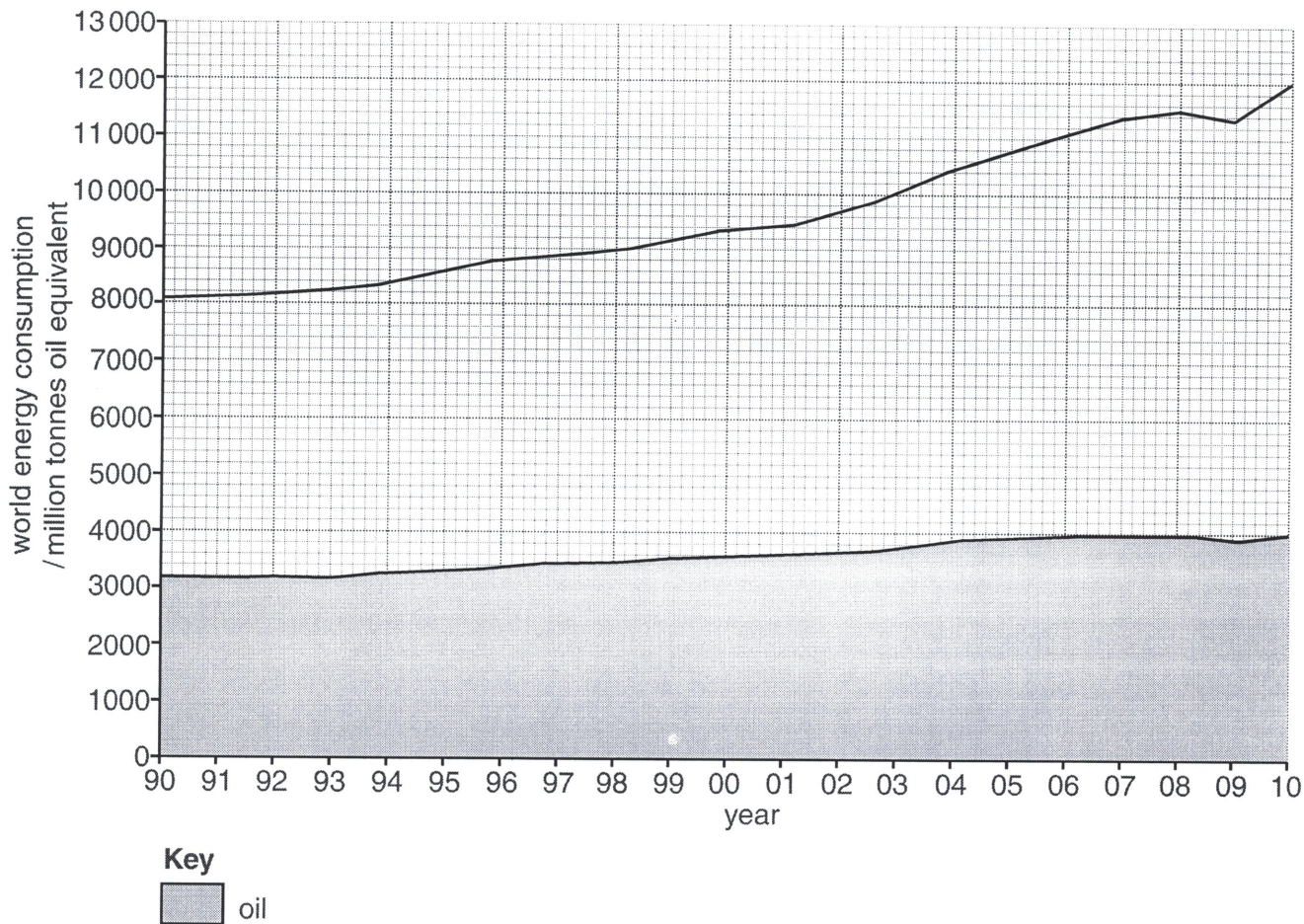
- (iii) Describe and explain ways in which governments can conserve fossil fuels.

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.....[4]

[Total: 10]

- 1 (a) Look at the graph below showing total world energy consumption between 1990 and 2010. It also shows the amount that oil contributed to the total.

world energy consumption 1990–2010



- (i) Using evidence from the graph describe what has happened to total world energy consumption between 1990 and 2010.

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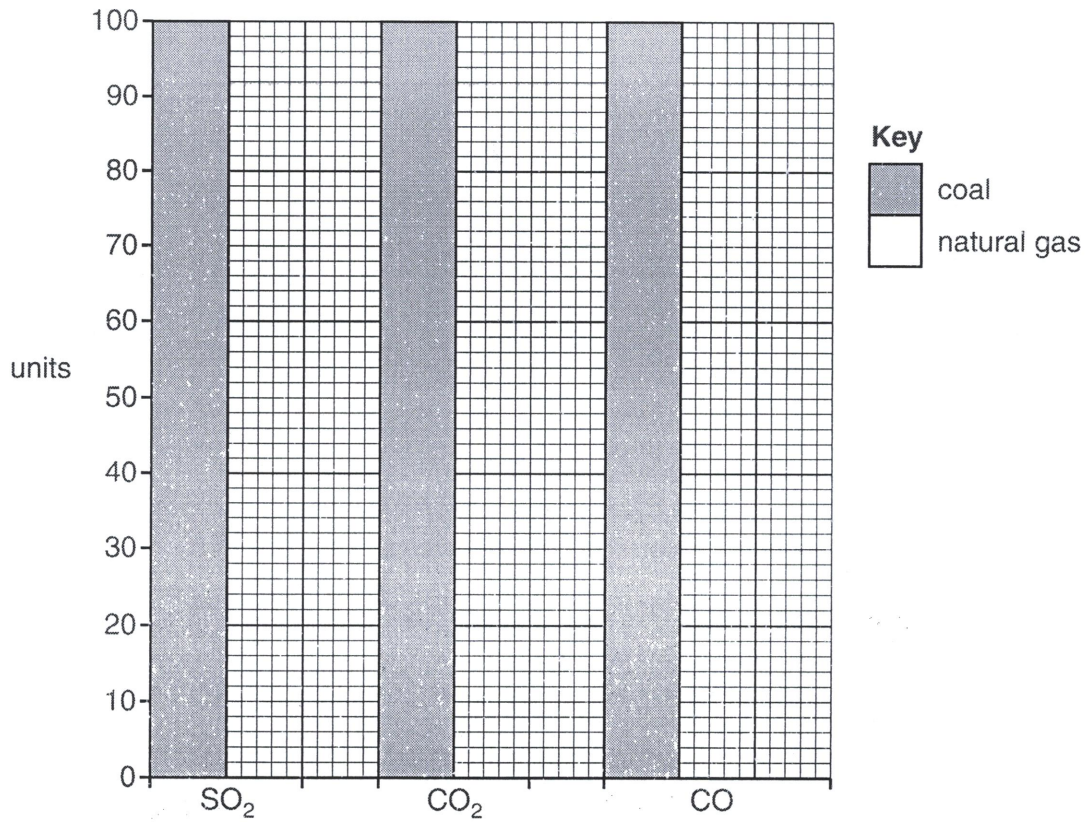
..... [3]

- (ii) What percentage of total world energy consumption was from oil in 2010?

..... [1]

- (b) The importance of natural gas as a fuel is increasing. In recent years there has been a 'dash for gas'. More natural gas is being used, especially for generating electricity.

Look at the graph below, which compares emissions from burning natural gas with those from burning coal.



- (i) Complete the graph by adding **three** bars to show these units of natural gas emissions.

natural gas emissions

SO ₂	1
CO ₂	60
CO	20

[1]

- (ii) For sulfur dioxide (SO₂) and carbon dioxide (CO₂), give **different** reasons why lower emissions are important for people and the environment.

SO₂

.....

.....

.....

CO₂

.....

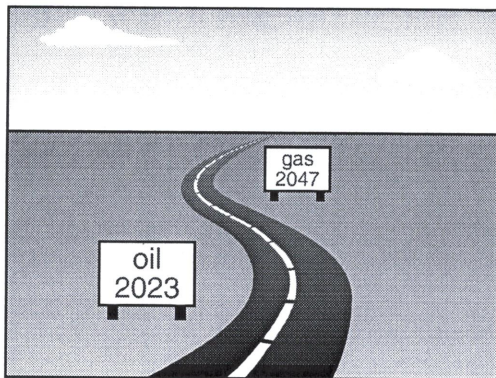
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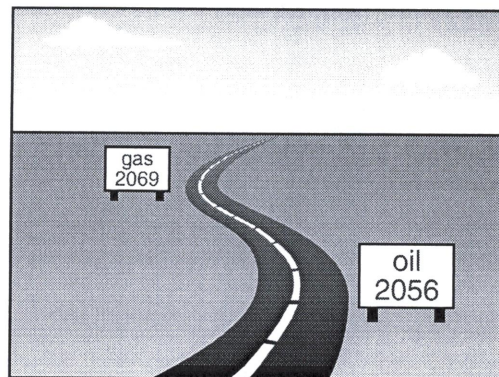
- (c) Oil and natural gas are fossil fuels; they are non-renewable.

Look at the diagrams which show the number of years that reserves of oil and gas were expected to last in 1990 and 2010.

A
estimates of reserves
made in 1990



B
estimates of reserves
made in 2010



- (i) Describe what the diagrams show about the accuracy of the estimates made in 1990.

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..... [2]

(ii) Suggest reasons why the estimates made in 2010 were different from those made in 1990.

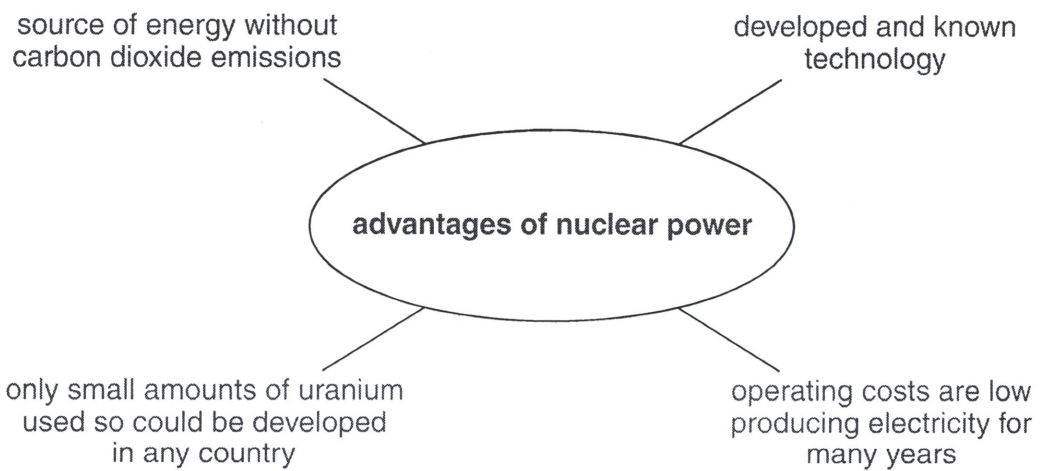
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..... [3]

(iii) Eventually the reserves of oil and natural gas will run out. Explain as fully as you can why this will happen.

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..... [3]

(d) In the 1970s and 1980s nuclear power was seen as a way of reducing world dependence on fossil fuels. It appeared to have many advantages.

Look at the spider diagram.



(i) Describe the advantages of nuclear power compared with:

fossil fuels
.....
.....
.....

renewable energy sources like solar, wind and wave
.....
.....
..... [4]

(ii) In 2010 nuclear power provided seven per cent of world energy. Many people expect this percentage to go down in future years.

Give reasons to explain why many people are no longer as hopeful about the future development and use of nuclear power as they used to be.

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..... [4]

(e) In Japan in 2010, 30 per cent of electricity was generated in nuclear power stations. In March 2011, a nuclear power station was badly damaged by an earthquake and flood. Following this, Japan has greatly reduced the percentage of its energy generated from nuclear power stations.

(i) What do you think was the main reason that Japan reduced its use of nuclear power stations? Explain your view.

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..... [2]

- (iii) Solar panels contain a number of different materials that are extracted from rare minerals. What impact might this have on the sustainability of solar panels?

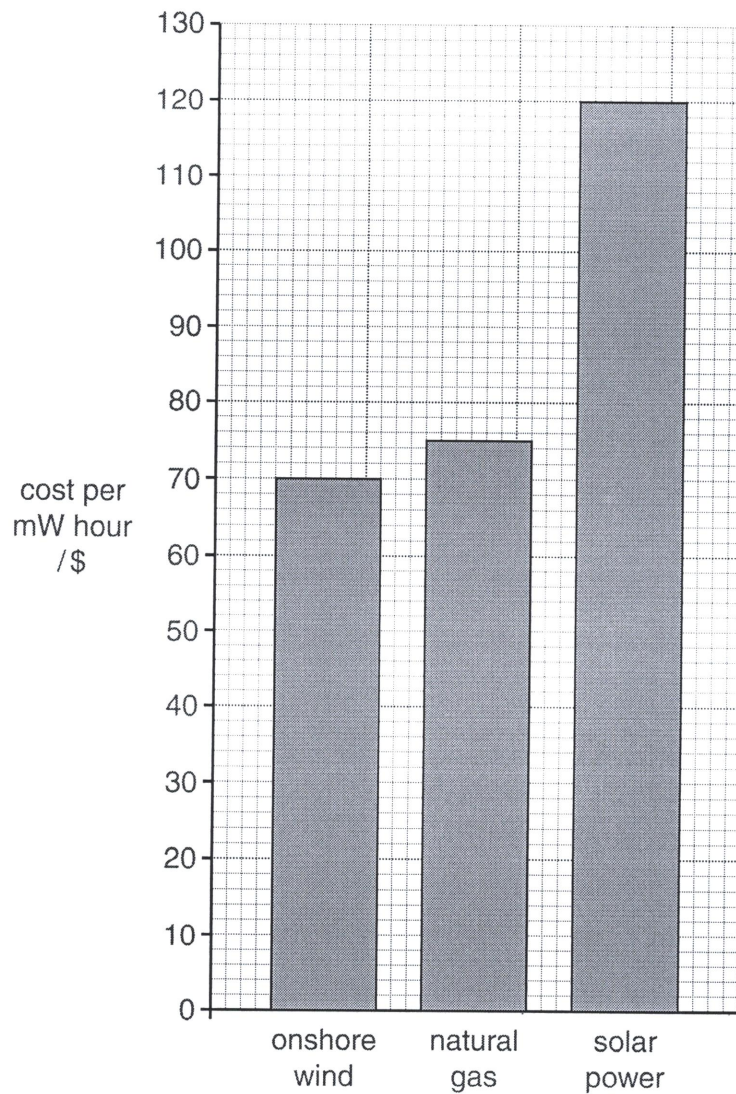
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..... [2]

- (g) The cost of producing electricity from three different energy sources in a developed country in 2011 is shown in the bar graph below. The costs given are for the most modern equipment.



Using the bar graph and your own knowledge, suggest what hope this gives for the greater use of renewable forms of energy in the future. Explain your answer.

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..... [3]

(h) In a developing country there is a great need for electricity. The electricity that is generated often comes from fossil fuel power stations using out of date technologies.

Suggest why people in developing countries want access to electricity.

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..... [2]

[Total: 40]

