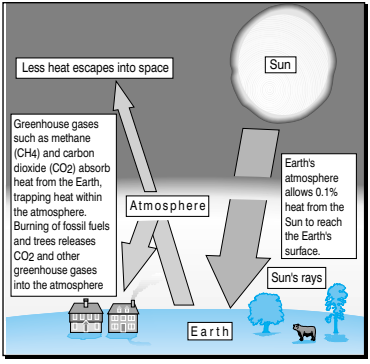
- **Natural resources** are naturally occurring things that are useful to us. They include fuels, minerals and timber. **Non-renewable** resources are fossil fuels such as coal and oil. **Renewable** resources include plants and animals, water and alternative sources of energy.

Global warming

- Average global temperatures have risen by 0.6°C during the last 40 years. Some scientists say that **global warming** will raise average temperatures by 3°C. Global warming is caused by the **greenhouse effect**.
- There is debate over whether global warming is a natural event or is caused by human activity. There is increasing evidence that the burning of fossil fuels has had a major effect.

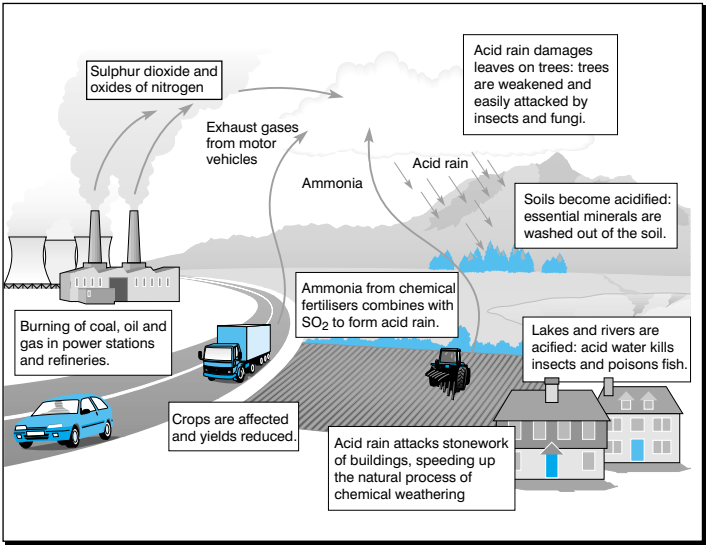


The greenhouse effect

- **Global warming** has both advantages and disadvantages. Britain will be able to grow a greater range of crops. Warmer weather may help the tourist industry. However, there will be increased danger of coastal flooding, water shortages, pests and disease. Globally, the melting of the polar ice caps will cause many low-lying areas to flood. Droughts, storms and floods will become more frequent.
- At the 1992 Earth Summit in Brazil there was a general agreement to reduce the amount of fossil fuels burnt. Rapid industrialisation in NICs, the economic interests of TNCs, and the reluctance of the USA to reduce its living standard means progress has been very slow.

Pollutants

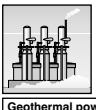
- CFCs are **destroying the ozone layer** that protects us from the sun's harmful ultraviolet radiation (UVB rays). Large doses of UVB cause skin cancer, eye cataracts, crop damage and harm to plankton. There is international agreement to reduce the production of CFCs. The reduction will take a very long time to take effect.
- Power stations and oil refineries release sulphur dioxide and nitrogen oxides into the atmosphere. These gases react with water in the atmosphere to produce **acid rain**. Forests, soils, lakes, rivers and buildings in Scandinavia have been badly affected by acid rain produced in the UK and Germany. International cooperation is required to reduce this effect.



Acid rain: causes and effects

Conserving energy resources

- The need to satisfy the increasing demand for energy and water is the primary concern in resource management. Increasing population and the rapid development of technology means that this problem will continue in future. **Conservation** and **sustainability** will be major considerations.
- In future, fossil fuels will still be needed to produce energy. In the UK there has been a large reduction in underground coal mining. **Open-cast mining** is still important because it is cheaper than deep mining. It also provides jobs in areas of high unemployment. However, it is environmentally destructive. Landscaping can reduce this effect.
- **Nuclear power** requires very little raw material and does not produce greenhouse gases or **acid rain**. It has become increasingly unpopular because of safety issues. The Chernobyl disaster and concerns about the Sellafield plant in the UK have affected public opinion greatly. Unlike the UK, France still regards nuclear power as an important source of energy.
- Alternative or renewable sources of energy such as wind, tidal, solar, hydro and geothermal power may be the way forward. These too have advantages and disadvantages.

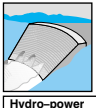


Geothermal power
Feasible where hot rocks, because of volcanic activity, lie close to the surface.

Wave power
There is great potential on the UK's stormy western coastlines. Small wave machines are already working well in Norway.

Tidal power
The UK with its large tidal range, could produce huge amounts of electricity from barrages across estuaries. Disadvantages include the high capital costs.

Solar power
Solar power can be used to heat water directly for domestic heating; to make steam to generate electricity; to generate electricity directly using photo-voltaic cells.

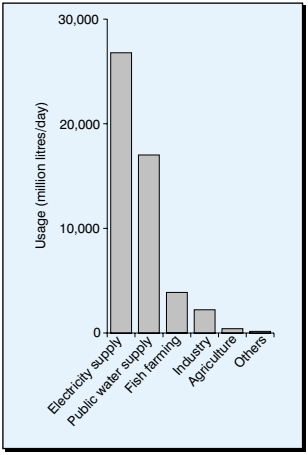


Hydro–power
Hydroelectric power (HEP) already provides nearly 2 per cent of the UK's electricity. There are significant environmental costs, particularly where dams are built and valleys are flooded.

Forms of renewable energy

Water resources

- At present, the global demand for water doubles every 25 years. Reasons are world population growth, increasing use of irrigation and increased consumption per person. This demand is unsustainable.
- Just 5% of the rain falling in the UK is used. In recent years water shortages have become common. Global warming may be responsible for these droughts. Most of the rain falls in the north and west of the UK. The largest demand is in the south and east. Rainfall is highest in winter but the greatest demand for water is in the summer.
- Satisfying water demand is not easy. As well as maintaining supply, water companies have to ensure supplies are sustainable and do not damage the environment. They can increase water reserves by building more reservoirs. Water can be transferred from areas of plenty to areas of shortage. **Conservation** measures include plugging leaks and metering water usage.
- Arid and semi-arid countries require large-scale solutions to water shortage. These are expensive so LEDCs have to find money to fund the schemes. Water provision may be part of a **multi-purpose scheme**. The Aswan Dam in Egypt provides water for irrigation, domestic water supply, and hydroelectricity.
- Demand for water can cause political disputes between countries. This can lead to war as in the case of India and Pakistan.



Water use in the UK

Managing natural resources (1–4)

1 What is the greenhouse effect? (1)

2 Name a greenhouse gas. (1)

3 State one effect of global warming. (1)

4 Why is Bangladesh particularly concerned about the effects of global warming? (1)

5 Name one effect of the hole in the ozone layer. (1)

6 How can acid rain affect buildings? (1)

7 Selby is the main British coalfield still mining coal underground. Where is Selby? (1)

8 What is the raw material used to produce nuclear energy? (1)

9 What is an aquifier? (1)

10 What is the disadvantage of taking more water from underground? (1)

11 Why does London get much of its water from underground? (2)

12 State three reasons why coal, despite being a polluting fossil fuel continues to be mined in the UK. (3)

13 Why is Scandinavia particularly prone to the effects of acid rain? (2)

14 What are the causes of the thinning ozone layer? (3)

SCORE

1 Greenhouse gases trap heat within the atmosphere. (1)

2 Methane or carbon dioxide. (1).

3 Melting of polar icecaps and a rise in sea level. (1)
4 It is a very low-lying country on the Ganges delta, so it will flood if sea level rises significantly. (1) Global warming has increased the scale and frequency of tropical storms.
5 Skin cancer, cataracts; harm to crops and plankton. (1)
6 It attacks stonework speeding up the natural process of chemical weathering. (1) Common in limestone buildings.

7 Yorkshire. (1).

8 Uranium. (1) Uranium is non-renewable but so little is used that supplies are effectively infinite.
9 Porous rock which contains a source of water. (1) This is where water from boreholes comes from.
10 Water table drops and river levels fall. (1) This looks unsightly and affects wildlife.
11 The rainfall in South-east England is relatively low. (1) The London basin is a downfold of chalk. The chalk is porous and forms a water-bearing aquifer. (1)
12 There are large supplies left, which are economic to mine by open-cast methods. (1) Many coal fired power stations remain. (1) Closing mines would cause unemployment. (1)
13 Norway and Sweden lie relatively close to the industrial areas of the UK and Germany. (1) The prevailing winds from the west blow pollutants across to Scandinavia. (1)
14 Ozone is concentrated between 20-30 km above the earth's surface. (1) CFCs accumulate in the atmosphere. (1) The CFCs contain chlorine which reacts with sunlight to destroy ozone. (1) Make sure you know the difference between global warming, ozone depletion and the greenhouse effect.

TOTAL