

4.8 Slowing global warming

Global warming is happening, but the human activity that is considered by many scientists to be contributing to this process, through the overproduction of greenhouse gases, is not irreversible. People can make a difference.

Alternative energy

Scientific research clearly demonstrates that the volume of carbon dioxide in the atmosphere has been rising beyond a natural level of increase since the Industrial Revolution. Since that time, those parts of the globe that have progressively become industrialised and urbanised have come to depend increasingly on burning fossil fuels.

Alternatives to using fossil fuels to generate more **sustainable energy** — using **sustainable resources** in ways that are less polluting — have been developed and used to various extents in different parts of the world. Four of these resources are wind, sun, water and geothermal energy. These, and others, are described here.

A Solar power

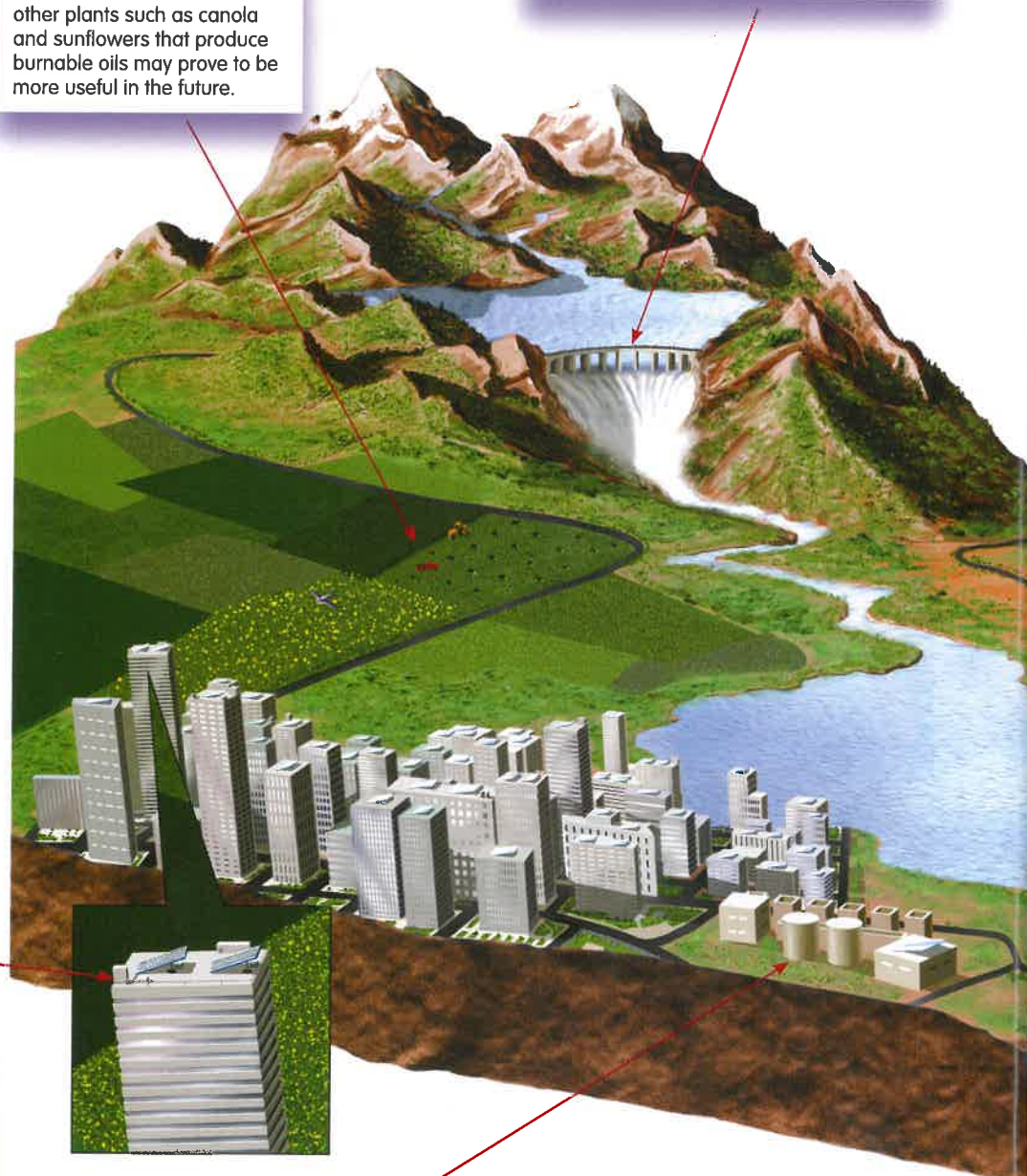
The sun, a limitless resource, can be used to generate electricity. Solar panels, pointed towards the sun, collect heat, which is converted into electricity via photovoltaic cells. The electricity is collected in batteries (storing excess energy during sunlight hours and feeding it back at night and on cloudy days). The size of the panels influences how much power is generated, and therefore how far it can be distributed. The electricity from larger generators can be fed into the national power grid.

B Biomass farming

This involves growing plants that can be used to produce electricity. Trees, of course, can be burned as fuel but other plants such as canola and sunflowers that produce burnable oils may prove to be more useful in the future.

D Hydro-electric power station

A dam blocks the flow of a river, creating a lake. Water rushes through giant pipes across turbines inside the dam. As the turbines spin, the energy of the falling water is converted into electricity. In the Snowy Mountains area of New South Wales, Australia's largest engineering project involved constructing a system of dams, tunnels and power stations to produce hydro-electricity.



C Landfill — waste and sewage treatments

These produce gases that can be used to generate electricity. In Queensland plant fibre that is a waste product in sugar production is burned to produce steam, which is then used to produce electricity to power the sugar refineries.

Activities



THINK

- With the help of a diagram, explain how one of the energy sources described in these pages generates power.
- Figure 1 shows a section of the Tarraleah hydro-electric plant in Tasmania. It harnesses water flow from nearby rivers. Explain:
 - why this location was ideal for its construction
 - what obvious impact the construction of this facility has had on the natural environment.

FIGURE 1



INVESTIGATE

- Could any of the energy needs of your own household be met by a 'home' version of anything shown in the main picture on this spread? Explain.

G Solar panels in the desert

A series of 1900 curved mirrors, computer controlled to follow the sun, concentrate the rays of the sun onto the top of a 100-metre-high tower. Molten salt heated to 560° Celsius is stored in the tower. The salt slowly releases the heat that is then used to run a generator.

E Tower of power

Greenhouses radiate seven kilometres outwards from the one-kilometre-tall tower of this prototype power generator. They will heat and trap air that then rises through the tower to the cooler air above. The rushing air will turn turbines in the giant tower, creating electricity.

J Wind power

Modern windmills, hollow towers with turbines at the top, can be used to generate energy from the wind. A generator converts the spinning motion into electricity. Wind turbines need to be located in areas where the wind blows at a constant speed. Reliably strong winds that would enable electricity to be generated in this way exist in many parts of the world. Opponents claim wind farms would be noisy and visually polluting.

H Geothermal energy

The Earth has a hot molten core. At appropriate locations this heat can be harnessed: bore holes are drilled down to hot rock through which water can be pushed down. The steam created can be brought to the surface where it is used to power turbines and create electricity. Australia has some of the best sites in the world for this type of geothermal power generation.

I Wave power

This is a floating platform that converts wave energy to electricity. The platform contains three air chambers in which the water level rises and falls as waves pass through the platform. This forces the air to pass over a turbine thereby creating electricity.

F Tidal power station

These operate in a similar way to a hydro-electric power station. They convert the energy from both the incoming and outgoing tides to turn turbines and generate electricity. They are best located at the mouth of a bay that has a large difference in water level between high and low tides.

- Undertake research to match the following locations with the correct type of power station: Rance (France), Mojave Desert (USA), Muswellbrook (NSW), Jindabyne (NSW), Manzanares (Spain), Brandon (Qld) and Portland (Vic.). Design a media campaign to promote one of these types of electricity generation. Include a newspaper advertisement, a television interview and an outline of a teaching kit for schools. Justify your chosen strategy.

SELF-DISCOVERY

- What are your personal views about using nuclear energy? Work in teams to find out as much as you can about this form of energy, including its benefits and risks. Negotiate research tasks, setting goals and timelines. In your group, share the information you have found and your own views. Afterwards write a journal entry to describe how your own views were either strengthened or changed as a result of the group discussion.

ICT/TEAMWORK

- Working in teams of four, design the eco-friendly house of the future. Your home will need to be self-sufficient — generating its own power, disposing of waste and supplying food and fresh water for a family of four. Present your design to the class.

sustainable energy energy using resources that are not in limited supply (e.g. solar, wind or wave power)

sustainable resource a resource that can be used in a way that does not ultimately use it up