

## Energy Resources

Everything we do requires energy to be converted from one form to another. As societies become more developed, their energy consumption increases. World energy use is doubling every 15 years as population increases and more countries strive to become industrialised.

Much of this energy comes from **non-renewable** sources such as fossil fuels and uranium. This is a resource that cannot be easily replaced. Fossil fuels are cheap and easy to use, but reserves are finite. Our current rate of use of non-renewable energy resources is unsustainable. There is also increasing concern about the impact of non-renewable energy sources on the environment.

The solution to the looming energy supply problem is to

**conserve** non-renewable sources of energy by avoiding wastage and increasing the efficiency. At the same time we must increase use of **renewable** energy sources. These are resources that can easily

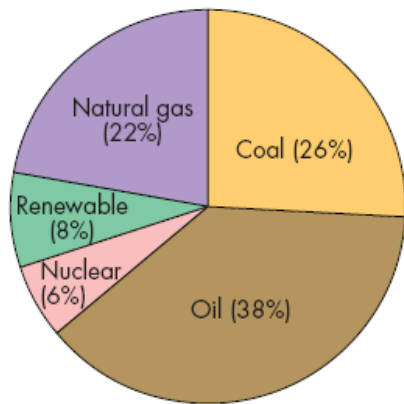
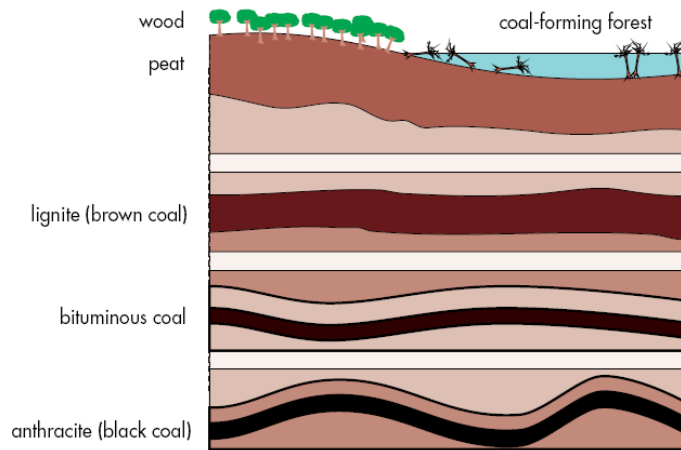
be replaced. But renewable energy sources are not without problems: some are expensive to set up and there are several technical and environmental problems to be solved.

## **Fossil Fuels**

Coal, oil and natural gas are referred to as **fossil fuels** because they formed from the remains of plants and animals that lived millions of years ago. Fossil fuel use has considerable impact on the environment. They are **non-renewable**.

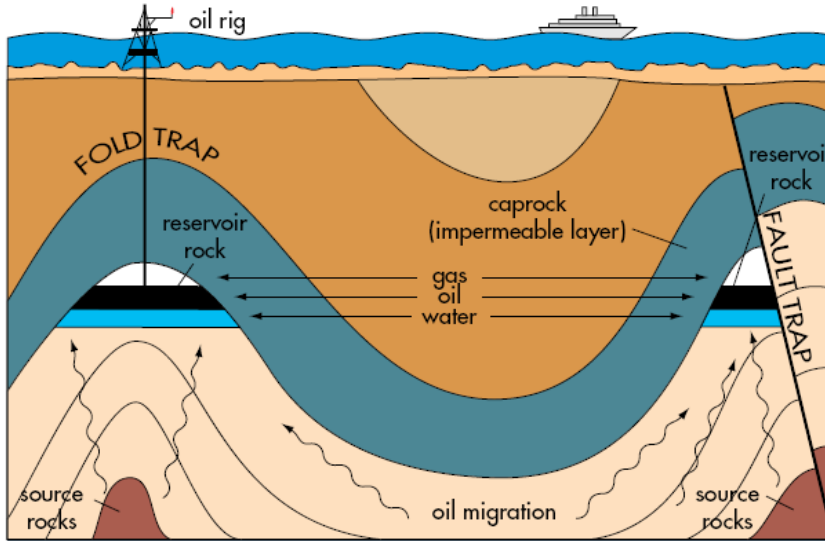
**Coal** formed from the remains of plants which grew in swamps and were buried by sediment. Australia has about 8% of the world's coal reserves.

**Oil** and gas formed from the remains of ancient marine organisms broken down by bacteria in the absence of oxygen. Australian deposits make up only 0.2% of world oil reserves. We import up to 25% of the oil we consume each year.



**FIGURE 9.2**  
World energy consumption  
(1998)

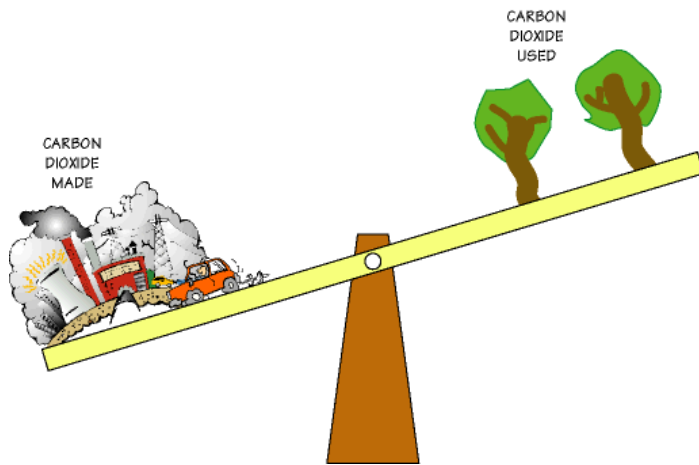
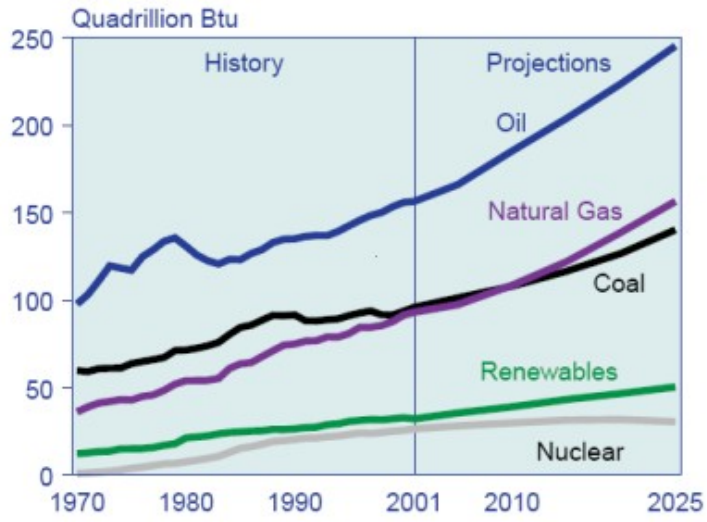
**FIGURE 9.5**  
The coal layer at the bottom of this pile of rocks is drier and more compacted than the layers at the top, which makes it better for burning as a fuel.

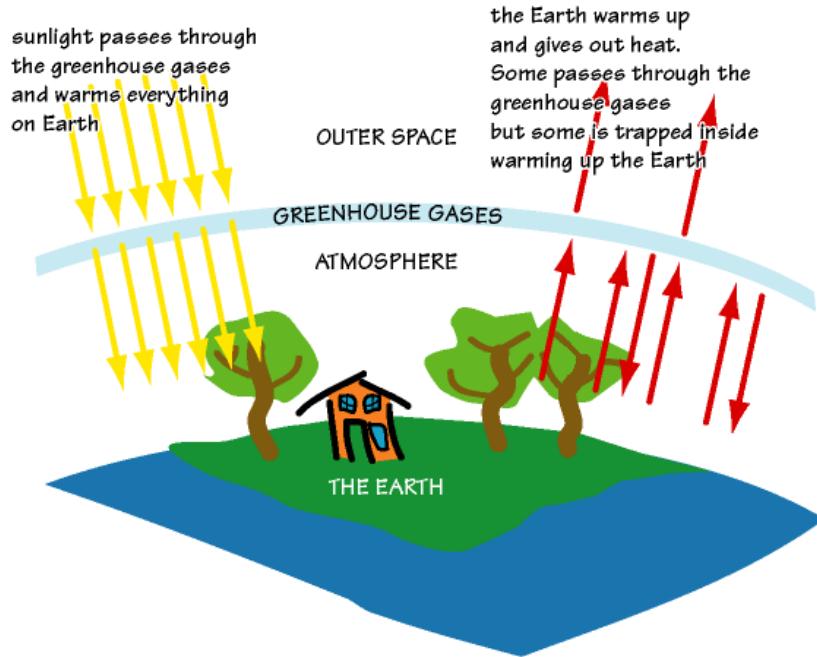


**FIGURE 9.6**  
Folds and faults in sedimentary rocks can trap oil and concentrate it in large underground reservoirs. Occupying the rock pores below the oil is water, a denser liquid. Natural gas, which bubbles out of the oil, can often be found in the pores of the sedimentary rock above the oil. The oil came from the **source rock**, collects in the **reservoir rock**, and the impermeable layer that traps is the **caprock**.

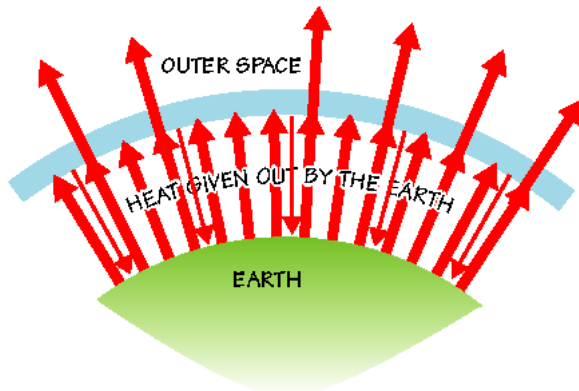
## Renewable Energy

Energy source	Method	Use	Issues
Solar	a Solar collectors heat water. b Solar cells convert light into electrical energy	Produce domestic and commercial hot water; produce steam to generate electricity or generate electricity directly	Equipment expensive; sunlight not always available
Wind	Wind rotates blades of turbine	Operate machinery such as water pump; generate electricity	Wind not reliable; noise and visual pollution; large area of land needed
Waves and tide	Back and forth movement of water across a bay or inlet drives turbine	Generate electricity	Few suitable sites; high impact on environment
Hydro electricity	Falling water held behind dam drives turbine	Generate electricity	High cost to build dam; impact on river environment
Geothermal	Heat from rocks deep underground produces steam to drive turbine	Produce hot water; generate electricity	Only available in some sites; expensive to set up
Ocean thermal gradient	Heat is drawn from the temperature differences between the ocean's warm surface water and its cold deep water	Generate electricity	Further research and development required
Biomass	Plant or animal material, wastes from agriculture, forests or humans are used as fuel	Generate heat to operate engines, machinery, heat water, cook food	Large areas of land needed to grow plants for fuel; produces CO <sub>2</sub> and adds to greenhouse effect





MIXTURE OF GREENHOUSE GASES 100 YEARS AGO



MORE CONCENTRATED MIXTURE OF GREENHOUSE GASES TODAY  
As the mixture of greenhouse gases has got more concentrated more heat is trapped close to the Earth

