

## ENVIRONMENTAL ISSUES

- ◆ Greenhouse Effect and Global Warming – The earth's atmosphere allows a lot of sunlight to reach the earth's surface, but reflects much of that light back into space. Some gases trap more sunlight, so that less light reflects back into space. These gases are called Greenhouse Gases, because the effect is like being in a plant glasshouse, or in a car with the windows wound up. The result is a gradual increase in earth's temperature or Global Warming. The major greenhouse gases are water, carbon dioxide, methane, nitrous oxide, ozone and chlorofluorocarbons (CFC's). Possibly, the main man-made causes are thought to be carbon dioxide and methane from factory, power station and car emissions, the waste products of respiration, logging, the mining of fossil fuels and the breakdown of plant matter in swamps. The long-term effects may include melting of ice-caps and a rise in sea level, and a global change in climate and type of vegetation.
- ◆ "Hole" in the Ozone Layer – Ozone is a gas in the earth's upper atmosphere whose chemical formula is O<sub>3</sub>. Ozone acts to block out much of the sun's ultraviolet radiation which causes skin cancer and contributes to the fluctuations of global climatic conditions that affect the environment. Above Antarctica is a thinner layer of ozone caused by the destruction of ozone gas by emissions of chlorofluorocarbons and hydrochlorofluorocarbons that are propellents in pressure-pak spray cans and refrigerants in refrigerators and air-conditioning units. In 1987, a treaty called the Montreal Protocol was introduced to reduce usage of ozone-destroying gases. Australia has banned CFC's, but many nations such as China still use them.
- ◆ Acid Rain – When gases such as sulphur dioxide and nitrogen oxides react with water in the atmosphere to form sulphuric acid and nitric acid, they form an acidic 'rain' which can destroy vegetation. Some of these gases are from natural sources such as lightning, decomposing plants and volcanoes. However, much of these gases are the result of emissions from cars, power stations, smelters and factories.
- ◆ Air Pollution – Air pollution is the release into the atmosphere of excessive amounts of harmful gases (e.g. methane, carbon dioxide, sulphur dioxide, nitrogen oxides) as well as particles (e.g. dust, tyre rubber, lead from car exhausts). To reduce emissions, the Australian government has legislated that all new cars use unleaded petrol and have catalytic converters fitted to the exhausts.
- ◆ Water Pollution
  1. Sewage is all household waste water. Many detergents contain phosphates which act as plant fertilisers. When these phosphates and the sewerage reach rivers, they help water plants to grow in abundance, reducing the dissolved oxygen in the river water. The result is death of aquatic animals due to suffocation by the algal blooms. This harmful effect is called eutrophication.
  2. Biodegradable detergents are more environmentally friendly because they are readily broken down to harmless substances by decomposing bacteria.
  3. Suspended solids in water such as silt reduce the amount of light that reaches the depths of the water in lakes and rivers. This reduces the ability of aquatic plants to photosynthesise and the result is less plant and animal life. Turbidity is the measure of 'cloudiness' or the depth to which light can reach in water.
- ◆ Introduced Species are species of plants or animals that have migrated or been brought to Australia. Many fit into the natural ecosystems and are kept in control by natural predators and parasites. However, some become pests as they are well-

adapted to our environment, readily obtain nutrients, and lack natural predators or parasites. Examples include rabbits, foxes, carp, and prickly pear cactus plant.

- ◆ Biological Control is an environmentally-friendly method to control these pests by the introduction of species-specific, living organisms to control their numbers. Successful examples include the myxoma virus and the calici virus for rabbits, and the cactoblastis moth feeding on the prickly pear. Unsuccessful examples include the introduction of the cane toad to reduce the numbers of natural cane beetles.
- ◆ Biological Magnification is the accumulation in body tissues of certain chemicals such as DDT pesticide and mercury. The higher along the food chain, the greater is the accumulation, sometimes to toxic levels, causing birth defects and death.
- ◆ Soil Salinity has increased greatly since the widespread logging of trees by farmers. Deep tree roots normally draw water from the underground water table. However, when logging of trees occurs, the water table rises close to the surface bringing with it salt from rocks. This creates soil that is so salty that vegetation cannot grow effectively. The result is loss of vegetation and erosion.
- ◆ Population Explosion is the rapid increase in population in developing countries causing famine, and also in developed countries causing more demand for energy and with that, increased pollution and destruction of the environment.

### ENERGY CRISIS AND ENERGY ALTERNATIVES

With population growth comes increased usage of energy. The energy crisis is the inability of the earth's resources to keep pace with the population's needs. The solution to the energy crisis is twofold – build more power stations to supply more energy, or reduce the usage of energy by building more energy-efficient devices. There are 2 types of energy sources – non-renewable and renewable.

#### NON-RENEWABLE ENERGY SOURCES

- ◆ e.g. fossil fuels (coal, oil, natural gas) and nuclear energy (uranium, plutonium)
- ◆ Takes a long time to form (e.g. millions of years)
- ◆ Cannot be reused
- ◆ Advantages
  - ◆ Cheap
  - ◆ Readily available
  - ◆ Efficient
  - ◆ Multipurpose (e.g. oil for cars, heating)
- ◆ Disadvantages
  - ◆ Running out
  - ◆ Polluting or radioactive

#### RENEWABLE ENERGY SOURCES

- ◆ e.g. biomass, solar, wind, wave, tidal, hydroelectric, geothermal
- ◆ Takes a shorter time to form (e.g. decade or two)
- ◆ Can be reused or is very abundant
- ◆ Advantages
  - ◆ Won't run out
  - ◆ Environmentally friendly
- ◆ Disadvantages
  - ◆ Geographically selected
  - ◆ Inefficient

## NON-RENEWABLE ENERGY SOURCES

- ◆ Fossil fuels began forming millions of years ago. At the time when it is believed that dinosaurs roamed the earth, forests of trees fell into swamps and were covered by silt and mud. They gradually changed into the coal, oil and natural gas that we use today.
- ◆ The advantages of using fossil fuels are that they are readily available at the present time and are cheap. They can also be used for many purposes e.g. coal can be burnt in power stations to make electricity and also in homes for heating.
- ◆ These fossil fuels took millions of years to form, yet humans are using them rapidly in cars, power stations and factories. They will probably run out within the next 100 years. So the disadvantages of fossil fuels is that they will run out, and also that they are polluting.

## RENEWABLE ENERGY SOURCES

- ◆ Biomass is plant matter that is used as an energy source. For example, timber can be burnt for both cooking and heating in many homes around the world. Methane gas that is flammable can be made from rotting vegetation in methane digesters. Also alcohol made from sugar cane can be used as an environmentally-friendly alternative to petrol.
- ◆ Solar Energy can be used in many ways. Buildings can be designed to take advantage of the sun's warmth in the winter so that we don't use electric heaters. Solar hot water heaters can reduce our electricity bills. Photovoltaic or solar cells can generate electricity. Solar energy is particularly useful here in Australia because of our abundance of sunlight.
- ◆ Hydroelectric Power Stations are initially expensive to build but are cheap to run. They can be located in mountainous areas where water is stored in dams and then released to turn turbines that generate electricity.
- ◆ Wind Energy from windmills can be used to generate electricity by turning turbines in the same way as in hydroelectric power stations. These are particularly useful in areas close to the coast where the winds are strong and continuous.
- ◆ Wave and Tidal Power can be used to generate electricity from the rise and fall of the waves and the tides. These forms of power can only be utilised at the moment in places such as Broome where the tide rises and falls through a considerable height very rapidly.
- ◆ Geothermal energy is energy harnessed in areas of the earth that are near volcanoes or hot springs such as in Rotorua in New Zealand. The heat can be used for domestic use. It can also be used to generate electricity by heating steam to turn turbines.
- ◆ The advantages of using renewable energy sources is that they won't run out and they are relatively friendly to the environment. Unfortunately, they are not as efficient in producing electricity as coal-powered power stations. Also another disadvantage of solar, wind, wave, tidal and geothermal energy sources is that they can only be used in certain areas around the world.

*Did You Know That...?* The Mad Hatter in the story of "Alice in Wonderland" was mad as a result of mercury poisoning. In the 19<sup>th</sup> century, hat-makers put a shiny lining of mercury on the inside of hat brims. Accumulative effects can produce headaches, madness and birth deformities.