

## Energy from biomass

### Activity sheet A – Energy from biomass

Most of our energy comes from non-renewable fossil fuels (coal, oil and gas). Many people think that we should be using fuels made from biomass, a renewable energy source. Biomass is the name given to anything made from plant material. Green plants trap the Sun's energy using chlorophyll in their leaves. During photosynthesis this energy is used to convert carbon dioxide and water to carbohydrates. Carbohydrates like starch and cellulose store energy. During the process of combustion this energy is released.

Some plant material can be burned straight away. Wood has been used in this way for thousands of years. In some countries wood is still the main source of fuel.

Sometimes plant material can be turned into a more effective fuel. If wood is heated without oxygen any moisture is driven off as well as flammable liquids and gases. The almost pure carbon that is left is called charcoal. This is a better fuel than wood because it burns slowly and causes less pollution. Charcoal is often used in barbecues.

Waste plant material such as straw and manure can be used to make biogas. Biogas is a mixture of methane and carbon dioxide. Biogas is produced by bacteria during anaerobic respiration. Biogas can be used as a vehicle fuel or for generating electricity. It can also be burned directly for cooking, heating and lighting.

In Brazil sugar from sugar cane is fermented. The product is then distilled to produce pure ethanol (alcohol). The ethanol can then be used instead of petrol in cars. The woody material (called *bagasse*) left over from crushing the sugar cane to extract the sugar makes a good solid fuel. It is used to provide the heat needed to distil the ethanol.

Some fruits, nuts and seeds can be pressed to extract oils. Rapeseed oil, soya bean oil and palm oil are all being used to make biodiesel. This can either be used pure or mixed with normal diesel.

Many people see alcohol fuels and biodiesel as the fuels of the future but others are concerned at the environmental cost as tropical forests are cut down to make way for plantations of sugar cane and palm oil.



Palm oil tree and its fruits