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Energy Source Facts

- **Electricity** is found in nature, as lightning, as first proved by Benjamin Franklin in 1752. His discovery helped scientists learn how to harness electricity and how to generate electricity from other methods. The electricity or electrical energy we use today was converted from other energy sources, mostly fossil fuels.
- **Fossil Fuels** are produced from the remains of plants and animals. Ancient plants absorbed the energy from the sun during photosynthesis. Ancient animals, like dinosaurs, ate the plants. When the plants and animals died, their remains collected under mountains of earth and, over millions of years, they formed the fossil fuels - coal, oil and natural gas. Most of the energy used by people today comes from these fossil fuels. But fossil fuels are limited in their supply, can cause pollution and are becoming more difficult to find. Coal is the most important energy source and will continue to be an important component of Australia's energy mix in the future. It consists principally of carbon and was formed millions of years ago from the remains of vegetation that was submerged in swampy water, altering the pattern of decay. Coal is Australia's most abundant fossil fuel and fuels nearly 90% of Australia's electricity generation and is essential for maintaining the quality of life in the nation today. Coal will continue to generate a significant amount of the nation's electricity. Burning coal can produce emissions of sulphur and nitrous oxides and results in carbon dioxide being released into the atmosphere. By using lower sulphur coal and advanced technologies, industry has significantly reduced emissions into the atmosphere. Emerging clean coal technologies require less coal to produce equivalent amounts of electricity, at very low pollution levels.
- **Water** is not an energy source, but the energy in moving water is used to produce mechanical energy. Water falling downhill is used to run turbines, which generate electricity. This is called hydroelectric power. About 5% of the world's power is now produced by hydroelectric power stations. The damming of rivers to make hydro storage lakes can have huge impacts on the environment below as well as above the dams.
- **Wind** can be used to turn windmills and wind turbines, which generate electricity. Windmills have been used for centuries in some parts of the world, like Holland to pump water or grind grain. Wind turbines to generate electricity have been used in Europe for many years and are being more widely used in Australia and other countries.

- **Bioenergy** is a renewable source of energy produced when the sun's radiant energy is transformed into chemical energy by plants in a process called photosynthesis. It can be divided into two different forms. Biomass energy, which uses solid plant and animal waste and biogas, which uses the methane produced when plant and animal material decompose under anaerobic (no oxygen) conditions. Bioenergy is used to generate electricity, fuel vehicles, and produce heat for industry. Using Bioenergy does not produce a net increase in carbon dioxide in the atmosphere because the plants that produce it use carbon dioxide as they grow. Bioenergy contains only small amounts of sulphur and nitrogen (depending on the feed stock), so it does not produce the harmful pollutants that contribute to acid rain.

- **Biomass** includes material for plants. Plants get their energy from the sun through photosynthesis. When plant waste is burned, the energy is released in the form of heat. In the past many homes have been heated with wood-burning stoves. Agricultural industries, such as the sugar milling industry utilise the waste plant material from the milling operation to fuel their boilers which provide heat for their milling processes as well as electricity to power the mill local community. This is known as cogeneration.

- **Biogas** allows us to extract energy from rubbish and other waste! Waste material, when it is decomposing, as in rubbish dumps and sewage stations produces methane, a gas, which can be used to fuel gas turbines for electricity production. Most waste-to-energy facilities produce enough energy to run the plant and sometimes supply additional power to the community. This is a small but growing source of energy.

- **Geothermal energy** results when ground water comes into contact with hot rocks underneath theearth. These pockets of boiling water under the earth's surface send steam to the surface of the earth. This steam can be used to drive steam turbines and generate electricity. Geothermal energy is considered a renewablesource of energy. It is heat energy produced within the earth. It is continuously generated, primarily by the decay of radioactive elements in the earth's core. The most active, high temperature geothermal resources are usually found along major plate boundaries where earthquakes and volcanoes are concentrated. High temperature geothermal resources can be used to generate electricity. Geothermal plants drill wells to capture underground steam, which spins a turbine to produce electricity. Geothermal is a clean energy source. Power plants release very small amounts of harmful substances into the atmosphere.

- **Nuclear Power** comes from the radioactive ore uranium. It produces far more power per ton than any other energy source. Nuclear power does not contribute to air pollution. However, radioactive waste is hazardous to living things. Exposure to radioactive materials can result in mutations, illness or death. The drawback to using nuclear power is finding a safe place to dispose of the nuclear waste. About 6 percent of the energy used in the world comes from nuclear power.

- **Food** is the source of energy used by all living things. The sun's light energy, the source of energy for ecosystems, is changed by producers through photosynthesis into chemical energy which then passes from one organism to another in the food web. Food that we eat is digested and the molecules of sugar and fat are available for use by our cells. When those molecules are broken down the energy is released and is used by the body to keep the heart beating, the blood pumping and the body growing. When a body has "low blood sugar," the body needs to eat and process more energy, so we can continue working, playing and growing.
- **Vegetable and animal oil** are often used in cooking but are also used in lubricating, as well as in lotions and soaps. Animal oil, like that from whales, seals and livestock, was used in the past for lighting lamps as well as for waterproofing.
- **Chemical energy** is the energy contained within the molecules of chemicals. When different chemicals react with one another, energy is released. Batteries create energy through chemical reactions but these reactions eventually stop so the battery must be replaced. Unfortunately the chemicals used in batteries (acids and lead) create a storage and disposal problem. Batteries are used in motor vehicles and many smaller appliances, like clocks, hearing aids and toys. They are also useful for backing up power supplies from solar and other remote systems which are not connected to the normal grid supply.