SOURCES OF ENERGY

Almost all of the energy we use comes from non-renewable sources. They are by far the quickest and easiest method of generating the large amounts of energy, which keep the planet's richer human communities moving. But they have two insoluble problems associated with them: the large amounts of pollution and the eventual drying up of supplies. In contrast renewable energy sources have huge, but mainly untapped, potential.

Non-Renewable Energy Sources

All non-renewable energy sources create pollution, in part due to their extraction from the crust of our planet but mainly from their burning. Only two types exist: the fossil fuels (coal, oil and natural gas) and nuclear fuels (uranium etc). Fossil fuels are useful to us only because they liberate heat energy when we burn the carbon they contain. "Burning" - combustion - is really oxidation; making carbon and oxygen combine to liberate heat. Unfortunately for us, the principal by-product is carbon dioxide, CO_2. Most scientists believe that this is an important contributor to global warming. The heat from coal, gas and oil we can use either directly or indirectly to raise steam in boilers and generate electricity using steam turbines to drive generators.

By contrast, properly managed nuclear fuels liberate no pollution to the atmosphere at all. Accidents are rare in the nuclear power industry but when they occur, their potential for long-lasting damage is horrific. The disaster at Chernobyl on April 26, 1986 was by far the world's worst nuclear accident.

Renewable Energy Sources

Source	Pollution	Regeneration time	Importance
Wind power	-	Continuous but variable	??
Wave power	-	Continuous but variable	Not yet used
Hydroelectricity	-	Depends on rainfall	?????
Solar - collectors	-	Every day, some cloud ok	??
Wood burning	||| 7 years or more	?????
Peat burning		Many centuries	?
Tidal power	-	Twice a day	? Hardly any
Bio fuels		A few months	?? In Brazil
Gas from animal wastes		Depends on supply	?

The greatest problem with most renewables is that they aren't reliable. Wind, waves, sunshine, and tides are all variable and hours or days may pass when no power can be generated. Hydroelectric power is more reliable, though dams tend to silt up, reducing their capacity and droughts can do the same. For mountainous countries, pumped storage could help smooth these gaps. Wood, although renewable, can cause serious pollution problems like coal if used widely. And peat is only marginally renewable for it takes thousands of years to form and extracting it can destroy the plant community which produces it, preventing it from continuing to build up. The enormous potential of renewables is particularly striking in developing countries because they largely don't have centralised energy systems. Renewables come into their own when they make use of local resources and skills for the good of local communities. Commonly they can become a part of the community's farming program too. Many food crops yield "waste" materials that can be burned or fermented in some way to produce energy. This is already the case in Brazil where sugar cane is used as a source of alcohol fuel for transport.

To generate the same amount of electricity as a large modern thermal power station, you'd need:
150 square kilometres of solar panels
300 60-metre diameter wind turbines
100 kilometres of wave energy converters