



Fact Sheet No. 11

OTHER FORMS OF RENEWABLE ENERGY

Of all the renewable forms of energy, geothermal, wave and tidal energy are probably least likely to be used in Australia. This is because, unlike the requirements for solar power, we don't have many suitable sites. However, geothermal energy has been used very successfully in a small number of countries that have the right conditions.

Geothermal

Geothermal energy is stored in the form of heat below the earth's surface. In some parts of the world where the earth's surface is cracked or thin, molten rock and steam can escape. These are usually places that have volcanoes and earthquakes. If water finds its way into these cracks, it becomes heated and may come to the surface as geysers, fumaroles, hot springs and mud pots. Parts of

New Zealand, USA, Japan and Europe have high geothermal activity. Australia is not in an active geothermal area but it does have some large areas of underground hot water which can provide some useful energy.

High grade geothermal energy, such as geysers, fumaroles, mud pots and hot, dry rocks, is used to generate

electricity. Low grade geothermal energy, such as warm underground water and hot springs, is usually used to heat buildings. In Iceland, hot water is brought to the surface through a bore, then sent through insulated pipes into homes and into radiator panels which provide heat. Over 80 per cent of homes in Iceland are heated this way.

In Australia, parts of Victoria and parts of South Australia and New South Wales near the Victorian border have some geothermal resources. In the city of Portland, hot water from under the ground is used to heat the city swimming pool as well as a number of buildings. In Birdsville, Queensland, the town's bore is over 1km deep and penetrates into hot rocks. Heat energy from the bore is used to generate enough electricity for about half the houses in town.



Although geothermal energy doesn't pollute the air with greenhouse gases, there are other environmental concerns about its use. Scientists are not sure how the longterm use of this resource could affect our underground water supplies. Some geothermal tourist attractions at Rotorua in New Zealand have already suffered a decline in surface activity due to the draw-off of geothermal fluid from the underground reservoir by domestic and commercial users. There are also concerns that:

- withdrawing large volumes of water from an underground aquifer may cause land subsidence
- the high levels of salt, hydrogen sulphide and ammonia that are released may cause problems
- continually replacing hot water with cold water may, in the long term, reduce the usefulness of this source of energy.



Tidal and wave power

The energy from tides and waves can be used to drive water and air turbines to generate electricity.

Tides

Tides can cause huge quantities of water to rush back and forth as they ebb and flow. This movement of water can be used to drive generators that produce electricity. To tap this energy, a dam or barrage is built across the mouth of a river or across an inlet. Water turbines are installed in the barrage wall and as water rushes in and out it drives the turbines and generates electricity. The amount of electricity produced depends on the range of the tide and the volume of water that passes through the barrage. To make it worth while, the tidal range (that is, the height between the high and low tides) must be more than four metres. The Bay of Fundy on the east coast of Canada has the largest tidal range in the world with an annual average of 10.8 metres. In Australia there aren't many places with a large enough tidal range to use tidal energy.

There are a number of environmental and social impacts that can be caused by the building of a barrage across an estuary or inlet. Lessened flushing action of an estuary could reduce changing water quality, sediment movements and shoreline vegetation. Marine animals could have their movements restricted, possibly affecting

their eating and mating habits. Many species use the safety of mangroves in estuaries as nurseries swimming into the open sea, only when they are large enough. The barrages could also affect shipping and boating traffic, and recreation and development opportunities.

Waves

Waves are formed when the wind blows across the ocean. Most wave energy can be found where winds are strongest. Norway, Japan, and the USA have all developed wave power technology. Norway used a 350kW device successfully for over five years before it was damaged in a storm. Studies have found that the waves off the west coast of Tasmania have three times as much energy as the waves off the coast of Norway. At present the technology is expensive and because most places have other energy options there has been little development or use of this technology. However, small island nations, with limited land area and resources, may benefit most from this technology.

Most wave energy devices float on the surface of the ocean. They use the up and down movement of the water's surface to make electricity. But structures used to convert energy from waves to electricity are likely to be very large and may interfere with shipping. Because wave energy devices reduce the height and strength of

waves, they may also have an impact on coastlines.

