

Renewable Energy: a prescription for a healthier, cleaner and cheaper future from Doctors for the Environment Australia

Renewable energy comes from natural sources which are constantly replenished. Sources include:

- Solar energy
- Wind energy
- Hydro energy
- Geothermal energy
- Biofuels
- Ocean energy



Solar energy

Australia has a competitive advantage in solar resources with the highest average solar radiation per m² in the world. The costs of solar technology have fallen dramatically and over 3 million Australians now live or work under solar panels. CSIRO predicts that by 2050 around 30% of Australia's energy will be from solar power.

There are two main solar energy technologies:

- **Solar photovoltaic** (PV) converts sunlight directly into electricity using photovoltaic cells. PV systems can be installed on rooftops, integrated into building designs or scaled up to large power plants.
- **Solar thermal** is the conversion of solar radiation into thermal energy (heat) that can be used directly for space heating or cooling, or to generate electricity using steam turbines. Solar thermal is also used for hot water systems.

PV technology provides intermittent, variable but predictable power, mostly at times when demand for electricity is highest, such as during hot sunny periods

Concentrated solar thermal (CST) technology with thermal storage can provide dispatchable power when required. Globally this technology is being implemented at an increasing rate and Australia is ideally placed to take advantage of CST. DEA has a separate [Fact Sheet](#) with more details on CST.

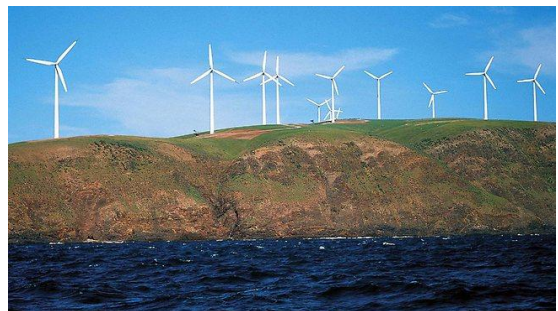
http://dea.org.au/images/general/CST_Fact_Sheet_09-14.pdf

Solar technologies have minimal health and environmental impacts. In fact, solar power contributes to improved human and environmental health by reducing pollution from fossil fuel use and is an obvious way for Australia to transition to a low-carbon economy.

Wind energy

Wind power is generated by converting wind currents into electricity through wind turbines, typically about 100 m high with blades spanning about 80 m.

Wind power produces no emissions and uses no fuel or water during operation. While a wind farm may span a large area of land, the area occupied by turbines is very small, and the rest of the land can be used for agriculture. Impacts on wildlife can be minimised by careful siting and design. A rigorous review by the NHMRC found that although a few nearby residents may object to aesthetics or noise, there is no reliable evidence that wind farms directly harm the health of humans.



Wind turbines near Cape Jervis on the Fleurieu Peninsula, South Australia

Current research aims to improve forecasts of wind energy and develop storage technologies to smooth out energy output from wind farms.

Wind power is expected to become Australia's largest source of renewable energy in the near future. In 2014 it provided one-third of South Australia's electrical energy demands. In a number of overseas areas with good wind resources, the cost of wind energy is already competitive with current energy market prices. Recent research has found that the inclusion of wind farms in the supply of power to Australia's grid has reduced the average annual wholesale price of electricity significantly.

Hydroelectricity

Hydroelectric power plants harness kinetic energy by channelling falling water, often from a dam, through turbines as it flows downstream. Over 100 hydro power plants currently operate in Australia. While operating costs are low, dams have direct and indirect environmental effects, which impact human health. For example,

still water can create breeding grounds for insects and toxic algae, and increase transmission of insect borne diseases.

There are positive effects on human communities and mental health through recreational activities and a constant water supply. Small-scale hydro power generation, used in many developing countries, has positive benefits for local communities and less impact on local environments. Careful analysis of benefit and potential environmental risks is essential in relation to each proposed site.

Geothermal energy

Australia has rich sources of geothermal energy (heat contained in the earth). Significant investment in development and demonstration is required in Australia before this renewable energy source can be commercially viable.

With increasing evidence of human and environmental damage caused by exploiting unconventional gas, a precautionary approach might also be appropriate for geothermal energy with regard to health and environmental impacts.

Biofuels

With heat and pressure over millions of years, dead plants and animals form fossil fuels like coal. 'Recently living' organisms can also be used to produce fuel. These renewable fuels are called biofuels. Wood, charcoal, non-food crops, agricultural residues, and dried animal manure (solid biofuels) can be burned to release energy. The use of manure and crop residues as fuel in poorly ventilated homes in developing countries results in high levels of air pollutants, which cause lung infections, cancer, eye disease, and increased rates of death in infants and children.

In developed countries, biodiesel is produced by modifying oils and fats from animals and plants. Carbon dioxide is absorbed during plant growth, offsetting the CO₂ released when they are burned. While carbon emissions can be lower than fossil fuels, in some cases, such as clearing dense native vegetation to grow plantations, emissions can actually be higher. The real degree of reduction of harmful emissions is therefore uncertain. In addition, an important health concern is the impact of biofuel production on food security when arable land is no longer used for food production.

Some algae with high oil content can be used to produce biofuel. Algae can be grown rapidly in vats or on the surface of waste water treatment plants, with minimal demand on water supply or existing farmland. With more research and rigorous sustainability requirements, bioenergy may provide a safe, clean alternative to fossil fuels.



Ocean energy

Ocean energy includes mechanical energy from tides and waves, and thermal energy from the sun's heat. Wave and tidal power are more predictable and consistent than energy from solar and wind sources. Tidal energy generation is already a reality using existing technologies. Wave energy technologies are being demonstrated for efficiency and robustness.



The Southern Ocean- a potential energy source

Australia's western and southern coastlines have enormous potential for wave energy generation, but the ocean energy sector is relatively underdeveloped in Australia.

It is unlikely that there would be any adverse health effects on humans from the generation of ocean energy, but environmental impacts would need to be carefully assessed through well-conducted health and environmental impact assessment studies.

RESOURCES

- <http://www.epa.gov/cleanenergy/energy-and-you/affect/hydro.html>
- <http://www.csiro.au/org/geothermal>
- <http://energyfuturecoalition.org/Resources/>
- <http://www.csiro.au/ocean-renewable-energy>
- <http://www.statedevelopment.sa.gov.au/what-we-do/renewable-energy>
- Diesendorf, M (2014) *Sustainable Energy Solutions for Climate Change*. UNSW Press and Routledge-Earthscan

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