Renewable energy sources fact sheet

# Hydroelectricity

Hydroelectricity is generated using the energy created by falling water. When water travels down the penstocks into the power station, the potential (stored) energy changes to kinetic energy - the energy of motion. In a hydro-power station, the water is directed through a turbine which drives the generator, usually mounted on a vertical shaft above the turbine.

Electricity is generated by rotating a magnet inside a wire coil. In a power station, this process is maximised by an electromagnet, or ‘rotor’. The rotor spins inside fixed copper coils. The stationary part with the copper coils is called the stator of the generator. Snowy Hydro has eight hydro stations with 33 turbines capable of generating 4,100 Megawatts.

Next, the generated electricity is boosted by transformers. Then transmission lines carry it over long distances to centres that distribute it to homes, schools, hospitals, factories, shops and offices.

Start your own research [here](http://www.snowyhydro.com.au/our-energy/hydro/the-scheme/)

# Snowy 2.0

Snowy 2.0 will act like a giant battery, storing water that can be used as energy at times of high demand. Pumped-hydro operates like a conventional hydro-electric scheme. In periods of high demand, electricity is generated by releasing water from an upper reservoir into a lower reservoir. However, instead of releasing the water after energy has been generated, a pumped-hydro scheme 'recycles' or pumps water back to the upper reservoir during times of low energy demand, so it can be used again.

Find out more about Snowy 2.0 [here](https://www.snowyhydro.com.au/our-scheme/snowy20/)

# Solar power

Solar energy is energy created by the heat and light of the sun. Solar power is produced when this energy is converted into electricity, or used to heat air, water, or other substances. There are two main types of solar energy technology:

* Solar Photovoltaic (‘photo’ means ‘light’ and ‘voltaic’ means ‘electricity’): this technology converts sunlight directly into electricity using photovoltaic (PV) cells. The solar PV cells are combined in panels, and are usually made from silicon. They can be put on rooftops, integrated into building designs and vehicles, or installed by the thousands across fields to create large-scale solar power plants.
* Solar Thermal: this technology converts sunlight into thermal energy (or heat). It uses a field of mirrors to reflect sunlight onto a thermal receiver, which transfers the heat to a thermal energy storage system. Energy can then be released from storage as required, day and night.

Snowy Hydro has a Power Purchase Agreement (PPA) with solar energy generators across Australia. This is an agreement to purchase an amount of energy from the solar generators at an agreed price for many years. These agreements make sure that solar energy generators have a guaranteed cash-flow to help them grow their solar generation assets and businesses. It also means that Snowy Hydro can use renewable energy to move water to be used for hydropower at a later time, or can pass on zero emission energy to consumers when they need it.

Start your research [here](https://arena.gov.au/about/what-is-renewable-energy/solar-energy/)

Geoscience Australia - [Solar Energy](https://www.ga.gov.au/scientific-topics/energy/resources/other-renewable-energy-resources/solar-energy) website

# Wind energy

Used for thousands of years, wind power is generated by converting the kinetic energy of the wind into electricity using wind turbines. These turbines convert the force of the wind into torque (rotational force), which is then used to propel an electric generator to create electricity. Wind energy power stations (known as wind farms) commonly draw on the output of multiple wind turbines through a central connection point to the electricity grid. Across the world there are both onshore (on-land) and offshore (out to sea) wind energy projects.

Snowy Hydro has a Power Purchase Agreement (PPA) with wind energy generators across Australia as well as solar. This is an agreement to purchase an amount of energy from wind farms at an agreed price for many years. These agreements give wind farms a guaranteed cash-flow to invest in maintaining their turbines, as well as investing in growing the wind energy sector. For Snowy Hydro, it means the use of renewable energy to move water to be used for hydropower at a later time, or can pass on zero emission energy to consumers when they need it.

Start your research [here](https://arena.gov.au/about/what-is-renewable-energy/wind-energy/)

# Ocean energy

Ocean energy is classified as:

* *Wave energy*: this is generated by converting the energy within ocean waves (swells) into other forms of energy (currently only electricity). There are many different wave energy technologies being developed and trialled to convert wave energy into electricity.
* *Tidal energy*: generated by harnessing the movement of tides. Tides contain both potential energy, related to the vertical fluctuations in sea level, as well as kinetic energy, related to the horizontal motion of the water.
* *Ocean thermal energy*: generated by converting the temperature difference between the ocean’s surface water and deeper water into useful energy. Ocean thermal energy conversion (OTEC) plants may be land-based, as well as floating or grazing. This has a range of applications for Australia, including electricity generation.

Start your research [here](https://arena.gov.au/about/what-is-renewable-energy/ocean-energy/)

# Geothermal

Geothermal energy can be drawn from the hot water circulating among rocks below the earth’s surface, or by pumping cold water into the hot rocks and returning the heated water to the surface. This water can be released from the ground as steam or hot water. The high pressure steam can be used to drive turbines to produce electricity.

Start your research [here](https://arena.gov.au/about/what-is-renewable-energy/geothermal/)

# Bioenergy

Bioenergy is the conversion of biomass into heat, electricity, biogas and liquid fuels. Biomass is organic matter derived from forestry, agriculture or waste streams available on a renewable basis.

Start your research [here](https://arena.gov.au/renewable-energy/bioenergy/)

Geoscience Australia - [Bioenergy](https://www.ga.gov.au/scientific-topics/energy/resources/other-renewable-energy-resources/bioenergy) website