

The Environmental Protection Agency is Queensland's lead agency to promote energy efficiency, renewable power, and other initiatives that reduce greenhouse gas emissions throughout the state.



Renewable energy

Geothermal energy

CLEANER ENERGY

Fact sheet
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New plate heat exchanger condenser and stand

The new condenser, the major component required to upgrade the Birdsville geothermal power station, allows use of environmentally friendly isopentane 'working fluid' and increased power output from 60 to 120 kW.



Geothermal energy

Geothermal energy is a renewable resource originating deep within the Earth where temperatures can reach up to 6000°C. At a depth of five kilometres from the Earth's surface, the temperature decreases to around 200°C.

Geothermal energy is responsible for volcanoes and earthquakes. High geothermal activity occurs where the Earth's crust is thin and molten rock and steam at high pressure are able to force their way to the surface.

Geysers, hot springs and mud-pots are also created by geothermal energy.

Geothermal resources

There are four main types of geothermal energy – hydrothermal, geopressed, hot dry rock and magma.

Hydrothermal is the only source used to generate commercially viable energy.

While geopressed, hot dry rock and magma have enormous potential, they are still undergoing research and development.

Hydrothermal (hot water)

Hydrothermal resources are derived from hot water and steam formed in porous or fractured rock at relatively moderate depths from 100 metres to five kilometres.

The hot water and steam are formed from the intrusion of molten magma into the Earth's crust or the deep circulation and heating of groundwater through faults and fractures.

High-grade hydrothermal resources are used to generate electricity and lower grade resources can be used in direct heating applications.

To generate electricity, hot water at temperatures ranging from 180°C to 350°C is brought from the underground reservoir to the surface

through production wells, and is flashed to steam in special vessels by release of pressure. The steam is separated from the liquid and fed to a turbine engine, which turns a generator.

Spent geothermal fluid is injected back into peripheral parts of the reservoir to help maintain reservoir pressure.

In direct heating, the geothermal water is usually fed to a heat exchanger before being injected back into the Earth.

Heated domestic water from the output side of the heat exchanger is used for a variety of purposes including home heating, greenhouse heating and vegetable drying.

Geopressured

Geopressured energy is derived from hot, pressurised waters containing dissolved methane, trapped at depths of three to six kilometres in sedimentary formations. The water temperature ranges from 90°C to 200°C.

Three forms of energy can be captured from geopressured sources – thermal energy from the hot water, hydraulic energy from the high pressure, and chemical energy from burning the dissolved methane.

Hot dry rock (HDR)

Hot dry rock is a heated geological formation consisting of dry, impermeable rock. Unlike hydrothermal resources, the fractures and faults required to conduct water to the surface are not present, therefore water must be pumped into the rock at high pressure to create an artificial underground reservoir of steam or hot water.

The Eromanga Basin in south-west Queensland has more than 80 percent (18,949 petajoules) of Australia's HDR resources.

Magma

Magma is the molten or partially molten rock that is found at depths between three and 10 kilometres below the Earth's crust and reaches temperatures up to 1200°C. While some magma resources are at accessible depths, a practical means of extracting magma energy has yet to be developed.

Renewable energy

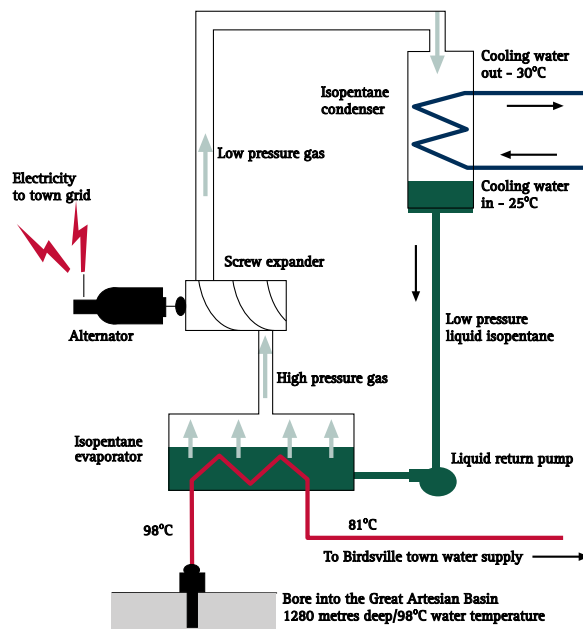
Renewable energy comes from sources that are essentially inexhaustible such as the sun, the wind and the heat of the Earth, or from replaceable fuels such as plants. Prior to the industrial revolution, these sources were virtually the only forms of energy used by humans. During the past 150 years, we have become increasingly dependent on fossil fuels - oil, coal and natural gas. Fossil fuels form slowly in comparison with the rate at which they are used so they are considered finite or limited resources.

Using renewable energy can provide many benefits, including:

- making use of secure, local and replenishable resources;
- reducing dependence on non-renewable energy;
- helping to keep the air clean;
- helping to reduce the production of carbon dioxide and other greenhouse gases; and
- helping to create jobs in renewable energy industries.

Geothermal, solar, wind, hydro, biomass and wave are all examples of renewable energies.

Birdsville Geothermal Power Station 150 KW Electric Capacity



For more information

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