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.

CLEANER ENERGY

Renewable energy

Wind

Fact sheet
Wind

Photos courtesy of Stanwell Corporation and Ergon Energy

Wind

Wind is simply air in motion, that is, the motion of air relative to the Earth's surface. It is a highly variable climatic element, caused by the uneven heating of the Earth by the sun. As the sun warms the air in the Earth's atmosphere it causes the air to rise because warm air is lighter than cool air. When the warm air rises, the cooler air rushes in to replace it, producing wind. The process of wind formation takes place at both a local and global level.

Wind turbines

Wind is converted into power by turbines. There are two main types of wind turbines - those that use wind energy to pump water, and those that harness wind to produce electricity.

Wind turbines vary in size, shape and capacity. They can be used to produce a very small amount of power for maintaining the charge in boat batteries, up to large generators that can supply enough power for hundreds of homes.

Wind turbines used to produce electricity consist of a set of blades connected to a generator or alternator, either directly or via a gearbox. The turbine produces power as the wind spins the blades. By far the most common is the horizontal axis turbine, which has blades like an aircraft propeller. Vertical axis turbines are also used in some countries. Although they do not need to face into the wind, they are often less efficient than horizontal axis models.

Finding the right site is essential for optimum turbine performance. An area with relatively high average wind speed and little or no turbulence is needed. Buildings or trees located near the turbine can cause rapid fluctuations in wind speed. Turbines are usually mounted on high towers, well above all obstructions. Tower heights range from 10 to 100 metres, depending on the application.

Remote area systems

Modern remote area power supply systems, comprising an individual wind turbine, battery storage and often a supporting diesel generator, have been installed in many remote locations throughout Queensland. These systems range from a few hundred watts to a few hundred kilowatts. In smaller systems, the power from the turbine is generally used to charge batteries for later use. Some smaller wind turbines have a regulator built in.

An inverter is used to convert the direct current (DC) produced by the wind turbine to alternating current (AC) used by household appliances.

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In larger systems, a wind turbine provides electricity directly to the loads in conjunction with a diesel generator.

Grid connected systems

Large wind turbines are being used more frequently to generate electricity and are often grouped together in 'windfarms', feeding AC power into the main electricity grid.

Windfarms of this nature require sites with good prevailing winds and close to the electrical transmission network. The turbines sweep an area with a diameter of 20-80m and range in power capacity from 50-2500kW.

The "clean" energy produced by such windfarms may be able to be purchased via your electricity retailer's green energy program.

Queensland Windfarms

Thursday Island - a wind farm consisting of two 225 kilowatt (kW) wind turbines operates in conjunction with a diesel power station. It has been operating successfully since August 1997 and provides about 10 percent of the island's power, saving about 359,000 litres of diesel fuel each year.

Atherton Tablelands - the Windy Hill wind farm, at Ravenshoe, is Queensland's largest wind farm development. Developed by the Stanwell Corporation it comprises 20 x 600kW turbines producing up to 12MW of energy (see picture on front page).

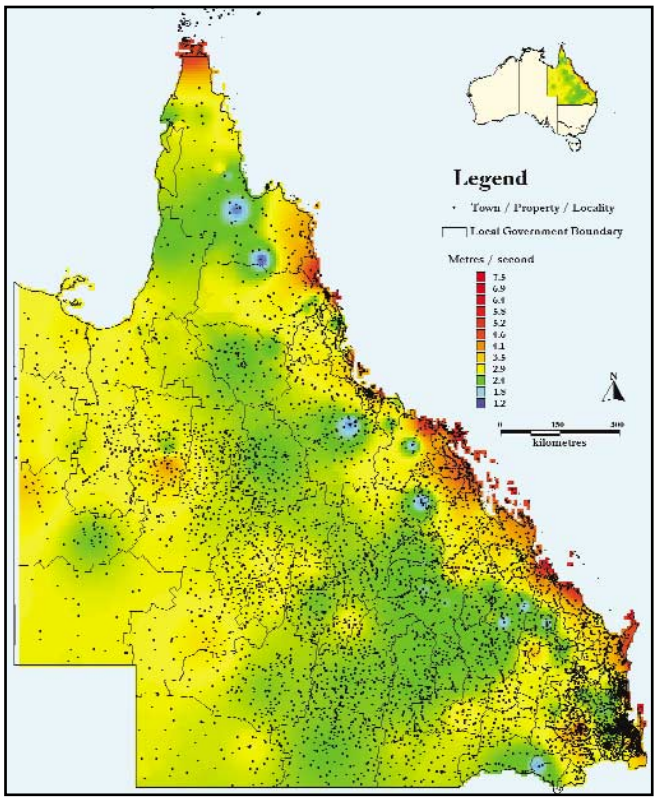
Renewable energy

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, modern civilization has become increasingly dependent on fossil fuels - oil, coal and natural gas. Fossil fuels form so slowly in comparison with the rate of energy use that 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
- Helping to create jobs in renewable energy industries.

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



Queensland Wind Resources

For more information

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