



Resources

- Enviroschools Kit – Precious Energy
- EECA video and booklets
- HCC Energy Booklet
- BRANZ Easy Guide to Eco-Building
- NZ Climate Change Booklets
- Schoolgen resources
- Harnessing Solar Energy
- Schoolgen data – what does it tell us?
- Warming it up using Solar Energy
- Benefits of Solar Panels
- What's Cooking with Solar?
- Is it Environmentally Friendly?
- Factors that Affect the Electricity Output of your School's Solar Panels)
- What Could Your Solar Panels Run?
- How a Solar Electricity System Works
- Decision making – Reducing Greenhouse Gas Emissions
- Exploring the Kyoto Protocol
- Interview about the Kyoto Protocol)
- Building Science Concepts #29 booklet
- Macmillan Little Green Readers Sets 1b, 2b, 3b and 4b
- Macmillan Science Investigation Series, Level 3 – Energy in Our Lives ISBN 0-908923-70-8, Blackline Masters ISBN 0-908923-71-6

Don't forget:

Eastern Bay of Plenty schools – contact Eastern Bay Energy Trust 07 307 0893 or GreenGauge 07 315 4623

Websites:

The following pages are some excellent websites

This is an excellent all round website <http://science.howstuffworks.com>

Energy – general

- The Generation Game – <http://eon-uk.com/EnergyExperience/481.htm>
- Ecokids – A comprehensive website with good teacher information and lots of interactive activities for students.
www.ecokids.ca

Energy Saving

- Log your audits on this national website
<http://www.measuringchange.co.nz/>
- Sustainability – www.mfe.govt.nz/issues/sustainability
- Energy Wise – Wide range of tips for saving energy.
www.energywise.org.nz – go to 'The energy spot'
- Sustainable Households – wide range of sustainable living tips
www.sustainablehouseholds.org.nz
- Energy Smart Schools – activities, information, teacher resources
www.energysmartschools.co.nz
- Contact Energy – saving energy tips.
www.contactenergy.co.nz

Electricity Generation

- Meridian Energy – information on generating electricity from a variety of sources including wind and hydro electricity generation.
www.meridianenergy.co.nz
- <http://www.eia.gov/kids/> information on electricity generation along with teacher resources and games for kids.
- Trust Power – information on electricity generation and energy efficiency
www.trustpower.co.nz/contents/schoolProjects.aspx
- Genesis Energy – information on electricity generation, electricity game, energy efficiency, and climate change fact sheet.
<http://www.genesisenergy.co.nz>
- Contact Energy – information on energy efficiency and carbon footprint calculator
www.contactenergy.co.nz
- Nova Energy – information on Eastern Bay of Plenty electricity generation
www.novaenergy.co.nz

Renewable Energy in New Zealand

Geothermal Power

- Mighty River Power – this is the company has built the geothermal power station at Kawerau.
www.mightyriverpower.co.nz

Geothermal Energy

- www.teara.govt.nz (keyword: Energy – geothermal)

Solar Energy

- Here comes the sun – a wide range of teacher and student solar energy activities.
www.schoolgen.co.nz ([Link to carbon footprint calculator and energy efficient right home quiz](#))

Wind and Solar Energy

- www.teara.govt.nz (keyword: Energy – wind and solar)
- www.windpower.org/en/kids/assign/index.htm
- www.meridianenergy.co.nz (Search: west wind)
- <http://windwithmiller.dk>

Hydro Energy

- www.teara.govt.nz (keyword: Energy – hydro)

Wave Energy

- www.teara.govt.nz (Search: wave energy)

Non-renewable

- www.novaenergy.co.nz
- <http://www.energyquest.ca.gov/story/> – Energy Story
- www.teara.govt.nz (keyword: Energy – coal and mining)
- www.teara.govt.nz (keyword: Energy – oil and gas)

Climate Change

There is a great deal of material in the media and on websites on the subject of climate change.

The Ministry for the Environment also has a website containing information on climate change

- www.mfe.govt.nz/issues/climate

Climate change – school stuff resources

- <http://www.climatechange.govt.nz/reducing-our-emissions/schoolstuff/>

There are great interactive learning activities on the National Geographic website

- <http://green.nationalgeographic.com/environment/global-warming/>

Energy glossary

Alternating current

An electric current that continually changes its direction at regular intervals (usually 50 times per second).

Amperage, amps

The basic unit of measurement of electric current flowing in a circuit.

Atom

The smallest unit of matter made up of protons, neutrons and electrons. Everything in the world is made up of atoms.

Atmosphere

Layers of gases around the earth, including the air we breathe. The gases include 71% nitrogen, about 21% oxygen and small, but important amounts of other gases including water vapour, argon, carbon dioxide, neon, helium, methane, hydrogen, nitrous oxide and ozone.

Battery

A group of electric cells that can store electricity and can then produce an electric current until they run out. A battery provides direct current (not alternating currents).

Blackout

When all electrical appliances, such as lights, are out because of an electrical power failure.

Biodiesel

An alternative diesel fuel made from organic material.

Biomass

Organic material such as wood by-products (eg wood pellets) and agricultural waste that can be burned to produce energy or converted into gas which can then be used as a fuel.

Capacitor

A device that stores electricity to be used later.

Cell

A container filled with a chemical substance (electrodes and electrolytes) that produces an electric current by chemical action.

Charge

An electrical charge is produced when there is a surplus of electrons (positive) at one point and a shortage (negative) at another. A neutral charge is where there is no charge.

Climate

Moisture, temperature and weather averaged over a long time (about 40 years) in a particular region.

Climate change

Observed changes in climate over time caused by natural fluctuations, such as ice ages, or by human activity, such as burning fossil fuels, which contribute to global warming.

Circuit

An unbroken loop of material that electricity can flow through. A circuit can be made from a battery (source), through a copper wire (connection) to a light bulb (output device) and back to the battery. If there is a break in the circuit, the electricity does not flow and it cannot work.

Conductor

Something that allows electricity to flow easily. This is because the electrons in the atoms move easily from one atom to another. Metals, salt and water are conductors of electricity.

Connection

The physical connection (transmission lines, transformers, switch gear etc.) between two electric systems that allow electricity to flow from one to the other.

Current

A constant flow of electrical charges through matter.

Direct current

An electric current that only flows in one direction eg from a battery

Distribution system

Part of the electricity system that carries electricity through overhead or underground power lines to homes and businesses.

Electricity

A type of energy to do with the flow of electrons.

Static electricity is where the flow is very short lived as the two surfaces touch and the charges equalized. With ordinary electricity it will keep flowing whilst there is something to drive it (e.g. a battery) and there is a continuous circuit.

Electricity generation

Electrical energy is produced in different ways, this is called generation. Many electrical generating stations use steam to spin a magnetic field inside coils of copper wire, which creates electricity. The steam is made by heating water by burning fossil fuels such as coal, oil and gas. Sometimes the water is heated from splitting atoms (nuclear energy) and sometimes from concentrating the sun's energy (solar power station). Moving water or wind can also be used to spin a turbine, which in turn spins a magnetic field inside the coils of copper wire. Solar electric cells can also be used to generate electricity. Photovoltaic cells convert sunlight into electricity with no moving parts.

Electrolysis

The production of chemical energy by passing an electric current through a liquid called an electrolyte.

Electron

A negatively charged particle that rotates around the nucleus of an atom.

Electromagnet

A coil of copper wire wrapped around a soft iron core that is magnetised when an electric current flows through it.

Emissions

Gases, particles and other material that are emitted or released into the air. Many emissions come from combustion and burning fuels. Some fuels release fewer emissions than others.

Energy

The ability to do work and produce power. Humans get their energy from eating food. Two states of energy are kinetic and potential energy.

Energy source

The primary source from which electricity can be generated. Common energy sources include coal, petroleum, gas, water, uranium, wind, sunlight, geothermal.

Energy star

A rating system for electrical appliances, such as refrigerators or computers, to indicate how efficiently they use electricity compared to other similar appliances.

Filament

A thin coil of wire in a light bulb.

Fission

The splitting apart of an atom. This releases a large amount of heat energy.

Fossil fuel

Naturally occurring fuel such as coal, petroleum and natural gas. They are formed from the remains of ancient living plants and animals so are rich in carbon and hydrogen. These fuels took millions of years to form.

Fuel

Anything that is burned to create heat such as wood, petrol, coal, oil, propane, natural gas etc. Also any material which can be fissioned in a chain reaction to produce heat.

Fuse

An electrical safety device with a metal wire or strip that melts when the current gets too strong and cuts off the flow of electricity.

Generator

A machine that produces an electric current by spinning a magnet in a coil of wire.

Geothermal energy

The heat energy that is stored naturally deep beneath the Earth's surface. The hot water or steam is used to generate electricity.

Global warming

A term given to the fact that the Earth's temperature is increasing. There is evidence that the burning of fossil fuels as well as changes in land use, such as clearing vast areas of rainforest, has contributed to this increase in world temperatures.

Greenhouse gases

Specific gases in the atmosphere that absorb heat energy (infrared radiation) that is given off by the earth, heat up, and re-radiate that heat energy, some of it back to the earth. Water vapour, carbon dioxide, methane, nitrous oxide, are the main other gases that do this. Burning fossil fuels and clearing forests has added more carbon dioxide to the atmosphere which means more heat energy is being re-radiated and is causing temperatures to rise.

Grid

The national grid is the network of high voltage power lines and substations which carry electricity from the power stations and feed it into local networks.

Hydroelectricity

Electricity that is generated when running water spins a turbine.

Hydrogen fuel cell

A device that converts hydrogen and oxygen into electricity, water and heat.

Insulator

Material that does not allow electricity to pass through it easily. The electrons in the atoms do not move easily from one atom to another. Good insulators include glass, rubber, plastic and dry air.

Incandescent bulb

A light bulb that emits light as the filament glows white hot when electricity flows through it.

Kilowatt

A unit for measuring electrical power. 1,000watts = 1 KW is the rate that energy is used.

Kilowatt-hour

A unit of energy. The use of 1,000 watts of electricity for one hour. That's the same as having ten 100W bulbs burning at the same time for an hour.
 $10 \text{ bulbs} \times 100\text{W} \times 1 \text{ hour} = 1\text{KWh}$

Kinetic energy

The energy something has when it is moving. The higher the mass of the moving object, the more kinetic energy it has. The faster it is moving the more kinetic energy it has.

Lightning

A flash of light produced by the static electrical discharge between two clouds or between a cloud and the earth.

Mechanical energy

The energy of motion used to perform work.

Megawatt

1,000,000 Watts of power or 1000KW or 1MW

Meter

An instrument that records the amount of electricity that passes through it. Power companies read household meters to see how much electricity they have used.

Natural gas

Gas that forms naturally in the earth when organic material decomposes under pressure.

Neutron

A particle in an atom's nucleus that has a neutral electrical charge.

Non-renewable fuel

Once it is used up it is gone! Fossil fuels are non-renewable resources. They have taken millions of years to form and once they are used we cannot replace them.

Nuclear power

Heat energy produced by splitting atoms in a nuclear reactor is used to heat water to move turbines to generate electricity.

Nucleus

The centre of an atom. The nucleus contains tiny particles called protons and neutrons. Rotating round the nucleus are electrons.

Ohms

The unit used to measure the resistance of an object to the flow of electricity through it.

Outage

The time that a generator, transmission line or other electric supply unit is out of service.

Ozone

A gas which shields us from harmful radiation when it is high in the atmosphere. Some manufactured chemicals can break down the layer of ozone high in the atmosphere. If ozone is low down in the atmosphere it can cause problems. It can damage lung tissue when we breathe and damage plants. It is also the main pollutant in smog and a lot of it comes from burning fossil fuels.

Photon

Any light that you see is made up of a collection of one or more photons propagating through space as electromagnetic waves. A photon is an elementary particle, the quantum of the electromagnetic field and the basic unit of light and all other forms of electromagnetic radiation.

Photovoltaic cell or PV cells

A solid-state device that is mostly made of silicon. It allows light energy from the sun to be converted directly into electrical energy.

Potential energy

Stored energy. The capability of something to do work or to move because of this stored energy. An object may have potential energy due to its position (e.g. its height) or its state (e.g. a stretched rubber band)

Power

The rate of energy use. Electrical Power is measured in Watts.

A Watt = 1 joule/second

Power plant

A place where electricity is generated.

Power line (cable)

A wire or cable used to carry electricity. High voltage power cables run between pylons high above ground or are buried underground.

Proton

A particle in an atom's nucleus that has a positive charge.

Renewable energy

A source that renews itself or is replenished in a short time scale. Solar, wind, geothermal and hydro are examples of renewable energy sources.

Resistance

The opposition a material has to allowing electricity to pass through it. Resistance is measured in ohms.

Solar energy

Energy produced by the sun's light and heat.

Solar panels

A solar electric panel converts sunlight into electricity. It is a group of photovoltaic cells wired together in a protective casing and placed in a sunny place.

Other solar thermal panels use the sunlight to heat water. Pipes and tubes containing water are heated by the sun.

Static electricity

The build up and surplus of like charges on a surface. More positive than negative charges, or more negative than positive.

Substation

A facility where transformers lower electricity voltage ready for distribution to other installations.

Sustainable energy sources

A way in which resources can be used so that the resource is always available without damaging the environment, animals and plants.

Switch

A device that opens or closes an electrical circuit.

Technology

Used to describe advances in scientific knowledge which are put to practical use.

Transformer

A device used to increase or decrease electricity voltage and current.

Transmission lines

Power lines that carry high voltage electricity over long distances.

Turbine

A device used in the generation of electricity. It has a shaft with blades at one end and electromagnets at the other. Water or steam, or some other energy source, pushes the blades which makes the shaft and the magnets spin very fast. The magnet end is surrounded by coils of copper wire, and the spinning magnets cause electrons in the wire to begin to move, creating electricity.

Utility

A company or other organisation that provides a public service, such as supplying electricity or water.

Voltage, volts

The force or pressure that moves electric current through a conductor. The pressure is measured in volts.

Wattage, watts

A measure of the amount of electrical power. It can be measured by multiplying the current (amps) by the voltage (volts).