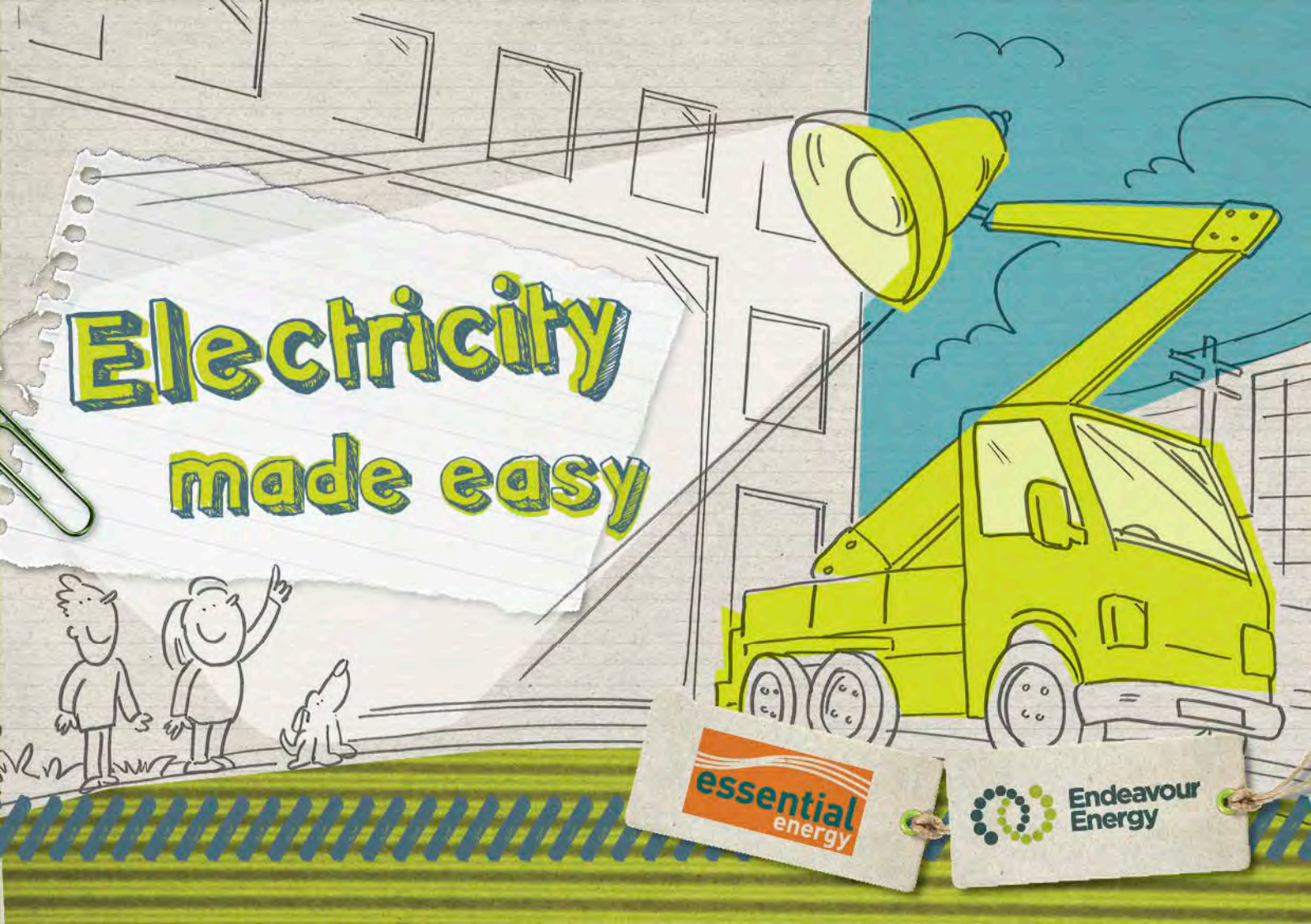

Electricity
made easy
essential energy
Endeavour Energy

What is electricity?

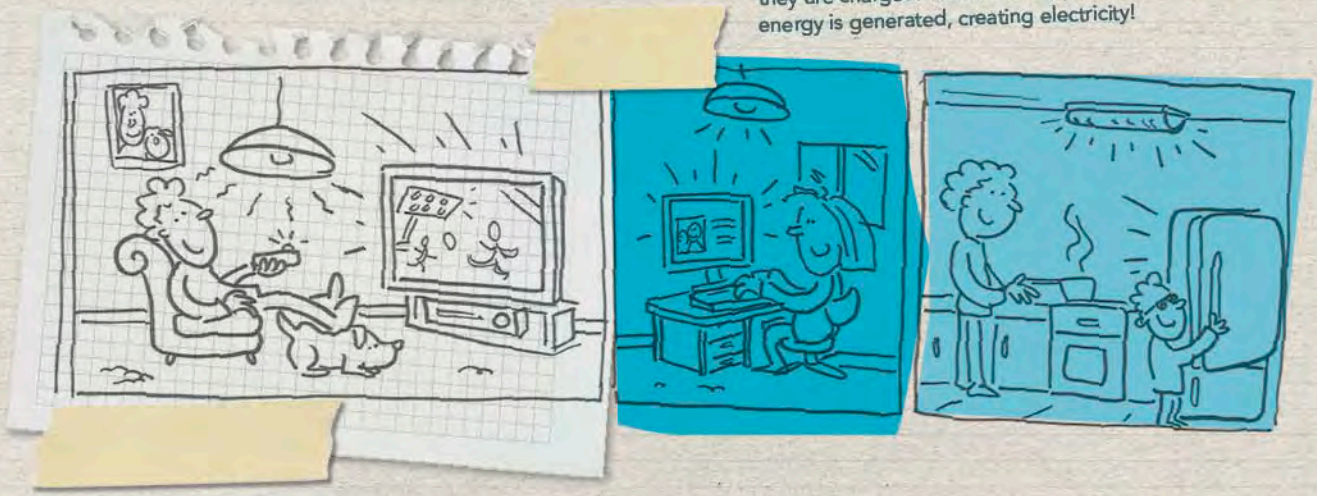
Electricity runs almost every appliance in your house. Without it, you wouldn't have things like lights, computers, televisions, or refrigerators!

Electricity is the flow of energy, or 'electrons' from one atom to another atom.

Atoms are the building blocks of everything around us, such as metal, food, fabric – even you! These atoms are too small for you to see with your eyes, but scientists can see them with special microscopes.

Atoms and cells are made up of even smaller particles including a centre or 'nucleus'. The nucleus contains positively charged particles called protons, and uncharged particles called neutrons. Atoms also include negatively charged particles called electrons, which spin quickly around the nucleus just like the moon around the earth.

Some kinds of atoms, like those which make up metal or wire, have electrons that flow easily from one atom to another when they are charged. When this happens, a 'current' or 'flow' of energy is generated, creating electricity!



Who discovered electricity?

Electricity wasn't discovered by any single person. Lots of people discovered it over a very long time.

It all began in 600BC when a Greek philosopher rubbed a piece of amber with a fur cloth. He found that doing this could attract lightweight things to it, like straw or feathers.

This made him the first person to discover static electricity, and the first of many to discover how to make electricity!

FACT

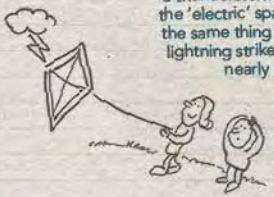
The Greek word for amber is 'electron'

16th Century

Dr William Gilbert proves many substances are electric and magnetic, not just amber.

1752

Benjamin Franklin flies a kite in a thunderstorm and proves that the 'electric' spark from amber is the same thing as lightning. The lightning strike that proves this nearly kills him!



1769

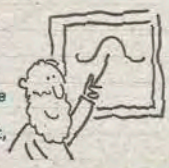
James Watt invents the steam engine. The Watt is named after him.

1792

Alessandro Volta discovers that an electric current can be created when two metals touch. He invents the electric battery and the word 'Volt' is named after him.

1820s

Andre Marie Ampere is the first to explain how the flow of electricity works. The unit of electric current, the 'Amp' is named after him.

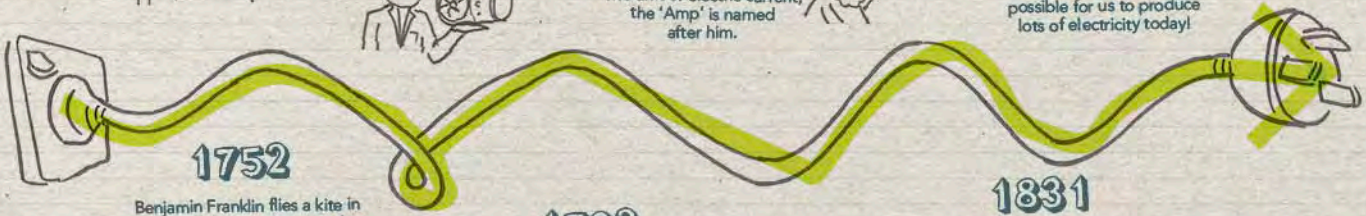


1831

Michael Faraday invents the first electric generator.

1879

Thomas Edison invents the first light bulb. He also invents a type of generator that works with James Watts' steam engine. Together they make it possible for us to produce lots of electricity today!



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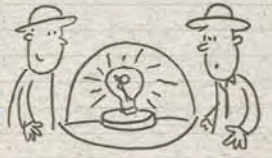
Electricity down under

Australia was very quick to start using electricity. Here's how it went from being a novelty to something we can't imagine life without!

1863

The first electric light is put on public display in Australia at the Observatory in Sydney.



1894

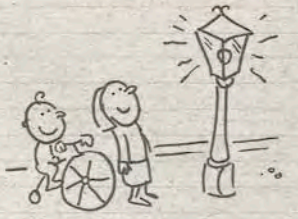
Melbourne is the first city in Australia to have a power station and the first to have electric street lights.

1927

By now, one third of all homes in Australia have electricity and the most popular appliance is the clothes iron.

1888

Tamworth is the first Australian town to have street lighting. Penrith, Moss Vale, Broken Hill and Redfern follow soon after.

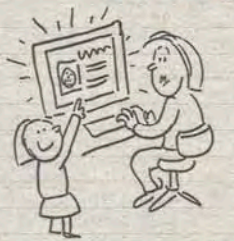


1904

Sydney gets its first power station. It's built in Pyrmont, which today looks very different!

Today

There are nearly 8 million households with electricity in Australia, and 70% have a computer.



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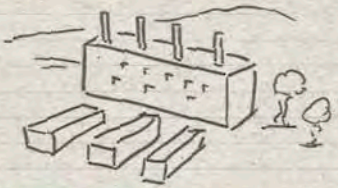
How is electricity made?

Most families get their electricity from a power station.

At each power station, there is a huge coil of wire that spins around in giant magnets. The coil of wire is made up of hundreds and thousands of atoms, with many more thousands of electrons. As the wire spins, the giant magnets cause the electrons to flow quickly from atom to atom, creating electricity.

Different power stations use different methods to make the coil wire spin. Here are a few different power stations people have built to get those electrons flowing.

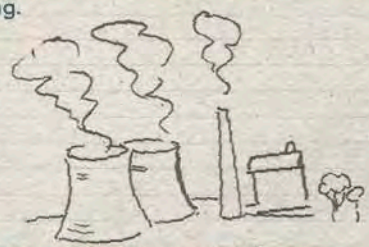


Gas-turbine power stations

Fuels are burned to create hot gases which go through a turbine, which in turn makes the coil of wire spin and electrons flow.

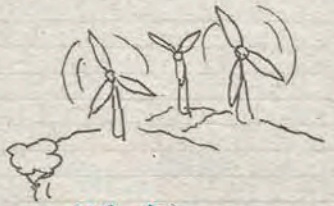
Hydro-electric power stations

Flowing water (usually from a dam) pushes against the turbine blades. This causes a rotor to turn, and the coil of wire to spin, making the electrons flow.



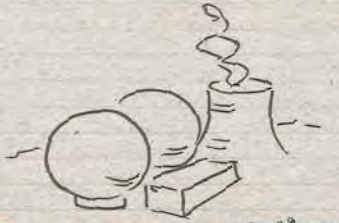
Steam power stations

Fuels such as petroleum, gas, coal or biomass (e.g. wood, rubbish) are burnt to heat water, creating steam which moves through a turbine (like a big fan or rotor). The turbine makes the coil of wire spin and the electrons flow, creating electricity.



Wind farms

Wind pushes against the turbine blades, causing a rotor to turn, the coil of wire to spin, and the electrons to flow.



Nuclear power stations

Nuclear reactions are created to heat water. This turns into steam and then goes into a turbine, which makes the coil of wire spin and the electrons flow.

Geothermal power stations

Deep wells are drilled into the ground to reach the layer of the earth where rain water has soaked in and become really hot. Steam from the hot water gushes out, going through a heat exchanger and then a turbine, making the coil of wire spin and the electrons flow.

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Solar energy

Solar energy can also be used to make electricity. Solar energy comes from the sun. There are two types of solar energy: heat and light, and there are two ways of collecting solar energy.

The first way is to 'collect' or absorb heat from the sun to heat fluid, usually water. Thermal collectors are used for this process, and can be commonly found on the roof of homes as part of solar hot water systems.

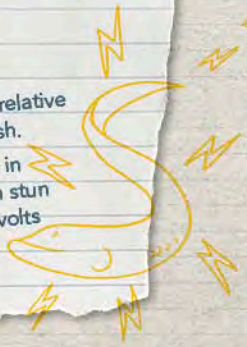
The second way is to use sunlight to make electricity. Solar collectors used for this process are called Photovoltaic (PV) cells (Photo = light, and voltaic = electricity). When the sun hits the PV cell, the little particles of light excite the electrons in the cell, and cause them to flow, generating electricity.

FACT

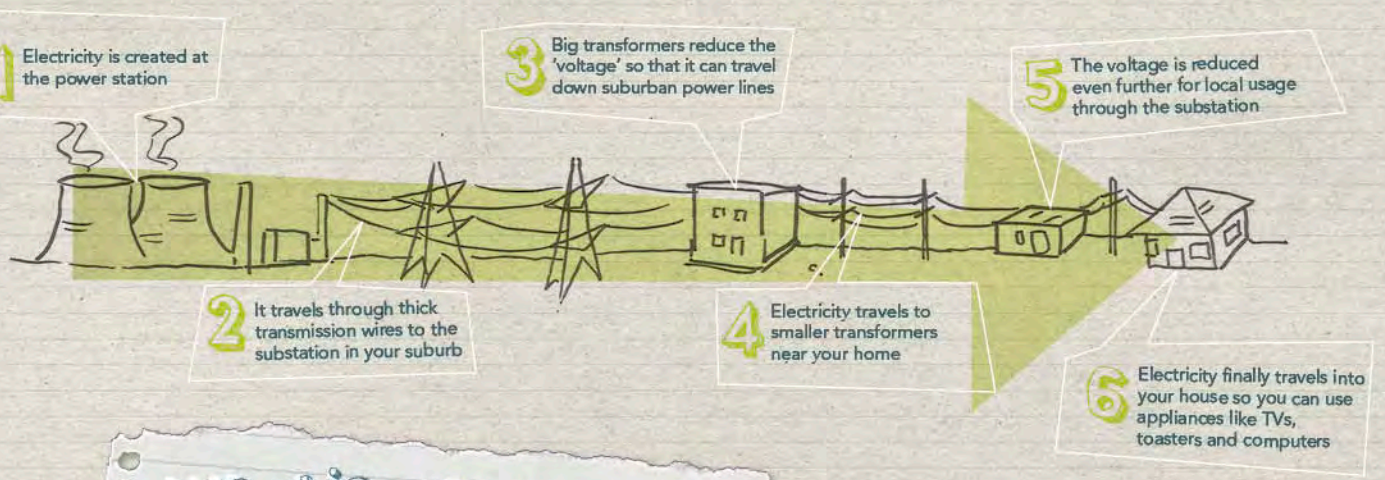
Frying fish

The electric eel (Electrophorus electricus), a relative of the piranha, is the world's most electric fish.

Measuring up to 1.8m (6ft) in length, it lives in the rivers of Brazil and the Guianas, and can stun its prey with an electric shock of up to 650 volts – enough to light an electric bulb or stun a human adult!



How does electricity travel to your home?



What is voltage?

Voltage means electrical pressure. You can think of it like the pressure that pushes water through a garden hose. The higher the voltage, the more electricity there is flowing through a power line.

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Living safely with electricity

Electricity can be dangerous, especially if we come into contact with it in ways we should not. You can prevent getting an electric shock by following these simple safety rules:

1. **Switch off and unplug**
   Always make sure you have turned off the power first before unplugging an appliance.

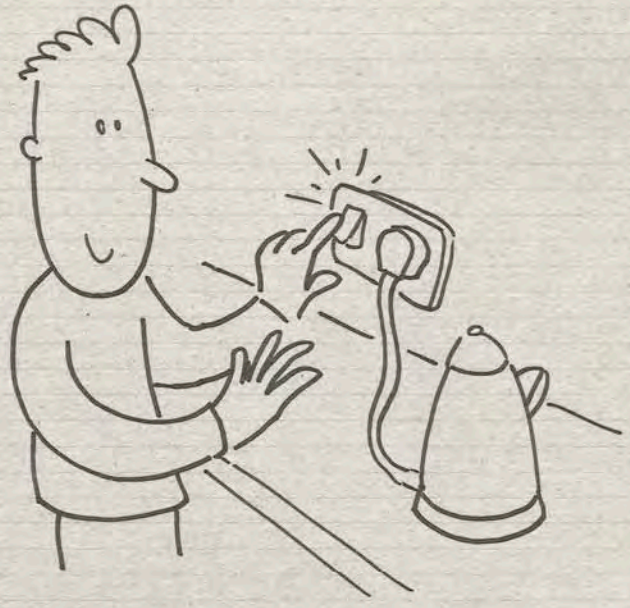
2. **Don't overcrowd**
   Don't plug too many appliances into the one socket because it might overheat.

3. **Electricity and water don't mix**
   Never leave an electrical appliance near the bath, sink or basin, and never touch appliances, power points or light switches with wet hands.

4. **Electricity can jump great distances**
   Never enter into substation sites– it's very dangerous in there because electricity can jump or 'arc' easily. And never go anywhere near a fallen power line. If it's live, you only need to stand near it to get electrocuted.

5. **Electricity always seeks a path to the ground**
   Never fly a model aeroplane or kite near overhead power lines. If it hits a power line, electricity could travel down the string and through you.

6. **Emergencies**
   If you see someone get an electric shock, DO NOT touch them. You'll get shocked too. Instead turn off the electricity at the switch, unplug the appliance the person is touching,and call **000**.



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Safety rules to remember outside

When playing outside always remember to:

1. stay clear of overhead power lines
2. make sure favourite trees, tree branches and cubby houses are clear of power lines
3. fly kites or model aeroplanes away from overhead power lines
4. after a big storm or strong winds, check outside play areas to make sure there are no fallen or damaged power lines
5. stay out in open spaces and close to the ground if you get caught in an electrical storm
6. look up before climbing trees.

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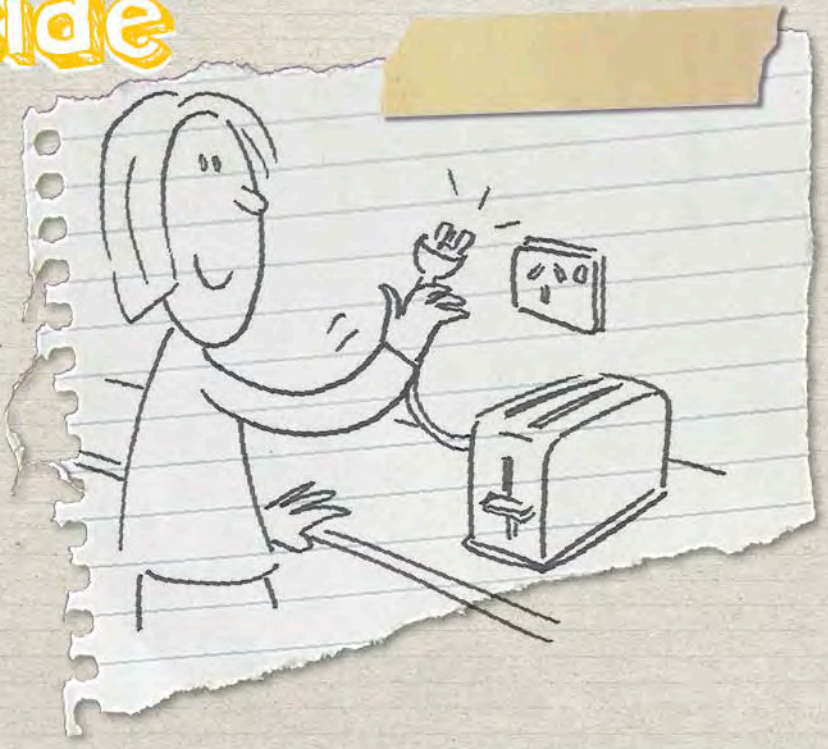
How birds sit on a power line and stay safe

If the kookaburra sits on only one power line, it stays safe. It's when the wings of a large bird – or flying fox – accidentally touch two power lines at the same time that it gets hurt. That's because a new circuit of electricity is created that can flow through the bird's body.

Safety rules to remember inside

When inside your home, remember to:

1. unplug bathroom and kitchen appliances when not in use
2. check that appliance cords and plugs aren't damaged or worn before touching them
3. keep electrical appliances well away from water
4. dry your hands before touching appliances, power points or light switches
5. treat electrical appliances with respect (so no knives in toasters for example!)
6. keep the number of appliances plugged into a single power point to a minimum.



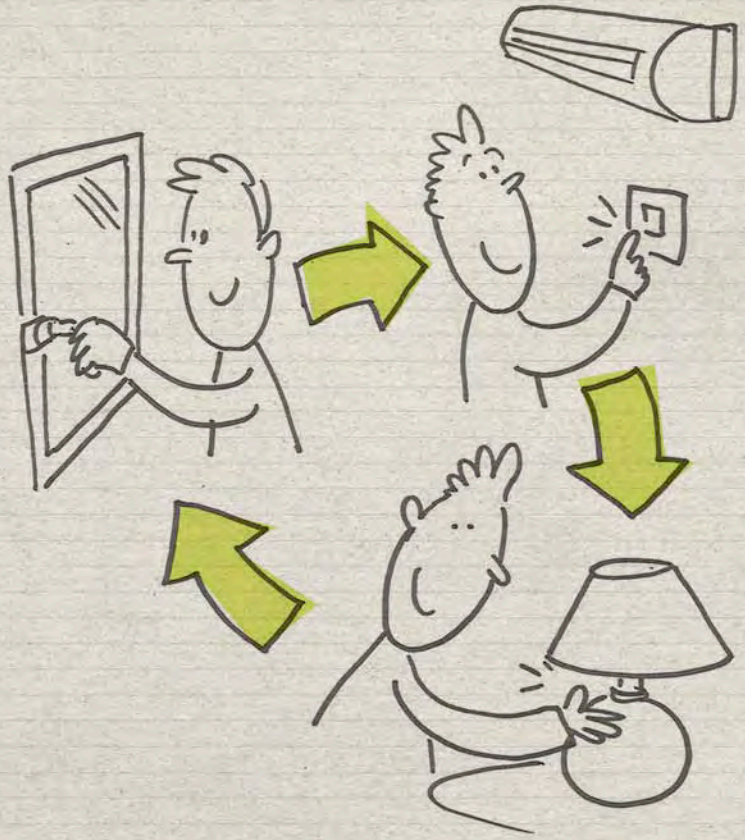
How to use less electricity

Think of how much electricity you use in a day.

From your alarm clock waking you up, to your hot shower before school, right through to watching your favourite TV show at night, you're constantly using electricity.

Now think of everyone in the world using as much electricity as you, every day. That's a lot of electricity!

That's why it's important we save electricity wherever we can. By saving electricity we can save money on our energy bill. And we can also reduce pollution and other environmental problems, all helping to make a difference.



How can you help?

Here's a check list of energy saving challenges for you to do around the house. Tick off the box for every energy saving challenge you complete!

- ☐ only turn on heaters and air conditioners in rooms being used
- ☐ when using heaters or air conditioners, close all the windows and doors to prevent the cool or warm air from escaping, and close the curtains where possible
- ☐ turn off your bedroom light and lights around your home when you don't need them, especially outdoor lights which can be easily forgotten
- ☐ keep the fridge door closed. Energy is wasted when cool air leaks out
- ☐ help hang out clothes on the line instead of using the clothes dryer. Sunlight is free and you don't waste energy
- ☐ turn your computer off when you finish using it. You waste energy if you leave it running all day
- ☐ turn off appliances like TVs, videos and stereos at the wall when you have finished using it. Standby mode still uses power
- ☐ dripping taps waste a lot of hot water, so turn off every tap fully after you finish using it
- ☐ showers use up to 20 litres of water per minute, so take shorter showers (4 minutes) and have the taps turned on low
- ☐ brushing your teeth or washing your hands does not require hot water. Use cold water instead to help save energy.

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How to read your electricity meter at home

Electricity use is measured in kilowatt hours (kWh). 1 kWh equals 1,000 watts of electricity used in one hour.

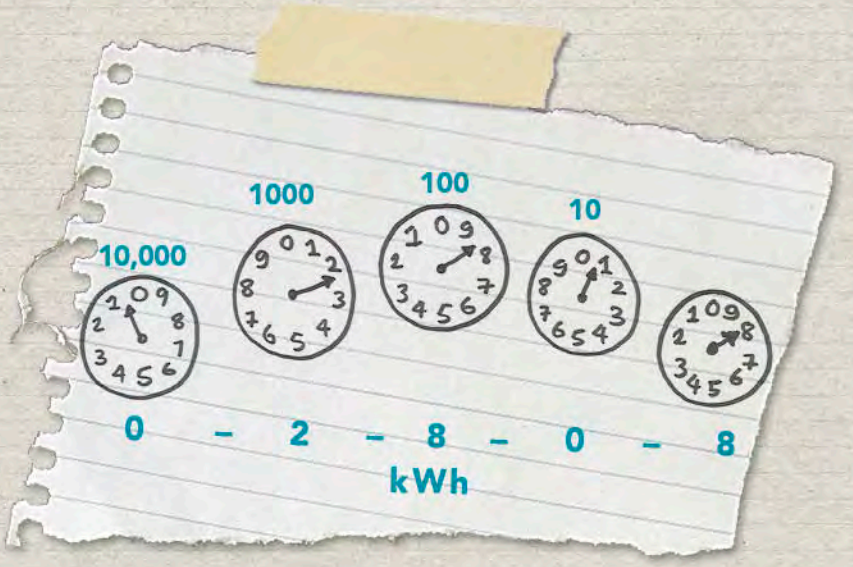
To measure how much electricity your family is using, ask an adult to find the meter box and check it is safe. Stand directly in front of it, and start reading the dials. Be very careful not to touch anything!

Read each dial one at a time and write down the matching numbers from right to left as you read them.

When a dial points between two numbers, write down the lower of the two. If it points between 0 and 1, write down 0, but if it points between 9 and 0, write down 9.

In the figure on the right, the reading is 0-2-8-0-8, which is equal to 2,808 kilowatt hours (kWh).

Do the same thing in one week's time, and then subtract the old figure from the new. This will tell you how much energy your family is using every week!



Are you an energenius?

How much about electricity do you remember? Take our quiz and find out if you are officially an "Energenius"!

Quiz Questions

1. What is the Greek word for amber?
2. Who invented the light bulb?
3. Which was the first Australian town to have street lighting?
4. What flows from atom to atom to create electricity?
5. Where is electricity created?
6. What is voltage?
7. What are the two ways of collecting solar energy?
8. What carries power to our homes?
9. Can you be electrocuted if you are not touching a power line?
10. Why is saving energy a good idea?

Answers

1. Electron
2. Thomas Edison
3. Tamworth
4. Electrons
5. The power station
6. Electrical pressure
7. Heat and light
8. Power lines
9. Yes, because it can jump or arc
10. Because it can help save money and protect the planet

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