

ENERGY



EXPLORERS



This book belongs to

mainpower

What is electricity?

Where does New Zealand's energy come from?

Most of New Zealand's electricity is generated through renewable energy sources, such as wind, hydropower, geothermal, and solar power.

KEY GENERATION LOCATIONS

- Wind Energy
- Solar Energy
- Geothermal Energy
- Hydropower

TRANSMISSION

- Transmission lines
- HVDC Cable

DISTRIBUTION

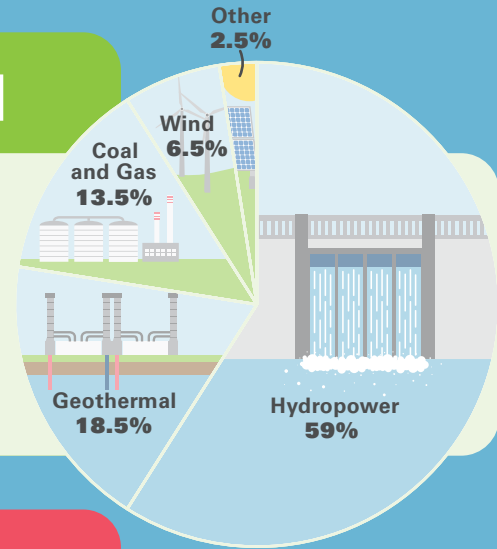
- MainPower distribution network
- 



ELECTRICITY GENERATION

Around 90% of New Zealand's electricity comes from renewable sources like water, hot steam underground or wind. There are more than 200 places where we make electricity in New Zealand, and some houses have their own mini electricity makers called solar panels.

Source: MBIE Annual Electricity Generation, 2022.



ELECTRICITY TRANSMISSION

Electricity transmission is like a big tree trunk carrying energy up and down the country. It takes power from where it's made to places that need it, like North Canterbury.

You might spot huge transmission pylons carrying high voltage electricity. And there's even a cable under the sea connecting the North and South Islands, called HVDC, to share electricity between them.



ELECTRICITY DISTRIBUTION

Power poles and cables carry electricity to homes, schools, and shops. Companies like MainPower take care of these cables and poles, making sure electricity gets where it's needed.

MainPower is one of 29 companies that do this in New Zealand. We look after the poles and wires that carry electricity around North Canterbury.



ELECTRICITY RETAIL

Electricity retailers are the companies you pay for electricity. You can pick from different ones depending on where you live.

Each company sets its own prices. You can choose the best one for you based on price, what they offer, and how good their service is.

[Powerswitch.org.nz](https://powerswitch.org.nz) can help you find the best deal for free.



Match up!

Connect each description on the left to the matching type of energy on the right by drawing a line between them.

Energy is used to turn the blades connected to a turbine to produce energy.

Energy from the sun is converted into electricity using photovoltaic (PV) cells.

Energy that is produced underground using steam.

Flowing water that travels through a structure such as a dam to produce electricity.

Giant metal structures that carry electricity transmission lines.

Underwater cable that transports electricity between the North and South Island.



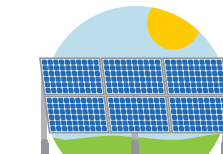
PYLON



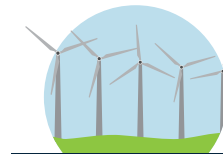
HYDROPOWER ENERGY



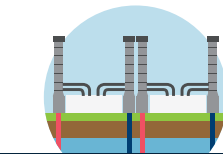
HVDC TRANSMISSION CABLE



SOLAR ENERGY



WIND ENERGY



GEOHERMAL ENERGY

Electricity hunt

Circle what uses electricity in your home.



What's Watt?

Electricity is all around us. We use it every single day... but what is it?



Electricity is a type of energy that can build up in one place or flow from one place to another.

There are two types of electricity:

CURRENT ELECTRICITY

Electricity that moves from one place to another is called current electricity.

STATIC ELECTRICITY

When electricity gathers in one place it is called static electricity.

VOLTAGE



Voltage is a type of electric force that makes electricity move. Voltage is measured in volts (V). The greater the voltage the more current can flow.

CURRENT



Voltage can't move anywhere. What moves through the electric wire in a circuit is called electrical current. Current is measured in amperes (amps).

POWER



Together, voltage and current provide power. The bigger the voltage and the bigger the current, the more electrical power. We measure electric power in units called watts (w).

STATIC



Static electricity is when an electrical charge is on one material. The charge remains in place until it can move away by an electric current or electrical discharge.

As the number of watts get bigger, the units we measure them in change.

1 watt

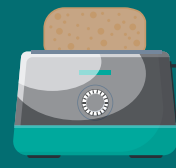
(w)



1 watt

1 kilowatt

(kW)



1,000 watts

1 megawatt

(MW)



1,000,000 watts

1 gigawatt

(GW)



1,000,000,000 watts

Did you know? New Zealand generates and consumes around 43,500 gigawatt hours (GWh) of electricity a year! That's 43,500,000,000,000 watts!



The MainPower Network

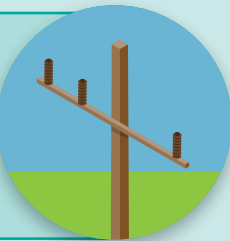


MainPower manages the electricity distribution network in the Waimakariri, Hurunui and Kaikōura areas. We deliver electricity from power stations to homes, schools, businesses, and other places where it's needed. MainPower makes sure that the electricity in your homes and schools is always working. So, whenever you turn on a light or charge your tablet, MainPower is behind the scenes, keeping everything running smoothly!

Here are some of the things MainPower uses to keep the electricity network running smoothly... How many can spot in your neighbourhood?

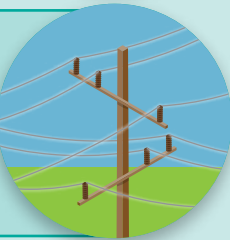
POWER POLES

A power pole carries electricity from one place to another so we can have lights, TVs, and all the electric gadgets we use every day! Power poles are made of wood or concrete. They keep electricity wires up high, so people and animals don't accidentally touch them.



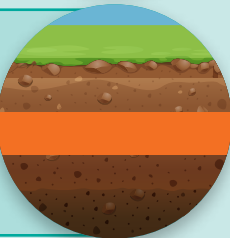
POWER LINES

Electricity travels through power lines, like water flows through pipes. Power lines are long, skinny ropes made of metal. Power lines are like roads for electricity. They carry the electricity from one place to another, kind of like how roads help cars get from your house to the shops.



UNDERGROUND CABLES

Not all electricity is transported up high using poles and wires, electricity can also be transported through the ground using electricity cables. Electricity cables carry electricity underground through orange pipes (ducts) to where it is needed, just like wires and poles!



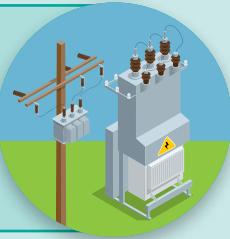
SUB STATIONS

So, electricity travels around using poles, wires and underground cables. But before it can go power our homes, schools, and favourite places, it stops at an electrical substation. A substation is a super important pit stop where electricity gets checked and powered up before it continues its journey to light up our homes. Substations have transformers that can change the electricity's power level. They also have switches and other equipment to keep everything running smoothly and safely.



TRANSFORMERS

A transformer transforms the voltage of electricity. Think of it like a magician for electricity – it can make it stronger or weaker. Transformers are usually big metal boxes, located on top of power poles or on the ground. If the electricity needs to be really strong to power a lot of things, the transformer boosts it up. If it needs to be gentler for something smaller, like a phone charger, the transformer makes it just right.



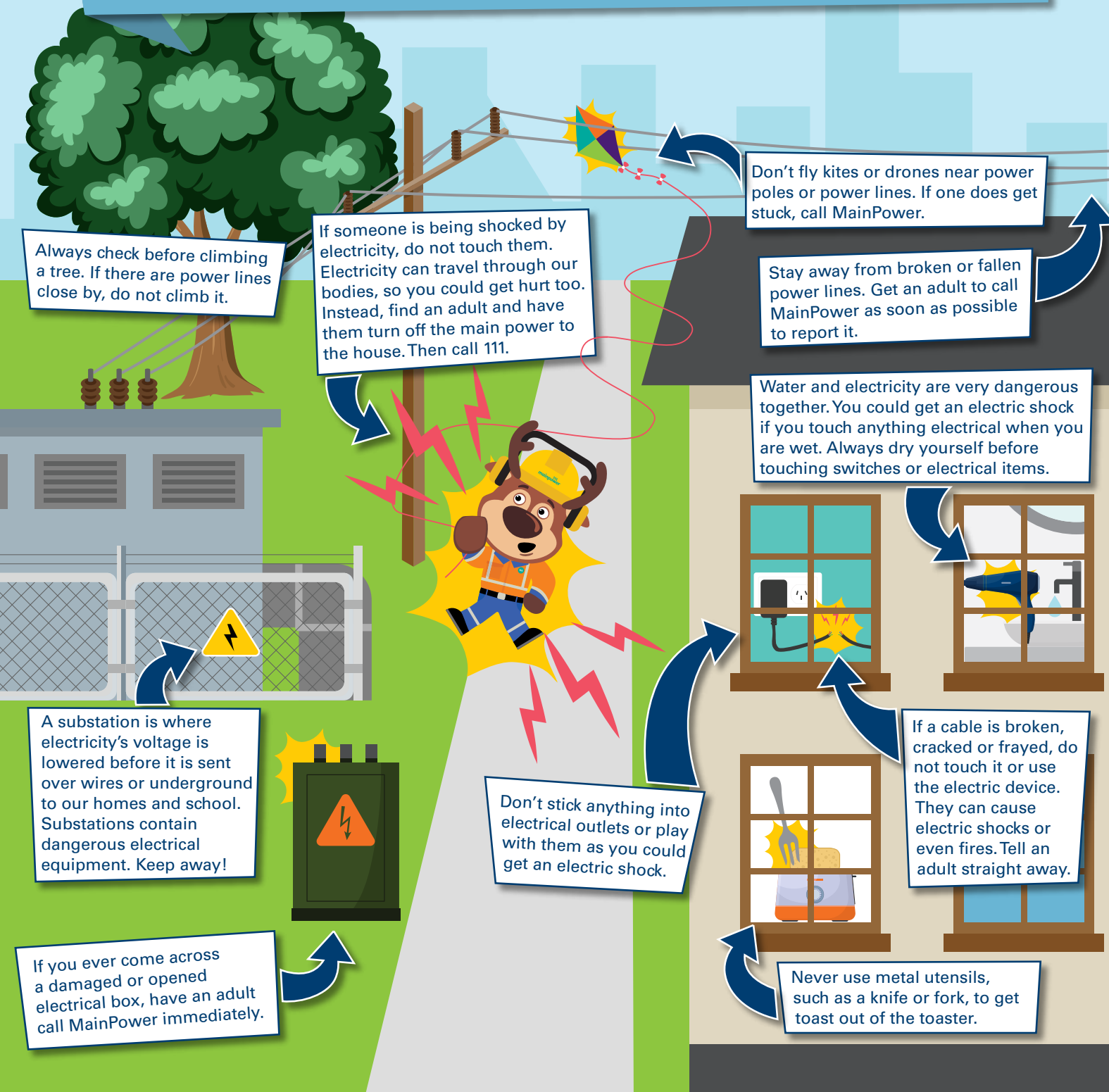
SERVICE BOXES

If electricity gets to your house through underground cables, you will have a service box near your house. Service boxes are small black or green boxes on the ground. When the electricity arrives at your house, it passes through these boxes. The switches inside control the flow of electricity to different parts of the house, like lights, outlets, and appliances.



Stay safe around electricity

Report anything unsafe to MainPower (0800 30 90 80)



Fill in the blanks

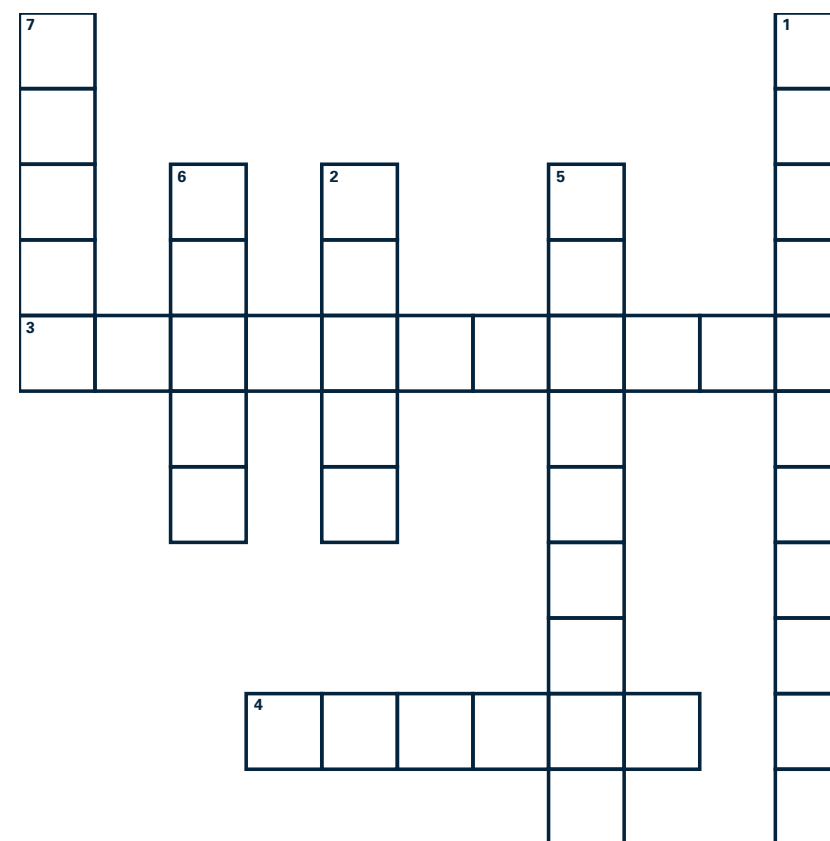
Choose the correct word from below to complete each sentence. Use the safety information you learnt on the page before to help you find the right answer.

transformer MainPower socket cable substations water lines

1. A _____ is a device that transforms electrical energy into a lower or higher voltage.
2. Never touch electrical things with wet hands. Electricity can travel through _____ and you could get an electric shock.
3. Places that contain the specialist equipment that allows the voltage of electricity to be transformed are known as _____.
4. A plug _____ is the power source in the wall where you insert a plug.
5. We must report any open transformers, broken or fallen power lines and poles, or any accidents that happen with power lines by calling _____.
6. Never use electrical devices if the _____ is broken or frayed.
7. Always look up and check for power _____ and poles before flying a kite or drone.

Word search

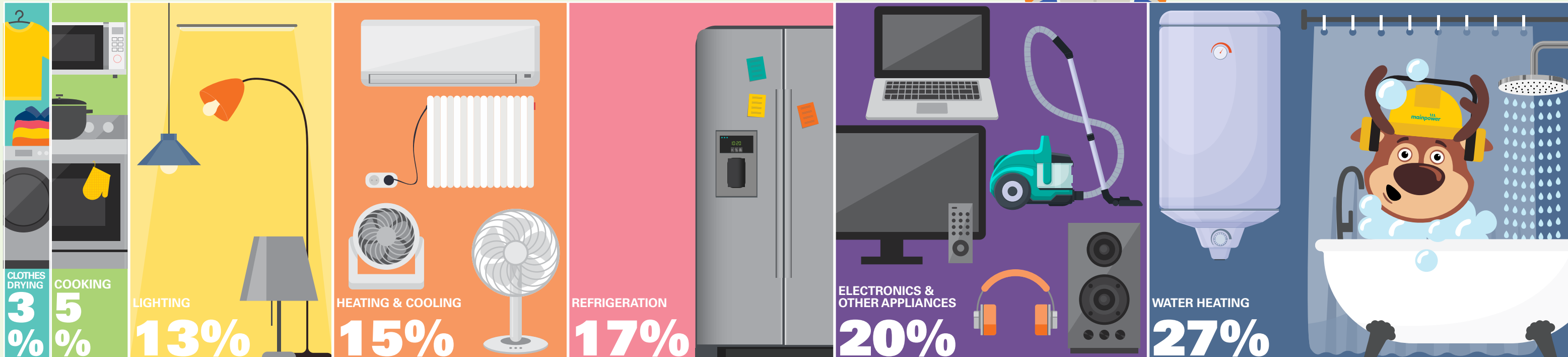
Fill in the Crossword search using the words you just found in the activity above!



How electricity is used in a typical home



Hmm...
Maybe I should
start turning the
aircon off when I'm
not home...



What uses power in your home?

In each box, draw one thing you find in your home that uses electricity.

--	--	--	--	--	--	--

CLOTHES DRYING

COOKING

LIGHTING

HEATING & COOLING

REFRIGERATION

ELECTRONICS & OTHER APPLIANCES

WATER HEATING

Source: Energy End User Database, EECA, 2018.

How can you help?

Handy tips for saving power in your home.

FRIDGE

Seals on your fridge stop the cold air escaping. If your fridge seals aren't working properly, it may be using more electricity to keep it cold.



CHALLENGE!

Check the seals on the fridge door by placing a piece of paper in the door. If the seals are working properly, they should hold the paper firmly in the door even when you give it a gentle tug. Make sure to check all around the fridge door.



HOME ELECTRONICS

Appliances like TVs, stereos, gaming consoles and computers could cost more than \$100 a year when they're plugged in and not even being used.



CHALLENGE!

Turn your appliances off at the wall when you're finished using it.



LIGHTING

LED light bulbs use up to 85% less electricity than conventional light bulbs, and can last 15 times longer. Replacing each conventional light bulb with an LED light bulb could save your family up to \$300 over its life.



CHALLENGE!

Have a go at the light bulb hunt on the next page and find out what light bulbs are in your house.



WATER HEATER

A family of four could save around \$18 every week just by taking shorter showers. This means some families could save \$900 a year!



CHALLENGE!

Try time your shower and aim to be in and out in under four minutes.



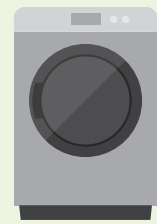
OTHER APPLIANCES

Dishwashers and washing machines cost exactly the same to run when they are half full, or completely full.



CHALLENGE!

Make sure dishwashers and washing machines are full before turning them on. (And wash on cold or Eco mode when you can).



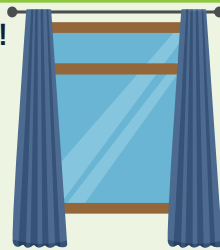
HEATING AND COOLING

Opening your curtains during the day lets the sun heat your house for free!



CHALLENGE!

In summer, close the curtains and blinds to keep your home cool. In winter, open curtains and blinds during the day to allow the sun to heat your home, then close them just before it gets dark to trap the heat inside.



Types of light bulbs

Did you know there's more than one kind of light bulb?

INCANDESCENT	HALOGEN	CFL	LED
LIFETIME 1 year	LIFETIME 1-2 years	LIFETIME 10 years	LIFETIME 25+ years
COST TO RUN High	COST TO RUN Medium	COST TO RUN Low	COST TO RUN Low

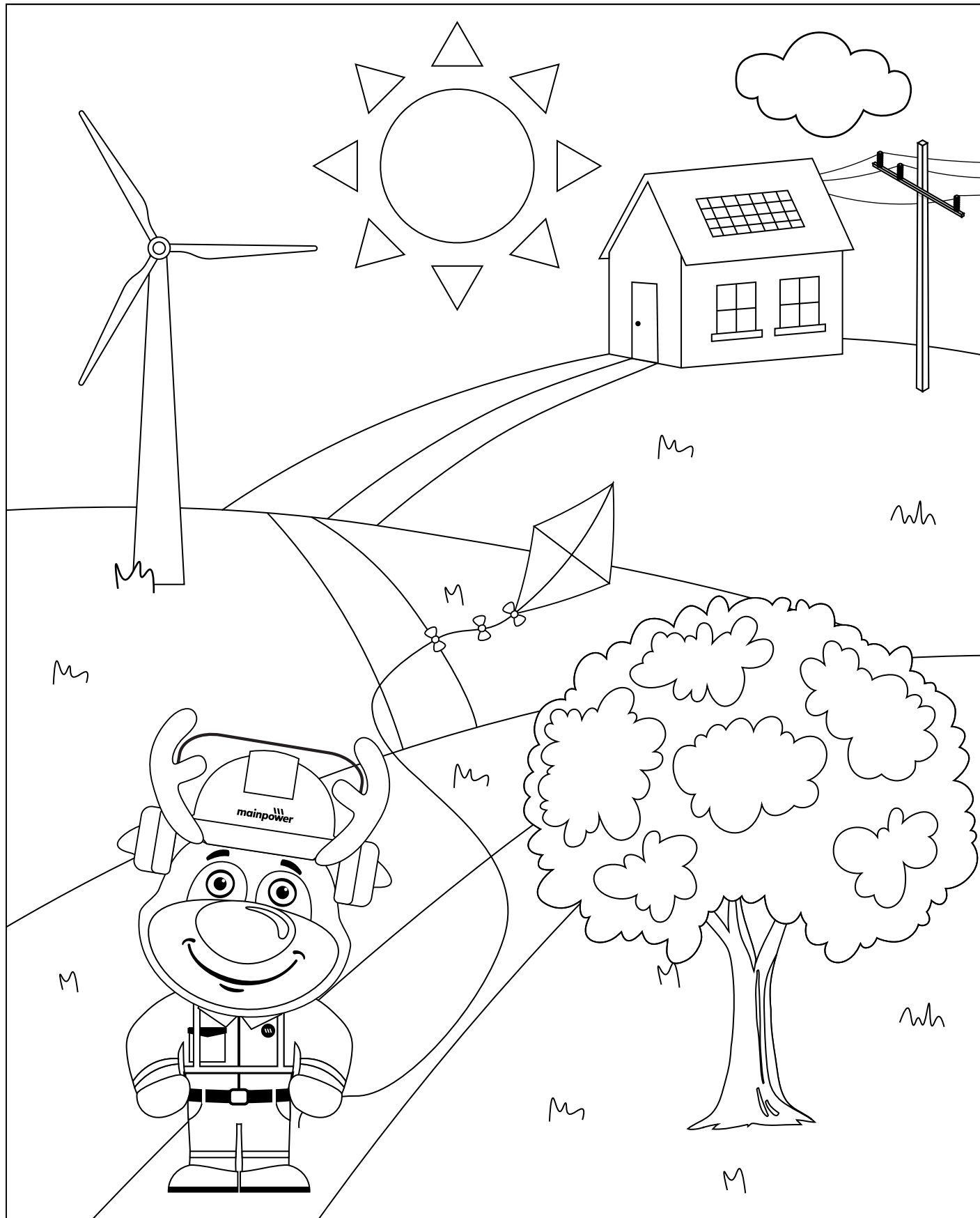
Light bulb hunt!

Go for a hunt around your home and count how many light bulbs you can find. Fill in the table below with what type of bulbs you find, and how many of each. Important: don't touch a light bulb if it is on as it may be hot.

	INCANDESCENT	HALOGEN	CFL	LED
Type of light bulb				
How many did you find?				



Colour in!



Saving energy challenge

Record how many times you saved energy in one week.
Put a tick in the box when you achieve the goal for the day.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Turned the tap off while brushing your teeth.							
Switch the lights off when no one is in the room.							
Wear clothes more than once (as long as they're clean).							
Unplug chargers when they're not being used.							
Had a shower in less than four minutes.							
Read a book or play a game instead of watching the TV.							
Turn off appliances at the wall.							





ENERGY EXPLORERS **NO POWER PLAN**

As an Energy Explorer you can be ready for a power cut by having a "No Power Plan" at home.

WHAT CAN YOU DO IN A POWERCUT?

- ✓ Keep a torch and spare batteries handy.
- ✓ Grab a blanket and jumper if the heating goes off in a power cut.
- ✓ Keep the fridge closed as much as you can so that food does not spoil.
- ✓ Get the board games out and have some fun whilst you wait for the power to be restored.
- ✓ Have some reading books handy too!
- ✓ With an adult, check on your neighbors to make sure they are OK, especially if they are old.

A FEW TOP TIPS FOR YOUR GROWN UPS.

- ✓ Keep all phones charged. You could use a car charger or a mobile power pack so you can stay connected.
- ✓ Have a non-electrical source of heating and cooking (like a BBQ).
- ✓ Candles are also a great option to keep handy if the power goes out at night (don't forget - always ask an adult to help you light a candle).
- ✓ Keep a first aid kit in easy reach.
- ✓ Store a box of non-perishable food that doesn't need to be cooked, in a sealed plastic box.

**mainpower**

24 Hour Faults Line

0800 30 90 80

