

2025

Home Energy Kit

*Instruction Manual &
Audit Tests*



Mildura Rural City Council

**You can download a copy of this Home Energy Kit Manual
at:**

[Electrify your home](#)

On the Mildura Rural City Council website

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Mildura Rural City Council

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Introduction

The Home Energy Kit allows you to:

- Understand the areas in your home that are using power and water
- Measure your usage
- Identify actions you can take to improve your home's efficiency

Using this kit to take tests will provide opportunities to reduce:

- Your environmental footprint
- Your energy and water bills

How can you use this kit?

Step 1: Follow the instructions for each audit test, using the equipment as instructed

Step 2: Record your results and use the action plan to identify where improvements can be made

Safety information



Care should be taken when using hot water or when near water pipes/hot water service



Installation and repair of electric and gas appliances should be completed by a licensed professional



Energy saving measures should never compromise the health and safety of household members



The information provided in this manual is a guide only. If in doubt, seek professional advice.



The thermal imaging camera contains a laser. **DO NOT** point the laser toward anyone's eye or allow the beam to strike the eye from a reflective surface. **DO NOT** use the laser near explosive gases or in potentially explosive areas.

Kit contents



Water flow measuring cup

Use the water flow measuring cup to determine the flow rate in litres per minute (l/min) for shower heads and taps in your house. High water efficiency is 6L/min or less for showers and 4L/min or less for taps. Measuring the flow rate can help determine if a more efficient showerhead or tapware is needed.



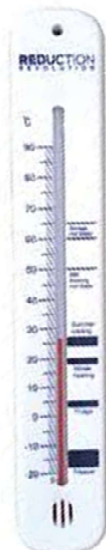
Thermal Imaging Camera

Use the Thermal Imaging Camera to locate draughty areas of your home, including around windows, window frames and door frames. You can also test areas of your home that may require improved insulation, including floors, walls, wall areas above windows and ceilings.



Power-Mate Lite

Use the Power-Mate Lite energy monitor to measure how much electricity each appliance in your home uses, and how much they cost to run.



Thermometer

Use the thermometer to measure ambient air temperature. Lines indicate the optimum temperature for energy efficiency and savings in the fridge (3-5°C) and freezer (-18 to -15°C) as well as room temperature in summer (24-26°C) and winter (16-18 °C).

Quick energy and water saving tips

Follow the simple steps below to reduce energy and water use in your home.



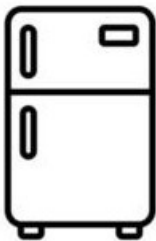
Heating and cooling

Using a reverse cycle air conditioner usually costs one-third of the cost of gas ducted heating. Only turn it on in occupied rooms and keep the temperature between 18°C and 20°C in winter and 24°C and 26°C in summer. Adjusting the thermostat by 1°C can save up to 10% on your heating and cooling bills.



Hot water

The most energy-efficient way to heat water at home is with a heat pump hot water system, which uses 60–75% less energy than traditional electric systems. When combined with solar panels, they can further reduce water heating costs. To prevent bacterial growth, set the water storage temperature to 60°C, while tap water is usually around 50°C. Use a thermometer to check the temperature and adjust your system accordingly, and whenever possible, opt for cold water.



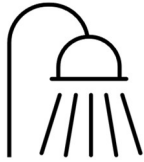
Fridges and freezers

Check the temperature of your fridge and freezer. For fridges, aim for 3°C (no higher than 5°C) and for freezers, between -15°C and -18°C.



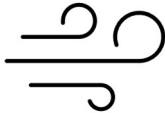
Switch off all appliances

Unused appliances can still consume power, so turn them off at the wall to reduce usage. Older appliances may also raise your electricity bills, so start looking into more efficient options for when it's time to upgrade.



Showerheads and taps

WELS star-rated shower heads and taps can significantly reduce water usage. A shower timer can help keep showers to 3–5 minutes.



Seal draughts

Draughts can cause up to 25% of heat loss in winter, impacting your home's energy efficiency. Sealing gaps around windows and doors and using draught stoppers can improve thermal comfort and lower heating and cooling costs.



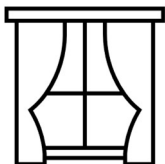
Lighting

Open curtains and blinds during the day to use natural light, and switch to energy-efficient LED bulbs. In peak summer heat, close curtains and blinds to keep your space cool.



Install insulation

Insulation is essential for a comfortable home and improving energy efficiency. Adding insulation to ceilings, walls or floors can save up to 20% on heating and cooling costs. Additionally, insulating hot water pipes, known as lagging, can enhance hot water efficiency.



Glazing upgrades

Windows allow natural light but can lead to heat loss in winter and heat gain in summer. To improve energy efficiency, consider upgrading to double-glazed windows, using Low-E film, and installing close-fitting curtains and pelmets.



Improve shading

Shading the windows on your home's northern and western sides during summer is a simple and effective way to reduce heat gain. Effective measures include installing awnings, using shade cloth, building a covered pergola, or planting deciduous trees.

Energy Audit

According to Snapshot Climate (snapshotclimate.com.au), gas and electricity usage by Mildura Rural City Council municipality accounts for more than half of the area's carbon emissions.

These emissions mostly come from

- Room heating and cooling
- Hot water systems
- Other appliances



Hot water

There are two types of water heaters:

1. Storage systems – water is stored in an insulated tank as required. Australian standards require storage tank systems to be set to no less than 60°C.
2. Continuous flow/Instantaneous systems – water is heated as required. Temperatures can be set closer to end use requirements, usually 50°C.

A heat pump hot water system is the most energy-efficient way to heat water in your home. It uses 60–75% less energy than older-style electric resistance hot water systems.

Activity - Hot Water Temperature Test

What you will need

- Thermometer
- Stopwatch/timer
- Cup
- Pen and paper

Process

1. Turn on the hot water tap nearest to the hot water system and let it reach full temperature
2. Carefully fill a cup with hot water
3. Sit the thermometer in the cup and set the timer for one minute
4. After one minute, read the thermometer and record the temperature

Action

- If the temperature is over or under 60°C and you have a storage hot water service, you can adjust the temperature on the external unit.
- For instantaneous systems, it is recommended to adjust the temperature to 50°C.

Draught detection

Draught-proofing helps retain warm winter air and block hot summer air, enhancing your home's comfort. Air leakage accounts for up to 25% of winter heat loss, and nine out of ten homes in Victoria experience unwanted draughts.

Activity – Heating and cooling leak test

What you will need:

- Thermal imaging camera (detailed instructions on how to use the camera can be found on page 19)
- Pen and paper

Process

1. Select an area in your room to take a reference point reading, e.g. an internal painted wall.
2. With this colour/temperature for comparison, use the camera to look for temperature variations, paying particular attention to areas where there may be gaps.
 - Around doorways and windows
 - Where pipes connect to external walls
 - Vents or air outlets
 - Fireplaces or flues
 - Around stairways
 - Between floorboards
 - Around exposed beams
 - Around built-in heating or cooling units
 - Along architraves and skirting boards
3. Note down your main leakage locations

Safety tip

The thermal imaging camera contains a laser. **DO NOT** point the laser toward anyone's eye or allow the beam to strike the eye from a reflective surface. **DO NOT** use the laser near explosive gases or in potentially explosive areas

Action

You can act once you identify the main sources of your heating and cooling leaks.

- Seal gaps and cracks around windows, skirting boards and architraves using silicone or expanding foam based on the opening size
- Install sealant tape and draught excluders around doorways. Check your local hardware stores for supplies
- When not in use, you can block chimney draughts with dampers, balloons, and screens
- Install a backdraft damper or cover for exhaust fans or upgrade to a self-closing exhaust fan



Please delete all photos from the thermal imaging camera before it is returned to the library.

Safety tip: Houses with gas appliances

Flueless gas appliances do not require a flue pipe or chimney, but they need fixed ventilation to operate safely and expel combustion byproducts. Open-flued gas heaters draw air from their surroundings and need fresh air for safe use. If you seal drafts in your home, have a licensed gas fitter check these heaters before use. Gas appliances should also be inspected regularly by a licensed gas fitter.

Activity - Testing Insulation

Depending on the age of your home, you may have extensive, partial, or no insulation at all. If you do have insulation, there could be gaps caused by incorrect installation or by tradespeople moving it during their work. These gaps can significantly affect the overall effectiveness of your insulation. For example, a small 5% gap in your ceiling's insulation can reduce its effectiveness by as much as 50%.

What you will need:

- Thermal imaging camera
- Smartphone camera

Process

1. Ideally, conduct the test when the outside temperature is about 10°C higher (or lower) than the insider temperature (i.e. early morning or a hot afternoon when the air conditioner is running).
2. Select an internal wall in your home to make a reference reading. Use the colour/temperature variation as your reference.
3. Use the thermal imaging camera to look for temperature variations (compared to your reference).
4. Pay attention to
 - a. Corners of ceiling
 - b. Areas around downlights, cooling or heating vents in the ceiling
 - c. Walls that are external facing
5. Gaps can be identified by a colour discrepancy where the insulation is missing. Make a note or take a photo of your insulation gap locations.

Action

1. Engage a qualified contractor to fill insulation gaps.



Activity – Refrigeration temperature test

What you will need:

- Thermometer
- Stopwatch/timer
- Pen and paper
- Thermal imaging camera.

Process

1. Place the thermometer in the chosen location.
 - fridge — shut the thermometer in the fridge
 - freezer — shut the thermometer in the freezer
2. Set the stopwatch for five minutes, leaving the thermometer in its chosen location.
3. After five minutes, read the temperature shown on the thermometer.
4. Write down the temperature reading. Compare it with the recommended temperatures shown on the thermometer and adjust the fridge or freezer temperature control knobs if needed.
5. Repeat the test for each location.

Action

Set refrigerators between 3°C and 5°C to avoid high electricity bills and frost build-up, which can harm food quality. The ideal temperature for freezers is -15°C to -18°C. Regularly remove frost and check seals for damage.



Energy-saving tip: To reduce energy use, position refrigerators and freezers in cool, shaded areas away from heat sources like ovens.

If you have several refrigerators/freezers, use them only when necessary, such as for large events.



Activity – Measuring electricity usage of appliances

Appliances and household equipment, such as refrigerators and ovens, collectively account for approximately 33% of a household's energy usage.

What you will need:

- Appliances
- Power-Mate Lite (detailed instructions on the Power-Mate tool can be found on page 20 of this manual)
- Pen and paper

Process

1. Check your electricity bill and take note of the Rate \$/kWh (or c/kWh).
2. Plug the Power-Mate Lite into a wall socket, then plug in the selected appliance.
3. Clear the old data by holding the RUN button until you reach the 'Confirm clr data' screen. Then press RUN again for 'Yes' to clear past data. You will need to do this for each appliance tested.
4. Press the RUN button again to start the reading.
5. Use the MENU button to scroll across to see the costs (real, hour, per quarter and yearly), greenhouse gas emissions, energy usage and meter readings for your appliance.
6. The 'Energy' measurement in watts is the most relevant, showing you the rate at which electricity is used at a given moment. The higher the watts, the more electricity the appliance is using at that time.
7. The 'Cost' measurement is the easiest to understand. Your computer might only cost \$50 per year to run, but your small electric heater could be significantly more expensive.



Energy Saving Tip: Appliances in standby mode can use 3-5% of a household's energy. To save energy, turn off appliances at the wall when not in use, except for critical medical equipment. Consider using timers as well.

Action

- Appliances in stand-by mode, such as computers and sound systems, still use electricity. Commit to switching them off when not in use.
- Compare your appliances' current usage with those that might be newer and more efficient. Do some research and plan for when you will upgrade your appliances next.

Safety tip:

This power meter is rated to 10A appliances. It is only suitable for indoor use and is not suited for equipment such as welders and heavy industrial equipment which are typically 15A.



Water Audit

Water is our most precious resource, essential to all life.

There are numerous reasons to save water, including

- Reducing the effects of drought and water shortages
- Saving energy and money
- Helping to keep water in our environment (rivers, wetlands, and water storage basins) and maintain wildlife habitat



Activity – Checking Water Flow

Water efficient appliances and fixtures, combined with sensible water use, will help conserve water and save money. Taps and showers are big water users. Ideally, your water flow rate should be around 6L per minute. Some taps/shower nozzles may use as much as 22L per minute.

What you will need

- Water flow measure cup
- Pen and paper

Process

1. Turn on the tap you'd like to measure
2. Place the water flow measuring cup under the water, with the handles pushed together until the water is overflowing
3. With the water still running – slowly pull the handles apart until the water stops overflowing and stabilises at a consistent level
4. Read the measurement on the side of the cup
5. Record the flow rate for that tap

Action

1. Fit flow restrictors to taps and showers if required
2. Fix dripping taps straight away
3. Check shower hoses are not loose
4. Check for drips in shower hoses

Next steps

1. Use the measurements from the completed audit tests to identify what steps you need to take
2. Develop an action plan
3. Involve your family and friends
4. Make the changes you can

Develop an Action Plan

| Action Item | Short-term fixes (less than \$200) | Longer-term fixes (more than \$200) |
|---|---------------------------------------|--|
| Change fridge to recommended temperature range | ✓ | |
| Re-position fridge to a better spot | ✓ | |
| Change freezer to recommended temperature range. | ✓ | |
| Re-position the freezer to a better spot | ✓ | |
| Keep freezer space full (using filled water bottles, if required) | ✓ | |
| Clean fridge/freezer door seals | ✓ | |
| Repair or replace fridge/freezer door seals | ✓ | ✓ |
| Turn off energy-consuming appliances overnight/when not in use | ✓ | |
| Upgrade old and inefficient appliances with energy-efficient versions | ✓ | ✓ |
| Install solar panels and consider a battery | | ✓ |
| Get a wireless in-home energy monitoring device. | ✓ | |
| Draught-proof around external doors and windows | ✓ | ✓ |
| Install insulation where missing | ✓ | ✓ |
| Put flow restrictors on taps | ✓ | |
| Change existing shower heads to four-star shower heads | ✓ | |
| Replace the washer on leaking taps | ✓ | |
| Add blinds or curtains to keep heat out in summer | | ✓ |
| Plant deciduous plants in front of any north or west-facing windows | ✓ | |
| Add shade sails to the external north wall | ✓ | ✓ |
| Change bulbs over to LED lights | ✓ | |
| Have a short shower instead of a bath | ✓ | |
| Turn down the temperature of the hot water system | ✓ | |
| Investigate a heat pump hot water service for your next system | | ✓ |

More Information

[Electrify your home | Sustainability Victoria](#)
[Department of Energy, Environment and Climate Action website](#)

Kit equipment guide

Thermal imaging camera

[User Manual Thermal Imaging Camera](#)

QR Code – Thermal Imaging Camera



Quick Guide

1. Press the power button to switch the camera on and check if the battery is charged.
2. Use the USB cable to charge the camera via your computer, phone or tablet charger if needed.
3. Run your heating or cooling as you typically would for the current season. For best results, there should be at least a 10°C temperature difference between the indoor and outdoor temperatures.
4. Aim the camera at surfaces within your home to see the object's surface temperature. The colour shown is relative to other surfaces within the frame, so keep people and pets out of the frame.
5. The screen also displays the approximate temperature of the target surface. Refer to the temperature given in degrees C to provide context for the colours shown.
6. Methodically scan across your roof and walls, covering all surfaces to determine any weaknesses.
7. Take a photo of any images you wish to keep for future reference.
8. Plug the camera into your computer using the USB cable and save the photos to your computer.
9. Please delete all images from the camera before returning the kit.
10. Charge the camera before returning, and hold the power button to turn it off.

Power-Mate Lite

The Power-Mate Lite provides insights into an appliance's running costs, energy use, and greenhouse gas emissions. It includes a timer function for taking readings over a set period and can measure appliances up to 2400 watts (2.4 kW). The values will vary with the appliance's power usage.

Useful Information

Power — the actual power used during measurement and measured in watts (W). 1000 watts is equal to 1 kilowatt (kW).

Energy — this is what the retailer charges for. Measured in kilowatt hours (kWh). 1000 watts equals one kilowatt. A device using one kilowatt for one hour has used one kilowatt hour of energy. Similarly, using five kilowatts for two hours uses 10 kilowatt hours (kWh).

Cost—Retailers charge per kilowatt hour of energy used. The Power-Mate Lite can calculate appliance running costs using your electricity rate. This function requires you to enter your charged electricity rate into the meter.

Greenhouse Gas Emissions — Emissions are produced during electricity production from fossil fuels. This meter can calculate the amount of greenhouse gas produced per hour, quarter, year, or other measured length of time. This function requires that the greenhouse gas coefficient be entered into the meter.

Safety Information:

- **The Power-Mate is an electrical device and should not be opened or tampered with. If you have any concerns about its operation or believe there may be a fault, please return it to the library and inform staff**
- **Please read the instructions carefully**
- **Do not use the Power-Mate in wet areas or outdoors**
- **The Power-Mate should only be used with mains power appliances up to a maximum of 10 amps (2400 watts). The majority of small home appliances will not exceed 10 amps. The appliance power or current rating will usually be written on the label or body of the appliance. Do not test multiple devices connected with a power board or double adaptor**
- **If the current exceeds 10 amp 'WARNING, OVERLOAD' will be displayed. Turn off or disconnect the appliance as soon as possible to avoid damaging the Power-Mate**

Setting up and using the Power-Mate Lite

When you first connect the Power Mate, it shows multiple lines of information, including power, volts and frequency. The MENU button allows you to scroll through measurement types. Click MENU to scroll.

Setting Electricity Rate (OPTIONAL)

To set your electricity rate, click the MENU button to scroll to COST and then click and hold MENU. SET COST will show on the screen. Clicking ZOOM allows you to change the number. Clicking RUN moves to the next digit, like setting a digital clock. Typical electricity rates are 20.0–29.0 c/kWh.

Setting Greenhouse Gas Emissions Value (OPTIONAL)

To set the Greenhouse Gas Emissions Value, click the MENU button to scroll to G/GAS. Set the value using the same method as for cost. Electricity in Victoria, which is primarily generated from brown coal, has a value of 0.77kgCO₂e/kWh (as of 2024).

Time Based Measurement

Measuring Energy, Cost, or Greenhouse Gas requires measuring for a period of time. For devices with constant power consumption, this can take a few moments or as long as it takes you to write down the reading. For devices with varied power use, a longer measurement will give a more accurate result. This is particularly important for appliances such as refrigerators and washing machines.

You can choose to manually control the time or set the timer.

For most measurements, manual control is the best option.

- Click MENU to scroll to RUNTIME or ENDTIME
- Click and hold MENU to set TIMER DURATION
- Click ZOOM to scroll through the options
- Choosing NOT SET allows manual control of the measurement. Alternatively, you can set the timer duration
- Click MENU to return to the measurement screens
- To start measuring, click RUN. An arrow will flash in the corner of the screen
- Click MENU to scroll to different types of measurement. Measurement screens will show hourly, quarterly and yearly values

- REAL is the value for the actual amount of time you have measured. To stop measuring, click RUN
- To reset the measurement, click and hold RUN. CONFIRM CLR DATA will appear
- Click RUN to select yes. It is important to do this step for each new measurement

Making your first measurement

- Plug an appliance into the piggyback plug of the Power-Mate and switch on the appliance » Click and hold RUN until prompted to 'clear all data.'
- Click RUN to select yes
- Now click RUN to start your measurement
- Click MENU to scroll through measurement types. Record your data on an energy audit worksheet

Don't forget to "clear all data" between tests.

Measuring Appliances

Knowing the cost of running appliances like washing machines or dishwashers is useful, as their power consumption varies throughout a cycle. To measure energy usage, start the Power-Mate before the appliance and stop it after the cycle finishes. The Power-Mate readout will show you the energy consumption and cost for that load.

Water Flow Measuring Cup

How to use the Water Flow Measuring Cup

It's very simple to use for measuring tap flow rates.

1. To fill the cup without spilling, turn the tap on full and hold the cup with the handles pressed together. Slowly pull the handles apart until the water level stabilises. If it starts to drop, press the handles back together slightly.
2. When the cup is full and level, turn off the tap and check the number on the side with the handle. This number shows the flow rate in litres per minute.
3. An efficient tap should have a flow rate of 6 litres per minute (L/m). Kitchen and laundry sinks need higher flow rates, while bathroom basins should be lower. Refer to the table below for guidance.

Recommended Flow Rates

| Type | Recommended flow rate (litres per minute) |
|---------------|---|
| Hand basin | 4 |
| Kitchen Sinks | 6 |
| Laundry Sinks | 6 |
| Outdoors | 6 |
| Shower Heads | 6 |