

# Home Energy and Water Efficiency Kit How-to Guide



# Introduction



Congratulations on borrowing this kit from your local library and thank you for your commitment to reducing your household's impact on the environment - and saving on energy costs.

This guide is designed to assist you in maximising the benefits of the kit. Happy exploring!

## Disclaimer

East Gippsland Shire Library does not provide any warranty on the precision, accuracy or completeness of any energy-use data that you obtain through using this kit. East Gippsland Shire Library has taken all reasonable steps to ensure the safety and suitability of the kit, however, you borrow and use the kit entirely at your own risk. East Gippsland Shire Library disclaims any responsibility for any loss, damage or injury to life or property suffered as a result of your use of the kit or any actions you take thereafter. Always seek professional advice and use qualified tradespeople to conduct any work.

# Safety information

Please take care to avoid injury  
or damage

Information in this booklet  
is to be used as guidance only

Seek professional help when installing products or dealing with electrical or gas appliances.

Using energy to heat and cool our homes is crucial, especially for the elderly and young children, as it helps manage health concerns. Don't risk your health by avoiding the use of heating and cooling systems.

Do not undertake draught-proofing if you have an unflued gas heater or an open-flued heater. In a tightly sealed home, gases from these appliances can present a carbon monoxide poisoning risk. With other gas appliances, special care needs to be taken including regular servicing and cooktop extraction to an external point (see p8 for more on getting off gas).

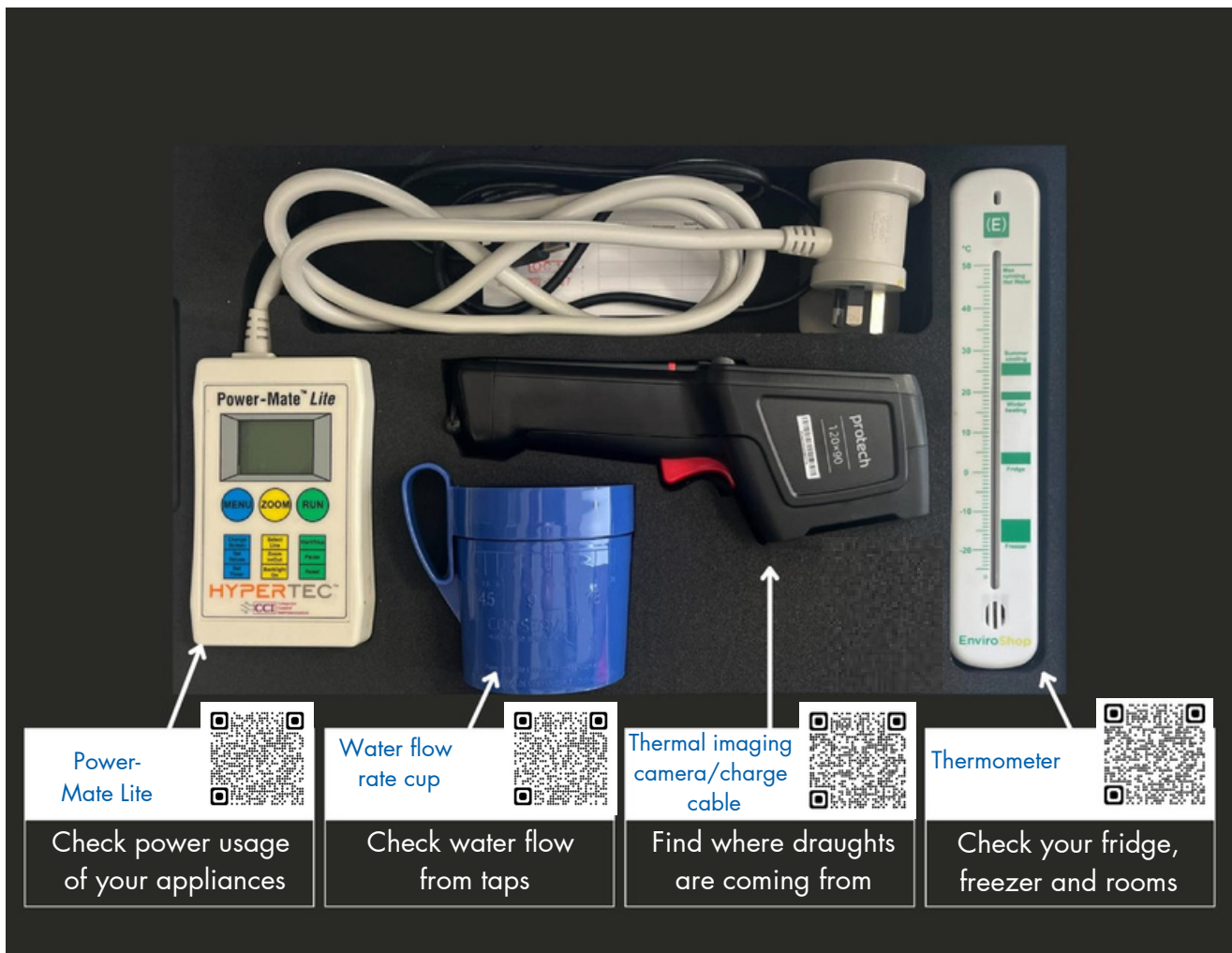
Take extreme care when handling hot water and water heater pipes as they can burn.

When measuring water flow, use cold water.

Take care near electrical and gas appliances.



# What's in the kit?



## Water-flow rate measuring cup

Use this cup to measure the flow rate of water from your taps.

1. With the handles together, hold the measuring cup under water flow until it overflows.
2. Slowly open handles until water is level with top rim.
3. Take reading from grid on side of cup. This reading is the number of litres of water flowing from the tap per minute.
4. If the flow rate is more than 9 litres per minute, install a flow restrictor and/or an aerator.

## Water Flow Measuring Cup

The water flow measuring cup is a simple device for measuring how much water your taps, shower etc. are using in litres per minute.

Fitting a flow restrictor to a tap or a low-flow shower head can save lots of water and especially energy if it's hot water. It can also save you from running out of hot water by using less water for the same length of shower.



### How to measure tap flow rate

#### STEP 1

Turn the tap on full, hold the cup under it with the handles pushed together until overflowing.

**IMPORTANT:** Aerators attached to the end of the spout must remain completely immersed in the water inside the cup during this test.



#### STEP 2

Slowly pull the handles apart. There will be a point where the water level stops going up and overflowing and stays fairly level. If it's dropping then push the handles back together a little.



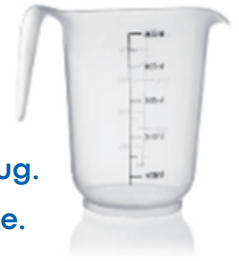
#### STEP 3

Once the cup is full to the top, and staying level, turn off the tap and look at the number on the side of the cup where the handle is pointing. This number will give you the litres per minute of flow.



## How to measure your showerhead water-flow rate

1. Get a jug or bucket (preferably with measurements).
2. Turn on the shower (cold or warm water so you don't burn yourself).
3. Use a stopwatch (there's one on your phone), place a jug under the showerhead and time the shower for 10 seconds. Turn off tap/remove jug.
4. Multiply the amount of water in your jug by six to get the flow per minute.
5. If the flow is 9 litres or more per minute, consider replacing it with a low-flow showerhead (some are as low as 5 litres per minute).



Tip: Using less hot water will result in a reduction in water-heating costs.

# Thermal imaging camera

## Use the thermal imaging camera to detect draughts and thermal leaks

In winter, use the camera to find hard-to-see draughts and unseen areas of missing insulation. In summer, use it to see where cool air is escaping or where warm air is entering.

### Instructions:

- Press the power button to switch the camera on.
- Check battery charge and use the USB cable to charge if required.
- Run your heating or cooling as you typically would for the current season. Ideally, there should be at least a 10C temperature difference between inside and outside.
- Aim the camera at surfaces within your home to see the object's surface temperature. Refer to the temperature given in degrees celsius to understand the colours.
- Methodically scan across your floor, ceiling and walls, scanning all surfaces to determine if there are any issues, such as where insulation may have slipped or moved.
- Take a photo of any images you wish to keep for future reference.
- Save photos on your computer - plug the camera USB cable into your computer.
- Please delete all images from the camera before returning the kit.
- Charge the camera before returning. Press and hold the power button to turn it off.



## Detecting leaks

This infrared photo shows a door on a cold day. The purple and black areas under the door indicate significant gaps, where cool air is entering the house. Draught-proofing around this door makes a big difference. Cooler surfaces appear black to dark purple, through to mid temperatures in red, and hot surfaces in yellow.

Note: The colour shown is relative to other surfaces in the frame, so keep people and pets out of the frame.

Potential gaps to look for: vents, chimneys, exhaust fans, doors, windows, floor and skirting boards.

# Power-Mate Lite energy meter

Use the meter to test the electricity use and operating cost of appliances

## Instructions:

1. Choose the electrical appliance you wish to test. The Power-Mate Lite can be used indoors in dry locations for appliances up to 10A / 2400W. Most plug-in appliances are under 10A, but if unsure, check the label or appliance nameplate, which should show an amp (A) rating.
2. Unplug the appliance from the power socket, plug the Power-Mate Lite into the socket and re-plug the appliance into the Power-Mate Lite socket (as you would with a double adaptor).
3. Turn on the appliance.
4. Clear any old meter data by pressing and holding 'run' and select 'clear all data'.
5. Press the 'run' button (quick press) to start measuring.
6. Pressing 'menu' scrolls through the display, showing: Energy (kWh); Cost (\$/kWh) (pre-set to Victorian single-tariff default 39c/kWh); greenhouse gas emissions (CO<sub>2</sub>-e) (pre-set to 0.85kg/kWh).
7. Each display shows four records: true value since the measurement started (cumulative), and an estimated hourly; quarterly; and annual amount.
8. Depending on the type of appliance, you may test for a short period or a longer time, usually 24 hours. The Power-Mate Lite has a timer function to help you test accurately over extended periods.

## Important safety information

Measure one appliance at a time, with a maximum draw of 10A (2400W).

Do not expose the meter to extreme heat.

Do not use if the meter reader or cord is damaged.

Use indoors in dry areas only.

### Appliance checklist

#### On/off appliances - test for one minute

- ☐ Desk lamp
- ☐ Pedestal fan

#### Standby appliances - test for one minute while running and again on standby

- ☐ TV
- ☐ Gaming console
- ☐ Desktop computer

#### Variable appliances - test for duration of use/cycle

- ☐ Air-conditioner/heater
- ☐ Washing machine
- ☐ Electric pan/wok
- ☐ Espresso machine

#### 24hr appliances - test for 24 hours

- ☐ Fridge
- ☐ Freezer
- ☐ Water/pool pump

## Power-Mate Lite Energy Meter

The Power-Mate Lite is an energy meter that measures how much electrical power is being used by a device that is plugged into it. It is very handy for educating yourself about how much energy different appliances are using and possibly identifying the culprit behind high energy bills.

It can't measure the energy use of hard-wired devices like lighting, electric hot water systems etc., but it can measure appliances such as your wall heater, stereo system or clothes dryer. By educating yourself about energy use of these kinds of appliances you are better placed to be able to understand how much these devices are using by estimation



### Did you know?

Electrical energy is usually measured in kWh, or kilo-Watt-hours and this is usually what appears on your electricity bill. One kWh is simply 1,000 watts being used for one hour. The maths is not hard to work out, you just need to convert power to kW and time to hours.

10 Watts = 0.01kW

100 Watts = 0.1kW

1000 Watts = 1kW

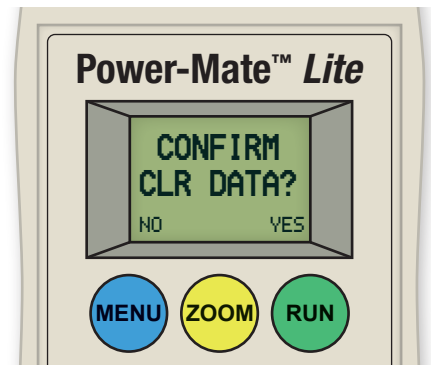
Multiply the kW by how many hours it is used for (e.g. a computer used 8 hours a day) E.g.  $0.1\text{kW} \times 8 \text{ hours} = 0.8\text{kWh}$

## How to use it to measure an appliance

### STEP 1

With the power point switched off, plug in the Power-Mate to a power point and then plug your appliance that you want to measure into the Power-Mate socket.

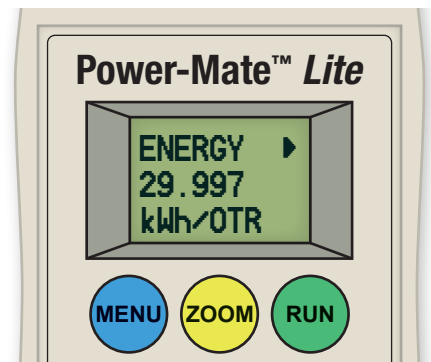
Turn on the power switch on the power point. Hold (long press) the **RUN** button and wait until the screen displays "**CONFIRM CLR DATA?**", then click (short press) the **RUN** button to select "**YES**".



### STEP 2

Click the **RUN** button to start the measuring the energy usage of the appliance.

A flashing ► will appear in the top right corner of the screen to show that the Power-Mate is now measuring the appliance's energy usage.

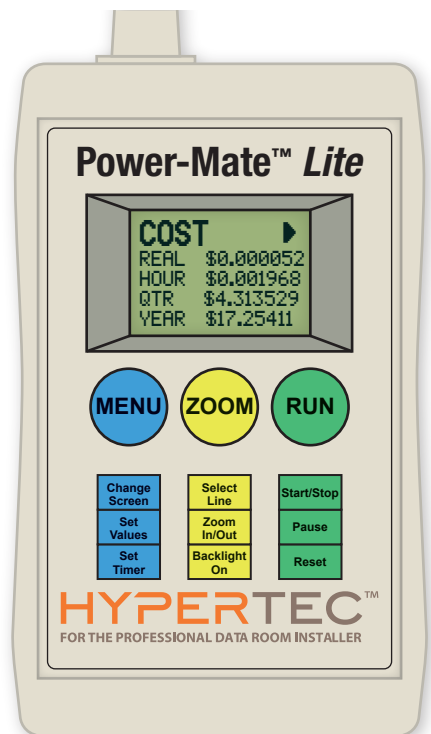


### STEP 3

You can see how much your appliance costs to run by clicking the **MENU** button until you are in the **COST** screen. This shows the real, hourly, quarterly, and yearly cost (\$) to run the appliance.

The Real cost is the cost to run the appliance since the measurement started. This is useful to find out the cost per use. Hourly, quarterly, and yearly costs are based on constant usage of the appliance over that time period.

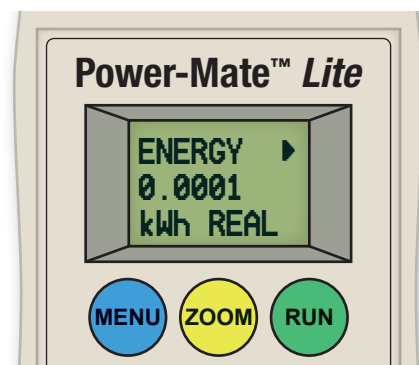
Click the **ZOOM** button to toggle between real, hourly, quarterly, and yearly cost lines. To magnify the figures, hold the **ZOOM** button. Click the **ZOOM** button to toggle between each magnified line, and hold the **ZOOM** button to revert back to the normal view.



#### STEP 4

To see the greenhouse gas emissions and energy used by the appliance, click the **MENU** button. The real, hourly, quarterly, and yearly greenhouse gas emissions (kg CO<sub>2</sub>-e) and energy consumed (kWh) by the appliance are shown respectively.

The **ZOOM** button can be used to toggle between and magnify lines.



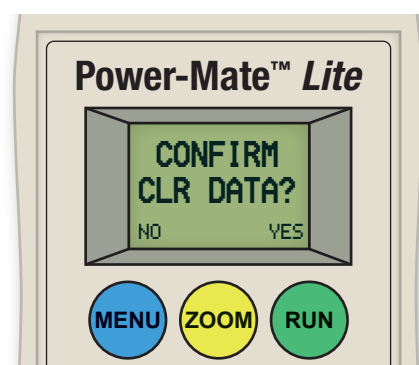
#### STEP 5

Write down your measurements to keep track of all your appliances. You can measure an appliance while it's running and then while it is in standby mode to see how much you'll save if you switch it off at the wall after you have finished using it. Just remember to clear the data between each reading (see STEP 1 or STEP 6).

#### STEP 6

Click the **RUN** button to stop the measurement. A flashing **II** will appear in the top right corner of the screen to show that the Power-Mate has been paused/stopped.

Hold the **RUN** button and then click the **RUN** button to select "**YES**" to "**CONFIRM CLR DATA?**". You are now ready to measure your next appliance.



#### STEP 6

Switch off appliances that are using energy when they're not being used and save money on your next electricity bill!

You can now use the information you have learned about your appliances to use them less and switch them off at the wall. If shopping for new appliances, you can also use the Power-Mate to compare the energy use (kWh) of your current appliance and the energy rating label of new products to make sure you buy something more efficient to run.

## How to understand the Power-Mate reading

Watts (W) are a measure of power, or how quickly electricity is being used. Power is probably the most important aspect to understand in energy efficiency.

The total amount of energy actually used is the power multiplied by the length of time it is used.

A small item run 24 hours a day (e.g. internet router) can consume quite a lot of energy. While a very high power item only run for a few minutes (e.g. .kettle) won't use much energy.

For example, an internet router that consumes 10 Watts (0.01kW) and is switched on 24 hours a day will use  $0.01 \times 24 = 0.24\text{kWh}$  per day.

A kettle that uses 2400W and is on for 5 minutes ( $5 \div 60$  minutes in an hour = 0.08333) will use  $2.4 \times 0.08 = 0.2\text{kWh}$  (nearly the same as the modem being on all day).

Multiply this by lots of large and small appliances around your house and you have your power bill.

## How to estimate your appliances' energy use

For simple devices that have fairly consistent energy use you can simply measure the watts and estimate how many hours a day it is used to work out total energy consumption.

Some appliances such as a fridge or plug-in heater will switch on and off (to ensure they stay at the correct temperature). To get an accurate idea of their energy use you need to monitor them over several hours or days. The Power-Mate is capable of logging energy use over time. If you want to do this it's best to refer to the manual (included in the kit). If it's not in the kit it is easily found online, just search for Power-Mate Lite manual.

Make sure you measure as many appliances as you can. Sometimes the biggest energy user is a fridge or freezer kept in the garage. It's often an older model that's been moved out there when you've upgraded in the kitchen and can be subject to extremes of heat in summer.

Many appliances these days come with an energy star rating which should have estimates of typical energy use. If the label has been

removed from yours you may be able to find it on the official database here: <https://www.energyrating.gov.au/>

The more appliances you measure, the more of a feel you have for what each one uses and where your household energy is going. (e.g. don't stress about the kids leaving lights on if it's a 5W LED, do stress about it if it's 6 × 50W halogen downlights!)

## Energy Saving Tip

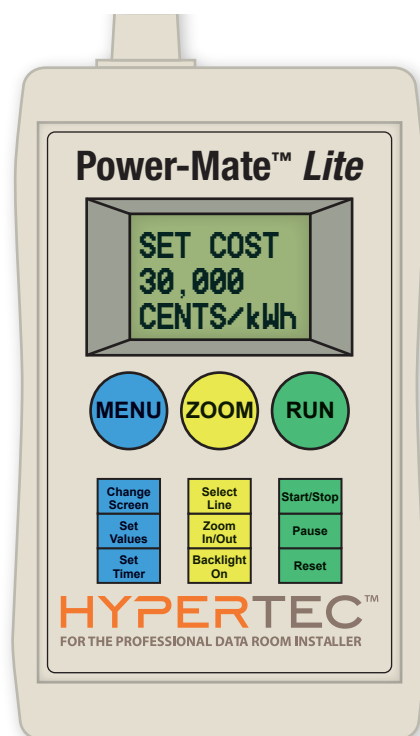
When you need to purchase a new appliance, remember: the more stars it has, the less energy it will use, and the more money it will save you over time. Also, the more water efficient it is (e.g. for a washing machine) the less energy it will need to heat the water when you are doing a warm wash. Remember however, that the best way to save energy when washing clothes is to wash in cold water.

## Additional Instructions

### Enter your own electricity cost

The electricity cost programmed into the Power-Mate may not be the same as what you are currently paying. If you wish to change the electricity cost and program it to use your current rate, follow these steps:

1. Check your electricity bill for your current electricity cost (c/kWh).
2. Click the **MENU** button (a few times if required) until you are in the **COST** screen.
3. Hold the **MENU** button in the **COST** screen until the **SET COST** screen appears.
4. Click the **ZOOM** button to change the flashing number to alter the electricity cost. Click the **RUN** button to select the next digit.
5. Once you are finished updating the costs, click the **MENU** button to exit and return to the **MENU** screens.



## Set an automated measurement time

For most appliances, a few seconds is enough time to get an accurate power use reading. However, appliances that operate on temperature cycles such as fridges and freezers will need to be plugged into the Power-Mate for at least 24 hours for an accurate reading: Appliances that use start-up power such as laptops, PCs, coffee machines, printers, and phones should be measured after their start-up routine.

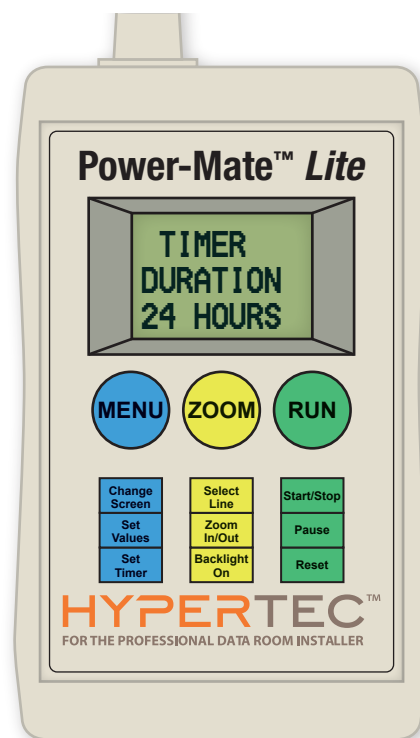
To set an automated measurement time follow these steps:

1. Click the **MENU** button (a few times if required) until you are in the **RUNTIME/ENDTIME** screen.
2. Hold the **MENU** button in the **RUNTIME/ENDTIME** screen until the **TIMER DURATION** screen appears.
3. Click the **ZOOM** button to select your desired run time.
4. Click the **RUN** button to load the selected run time.
5. Click the **MENU** button to exit and return to the **MENU** screens.
6. You can skip this step or select “**NOT SET**”. In this case, you will need to manually stop the Power-Mate’s measurement once you are finished by clicking the **RUN** button.

## WARNINGS

The Power-Mate is only to be used by an adult or under adult supervision — take care to avoid injury or damage when using the Power-Mate by following these instructions:

- Turn power off at the wall before connecting or disconnecting the Power-Mate.
- Do not use the Power-Mate if the cord of either the Power-Mate or the appliance you are testing is damaged.
- Do not allow the Power-Mate to get wet or expose it to excessive heat.
- The Power-Mate has a maximum capacity of 10 amps. Make sure the appliance you are measuring is under 10 amps — the current or power rating is usually written on the label. If a “**WARNING, OVERLOAD**” message appears, turn the power off at the wall and disconnect the Power-Mate immediately.



# Thermometer

## Use the thermometer to check the temperature inside your fridge and freezer

1. Place the thermometer inside the fridge (under the top shelf is the best spot) or freezer.
2. After 15 minutes, check the temperature displayed.
3. If needed, adjust the appliance thermostat to achieve the optimal temperature of fridge (3 to 5°C); freezer (-15 to -18°C)
4. After 15 minutes, check again to make sure it's within range.

## Use the thermometer to check room temperatures

1. Place the thermometer in a central location within the room, away from direct heating or cooling outlets.
2. After 15 minutes, check the temperature displayed.
3. If needed, adjust the appliance thermostat to achieve the optimal temperature: summer (24 to 27°C); winter (18 to 20°C)
4. After 15 minutes, check again.

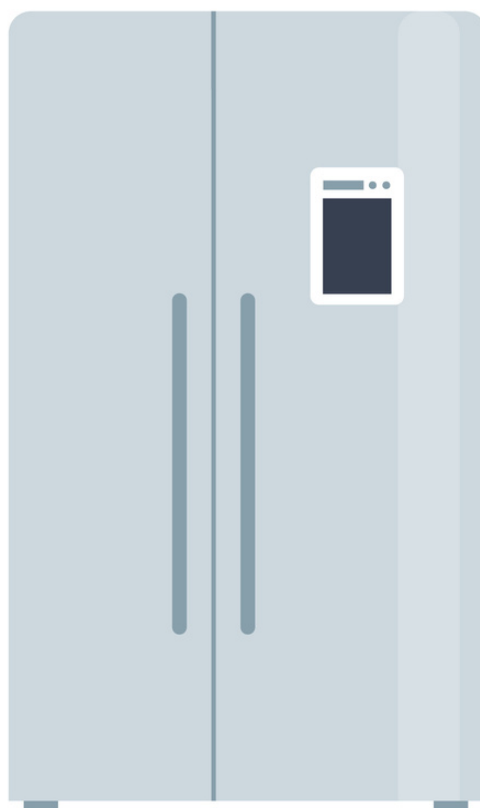
### Did you know?

For temperature- controlled heating and cooling, every extra degree of heating or cooling increases energy use by 10%.

## Fridge and freezer energy-saving actions

Turn off additional fridges and freezers when not in use. Retire old fridges and freezers

By ensuring your home is well sealed, and fridge seals are adequate, you can save both power and money on heating, cooling and refrigeration.



# Stand-by power

## How much electricity does standby power use?

Tip: Appliances on standby often have a small red light, clock or feel warm to touch.

## Get off gas

If you have old gas appliances that are due for replacement, consider going all-electric. Many electric appliances are now cheaper and less polluting than gas.

Heat-pump hot water and heat-pump split systems can be paired with solar PV – and when used during day they act as a 'battery' and mop up excess solar produced during the day.

For more information on getting off gas, visit [www.sustainability.vic.gov.au/electrify-your-home](http://www.sustainability.vic.gov.au/electrify-your-home)



# Your energy-saving action plan

## Use this checklist to develop your action plan

1. Temperature of fridge is 3 to 5°C
2. Temperature of freezer is -15 to -18°C
3. Adequate ventilation around fridge?
4. Do seals around fridge and freezer need replacing?
5. Heat house 18-20°C in winter, cool house 24-27°C in summer
6. Plan to draught-proof areas with air gaps
7. Install, add or replace insulation in ceiling, walls and doors
8. Turn off standby appliances if they are using significant amounts of energy
9. Replace old or energy-hungry appliances if possible
10. Put in tap restrictors if water flow is above 9 litres per minute on taps
11. If showerhead uses more than 9 litres per minute, replace it with a low-flow showerhead
12. Pelmet, heavy curtains and external window shading saves energy. Do you have them?

### More information from Sustainability Victoria:



**Draught  
proofing  
tips**

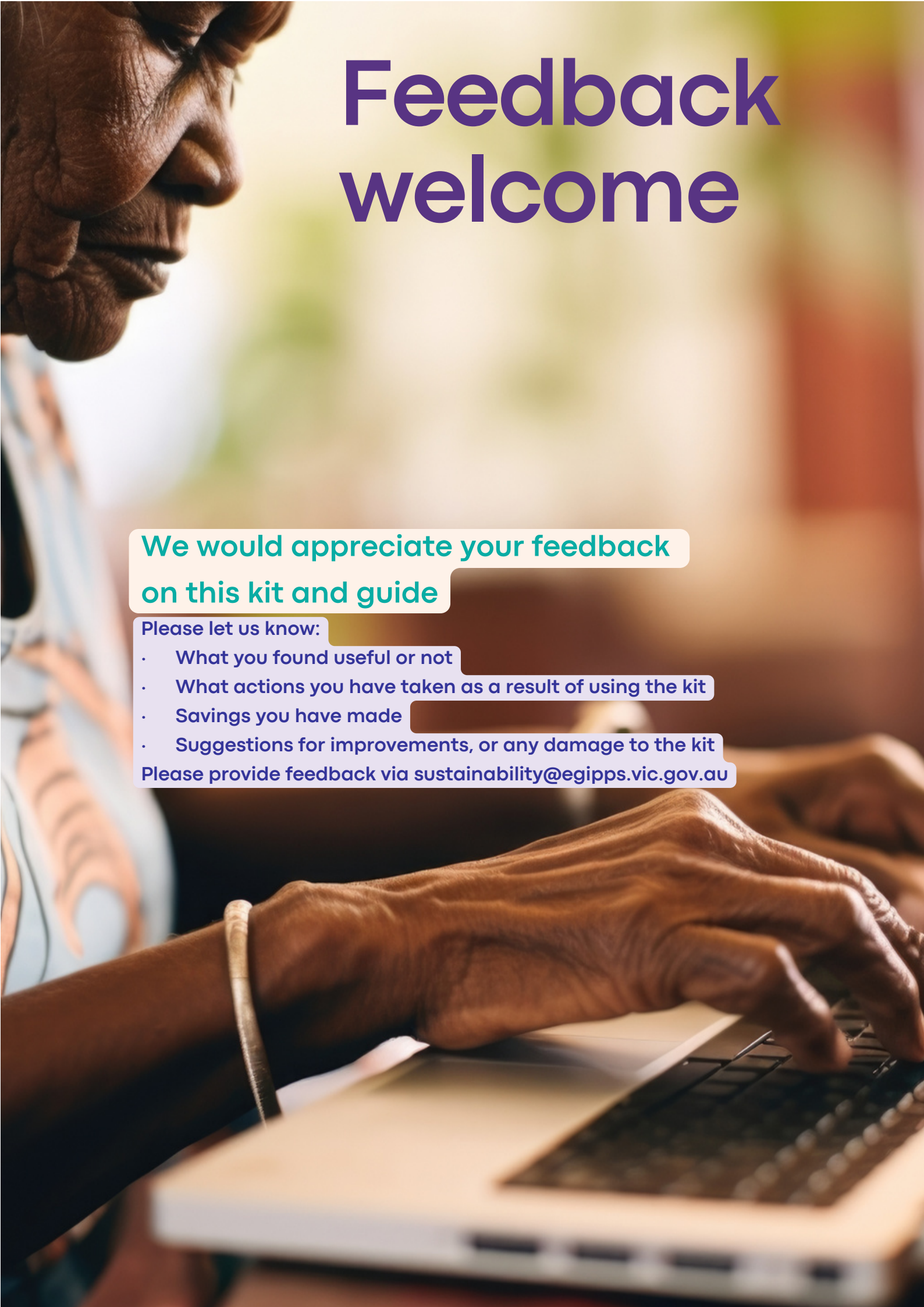


**Insulation  
tips**



**Solar PV  
and  
rebates**

For more on sustainability and energy use, visit [www.eastgippsland.vic.gov.au/environment-and-waste/energy-use-and-savings](http://www.eastgippsland.vic.gov.au/environment-and-waste/energy-use-and-savings)



# Feedback welcome

We would appreciate your feedback  
on this kit and guide

Please let us know:

- What you found useful or not
- What actions you have taken as a result of using the kit
- Savings you have made
- Suggestions for improvements, or any damage to the kit

Please provide feedback via [sustainability@egipps.vic.gov.au](mailto:sustainability@egipps.vic.gov.au)