

Measuring and Monitoring Energy Consumption

A practical guide from Steplight

This guide provides background and tips on how to use the various energy monitoring devices available from Steplight at:

www.steplight.com.au/monitor-energy

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Using the Plug-in Power Meter

The plug-in power meter allows you to measure the electricity consumption of appliances around your home or workplace. A range of energy saving options can often be identified, and if nothing else, the device will help you understand which appliances are using the most energy.

Part 1: Measuring Appliance Consumption

There are two ways to measure appliance consumption. If you know how often an appliance is used then measure the Watts of the appliance and multiply this by the number of hours:

$$\text{Watts} \times \text{hours used} = \text{Wh} \quad \text{Then divide by 1000 to get kWh: } \frac{\text{Wh}}{1000} = \text{kWh}$$

For some appliances, power usage changes over time, so consumption cannot be calculated using the above method. This is the case for a refrigerator that turns on and off throughout the day, or a washing machine where the power used will depend on what cycle is running. You can use the power meter to work out the usage over time, and the cost, using the following steps:

1. Plug the appliance into the power meter
2. Set the cost of electricity on the power meter to what you pay (see manual)
3. Leave the appliance plugged into the power meter for the desired measurement time (24 hours, one washing machine load, etc.)

Come back after the specified time and press the 'FUNC' button until you come to 'kWh' for consumption or 'Total Price' for cost.

Part 2: Measuring Standby Loads

1. Plug the appliance into the power meter.
2. Turn the appliance back on to 'stand by' (eg, so the remote can be used on a television).
3. Press 'FUNC' on the power meter twice to display the power consumption in Watts.
4. This is how much power the appliance is using in standby mode.

So how much can be saved by turning all these appliances off at the wall?

1. Measure the standby power (in Watts) of an individual or group of appliances.
2. To work out the cost, find how much you pay per kWh on your electricity bill (often around \$0.25/kWh), and multiply this by the hours in standby per day (an example of 20 hours per day is shown below).
3. To calculate the approximate total savings (the power meter can do a similar calculation to this automatically if you have already entered your electricity tariff):

$$\text{Saving (\$/yr)} = \frac{\text{Watts}}{1000} \times 20 \text{ (hrs/day)} \times 365 \text{ (days/yr)} \times 0.25 \text{ (\$/kWh)}$$

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Using the Non Contact Thermometer

The non contact thermometer will measure the surface temperature of an object it is pointed at. To use it, simply hold down the 'measure' button. For more accurate readings press the button for a longer period as it displays an average reading over this time once the button is released.

Temperature and Efficiency

Most electrical appliances will produce 'waste heat' when switched on. This is because all the components inside them are not 100% efficient and the wasted energy is typically converted to heat. As such, inefficient appliances often produce significantly more waste heat than efficient ones (for example, hot halogen down-lights, poorly insulated ovens, and so on).

Temperature and Comfort

Radiant temperature is a very important aspect of thermal comfort. Use your thermometer to identify what parts of your building are letting in too much heat in summer or sucking it all out in winter. Measure the surface temperature of a window and compare it to an internal wall. Can action be taken to better manage heat loss or heat gain through the window?

Air Conditioners

Most people will find a temperature of 24-26 degrees to be pleasant in summer and 18-20 degrees suitable in winter. These are good levels to have your air conditioner set at. Setting the air conditioner lower in summer typically does not make it work any faster: it will just use more electricity because the compressor will remain on for longer. As a rule of thumb, a one degree temperature adjustment can save around 10% off your heating and/or cooling costs.

Refrigerators

Refrigerators and freezers often remain set to their over-spec factory settings. To measure the fridge or freezer temperature, point your thermometer at an object inside the unit. A temperature of around four degrees is recommended for your fridge and as 'warm' as -12 degrees is suitable for the freezer. Adjust the settings on your unit as appropriate. A freezer temperature of -12 will safely store foods for relatively 'short' periods (2-3 months) whereas the factory settings of around -18 degrees can store food for much longer periods, but this is unnecessary in most situations.

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