



**CONSUMER GUIDE TO
SMART METERS**



Smart meters are offering more options for home automation which can help save money on your energy bills, like at this 8-star home in Melbourne.



Smart meters are starting to appear across Australia. In Victoria, they will be in all homes and small businesses by the end of 2013.

Compared to the old 'spinning disc' meters, smart meters change the way energy is measured and priced, allowing for more efficient electricity networks and different ways of paying for energy. They can also enable a host of products and services with potential benefits for consumers. However, consumers need to be informed about the issues relating to smart meters. For instance, a person will pay higher bills if they choose the wrong type of tariff for them.

The Alternative Technology Association has produced the *Consumer Guide to Smart Meters* to help householders and small businesses understand and take advantage of their smart meter.

This Guide provides independent, easy-to-understand information about the products and services associated with smart meters. Some of these products and services exist now, and some are expected to become available in the next two to three years.

Please note, this Guide is not intended to promote the uptake of smart meters or any particular product or service.

The potential benefits and risks of smart meters will be different for different energy consumers. With that in mind, the Guide has been prepared to assist consumers to make informed decisions about smart meters and their related technology.

The products and services enabled by smart meters that are likely to be available to Victorian electricity consumers in the next few years include:

1. In-home displays;
2. Online web portals;
3. Time-of-use or 'flexible' electricity pricing;
4. Direct load control; and
5. Smart appliances.

SPEAKING ELECTRICITY SPEAK

Smart meters change the way our electricity consumption is measured. To take advantage of the products and services associated with smart meters, we first need to understand some basic electricity concepts.

When talking about electricity, we often hear the words **watts**, **kilowatts** and **kilowatt-hours**.

Although they sound similar, the differences between them are important since they relate to your appliances, energy consumption and bills.

(1) **W (watts) and kW (Kilowatts)** are indications of the 'speed' or 'rate' at which energy is consumed by an appliance or group of appliances at any time, and are also referred to as 'power'.
1 kW = 1000 W.

(2) **Kilowatt-hours (kWh)** is a measure of the amount of **energy consumed over a time period**. Kilowatt-hours as a measurement only makes sense if the time period is specified, for example, kWh per day, or kWh per year.

Kilowatt-hours is also the term that is used on your electricity bill to indicate how much energy you have consumed over the billing period.

In the example image below, **Appliance A** has a higher electrical power (2 kilowatts) than **Appliance B** (1 kilowatt).

Appliance A would need to be on for two hours to consume 4 kilowatt-hours of energy, while in comparison Appliance B would take four hours to consume the same amount – that is, 4 kilowatt-hours of energy.



A Power = 2 kilowatts
2 hours of running time

Same energy consumed
4 kilowatt-hours



B Power = 1 kilowatt
4 hours of running time



Examples:

- Iron – 1 kilowatt average power
 - Used for one hour a week will consume around 52 kilowatt-hours of energy per year
 - Used for three hours a week will consume around 156 kilowatt-hours of energy per year
- Refrigerator – 0.1 kilowatt average power
 - Left on for a whole year will consume around 876 kilowatt-hours
- Mobile phone charger – 0.001 kilowatt average power (if left on standby between use)
 - Left on for a whole year, charging when needed, will consume around 9 kilowatt-hours of energy

It's important to understand what types of appliances you are running in your home or business – whether they are low or high power, and how much they may be contributing overall to your total kilowatt-hour usage.

To find out how much electricity a specific appliance uses, you can use a device such as a plug-in energy meter.

Some appliances, like irons and toasters, use more power (high kilowatts), but are only used for short periods of time.

Other appliances or devices, such as mobile phone chargers or high-efficiency TVs, use low power (low kilowatts), but may be left on for long periods of time.

These low-power 'always on' appliances can often use more energy over a long period than the high-power appliances that are used more occasionally.

Plug-in energy meters are typically hand-held devices that plug into the wall. You then plug your appliance into the plug-in energy meter.

These meters typically have a digital display, and show the amount of power your appliance is using at that point in time. The majority of plug-in energy meters also record the total amount of energy used by that appliance over a given time period (e.g. an hour, a week, or for as long as the meter has been plugged in).

IN-HOME DISPLAYS

An In-Home Display (IHD) allows you to view detailed information about your electricity use and cost.

IHD can also provide information about the carbon footprint of your electricity consumption.

IHDs can take many different forms. All show your electricity usage in 'real-time' – that is, at the time you are consuming the electricity.



Benefits

IHDs can help you identify appliances that consume high amounts of electricity and help you understand how much energy is used unnecessarily in your home (e.g. appliances that use standby power).

Most consumers receive electricity bills every month or three months. This time lag can make it difficult to relate your behaviour and the use of appliances to your total electricity use.

IHDs can help pinpoint the appliances and behaviours that increase or decrease your energy use. If you move house or buy a new electrical product or change the way you use a major appliance, an energy monitor can provide you with quick feedback on the impact of those changes.

Overall, owning an IHD allows you to better understand electricity use patterns in your home or building.

Some IHDs can present electricity use data over time – that is, over the past 24 hours or week or year. This allows you to see how much electricity is used and the times, days or seasons at which you used it.

Seeing your electricity usage over a specific time period can be helpful when considering whether you would have lower electricity bills on a flexible pricing tariff (see page 10), or by staying on a flat tariff.

IHDs can also display messages from your energy provider: for instance alerting you to power outages in your area or a time period in which energy may cost more or less.

Other information, such as bushfire or flood warnings in your region, can also be received and displayed on your IHD.

Trials

There have been customer trials of IHDs across Australia and in many other countries.

Two separate trials in Perth and Townsville helped consumers reduce their average electricity use by just over 5% and almost 7% respectively. For a typical Australian household, this could mean a saving of around \$50 to \$100 a year.

Potential Risks

As a device that simply communicates information, there is little risk involved in owning an IHD.

Be sure to find out the types of information your IHD can display, and learn about what the information means for you.

It is recommended in Victoria to buy 'Zigbee'-based IHDs accredited under the Energy Saver initiative scheme (see below), as these are approved by all distributors and are built to a strict specification

Be careful buying ZigBee devices off the internet though – if they are not supported by your local distributor (who provides your meter), you may not be able to use them with your IHD.

Current Availability

A number of models and types of IHDs are currently available.

Depending upon the functions and quality of particular IHDs, prices range from around \$50 to a few hundred dollars.

Some IHDs will soon be available under the Victorian Government's *Energy Saver Incentive* scheme (<http://www.switchon.vic.gov.au/how-can-i-take-charge-of-my-power-bill/energy-saver-incentive>). This should reduce the price of any eligible IHD.



ENERGY WEB PORTALS

Energy web portals give consumers access to their electricity consumption data via the internet, enabling your household or small business to monitor and review electricity consumption and cost over time.

Electricity sent to the grid by solar panels can also be displayed through an energy web portal.

Energy web portals typically provide your electricity usage data up to the end of the previous day. They generally cannot give 'real time' feedback in the same way as a IHD (see previous chapter).

Web portals do allow for a more comprehensive, interactive and user-friendly assessment of energy use than most IHDs.

They may be provided by your electricity distributor or retailer, with the electricity use data having been collected directly from your IHD.

Benefits

Energy web portals allow you to view your data over different time periods – for example half-hourly, hourly, daily, monthly or over seasons or years.

This allows you to track changes and trends in your electricity use, and helps you to understand why usage patterns may have changed (for example, increased air-conditioning in summer).

Some energy web portals also allow you to set targets for reducing electricity use and to monitor your progress in achieving them.

You can use your historical energy data to work out if flat or flexible tariffs would best suit you.

If your portal is provided by a distributor or independent third party, you may be able to use it to work out if you can get a better electricity deal by changing retailers. Portals provided by retailers are unlikely to have this function.

Just like on electricity and water bills, some web portals provide comparative information such as how your electricity consumption compares with that of other energy users (e.g. for a suburb or household type).

And like IHDs, web portals can communicate messages and notifications such as power outages in your area.

Potential Risks

As with IHDs, energy web portals simply communicate information to the consumer. There isn't much risk involved in using a web portal, and generally signing up is free.

Make sure you know what type of information is being communicated to you through the web portal and what it means for your electricity use and potential tariff options.

If your portal is provided as part of a bundle of services with an energy retail contract, check the conditions of the contract and shop around to make sure you are still getting a good energy deal. Remember that retailers' portals may not provide information that makes it easy to directly compare retail products.

Current Availability

As of early 2013, the following three web portals exist in Victoria:

- Jemena's Electricity Outlook¹;
- SP Ausnet's myHomeEnergy²; and
- Origin Energy's Origin Smart³.

Other electricity businesses are currently trialing web portals, but it is unclear when these might be released for public use. More are likely to be developed in the near future.

¹ Jemena is a Victorian electricity distributor. You must live in the Jemena distribution network in order to be able to access this portal: <http://jemena.com.au/customer/electricity/smart-meters/portal/>

² SP Ausnet is a Victorian electricity distributor. You must live in the SP Ausnet distribution network in order to be able to access this portal: <http://www.sp-ausnet.com.au/?id=210101801D0D8EBBE89D95CDA257ABB001FC60D>

³ Origin is an electricity retailer. You must be an Origin customer in order to be able to access this portal: <http://www.originenergy.com.au/originsmart>

FLEXIBLE PRICING OR TIME-OF-USE TARIFFS

'Flexible' or 'time-of-use' pricing means different prices for electricity at different times of the day and week.

Flexible pricing is different from the traditional 'flat' rate in which electricity is charged at the same rate at all times.

From late 2013, all Victorians households and businesses will be able to choose from a range of flexible tariffs once their smart meter is installed.

It is important to note that no electricity consumer will be forced to change to a flexible tariff or to give up their existing flat tariff. Any change to flexible tariffs will be voluntary.

If you live outside Victoria, you may be able to choose a flexible or time-of-use tariff. This is dependent on what retailers in your area offer and whether you currently have, or can purchase, an interval meter.

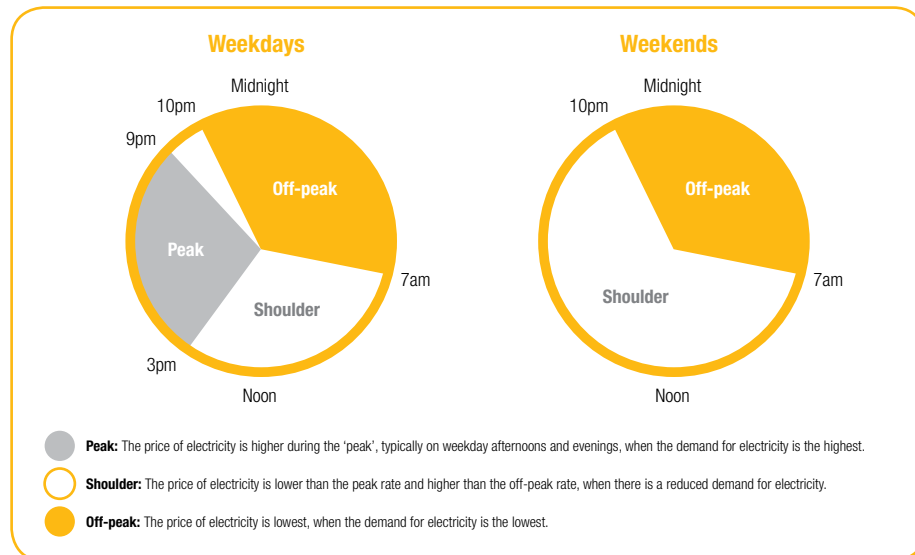
How does flexible pricing work?

The type of flexible pricing to be offered in Victoria later in 2013 will include a three-part tariff. This will involve paying:

- 1. more** to use electricity at times of high or 'peak' demand, for a few hours during weekday afternoons and evenings (e.g. from 3pm to 9pm Monday to Friday);
- 2. less** during times of lower demand or 'off-peak' (e.g. from 10pm to 7am every night); and
- 3. something in between** peak and off-peak rates at other times. These are known as 'shoulder' periods and include daytime on weekends.

The graph below is an example of how the hours of the week are divided into the three periods of flexible pricing.

Example of how time is divided over the different periods of flexible pricing⁴



Source: <http://www.switchon.vic.gov.au/how-can-i-take-charge-of-my-power-bill/flexible-pricing>

⁴ Example from <http://www.dpi.vic.gov.au/smart-meters/flexible-pricing>

Compared to the flat tariffs that most electricity consumers are on, flexible pricing more closely reflects the actual costs of building electricity networks and operating generators to meet consumer demand.

Generally, consumers who use less energy during peak times will be better off on flexible pricing, and consumers who use more energy during peak times will be better off on flat tariffs.

For example, while a flat tariff may be 25 cents per kilowatt-hour at all times of the day, under flexible pricing:

- an off-peak tariff may be about 12 cents per kilowatt-hour;
- with a peak tariff of 40 cents per kilowatt-hour; and
- an in-between shoulder tariff of 25 cents per kilowatt-hour.

Critical Peak Pricing

In the future we may also see 'critical peak pricing' introduced as an option for homes and small businesses.

Critical peak pricing is a time-of-use tariff when, on the few days of the year when electricity demand is at its highest (usually hot days in summer but sometimes also very cold winter days in some areas), the price rises much higher – possibly up to 10 times the typical charge per kWh.

The reward for a consumer taking up a critical peak pricing tariff is having a lower tariff than normal for the majority of the year.

The logic behind critical peak pricing is that a large proportion of the cost of the electricity network is spent building and upgrading power plants, poles and wires to keep the electricity network operating on very high demand days.

Critical peak pricing provides an opportunity for those who can reduce their electricity usage on these high demand days to benefit from lower bills.

As with all flexible pricing, critical peak pricing will not be compulsory and is unlikely to be introduced until measures are in place to protect vulnerable consumers.

Benefits

Flexible pricing can benefit many electricity consumers – particularly those who already use less electricity during peak times and/or more during off-peak times.

If you are one of these people, savings can come without any change to the way you use energy.

As well, if you have the ability to change the times at which you use electricity (that is by shifting electricity consumption away from peak times), then you may also be better off under a flexible tariff. Examples include running the dishwasher only at night or doing laundry only on weekends, when electricity is cheaper.

Some reports suggest that many consumers could save a few hundred dollars a year by shifting the times of use of common household appliances.

When a large number of electricity consumers begin to use less energy at peak times, there are system-wide benefits that may mean long-term savings for all consumers. This comes from reducing the need for expensive network infrastructure and generators that are only used infrequently, the cost of which is passed through to all consumers on electricity bills.

This is part of the reasoning behind flexible pricing.

Potential Risks

Flexible pricing has higher risks for the consumer than the normal flat tariff.

When considering any flexible tariff, you need to understand the timing and amount of your energy usage, and whether or not you are able to shift the times of your electricity consumption. Some people will be unable to determine whether they will be better off on flat or flexible tariffs, and these consumers are at risk of choosing the wrong tariffs for them.

If you use a significant amount of electricity at the times when a peak or higher rate is charged, then you are likely to be worse off on a flexible tariff.

There is a risk that consumers who do not benefit from flexible pricing will move to it anyway, perhaps due to a lack of understanding or as a result of questionable marketing practices.

There is also the risk that a change in the amount of time spent at home, for example due to a change in family or working arrangements, will affect which type of tariff is best for them.

Current Availability

From late 2013, Victorian electricity consumers will be able to choose between flat tariffs and flexible tariffs.

In the future, tariff options available to consumers will be able to be found at the Australian Government's new price comparison website, Energy Made Easy:

<http://www.energymadeeasy.gov.au/>

To address some of the risks associated with flexible pricing, until 2015 Victorians can try a flexible tariff and return to their old tariff at any time if they find it does not work for them – without being locked in to a contract with the threat of exit penalty fees.

This will give households the opportunity to 'dip their toe in the water' to understand the potential benefits and risks, without being locked in.



DIRECT LOAD CONTROL

Direct load control is the ability to remotely manage a specific appliance at a household or small business. Direct load control can be done through the smart meter.

It is usually done by an electricity distributor or retailer, and usually in return for some type of reward (often a fixed payment a number of times a year or a reduction on the energy tariff). It can also be done by an automated program set up in a smart meter.

Direct load control can work by shifting the times of use of some appliances (e.g. a pool pump) from peak times to off-peak times when electricity prices are cheaper.

Direct load control can also work by 'cycling' an appliance. Cycling means switching on and off repeatedly over a set period.

In the future, you will be able to enter into a contract with your retailer or distributor (or possibly another business) where they can reduce the energy consumption of your air-conditioner on a few days each year in return for you being paid a fixed annual payment or a discount on your bill. In many homes, air-conditioner control can be done without affecting comfort levels. Before signing up to any deal like this, it will be important to understand how it might affect you, taking into account your specific needs.

It is important to note that direct load control is a voluntary electricity product. You can choose to sign up to direct load control if the product works for you: no electricity consumer will be required to adopt a tariff that includes direct load control.

While it has not yet been made available in Victoria, direct load control is not new in Australia. For example it is well established in Queensland, with electric hot water systems remotely switched off and on to move their overall energy consumption away from peak demand times, and has more recently been expanded to the control of pool pumps.

Benefits

Having direct load control can be financially beneficial for a number of reasons.

Financial incentives – such as a rebate, payment or reduced tariff cost – can encourage consumers to sign up to a direct load control product.

Another benefit is the reduced cost to run an appliance on direct load control. For example, when your pool pump is controlled so that it only operates during off-peak periods, the cost of running it is reduced since the off-peak rate is cheaper.

By reducing or shifting the electricity consumed by energy-hungry devices such as air-conditioners and pool pumps, electricity distributors can avoid blackouts.

Importantly the need to upgrade expensive poles and wires is also reduced, which is a potential longer-term benefit for all electricity consumers.

Potential Risks

The most obvious risk from having direct load control is that your appliance may not be in use exactly when you need it.

In the case of air-conditioning control, this can be critically important to those who, for medical reasons, require specific comfort levels to be maintained. Energy businesses have a responsibility to avoid offering direct load control to these consumers.

If you are considering a direct load control tariff, make sure you clearly understand how and when an appliance will be managed and what the risks and benefits are for you.

Current Availability

Direct load control is available in Queensland for air-conditioning, pools and hot water systems. Queenslanders can receive a rebate when buying and installing a 'smart' air-conditioner.

Although in Victoria direct load control is not yet available, Victorian electricity businesses are looking at ways in which it may be offered to consumers.

The Victorian Government is also considering the necessary additional consumer protections that may need to be put in place.

Tariff products that include direct load control are expected to be available from 2014 in Victoria.

SMART APPLIANCES

Smart appliances are electrical appliances that can manage their energy use in a smart way, leading to a lower cost for consumers.

Some smart appliances can decide to use less energy during peak times and more energy during cheaper off-peak tariff periods, thereby saving the owner money.

Smart appliances generally manage their energy based on a number of criteria:



When: A smart appliance can operate or stop operating depending on the time of day or day of the week.



Cost: A smart appliance can automatically operate during a time when the cost of electricity is lower or stop when the cost of electricity is higher.



Signals: A smart appliance may operate or stop when it has received a signal from a smart meter or another smart appliance.

Smart appliances include dishwashers, washing machines and driers that will automatically wait until lower-cost periods to operate, reducing costs.

Smart refrigerators or freezers can pre-cool contents to below-normal temperatures during lower-cost periods so that less energy is used during higher-cost periods.

Some smart appliances can be remotely controlled by the owner, while others may be pre-programmed to operate automatically at certain times.

Benefits

Smart appliances can benefit consumers by:

- saving money using cheaper off-peak energy;
- saving energy and money operating more efficiently; and/or
- greater convenience not having to manually manage the energy use of an appliance.

Potential Risks

Some smart appliances will be self-programming, automatically loading and updating necessary information from the meter. Others will need to be manually programmed.

In order to use electricity at cheaper times, it is critical that the smart appliance is programmed to switch on after a cheaper off-peak tariff commences, and to switch off before the tariff changes to a higher rate.

As the operator, you need to be sure of the times at which those cheaper tariffs apply and ensure that your remote or programmed instructions to the smart appliance are consistent with those times – otherwise you may be worse off.

Current Availability

There have been trials of smart air-conditioning systems, smart pool pumps, smart hot water systems and smart electric vehicle charge points in Australia.

In Victoria, it is expected that smart meter-enabled smart appliances will be introduced during the next two to three years.





The home automation system at this Melbourne home links to a home weather station to open windows when it's cooler outside than inside, turn on fans at preset temperatures, run the hydronic heating and control the solar hot water system's gas booster.

Image credit: Simon Black courtesy of Positive Footprints.

MESSAGES & NOTIFICATIONS

Smart meters have the ability to communicate messages to consumers. The messages can be displayed on an in-home display

The types of messages could include:

- notifications about power outages, network maintenance or other activities that will affect a consumer's electricity supply;
- notifications of electricity tariff changes
- advance notifications of critical peak pricing events;
- information relating to your bill, such as a current bill estimate; and
- emergency notifications, such as warnings about natural disasters like bushfires, floods and extreme weather.

Benefits

The main benefit of smart meter messaging is that important information relating to energy cost, energy supply and local hazards can be sent directly into the home.

Current Availability

The Victorian smart meter network has the capability for messages and notifications to be sent to smart meters.

You would need to have an in-home display or similar device connected to the smart meter to be able to access messages and notifications.



**Booklet developed by
Alternative Technology
Association**

The Alternative Technology Association (ATA) is a not-for-profit organisation that has been promoting the use of renewable energy, water conservation and sustainable building since 1980.

ATA provides expert, independent advice about sustainable home solutions to households, government and industry. ATA has thousands of members across Australia actively walking the talk in their own homes.

Publishers of *ReNew: technology for a sustainable future* and *Sanctuary: modern green homes* magazines.



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