

Meter smarts

Track your energy use online

With Jemena's new online portal, you can even monitor your energy use when you're not home. Energy efficiency consultant Richard Keech puts the portal to the test.

AROUND Australia, and especially in Victoria, the deployment of smart meters and related devices is set to fundamentally change the way households track and manage their electricity use. Richard Keech tried out one distributor's smart meter web portal and gives us some insights about what he found.

Unless you've been hiding under a rock, you'll know that there's a push, around the country, to install so-called smart meters. You may already have one. There's been much reported in the media. There has also been some hysteria about time-of-use tariffs and alleged negative health effects of smart meters. I'm not going to look at the cost, health or policy dimensions of smart meters except to say that once they're fully deployed and working, I think we'll wonder what all the fuss was about.

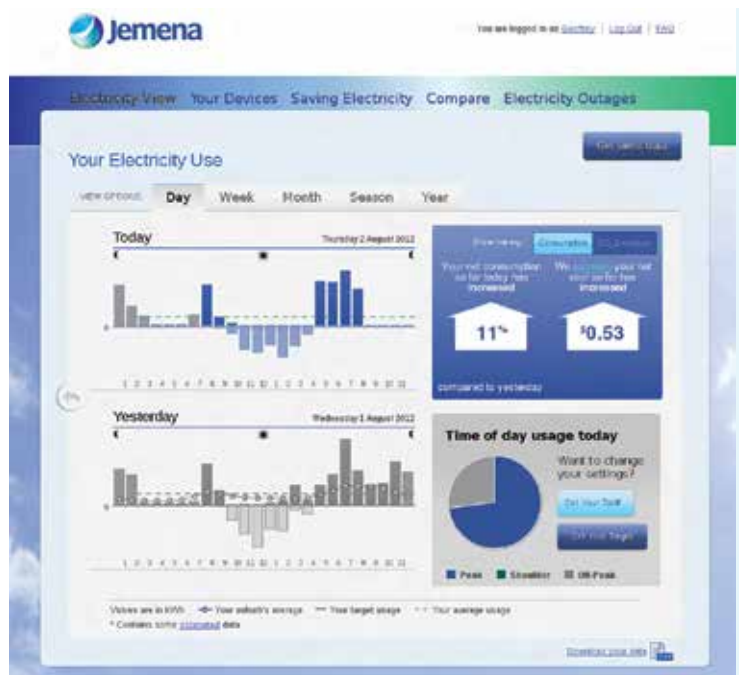
This article takes a look at the smart meter web portal that has recently been deployed by Jemena Electricity Networks in Victoria. Smart meters were looked at in *ReNew* issues 111, 112 and 119. To start off, here's a recap of the basics.

Why smart meters?

Your traditional electricity meter keeps track of energy imported from the grid to the house (minus any exports if you have solar), and needs to be read manually at the end of every billing period. And that's all it does. Applying communications and information technology to metering in smart meters can give rise to other useful things which potentially benefit both the energy company and the consumer:

Interval metering. Traditionally, at the end of the billing period, we know the total amount of energy used but we know nothing about the pattern of use during that period. Smart meters are interval meters which keep

→ The portal provides useful data for tracking energy use by time of day, day of week and month, and compared to previous periods.



track of energy use over time, usually with a sampling interval of 30 minutes. Interval metering also makes time-of-use tariffs possible (for better or worse) without needing a separate off-peak circuit and meter.

Remote meter reading. By transmitting meter readings back to the energy company over a communications network, the need for manual meter reading is removed. It becomes almost as easy to collect the data hundreds of times per billing period as it does for a one-time reading. This gives rise to the possibility of presenting the interval data to consumers to help them understand, track and manage their usage. The wireless technology for remote meter reading is called Advanced Metering

Infrastructure (AMI). Smart meters talk back to the energy company's AMI network using a built-in wireless modem. In my case, half-hourly data is communicated to my distributor (Jemena) via the AMI every four hours, starting at midnight daily. Other distribution businesses may vary on their timing.

Home-area network. Smart meters can talk to devices in the home via a wireless network technology called Zigbee. The most important type of device is called an in-home display (IHD) which can show real-time power and energy usage and tariff information. We will take a closer look at IHDs in the near future. Another important device type is the demand-response enabling device (DRED)

which provides the means to automatically turn off or cycle specific equipment if the power network is at risk of overload.

Guinea pig time

Some energy companies (both distributors and retailers) have decided to offer their users web-based access to their interval meter data. My own experience here arose from responding to an ATA notice to members in Victoria. The distribution business Jemena was looking for guinea pigs in a trial of their new web portal. Since I'd had a smart meter installed in May, I was curious to find out what this web portal could do, so I signed up for the trial.

I registered on the Jemena portal (called Electricity Outlook) by giving my details and my meter identification number. After my electricity retailer gave their blessing (a delay of a couple of days), my web access was activated.

Choose your screen. Access to the Jemena portal requires a web browser on your internet device of choice—PC (Windows, Mac or Linux), tablet (iPad or Android), or smart phone. In my case I've tried it on Mac, Linux, Android tablet, Android phone and iPad. The mobile version of the portal is adapted to the smaller displays, but the experience is essentially the same.

Electricity View. The main mode of access, called 'Electricity View', lets me see my electricity use depicted as bar graphs by day, week, month, season and year (see figures opposite). The initial view shows data up to and including yesterday. However, the screens have a 'Get Latest Data' button which causes my most recent meter data to be fetched from Jemena and displayed. Since the data is uploaded from the meter to Jemena every four hours, you can see data which can be as stale as four hours or only a few minutes old, depending on when you hit the button.

Clever graphs. The graphs let me mouse over a bar to have it display the corresponding energy use in that period along with the estimated cost (assuming you have entered the tariffs). The graphs also show a line corresponding to the average value for your suburb. This gives me a basis for comparing my own use against other consumers in my area. The third feature on each graph is a horizontal dotted line representing my own average use.

Solar generation. When my solar panels export energy to the grid, this is represented 'below the line', i.e. as subtracting contributions to the net energy equation. Of

course, with import/export metering, this is exported energy only, and not the full amount of generation, so it doesn't coincide with what my inverter tells me.

Tariffs. The portal lets me enter my own tariffs, which allows the cost to be properly estimated. Time-based tariff schedules can be entered, as well as solar feed-in tariffs. One frustration here is that smart meters and the AMI could easily provide tariff information automatically from the retailer. Indeed the protocols and smart meter software have support for holding tariff information. This capability is going unused in Victoria.

Fetching the data. Energy geeks like me are always going to want to do more with the data than the portal can offer. So the designers have provided the means to download the raw interval data to be analysed as you see fit. I have been able to fetch this 'CSV' data and import it into a spreadsheet without a problem.

This overcomes a couple of limitations with the portal, namely:

- **sample period.** The portal shows, at its most fine-grained, data points every hour. However the smart meter interval data is at 30-minute resolution. Downloading the CSV data gives me access to the real 30-minute data.
- **graphical precision.** For all their cleverness, the portal's graphs make it hard to read off a numerical value because of the lack of a careful scale and grid lines. Plotting the CSV data on a spreadsheet lets me represent the data as I see fit.

Insights from the data

After about three months using the portal it has been able to tell me some interesting things about my usage. First, it's been able to show me how much power I've been using overnight. This helps establish a baseline minimum continuous power, which in my case seems to be about 100 W, coming from the fridge and a couple of other essential items on standby.

The second insight is the ability to notice when an unexpected level of usage occurs. For example, I was showing some people at work the portal during the day. I noticed that the use was much higher than expected, and was able to infer that one of my split-system heater units had been left running when I left the house. Although unable to remotely switch off the device, it made me more conscious of the need to turn devices off.

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The limits of peer comparison. The portal's ability to compare my energy use with my neighbours seems less useful than at first glance, because different houses have a different mix of electricity and gas. In my case, being no longer a gas consumer, I compare poorly since, on average, my neighbours are getting a significant part of their energy from gas. In an ideal world the portal would integrate electricity and gas usage, allowing a fair comparison of energy use. In the absence of that, maybe there should be some scaling based on consumers nominating what they use their energy for.

The test of time. Another benefit of this system will really only become apparent after a couple of years of use: the ability to compare usage across years and perhaps correlate it with energy efficiency measures taken during that time. I can well imagine that this will assist people to properly quantify benefits from efficiency measures taken, especially if one uses electricity for all home energy.

Numerous studies have found that consumers armed with near-real-time feedback of their consumption can then reduce their usage by 10% to 15%. Having now tried it, I can well believe that these estimates are reasonable.

What the future holds

As part of this exercise of getting to understand smart meters and web portals, I have been able to see how else smart meter technology might have an impact in the near future. Likely things in the offing are subsidised in-home displays, mandatory time-of-use tariffs, and even demand-response systems. These things build on smart meter technology. Look out for more on these coming up in future editions of *ReNew*.

Smart meters are here to stay. Courtesy of my own smart meter, I've been able to better understand and manage my own electricity use through access to the Jemena portal. After all, knowledge is power. ✨

Richard Keech has over 25 years engineering experience in the military and in commercial IT. In 2010, he quit his job to study and last year graduated from Melbourne University with a Master of Environment. Today Richard works as an energy efficiency consultant and writer.

