WESTERN POWER

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CITY IN THE SUN

Western Power brings electricity to Australia's fastest growing region. Fuelling that growth is costly; but the Perth Solar City programme is helping to solve the grid's problems—and those of its customers too

Meter inspection

As the hub for Western Australia's mining activity, lying close to the port of Fremantle, the city of Perth has been the recipient of a great deal of state and federal investment to ensure its infrastructure keeps pace with its strategic economic importance.

And Perth has a pleasant climate. It averages 2,900 hours of sunshine a year—that's around eight hours every day, making it the ideal place to site solar panels. Around 1.7 million people live in the city; most of them have air conditioning in their homes and workplaces, many have pools—and with average summer temperatures in the high 80s Fahrenheit, these get plenty of use. When the temperature soars, AC equipment and pool pumps kick in, creating peak demand that is very challenging for the energy utilities to meet.

2,900

Average hours of sunshine each year in Perth

Of course Perth is not the only place in Australia (let alone the rest of the world) with similar patterns of use. Nevertheless the way this city is tackling its present and future energy use is making it something of a benchmark for best practice.

Australia has designated seven Solar Cities—regions that bring together industry, business, governments and communities to rethink the way they produce, use and save energy. Perth is the newest of these, launched in 2009, and had the advantage over the others of being able to harness 'smart grid' technology—which bins the old model where consumers simply waited with fingers crossed for their two-monthly bill. This model may have been modified by growing awareness that we ought to conserve power and buy low energy light bulbs; but the smart grid concept allows a real partnership all the way through, from electricity generation to the consumer.

Perth Solar City covers a large area to the east of Perth and includes over 120,000 households. It is delivered by a consortium led by Western Power, the regional network provider, and eight other members: Eastern Metropolitan Regional Council; the Botanic Gardens and Parks Authority; Living Smart; Mojarra Energy Management Systems; Prospero Productions; Solahart; SunPower; and Synergy (the electricity retailer). Between them these partners have already got around 14,000 households involved in the project.

The entire programme is highly customer-focused, says program implementation manager Andrew Blaver. "Traditionally energy management has been all about the supply side—about building generating capacity and networks to meet ever-growing peak demands. Smart grid gives us the opportunity to give customers what they want—to save money while continuing to be able to use their appliances—and at the same time, to reduce consumption at the peak times on our network."

The key elements of a smart grid are smart meters—meters that can do much more

City view of Perth, Australia

EPC International Pty Ltd
A.C.N 086 150 709

EPC International (EPCI), jointly with Koncar Instrument transformers Inc and Hapam Disconnectors, has been very fortunate to have been accepted by Western Power over the last few contract periods. Both of our principal manufacturers, Koncar and Hapam, have understood Western Power's specifications and requirements to continue delivering value for money. EPCI keeps Western Power updated with the manufacturing schedule by providing timely feedback.

Shipment of the instrument transformers and disconnectors is carried out through EPCI's own logistics company, EPIC Worldwide Logistics. This allows us to ensure our own staff are involved in timely deliveries to the Western Power stores. A jointly developed packing and monitoring system with Western Power has ensured almost 1,000 units have been delivered in mint condition, allowing Western Power's installation team to install these on their sites with ease and confidence.

Part of Koncar/EPCI's customer satisfaction process involves yearly feedback on the various products delivered, as well as a face-to-face forum between Koncar/EPCI and Western Power's technical and supply chain teams, to iron out any issues and also to share the latest developments in the manufacturing of transformers to the latest IEC standards. This close cooperation ensures Western Power's specialist procurement engineers obtain a deep and good understanding of the products being used in their electricity grid.

EPCI's motto has always been "***To be a significant engineering company adding value to the operations of its customers***". We will strive hard to remain the best equipment supplier to Australian and New Zealand Utilities well into the future. EPCI has ensured that Australia is a long-term purchaser of both Hapam and Koncar products.

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The Eco House showcases sustainable living

than just record the amount of electricity a household has used—and the back office systems to manage them. In March 2010 Western Power signed a $5.33 million deal with Landis+Gyr (L+G) and Silver Spring Networks (SSN) to set up an initial smart grid trial. The new meters supplied by L+G can give the consumer the information they need to better manage their energy use. They measure electricity use in the home or business at half hourly intervals and transmit the information to Western Power. But better still they can allow the utility access to household appliances to make better use of them.

This is new territory, so the trial was needed to find out just how effective the initiative will be in delivering two key objectives: giving customers greater and more relevant information to help them reduce their electricity consumption, and helping to reduce peak demand. “On the hottest days in summer we remotely cycle the air conditioner. We don’t turn it off but trick it into thinking it is a bit cooler than it really is. The fan continues to run but the compressor is cycled for 15 minutes.” Results from the first summer of the trial have shown that almost nobody noticed, nobody complained, or reported that they could detect a change in comfort levels. However the trial group logged a reduction in electricity consumption at peak time of up to 20 per cent in the first summer. “That would be really significant if we could extend it to the entire network,” says Blaver.

By entering the race late, Perth has been able to leapfrog intermediate technology. “Technology can advance quite quickly. The future-proof model and open architecture of our smart grid means we will not become dated or obsolescent: we will be able to upgrade the software and adapt to other benefits that the smart grid could take advantage of,” Blaver says. Air conditioning was chosen simply because it is the biggest culprit, but in the future other equipment like pool pumps may be brought into the picture.

> “THE FUTURE-PROOF MODEL AND OPEN ARCHITECTURE OF OUR SMART GRID MEANS WE WILL NOT BECOME DATED OR OBSOLESCENT”

The information gained is communicated via SSN’s Smart Energy Network, a secure IP based RF mesh network, and Western Power’s existing fibre based substations communications network. As well as enabling Western Power to capture data from consumers, it enables consumers to monitor their own energy use in real time through in-home displays via a ZigBee wireless home area network (HAN) interface on the meter. ZigBee can run for years on inexpensive batteries. As well as telling you how much electricity you use and saving on air conditioning, it can read the meter automatically, turn the lights on and off remotely or in the case of an office or a school, manage the building’s automation systems.

Once this year’s results are added there will be an intensive period of analysis and evaluation. But this is just part of the picture. Another trial has been going on: the Solar Photovoltaic (PV) Saturation Trial. An increasing number of small scale and domestic PV systems are being connected to the grid, and the trial aims to assess the impact these could have if, as hoped, Solar City lives up to its name. Consortium partner SunPower gives discounts on its reliable and high quality domestic systems, normally roof-mounted: participating households have so far shown a 57.9 per cent reduction in average daily consumption from the network, and in

addition receive a payment for the surplus they feed into the grid. A further 15 per cent saving has been recorded by residents who have replaced electric systems with Solahart's solar-boosted system, again at a substantial discount.

Once the numbers have been crunched, Blaver believes the trials will have supported extending the smart grid across the state. "We are already confident to the point where we have submitted a proposal to the regulator to replace a third of the meter points we operate in Western Australia." That will bring smart grid technology to more than 300,000 users, with the advantage of real time access to information about their electricity use being just one benefit.

The importance of Perth Solar City and the smart grid cannot be over-emphasised. The biggest winners will be the end users:

> "CUSTOMERS WHO SEE THE BENEFIT OF ENERGY EFFICIENCY AND BUY INTO THIS NEW TECHNOLOGY WILL SEE THEIR CONSUMPTION FALL CONSIDERABLY"

Open day at the Eco House, Perth

Information session at the Eco House open day

for many years, electricity pricing in Western Australia was kept down but it is now being increased to reflect the rising cost of energy. In the last couple of years, users have seen electricity prices go up by 57 per cent. "Our customers are beginning to understand that the high energy use they have taken for granted for so long has started to cut into their disposable income. Customers who see the benefit of energy efficiency and buy into this new technology will see their consumption fall considerably." Some customers may still choose to switch on and pay up but with the trials already showing that savings of 50 per cent are possible, a significant number will surely opt to save money while reducing their reliance on fossil fuels.

For Western Power and its partners in the electricity generation and supply chain, reduction in overall demand and any smoothing of that demand are the primary objectives. As Blaver puts it: "By gaining customer buy-in and encouraging the adoption of smart grid tools (such as in-home displays, direct load control and time-of-use tariffs) customers have achieved their stated objectives of reducing energy costs and helping the environment. In turn, Western Power can use existing resources more efficiently and minimise costs associated with expanding the network." BE

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