

Solar surplus 10 years in a row

In 1996, Stuart McQuire and Wendy Orams switched their house to solar power. Stuart tells us how the solar has performed

Ten years ago we were the first house in Victoria and the second in Australia to have grid-connected solar power. With increasing concern about fossil fuels leading to global warming, and with some corporate and government interests pursuing a nuclear future, we're keen to share our experience of solar electricity.

It works! Each year, for 10 years in a row, our house has generated more electricity from solar power than it has used. It's put an end to us paying for electricity and we receive credit for putting electricity back into the grid.

Getting started

Over time we have given our 1929 Californian Bungalow style weatherboard house a 'green makeover' without needing to renovate or rebuild.

We first heard about grid-connected solar electricity in the early 1990s when *ReNew* reported on systems being installed overseas. Not far from where we lived, the council-owned Brunswick Electricity Supply Department (ESD) had set up grid-connected solar electricity as part of its Aurora Project.

Residents could buy a solar panel, or part of a panel, and receive a solar credit on their electricity bill. The solar panels were placed on the electricity supply office building and on frames erected at CERES Environmental Park in East Brunswick, adjacent to the office building.

In 1994 we were excited to read that the Brunswick ESD planned to extend the Aurora project to local houses, factories and community buildings. We immediately contacted them and, after discussions, agreed to pay \$5000, half



the cost of a 1 kilowatt grid-connected system.

However, restructuring of the electricity industry in Victoria saw the Brunswick ESD compulsorily ac-

quired and privatised to become part of the newly created electricity retailer CitiPower. It became uncertain whether CitiPower would proceed with the Aurora project. But the door was open,

with us on one side and some of the former staff from Brunswick ESD at CitiPower on the other (led by Roger Lamb and Peter Zwack), and both sides pushing for residential grid-connected solar electricity.

Eventually CitiPower agreed to install a 2 kilowatt grid-connected solar system on our house. The panels were installed around September 1995 (by the late Ross Horman, a past president of the Alternative Technology Association (ATA), publishers of *ReNew*). Because there was no Australian standard for grid-connected solar, the panels sat on the roof through the first summer without being connected. Finally, on 4 April 1996, the system became operational.

The solar system

The 24 x 83 watt panels sit on the north-facing roof at an angle of 29 degrees, and cover an area of just 18m².

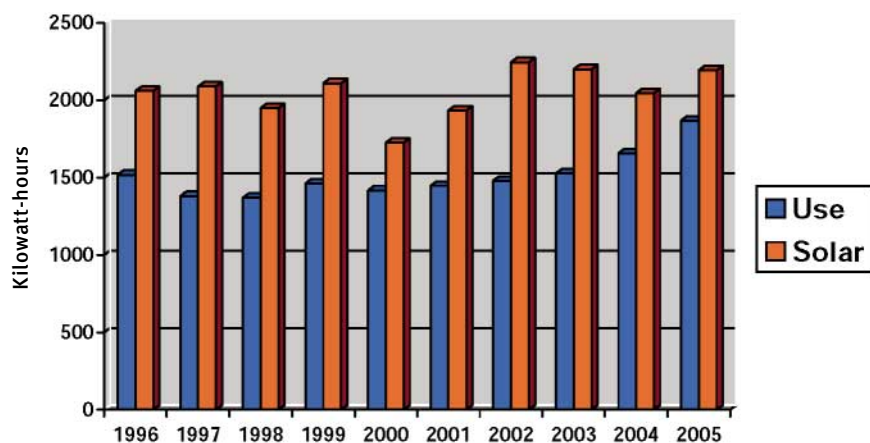
When the sun shines, the solar panels generate electricity in the form of direct current (DC), which is fed into an inverter, converting the electricity to the household standard alternating current (AC) at 240 volts.

There are no batteries or need for special wiring or appliances in the house. Meters record the flow of electricity into the grid when the sun's shining, or from the grid at night or when it's overcast.

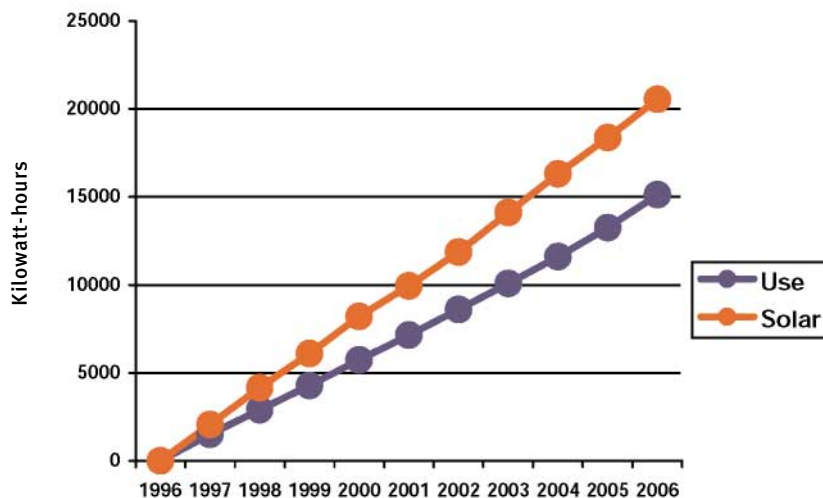
Performance

Solar electricity generation has exceeded our household consumption every year for the last 10 years. The solar panels generate around 2000 kilowatt-hours (kWh) per year, compared to household consumption of around 1500 kilowatt-hours per year.

Using less electricity has been a big part of generating a solar surplus. In some ways we use more electricity than a typical house because I work full time from a home office and the installation of new rainwater systems has



Graph 1. Annual electricity consumption and generation.



Graph 2. Accumulative total electricity consumption and generation.

increased electricity use by around 1kWh per day. We also have the normal range of electrical appliances and equipment, along with gas for cooking, heating and boosting the solar hot water. But, we have cut consumption in a number of ways including fitting compact fluorescent lights, using a medium-size fridge (rather than a large one), switching off appliances when not in use, washing clothes on the cold water cycle, and using a solar clothes dryer (clothes line).

Over the 10 years a surplus or credit of over 5000 kilowatt-hours has built up,

with the household using just under three quarters of the solar electricity that was generated. In theory, this shows that we could have used a smaller system (around 1.5 kilowatts) to meet our needs.

The billing works by crediting us at the retail rate for any surplus electricity, reducing the supply or connection charge that we pay each quarter.

Greenhouse emissions

In terms of household greenhouse emissions we have cut our emissions from electricity and gas by over 90%, from 10 tonnes per year in 1994 to less than 1

tonne per year now. This has been through a combination of reduced consumption, solar hot water and solar electricity.

Grid-connected solar today

Today grid-connected solar electricity systems are priced from around \$5000, while one that generates about the same as our system would cost around \$15,000 (after a \$4000 rebate from the federal government). A system that generated a similar amount to our average electricity consumption would cost less than \$12,000 after rebate.

It's expensive, but in the greater scheme of things may not be out of reach for a lot of people. The capital cost of borrowing or using \$12,000 is around \$840 per year (at a 7% interest rate). This is equivalent to \$2.30 per day, or less than the price of a cup of coffee

at a cafe. For that you can have a solar power station on your roof, generating the premium green power and cutting your electricity bill.

The benefits of solar go beyond free electricity. Solar power is the premium green power because it is renewable, abundant and non-polluting. Unlike electricity from coal, there's no smoke and no greenhouse gases. Unlike electricity from nuclear power there's no radioactive legacy.

A further benefit of grid-connected solar electricity systems is that they generate electricity right at the time (and place) of peak demand: on hot days in summer. Little or no maintenance is required and the solar panels are designed to last at least 20 years.

Ideally a premium rate would be paid for the buy-back of solar electricity that is put back into the grid. The most suc-

cessful schemes overseas have used such incentives to encourage the installation of solar electricity. Japan and Germany have led the way, and in 2005 Germany installed over half of all the solar photovoltaic panels installed worldwide, the equivalent of over 400,000 systems of the size we use.

Switching to the sun

Solar energy is abundant in Australia. I remember hearing Professor Ian Lowe at a conference several years ago, where he pointed out that the amount of solar energy falling on Australia in one day is equivalent to all the energy used by all the people in the world in one year.

The sun is the Earth's great source of energy. Why not use it? ★

If you would like to learn more about Stuart's and Wendy's home go to www.greenmakeover.com.au