



Solar cities generating new approaches

The far-reaching national Solar Cities program is set to trial the wide-scale deployment of the latest solar technology. It also aims to find new ways for communities to think about their energy use, and for electricity markets to deliver competitively priced renewable energy where and when it is needed.

How could you demonstrate how solar power, smart meters, energy efficiency and new approaches to electricity pricing can combine to provide a sustainable energy future in urban locations around Australia?

Answer: via the ambitious \$75 million Solar Cities program.

Administered by the Department of the Environment and Heritage, and developed under the Australian Government's recent energy White Paper, *Securing Australia's Energy Future*, the program is part of national climate change mitigation investment.

With 21 towns, urban centres and whole cities across Australia nominated to partic-

ipate in this future-scoping initiative, at least four grid-connected urban projects are being selected from these to showcase the program.

Solar Cities follows directions set by the Ministerial Council on Energy, comprised of Commonwealth, state and territory ministers responsible for energy, and will inform future greenhouse and energy market policy.

Both residential and commercial buildings, as well as industry facilities, will be involved, and valuable data will be collected from the projects to help assess the impact on electricity supply and demand and greenhouse gas emissions.

The Solar Mallee Trees sculpture in Adelaide's town centre. Adelaide City Council

Of the initial 21 expressions of interest in hosting a solar city, 11 consortia have been short-listed and decisions on successful Solar Cities are being announced in late July this year.

The short-listed contenders are:

- Adelaide Solar Citizens
- Alice Springs – Australia's Solar Centre
- Blacktown Solar City
- Brighter Future – Sydney Olympic Park/Auburn Solar City
- Central Victoria Solar Cities Project
- Coburg Solar Village
- Kalgoorlie-Boulder Solar Cities Project
- Perth Solar City
- Solar Cities Adelaide
- Solar Newcastle
- Townsville: Queensland Solar City

Key criteria for program participation include the uptake of photovoltaic technologies and the potential to impact future

'If 10 000 homes were solar equipped, Adelaide would be one of the most advanced solar cities in the world.'

supply and demand in the Solar City, especially in relation to peak loads. The potential for widespread commercial application solar technology and the ability to defer future investment in electricity infrastructure have also been given a high priority.

Parties which could be involved in the Solar City projects include electricity generators and retailers; manufacturers; suppliers and installers of solar, smart meter and energy efficient technologies; energy service providers and energy management companies.

Other participants include financial institutions, building developers and architects, community and business groups, and state and local governments.

In addition to the funds provided by the Australian Government, extra investment is being sought from consortium members or other sources that would constitute not less than 50 per cent of the total cost of each project.

Adelaide's smart metering

An Adelaide Solar City project will be included in recognition of the peak electricity supply problems of that city, and the high proportion of sunny days and higher electricity prices for consumers compared to other capital cities.

The Solar Cities Adelaide consortium, which includes such prominent organisations as the Electricity Trust of South Australia, AGL and Westfield, is proposing to facilitate the installation of photovoltaic (PV) cells on the roofs of 10 000 houses.

Professor Richard Blandy, Chairman of the Adelaide consortium and Director of the Centre for Innovation and Development at the University of South Australia, says that by redesigning PV units and bulk purchasing, the cost of installation can be cut by about 50 per cent.

That's a significant cost reduction given that a high up-front cost has so far been seen as the major barrier to wider uptake of solar power technology.

'We propose to target both existing and new homes, and the cost will be absorbed into the homeowner's mortgage repayments or by a low cost loan. Surplus power



Townsville's citizens have enthusiastically backed the town's bid to be a Solar City. City of Townsville

generated would be fed back into the grid and save the average household up to \$300 a year,' Professor Blandy said.

'Solar power generation will help to address peak demand, which is a major problem in Adelaide due mainly to the heavy use of air conditioning over about 14 very hot days in summer. During those days the whole of our capacity is utilised, while for the rest of the year we only use half of the capacity. In other words, enormous capital investment is required to meet the demands of a small part of the year.

'Also, there is a huge impact on prices because consumers have to pay for all that capacity which is only used for about four per cent of the time.

'If 10 000 homes were solar equipped, Adelaide would be one of the most advanced solar cities in the world. Renewable energy living is the way things are going and we envisage the day when the television weather report will include a solar energy segment.'

Project Director, Dr Andrew Scott from the Adelaide City Council, says a key part of the consortium proposal also involves trialing various pricing regimes linked to smart in-house meters.

'Participating households in the Direct Load Control Program would have their power usage managed remotely in response to potential peaks in demand by switching off non-essential equipment such as pool pumps. Participants would not even notice, but would gain significant

savings in their power bill as well as helping the environment,' Dr Scott said.

'The program has the potential to remove about 60 megawatts of demand at the peak. This would enable energy infrastructure investment to be deferred and reduce the incidence of blackouts and "brownouts".'

'As a comparison, our Cost Reflective Pricing Program would enable consumers to see the real price of electricity as they use it and adjust their consumption as the price changes. Thus, they could also achieve the same benefits if they choose to take action.'

The Alice is set up

Alice Springs, with a community of 30 000 people and many hours of sunshine, already has a high uptake of solar hot-water systems. But its extremes of temperature mean big peaks of energy use are still a challenge.

The Alice Springs Solar Cities proposal aims to create a model of cooperation between government, business and the community to establish market conditions that encourage the widespread use of solar energy and energy conservation, and engage the whole population in better energy efficiency.

Alice Springs Mayor, Fran Kilgariff, sees the Solar Cities program as a way of getting people to trial community initiatives that wouldn't normally occur due to lack of funding. 'It's a way of kick-starting

Progress

programs which ultimately could apply more widely,' she said.

'Our proposal involves fitting 350 households and 50 businesses with smart meters plus time-of-use pricing, and 1000 new solar water heaters will be installed along with 225 PV generators. Initiatives for local businesses include energy audits and efficiency improvements, with a revolving loans fund.

'A full spectrum support facility, called a Smart Living Centre, will be established to serve as an activity hub, coordination centre, education venue and showroom for Solar Cities program activities.'

Suburban proposals

Down south, in the cooler climate of Melbourne, a consortium led by Moreland Energy Foundation Limited has developed the Coburg Solar Village proposal.

Chairperson of the Central Coburg 2020 Steering Committee, Councillor Andrea Sharam, says the proposal targets 1000 existing and new households and 80 businesses with a combination of energy efficiency initiatives and solar technology.

'Significant measures will be introduced including interval metering to provide half hourly breakdowns on consumption with a view to reducing peak summer demand,' Sharam said.

'This will give access to data not currently available which can then be applied across the city more broadly.'

Bruce Thompson at the Moreland Energy Foundation believes the implementation of cost reflective pricing, involving a series of different tariffs at different times of the day and year, combined with energy efficient technology and education, can have a major impact in reducing peak demand.

'Although PV is a high value technology, it is currently uneconomic. There is scope for encouraging the installation of PV cells by providing premium rates for export of energy to the grid,' he said.

'We are also aiming to establish a viable business model combining PV with gas cogeneration technology to service 500 apartments in a local medium density housing development.'

Sunshine to burn

Across the other side of the country, the City of Kalgoorlie-Boulder, with a population of 33 000, has developed a Solar Cities proposal involving substantial installations of PV cells to power domestic homes, industry and aboriginal communities.



Solar lighting in Victoria Square, Adelaide.

Adelaide City Council

Mayor Ron Yuryevich says the location of the city is ideal for the development of solar energy because it receives around 340 days of sunshine, on average, per year.

'The expansion of PV technology, as well as solar panels to produce hot water, has the potential to significantly reduce the reliance on diesel fuel and gas,' he said.

'Our Solar Cities proposal is seen as a step towards developing a new solar research industry for the city, and has provided an insight into the potential for a hydrogen-based economy.'

'The importance of the Solar Cities program lies in its potential to provide integrated models for sustainable electricity supply, energy efficiency and greenhouse gas abatement ...'

'The proposal builds upon other planned initiatives such as the development of a 2.5 megawatt Sun Farm about 18 kilometres east of the city on the edge of the grid system.

'We are also working on a project to develop a viable energy source based on hydrogen fuel cells with the aim of replacing underground power generation equipment in the mining industry.'

According to Peter Dormand, City and Energy Resource Manager at the Newcastle City Council, Newcastle's Solar Cities

proposal extends existing action to develop sustainable energy use based on a combination of PV, energy efficiency and demand management through cost reflective pricing, including smart meter technology.

'The city is already on target to stabilise greenhouse gas emissions by 2008 based on 2000 year levels. Every month greenhouse gas emission statistics for the whole city are posted on the Climate Cam website at www.climatecam.com.

'As part of the Solar Cities program, we plan to work closely with residents, business and the education sector to create a high level of solar consciousness, especially in schools where a whole generation can be influenced, i.e. the "Solar Generation".'

Meeting demand

Electricity demand has more than doubled in Australia over the last 20 years, and the Australian Bureau of Agricultural and Resource Economics (ABARE) estimates that it will increase by another 50 per cent again by 2020. The increasing uptake of power-hungry air-conditioning systems and electrical appliances in homes and businesses seems responsible for this demand. With coal-based electricity provision being our single largest source of greenhouse gas emissions, the implications of this for national emissions targets are clear.

The Australian Greenhouse Office (AGO), which is coordinating the Solar Cities projects, reports that the community-scale trials will provide an opportunity to modify this growth trajectory in specific locations by encouraging distributed solar technologies, promoting the adoption of energy efficiency and load management measures, and introducing cost reflective pricing to motivate consumers to better manage and value their electricity use.

In its summary documentation of the initiative's expected impacts, the AGO says 'The importance of the Solar Cities program lies in its potential to provide integrated models for sustainable electricity supply, energy efficiency and greenhouse gas abatement which could then be applied on a much broader scale around Australia.'

The imminent trial projects are likely to produce substantial economic and environmental benefits alongside new insights on distributed renewable energy management.

● Hartley Henderson

More information:

www.greenhouse.gov.au/solarcities