



ADELAIDE SOLAR CITY: INNOVATIVE SOLUTIONS TO ENGAGE CONSUMERS AND FACILITATE BEHAVIOURAL CHANGE

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ABSTRACT

The Solar Cities programme is a \$94 million Australian Government initiative aimed at implementing innovative products and technologies to engage consumers and encourage them to better manage their long term energy use. In seven key locations, Solar Cities is creating new partnerships to save energy, increase up take of Australia's leading-edge solar technologies, reward energy efficiency and solar power generation, and showcase the economic and environmental benefits of wiser energy choices.

The Adelaide Solar City (ASC) project which is led by Origin, includes a market trial of residential solar photovoltaic (PV) systems, pricing, smart metering technology, energy efficiency products, low income housing trials and community engagement initiatives.

The project also provides a number of innovative iconic solar PV installations, one of which powers the world's first solar electric bus.

The ASC project also includes a community engagement strategy, developed in consultation with supporting Councils. The strategy provides for the recruitment of "Solar Citizens" as project ambassadors.

A key project initiative is the trial of innovative electricity pricing combined with smart metering and interactive communication technology. This includes pricing signals and the provision of up to date information (e.g. weather reports) to 4,950 participants through In Home Displays and Internet access.

Currently, the project has signed up over 40,000 customers for a Greenpower product and 350 for a solar PV system. In addition four "iconic" solar PV systems have been installed and 150 home energy audits conducted. The pricing trial is also underway.

The information collected from each Solar City will assist in the development of government greenhouse policies, with successful strategies being considered for implementation in other Australian cities.

THE ADELAIDE SOLAR CITY PROJECT

Adelaide Solar City (ASC) is an \$80 million project of which \$16 million is funded by the Australian Government with the remainder provided by a consortium.

The ASC consortium is led by Origin and includes BP Solar, ANZ, Delfin Lend Lease, Big Switch Projects and the South Australian Councils of Salisbury, Playford, Tea Tree Gully and Adelaide City.

Adelaide is a city with a population of approximately 1.17 million and is the capital of the state of South Australia. The geographic area of the project covers approximately 120,000 households in northern Adelaide.

The project which covers the period 2007-2013, has three major objectives:

- successfully deploy sufficient product quantities to test the barriers of take up of the products
- obtain data on the impact of the products and technologies on consumer behaviour to assist government policy development
- provide ongoing consumer engagement with the Project

The expected benefits of the project are:

- consumers will receive monetary and other benefits for better managing their energy use
- utilities will obtain a better understanding of the cost to service peak electricity demand and investment in infrastructure
- industry will be able to test new sustainable energy options
- better information will be available on which to base future energy strategies

The major project deliverables include:

- installation of solar photovoltaic (PV) systems on residential sites and buildings
- introduction of new Time of Use and Critical Peak Pricing products to 2 500 households
- marketing of energy efficiency products (i.e. energy audits, ceiling insulations) and the provision of energy efficiency equipment
- implementation of smart metering technology
- development and rollout of 550 innovative In Home Displays
- ongoing delivery of community engagement initiatives
- introduction of the Home Assist programme aimed at supporting financially disadvantaged energy users.
- acquisition of GreenPower product customers across South Australia

PROJECT STATUS

The project achievements to June 2009 include:

- four “iconic” solar PV systems installed
- 350 residential solar PV customers signed up
- In Home Display development completed
- 100 ceiling insulations installed
- 150 home energy audits completed
- five building energy efficiency programmes conducted
- launch of the electricity pricing products in May 2009
- smart metering and communication platform build finalised
- community engagement activities held with Councils
- Home Assist programme in progress
- over 40,000 GreenPower customers across South Australia

COMMUNITY ENGAGEMENT

The ASC initiative places significant emphasis on engaging the local community. This includes the use of media (i.e. television, radio and press advertising), council notices and consortium representation at local community events. There is also strong council involvement in increasing awareness of the project within their geographic areas.

In addition, a local family has been recruited as ambassadors for the project. These “Solar Citizens” have become a focal point for ongoing media involvement.

The community engagement approach is based on the premise that sustainable, long term behavioural change is best achieved by providing tangible benefits that encourage consumers to modify their behaviour voluntarily.

ADELAIDE SOLAR CITY PRICING TRIAL

A key component of the project is to trial new Time of Use (ToU) and Critical Peak Pricing (CPP) products with 4,950 participants with the aim of shifting electricity consumption from peak to off peak periods and reduce overall energy demand. All participants in the trial will have remotely read interval meters installed.

Two ToU prices have been developed. This includes an all year price where the peak and off peak components are applicable throughout the year and a seasonal price where consumers are charged different peak rates during the summer and non summer periods. The off peak rate remains the same throughout the year.

Two CPP options are also available in the pricing trial. CPP has a differential pricing structure that targets critical peak periods with an increased rate for a set number of hours that can only occur for a certain number of days per year. The rest of the time is a flat energy rate.

The energy rate during the critical peak period is far more expensive than the flat rate to reflect the increased cost of energy, sending a price signal to consumers about the cost of their consumption at that point in time.

The two CPP options apply from 2pm to 8pm on 10 days during the Peak Season (i.e. 1 December to 31 March). A minimum 24 hours notice is provided to consumers of a Critical Peak Day. Consumers are alerted via a number of communication options including In Home Displays (IHD's), Internet, Mobile (SMS) and phone messaging.

A pilot was undertaken with a small number of households in November 2008, prior to the rolling out the pricing products to the trial participants. Results indicate that over 70% of the pilot participants had a preference for the CPP products. This preference is based on the participant's belief that they can be financially better off by taking up this option.

Feedback from participants also indicates that they are prepared to modify their behaviour on CPP days, for example, by going out to the shopping mall or beach instead of staying at home with the air-conditioner on.

CPP alerts of a peak event were undertaken during the period 26 February to 31 March 2009. The alerts provided the first opportunity to trial IHD's, an automated callout system (that sends simultaneous messages via IHD's, email and SMS) and back office processes and systems in a live market environment.

Results from the pilot indicate that participants responded well in shifting electricity consumption from peak to off peak periods and in reducing overall energy usage.

SMART METERING AND NEW PRODUCT DEVELOPMENT

A key aspect of the pricing trial is the use of smart metering and interactive communication technology to facilitate permanent consumer behavioural change. This includes sending pricing signals to consumers and the provision of up to date information made available through IHD's and Internet access.

In 2008, Origin built a metering and communication platform in the ASC area which included smart meters, IHD's and a GPRS based communication link.

The technology platform is now complete. This includes the communication network link with the system components (i.e. meter, IHD, data management system and ZigBee transmitter / receiver). Smart meter installation is currently underway for both pricing trial participants and Solar PV customers.

The technology platform has the flexibility for future enhancements including an interface with gas and water meters and potential new product and service developments e.g.

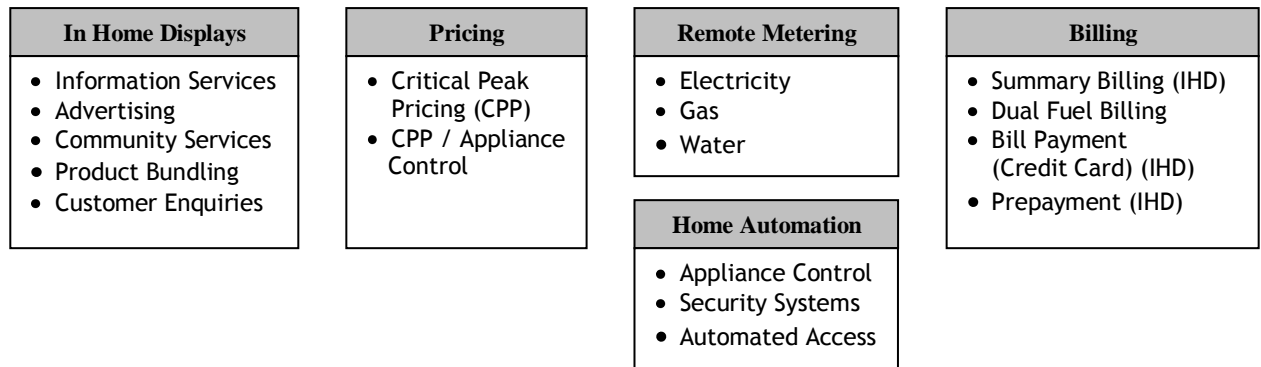


Figure 1: Potential product and service enhancements

IN HOME DISPLAY INNOVATION

Existing IHD's are primarily designed to provide energy only information, e.g. electricity usage, CPP pricing alert and greenhouse gas emissions. Consumer awareness of the benefits of IHD's from a number of Australian pricing trials has been inconclusive. Indicating that at present the IHD is perceived to be of limited value (i.e. primarily of value during the CPP period but not for the remainder of the year) and hence unlikely to maintain ongoing consumer engagement.

The major innovation associated with Origin's IHD development is the provision of content and features (ranging from weather reports to energy information) that can be of value to the consumer throughout the year.

The content aims to provide the consumer with close to real time information to assist them in managing their energy consumption throughout the year. For example, the weather forecasts can be used as an early warning of potential Critical Peak days.

The IHD consists of a portable, colour touch screen device which includes energy and general information as well as the capability to include content on gas, water, on site generation and the functionality to connect to home automation (e.g. appliance control) devices.

A number of IHD's with the following content are currently being trialled i.e.

Table 1: In Home Display content

Content	Description
Energy	
Electricity Consumption	current day and historical electricity usage displayed in 30 minute intervals
Pricing Information	current electricity charges
Critical Peak Pricing Alert	advice of Critical Peak day and applicable prices, including consumer acknowledgement
Greenhouse Emissions	amount of greenhouse gas emissions in kilograms
Solar PV Information	amount of solar generation in kWh
General	
Date / Time	day, month and current time. Time updated from the National Measurements Institute atomic clock in Canberra (Australia)
Room Temperature	actual temperature at the location of the In Home Display (under development)
Weather	weather information sourced from the Australian Bureau of Meteorology including present day forecast and forecasts for next 4 days
Community Information	e.g. information on Solar City events
Energy Information	e.g. tips on energy savings
Electricity Account Details	consumer details; including address, meter number, etc
Utility Details	including contact numbers for Utility services
Advertising	initially Solar City related advertising

Some examples of the IHD screens are shown below.

Figure 2: In Home Display screens (for illustration purposes only)

In Home Display Screen Content



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Additional content under consideration includes news and sports reports, lottery results, the Horoscope and On This Day.

Market research indicates that the IHD is seen by the consumer to address a pre-existing need in enabling them to monitor their energy consumption and as a means of managing the household's budget.

INTERNET ACCESS

Internet access for both pricing product and solar PV customers has also been implemented. The information that can be obtained on the web site includes energy usage and carbon emissions data in 30 minute intervals.

It's planned to increase site content by including information similar to that provided on the IHD.

The provision of usage and carbon emissions data through the Internet and IHD will enable a comparison of frequency of use and identify customer preferences. The key difference in the information provided, is that IHD information is close to real time

(as it is obtained directly from the meter) compared to Internet data which has a 24 hour delay.

Anecdotal feedback from trial participants indicates that the IHD is preferred as it provides the user with the real time data to make immediate decisions on their energy usage.

ICONIC SOLAR PV INSTALLATIONS

The ASC programme also includes the installation of iconic solar PV systems.

The project's first key solar installation was the Adelaide Central Bus Station. This is 50 kilowatt solar photovoltaic system used to power the world's first solar electric bus.

In addition, the Australian Government announced on 17 April 2009 the allocation of \$1.24 million in Federal funding to enable the installation by BP Solar of three additional iconic sites at the Keylink Industrial Estate, Rundle Lantern and Adelaide Central Market.

The Keylink Industrial Estate is a "greenfields" industrial site approximately 24 km north of Adelaide. Whilst the Estate will take some years to be fully developed, it has the potential to become a model of how sustainability can be achieved within the Industrial / commercial sectors.

The focus of the installation will be on educating the community and in particular, the management and workforce in the industrial / commercial sectors of the benefits of solar PV systems. On this basis, the installation will include a dedicated website with an educational focus and the construction of a viewing platform.

The Rundle Lantern installation in central Adelaide will be used to generate renewable energy to power a public art display which covers a façade of a multi level building. The Central Market site (also in central Adelaide) is a highly visible historic iconic building and the most visited tourist attraction in South Australia..

A number of smaller iconic solar PV installations have also been completed in all ASC Council areas.

RESIDENTIAL SOLAR PV APPLICATIONS

In conjunction with the installation of iconic solar PV systems, the consortium is also implementing a residentially focussed solar PV programme. This includes the installation of 1 and 1.5 kilowatt systems on both existing and new homes.

Currently, about 350 trial participants have purchased one of the programme's solar PV systems which include access to innovative financing arrangements aimed to break down barriers to the take up of solar technology.

The majority of the customers have access to their consumption and carbon emissions data via an internet site.

In addition, the project includes a community housing solar PV initiative which provides installations for low income housing tenants.

MARKET RESEARCH FINDINGS

Market research has been conducted throughout the course of the Adelaide Solar City project to track consumer awareness levels. This research indicates that more than 50% of households within Greater Adelaide are aware of the Project, and around 60% are aware of it within the Adelaide Solar City catchment area. In June 2008 the Project undertook research with 230 randomly selected residents within the catchment area to determine attitudes towards the Project, energy efficiency behaviours, and to identify barriers to taking up a Project product offering.

Following are the key findings;

- all 230 respondents claim they have made some form of energy saving measure in the preceding 12 months.
- the main motivator for behavioural change is to save money, although climate change and global warming concerns do strike a cord with residents.
- the three main barriers preventing people making a commitment to change are:
 1. lack of information
 2. procrastination
 3. waiting to move home

CONCLUSION

The requirements of the Adelaide Solar City project has led to the development of a number of innovative pricing, In Home Display and solar PV initiatives aimed at engaging consumers and encouraging them to better manage their long term energy use.

The extent that the project impacts on changing consumer behaviour will be a key determinant on the timing and cost of future electricity infrastructure.

Throughout the life of the programme, valuable information will be collected from each Solar City. Successful strategies that are sustainable in the longer term may be replicated in other cities around Australia.