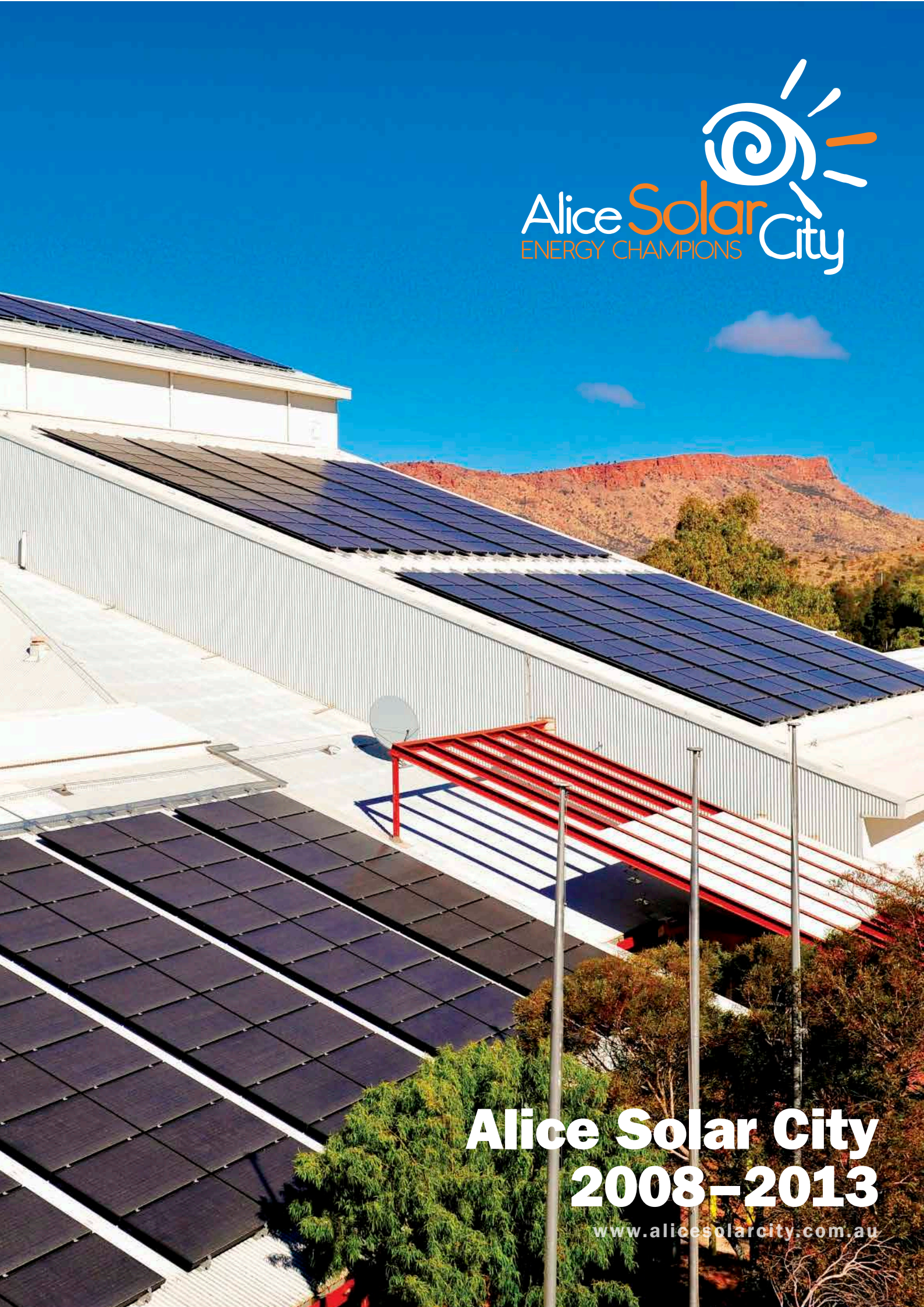

Alice Solar City 2008–2013

www.alicesolarcity.com.au

Acknowledgements

In addition to the suppliers mentioned on page 65 of this report, the following people made a significant contribution to Alice Solar City's success; a big thanks to all involved.

Alice Solar City bid

Grant Behrendorff
John Brisbane
Mike Crowe
Rebecca Kardos
Fran Kilgariff
Trevor Horman
Glenn Marshall
Brendan Meeney
Eric Peterson
Steve Sawyer
Andrew Thompson

Alice Solar City staff

General Managers

Brian Elmer (Jan 2008 - June 2011)
Sam Latz (June 2011 - June 2013)

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Scott Large
Neil Rilatt

Commercial Services Managers

Craig Hanicek
Sam Latz

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Lisa Elliott
Catherine Escriva
Stephanie Grantham
Ashleigh Grantham
Elenoa Hawea
Sara Keays
Trudy Keays
Andrey Kostenko
Aga Kozlowski
Brooke Lawson
Leanne Maloney
Renata Peters
Mike Rowell
Reece Stockhausen
Louise Way

Consortium Representatives

Grant Behrendorff (Chair)	Evolve Energy
Jimmy Cocking	Arid Lands Environment Centre
Glenn Marshall	Arid Lands Environment Centre
Rex Mooney	Alice Springs Town Council
Damien Ryan	Alice Springs Town Council
Jane Clark	Alice Springs Town Council
Jade Krudenko	Alice Springs Town Council
Dave Douglas	Alice Springs Town Council
Chris Turner	Alice Springs Town Council
Fran Kilgariff	Alice Springs Town Council
Greg Buxton	Alice Springs Town Council
Craig Catchlove	Alice Springs Town Council
Chris Kendrick	Alice Springs Town Council
Tony Cheng	Alice Springs Town Council
Kay Eade	Chamber of Commerce Northern Territory
Julie Ross	Chamber of Commerce Northern Territory
Jan Ferguson	Desert Knowledge Cooperative Research Centre
Eleanor Dennis	Desert Knowledge Cooperative Research Centre
Craig James	Desert Knowledge Cooperative Research Centre
Kym Davies	Northern Territory Government
Eva Lawlor	Northern Territory Government
Andrea Martin	Northern Territory Government
Tony Mayell	Northern Territory Government
Rabindra Shrestha	Northern Territory Government
Bob Adams	Northern Territory Government
John Baskerville	Northern Territory Government
Matthew Sloane	Northern Territory Government
Vikki McLeod	Northern Territory Government
Gillian Jan	Northern Territory Government
Marion Buwalda-Pedlar	Northern Territory Government
Trevor Horman	Power and Water Corporation
Steve Sawyer	Power and Water Corporation
Djuna Pollard	Power and Water Corporation
Maryanne Gomatos	Power and Water Corporation
Rebecca Kardos	Power and Water Corporation
Jim Bamber	Power and Water Corporation
Andrew Broffman	Tangentyere Council
Jan Berriman	Tangentyere Council

Other key contributors

Paul Della	Alice Springs Town Council
Professor Rolf Geritsen	Charles Darwin University
Biggi Gosling	Alice Springs Town Council
Simon Green	Power and Water Corporation
Laurelle Halford	Creative Territory
Lisa Havas	Charles Darwin University
Tony Jennsion	Alice Springs Town Council
Lyndon Frearson	CAT Projects
Skevos Macarounas	Power and Water Corporation
Lee Morgan	Power and Water Corporation
Sallyann Nepe	Power and Water Corporation
Dinesh Pillay	Alice Springs Town Council
Villamanda Reininger	Alice Springs Town Council
Andrew Thomson	Alice Springs Town Council
Bryan Vanderstelt	Power and Water Corporation
Kylie Wells	Alice Springs Town Council

CONTENTS

INTRODUCTION FROM MAYOR & CONSORTIUM MEMBERS

The Alice Springs Town Council is immensely proud to have been the lead agent for the success story that is Alice Solar City. The Council has invested over $1 million into the project, from the original funding bid in 2005 through to completion of the project in June 2013. For that investment Council has seen a total economic impact estimated at over $100 million, as well as the establishment of Alice Springs' reputation as a nationally and internationally recognised solar city.

Alice Solar City has been unique among the seven (7) Solar City projects in being led and delivered by a single local government authority for its community. Council's contribution to the project has been nationally recognised through awards such as the United Nations Environment Day Awards and Keep Australia Beautiful.

As well as investing in the project and leading its delivery, the Council led by example in investing in its own facilities, including large solar PV installations on its civic centre and works depot, and the large scale rooftop water heating system that is drastically reducing the gas bill for the Aquatic and Leisure Centre's heated pools.

Although the project drew to an end in June 2013, Council remains committed to Alice Springs as a true Solar City and will continue to lead the community in enhancing this reputation.

Damien Ryan
Damien Ryan
Mayor

Rex Mooney
Rex Mooney
Chief Executive Officer

Power and Water Corporation was pleased to be invited to be a founding member of the Alice Solar City consortium. Alice Springs was the first town in Australia to have electricity generated by clean natural gas in 1983 and it was appropriate to move further along the sustainable energy path by investing in the Solar City program.

Power and Water Corporation saw the Alice Solar City program as:

- A useful trial ground for the new billing and processes that will be needed in the new era
- A trial for exploring customer behaviour trends when faced with pricing signals
- An opportunity to explore the impacts on power networks from high levels of solar penetration
- An opportunity to explore the impacts of new and evolving technologies
- An opportunity to introduce utility scale solar into a regional town
- An opportunity to interact more closely with customers who are energy conscious.

The Power and Water investment in Alice Solar City has been significant both in cash and in-kind. Behind the scenes Power and Water staff have contributed well beyond the call of duty to ensure the success of the program.

Along the way many lessons have been learnt which will be valuable as we head into the new era where energy will no longer be cheap and sustainability will be more and more important. Power and Water has really appreciated the great working relationship that has been experienced with consortium partners, community groups, suppliers, the Solar City office and particularly the participants.

Trevor Horman

Tervor Horman
Manager, Sustainable Energy

The Northern Territory Government (NTG) was, and remains, very supportive of the Alice Solar City initiative. The Department of the Chief Minister's southern region office coordinated the NTG's efforts across the agencies that were involved. The Power and Water Corporation led the NTG's effort and were obviously a key player in what was ultimately a terrific team success.

I think it is a perfect example of what is so great about regional Australian communities, the ability and willingness for all to get behind something that both makes sense but also delivers a legacy that everyone now and in the future can be extremely proud of, and Alice Springs does that better than anywhere else. The exciting challenge and next step for all is how the community continues to evolve the opportunity from the platform that has been established which will probably take us down different pathways, relative of course to the level of resources that are available.

Tony Mayell

Tony Mayell
Executive Director, Southern Region

The Arid Lands Environment Centre (ALEC) has a vision of 'healthy futures for arid lands and people' and solar energy is a major part of achieving it here. ALEC has been involved with Alice Solar City since day one. ALEC staff assisted in developing the bid and building community support for the project and we continued on as a Consortium member providing strategic advice and working passionately to ensure a legacy was established.

Alice Solar City was a fantastic entry point for local people to be engaged with solar energy and energy efficiency in central Australia. Despite the thousands of solar panels remaining as a legacy to the Alice Solar City project, ALEC will continue to work with and encourage the key players to build on the wins for the long–term.

Jimmy Cocking

Jimmy Cocking
ALEC Director

In 2007, the Joint Solar City Advisory & Coordinating Committee was formed, of which the Chamber of Commerce NT was a member. We were very pleased when Alice Springs was successful in its bid to be a Solar City.

The Alice Solar City team broke new ground and never missed an opportunity to trial new technologies. The residential market welcomed this project with both arms, but initially, the business community was slow to appreciate the value in energy efficiencies. There were a few blockages along the way for businesses, such as being time poor, building leasing arrangements and the time to administer the recommendations. Eventually, businesses started to get involved and found the benefits far outweighed the blockers. Over 200 businesses participated in the project over the five years.

Alice Solar City has made an enormous economic impact to the town, and allowed many businesses to further their expertise in this field. Their new found knowledge will ensure that solar power will be the 'norm' for Alice Springs homes and businesses.

I would like to thank the Alice Springs Town Council for having the courage and foresight to see this project through to the end, and to give the residents of Alice Springs something to be proud of.

Kay Eade

Kay Eade
Executive Officer Central Australia, Chamber of Commerce NT

Alice Solar City has been instrumental in helping to foster a culture of sustainability within the Alice Springs community, and Tangentyere Council has enjoyed its participation as a consortium member of this important initiative. The program has achieved significant targets in the commercial and residential sectors, but importantly reached beyond this to include many of Alice Springs' most disadvantaged citizens - the residents of the town camps.

As the principle representative body of the town camp housing associations, Tangentyere Council has been able to advocate for financial support (through Alice Solar City) of a range of energy efficiency measures that were a fundamental part of our major town camp housing upgrades project between 2008 and 2011.

Bridging the energy divide between those who can afford to purchase 'green' technologies and those who struggle to pay their power bills will remain an important goal as Alice Springs continues to adapt to the challenges of climate change across its diverse population.

The willingness to embrace solar technologies and experiment with creative ways to minimise carbon emissions has resoundingly demonstrated a commitment to environmental sustainability from all parts of the community. Tangentyere Council is glad to have been part of this exciting project.

Andrew Broffman

Andrew Broffman
Managing Director, Tangentyere Design

From left: Fran Kilgariff (2008 Alice Springs Mayor), Scott Large and Brian Elmer (Alice Solar City General Manager 2008-2011) at the launch of Alice Solar City on 10 March 2008.

Brian Elmer and the Hon Peter Garrett (Federal Minister for the Environment) commissioning the PV system at the Alice Springs Town Council Chambers on launch day.

From left: Adam Glass (Crowne Plaza General Manager), Brian Elmer (Alice Solar City General Manager 2008-2011), the Hon Peter Garrett (Federal Minister for the Environment) and Lyndon Frearson (CAT Projects General Manager).

THE AUSTRALIAN SOLAR CITIES PROGRAM

Alice Solar City was one of seven projects funded through the Australian Government's Solar Cities Program, a $97 million national program launched in 2004, and designed to run until June 2013.

The original objectives of the Solar Cities program were to:

- Demonstrate the economic and environmental impacts of integrating cost-reflective pricing with the concentrated uptake of solar, energy efficiency and smart metering technologies
- Identify and implement options for addressing barriers to distributed solar generation, energy efficiency and electricity demand management for grid connected urban areas.

The program was designed in the national context of:

- Rising peak electricity demand levels driving up energy costs
- Growing concerns about greenhouse gas emissions levels, and
- Expanding interest in solar energy technology.

Applications for funding were invited from consortiums, for projects that incorporated and addressed the following criteria:

- Up–take of photovoltaic technologies
- Potential to impact future electricity supply and demand profiles in the Solar City over the period of the project, in particular for peak loads
- Potential to defer future investment in electricity infrastructure arising from the implementation of the Solar City project
- The use of a business model that addresses the key elements of the Solar Cities program and provides information to enable widespread commercial application
- Pricing arrangements that optimise the benefits of photovoltaic and smart meter technologies and energy efficiency and load management measures and better reflect the real costs of electricity supply to consumers at the time of use
- Community support
- Arrangements for, and access to, real-time measurement and monitoring of energy data
- Impact on projected energy use and greenhouse gas emissions for the Solar City over the period of the project

- Effective risk management, consumer education, community engagement and exit strategies
- The use of measures and technologies that can be readily deployed into existing building stock
- The proponent's capabilities to deliver the proposed project outputs on time and within budget
- Support (either cash or in – kind) from sources other than the Australian Government, noting that the Australian Government is seeking 50% leverage of total costs associated with each Solar Cities project
- Expenditure by program participants in adopting the technologies and measures being promoted by the consortium.

Desirable criteria included:

- The introduction of change in policies, guidelines or mandatory requirements that facilitate the adoption of photovoltaic and smart meter technologies, energy efficiency and load management measures, including cost-reflective pricing
- Potential for change in community attitudes and behaviour in relation to the efficient use of energy and uptake of new technologies over the course of the project.

The design of the successful Alice Springs Solar City funding application was driven by these objectives, but it also incorporated unique ideas and approaches tailored to the Alice Springs community.

Alice Springs was announced as a Solar City in April 2007 and operated in the community from March 2008 to June 2013. This document describes the town's five year journey and the outcomes of its Alice Solar City project.

Alice Solar City Chairman, Grant Behrendorff

Alice Springs – the solar heart of Australia

Our solar city journey

April 2006

Alice Springs' application to become a Solar City is submitted to the Australian Government

April 2007

Alice Springs is announced as the fifth Solar City

2008

MARCH

10 Alice Solar City is officially launched with over 400 residents attending

APRIL

10 First incentive vouchers claimed for solar hot water, lighting, painting roof white

MAY

5 First PV system installed under Alice Solar City

29 Launch of Commercial Services program

OCTOBER

1 Crowne Plaza Alice Springs announces iconic PV project

10 Alice Solar City wins Keep Australia Beautiful Award

20 First EcoSmart electricians trained in Alice Springs

22 Cost Reflective Tariffs launched

OCTOBER

20 Milestone – 500 residential customers

2009

FEBRUARY

2 Australia's largest building mounted solar PV system commissioned at Crowne Plaza Alice Springs (iconic project no. 1)

MARCH

10 Solar Systems announces withdrawal from iconic projects. Selection of replacement projects commences

20 First birthday community celebration with around 800 residents attending

MAY

4 Sponsorship of local iconic event The Bangtail Muster – community celebrates with 'solar' theme

JUNE

23 Winner of $50K Sustainable Living House makeover announced

JULY

9 Zone A Architects becomes first small business with solar PV

16 Milestone – 1000 Home Energy Surveys completed (over 10% of all households)

SEPTEMBER

12 Sustainable Living House opens to the public for the first time

OCTOBER

5 Milestone – 270 homes registered to receive solar PV

19 Funding closes for solar PV

2010

MARCH

15 Alice Solar City announces bulk purchase scheme for solar PV

JULY

1 First stage of Alice Springs Hospital energy efficiency project announced

19 Alice Springs Town Council announces Alice Solar City iconic project at Aquatic Centre

23 NT Government announces withdrawal of solar air-conditioning iconic proposal for Araluen Arts Centre. Investigation of alternatives begins

29 Roll out of In-house displays in 300 homes begins

AUGUST

4 Australia's premier solar installers event, the Appropriate Technology Retailers Association of Australia (ATRAA) conference, held in Alice Springs

SEPTEMBER

15 Alice Solar City attends World Solar Cities conference in China

NOVEMBER

4 Alice Springs Airport iconic solar project launched (iconic project no. 2)

DECEMBER

15 Uterne solar power station announced

2011

MARCH

10 Milestone – 2000 Home Energy Surveys completed on Alice Solar City's third birthday (20% of all households)

APRIL

17 Alice Springs Aquatic and Leisure Centre launches iconic solar heating project (iconic project no. 3)

JUNE

2 Cost Reflective Tariffs Trial closes to new participants (370 households participating)

JULY

10 Tangentyere Energy Efficiency project completed (in 61 Alice Springs Town Camp homes)

28 Uterne Solar Power Station iconic project launched (iconic project no. 4)

OCTOBER

9 Australian Solar Cities Annual Forum held in Alice Springs

2012

MARCH

10 Alice Solar City turns four and announces 2012 as the 'Year of Energy Champions' in Alice Springs

APRIL

24 Araluen Arts Centre iconic solar PV project announced

JULY

11 Milestone – 2500 Home Energy Surveys completed (25% of all households)

18 Commercial solar funding closes – 2200 solar panels now installed on 39 commercial premises in Alice Springs

25 Montgomery Road (site of Uterne Solar Power Station) named after Alice Springs solar pioneer Greg Montgomery

AUGUST

22 Alice Solar City has $100 million impact on the Alice Springs economy over the past 5 years (research by Charles Darwin University)

DECEMBER

10 Alice Solar City's final iconic solar project launched at Araluen Arts Centre (iconic project no. 5)

31 Residential energy efficiency funding closes ($680,000 committed)

2013

FEBRUARY

26 Commercial energy efficiency funding closes (200 commercial customers)

MARCH

6 First bird's eye study of Alice Springs rooftops reveals solar potential of 48 MW

11 Alice Solar City's fifth anniversary, Year of Energy Champions closes

MAY

27 Alice Springs Hospital Energy Efficiency project completed

JUNE

3 Milestone – final Home Energy Survey completed (2631 households – 30% of Alice Springs' homes)

14 Closure of Smart Living Centre

28 Alice Solar City ends

Staff unveiling the Smart Living Centre

ALICE SOLAR CITY EXECUTIVE SUMMARY

I am proud to present to you this document on behalf of the Alice Solar City consortium and the many people who worked tirelessly through the life of the project.

It is a snapshot of the many outcomes and achievements of the town of Alice Springs on its Solar City journey and I encourage you to seek out additional information from the individual detailed reports and case studies available on the Alice Solar City website. While the Alice Solar City project is now complete, it is by no means the end of the solar story for Alice Springs – merely the end of the beginning.

BACKGROUND

Alice Solar City, part of the Australian Government's Solar Cities program was a $42 million project designed to explore how solar power, energy efficient technologies and new approaches to electricity supply and pricing could encourage the residents of Alice Springs to become energy champions and develop a sustainable energy future.

The Alice Springs bid to become a solar city came about as the result of a grass roots community vision of Alice Springs as a world leading solar energy centre. Alice Springs receives an abundance of sunshine, but also has high energy needs because of its extreme climate.

It is also an isolated community, and its occupants have a strong sense of its unique setting and environment. The culmination of these factors is a community proud of thriving in its unique environment, and one that is extremely supportive of increased use of solar and renewable technologies.

The Alice Springs Town Council led the development of a funding bid to the Solar Cities program in response to the community ground-swell, and as part of its broader commitment to community action on sustainability and climate change. A consortium of local and Territory organisations was brought together to create an innovative and comprehensive community wide funding bid which led to the launch of Alice Solar City in March 2008.

Alice Solar City then operated continuously through to June 2013, delivering on its targets across the community.

Sam Latz
Sam Latz
General Manager
Alice Solar City

Alice Solar City engaged all sectors of the community through three key program areas:

RESIDENTIAL

A range of financial incentives and free services were available to residents to encourage them to be more energy efficient and embrace solar technologies. Participating households benefited directly from the project, as well as making a valuable contribution to reducing greenhouse gas emissions.

Key residential outcomes

- 2,711 free home energy surveys completed in participating households – 30% of the whole community and 47% of owner-occupied homes
- 277 residential PV systems installed, with an integrated package including a feed in tariff, time of use tariff and in–house display
- 908 residential solar hot water systems installed with funding support. Measured electricity savings after installation ranged from reductions of 11% (replacing existing solar units) to 16% (replacing electric hot water)
- 2261 other measures undertaken using incentive vouchers
- A total of 636 participants in the Cost Reflective Tariff trial – the first of its kind in the Northern Territory
- Over 800 residential smart meters installed in homes
- Significant learnings for Power and Water Corporation around smart metering and residential "time of use" electricity tariffs
- 61 homes upgraded in Alice Springs town camps by Tangentyere Council, each receiving a tailored set of energy efficient retrofits that provided residents with more efficient housing and better thermal comfort as well as training and employment opportunities for a group of residents.

COMMERCIAL

Tailored services and incentive packages were offered to the commercial sector. These were designed to help them examine their current energy consumption and achieve greater energy efficiency, thereby reducing their costs as well as the environmental impact of their business.

Key commercial outcomes

- 199 energy audits completed for participating businesses, which represented over 47% of the Alice Springs commercial sector's energy consumption
- 411 kW of commercial PV installed on 40 business roofs
- $434,023 of funding provided for 142 energy efficiency retrofit projects resulting in savings of 2,572,000 kWh per annum, equivalent to the annual consumption of 302 average households
- A dedicated project at the Alice Springs Hospital, resulting in energy savings of 625,000 kWh per annum and providing inspiration for similar projects in the NT health sector and beyond.

LARGE SCALE ICONIC PROJECTS

Solar technologies were installed at five high profile public locations around Alice Springs to generate significant power for the town, and to serve as visible and tangible icons of the town's solar city status.

A total of $12.8 million was invested in these projects and their completion set a number of records and firsts for Australia, putting Alice Springs well and truly on the map for solar energy.

A SOLAR POWERHOUSE

When Alice Solar City launched, there were two small grid connect systems in Alice Springs. At the end of the project, 317 solar photovoltaic (PV) systems had been installed on homes and businesses with Alice Solar City funding support, and over 700 solar PV systems had been installed in total.

Alice Springs now has more than 4 megawatts (MW) of solar PV capacity, enough to power 860 average Alice Springs homes, and to meet 3% of annual electricity needs and up to 10% of daytime demand.

Unusually for Australia, the solar PV total is spread evenly amongst sectors with 1.31 MW on homes, 1.62 MW at commercial premises, and a 0.97 MW utility scale installation.

Solar power installations represented nearly half of the total Alice Solar City project expenditure, and 46% of its total estimated greenhouse gas savings.

While photovoltaics was the defining technology of Alice Solar City, the humble practice of heating water with the sun's energy was also central to the project, accounting for 28% of greenhouse gas emissions savings.

ADDITIONAL IMPACTS

- With a $42 million combined expenditure by the consortium and participants along with spin–off benefits such as conferences and tourism, total impact on the Alice Springs economy has been estimated at $100 million;
- An estimated 9,175 tonnes of greenhouse gas savings are being made each year from the installations supported by Alice Solar City – equivalent to the emissions generated from electricity consumption by 1,490 typical Alice Springs homes;
- Investment in solar technologies, energy efficient buildings and appliances are easing the pressure on maximum demand on the Alice Springs power system;
- Solar and energy efficiency improvements to homes are now recognised by the Alice Springs real estate market as desirable features for home buyers that provide a sales advantage;
- Increased labour productivity of energy efficiency suppliers and installers has led to a higher degree of skills specialisation; a valuable asset in a town with skilled labour shortages;
- Implementation of a highly successful operations and community engagement model which has helped to inform other similar programs in the Northern Territory;
- A positive contribution to the community spirit of the town with over 30% of the population participating.

Table 1: Summary of annual savings from Alice Solar City projects (as at 2013)

Activity	kWh Saving (grid or equivalent*)	CO_2 Saving or offset (kg)	% Contribution of savings
Residential Energy Efficiency	818,760	646,820	7
Residential Solar Hot Water	1,848,100	1,459,999	15
Residential Solar PV	851,050	672,330	7
Commercial Energy Efficiency	2,572,561	2,032,323	21
Commercial Solar PV	723,187	571,318	6
Alice Springs Hospital Project	624,915	493,683	5
Crowne Plaza Iconic Project	531,000	419,490	4
Airport Iconic Project	600,000	474,000	5
Araluen Iconic Project	302,000	238,580	3
Aquatic and Leisure Centre Iconic Project	958,000	350,000	8
Uterne Iconic Project	2,300,000	1,817,000	19
Total	**12,129,573**	**9,175,543**	**100**

*Includes net savings from natural gas converted to units of kWh.

FURTHER INFORMATION

This report includes a summary of key Alice Solar City projects. Detailed technical reports can be found on the Alice Solar City website at www.alicesolarcity.com.au

Detailed reports available include:

- Residential Overview
- Residential Energy Efficiency Measures
- Residential Solar Hot Water
- Residential Photovoltaic Systems
- Home Energy Audit: Customer Feedback
- Residential Cost Reflective Tariff Pricing Trial
- Tangentyere Council Energy Efficiency Project
- Commercial Program
- Alice Springs Hospital Energy Efficiency Project
- Sustainable Living House Project

About Alice Springs – the solar heart of Australia

Alice Springs is located in the heart of Australia, in the Northern Territory. It is isolated from major centres, but as a vibrant town of over 25,000 people it enjoys an unusually high national and international profile brought about by its unique location.

Life in 'The Alice' is rewarding and somewhat laid back. This relaxed lifestyle applies to family, leisure and work and is what attracts people to the town and entices them to stay. There is much about Alice Springs that makes it unique – the people, the environment and its cultural diversity.

However, the unique environment can present its challenges and is sometimes harsh, with a long hot summer with temperatures that soar above 35˚C lasting for around six months, and the winter exposes residents to freezing temperatures overnight.

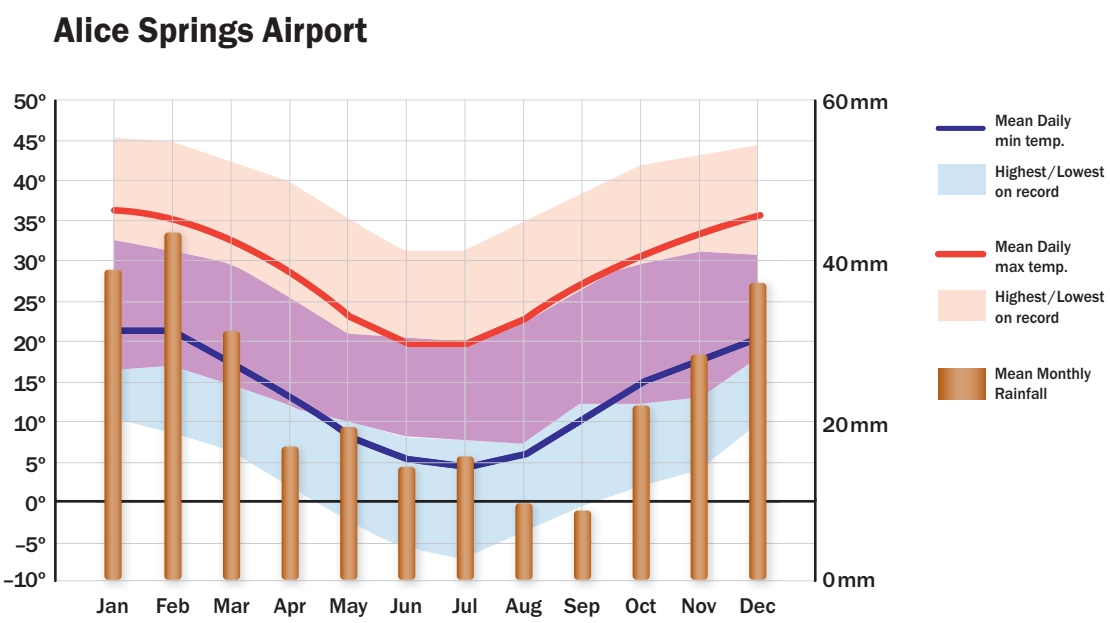
Figure 1: Map of Australia, showing location of Alice Springs.

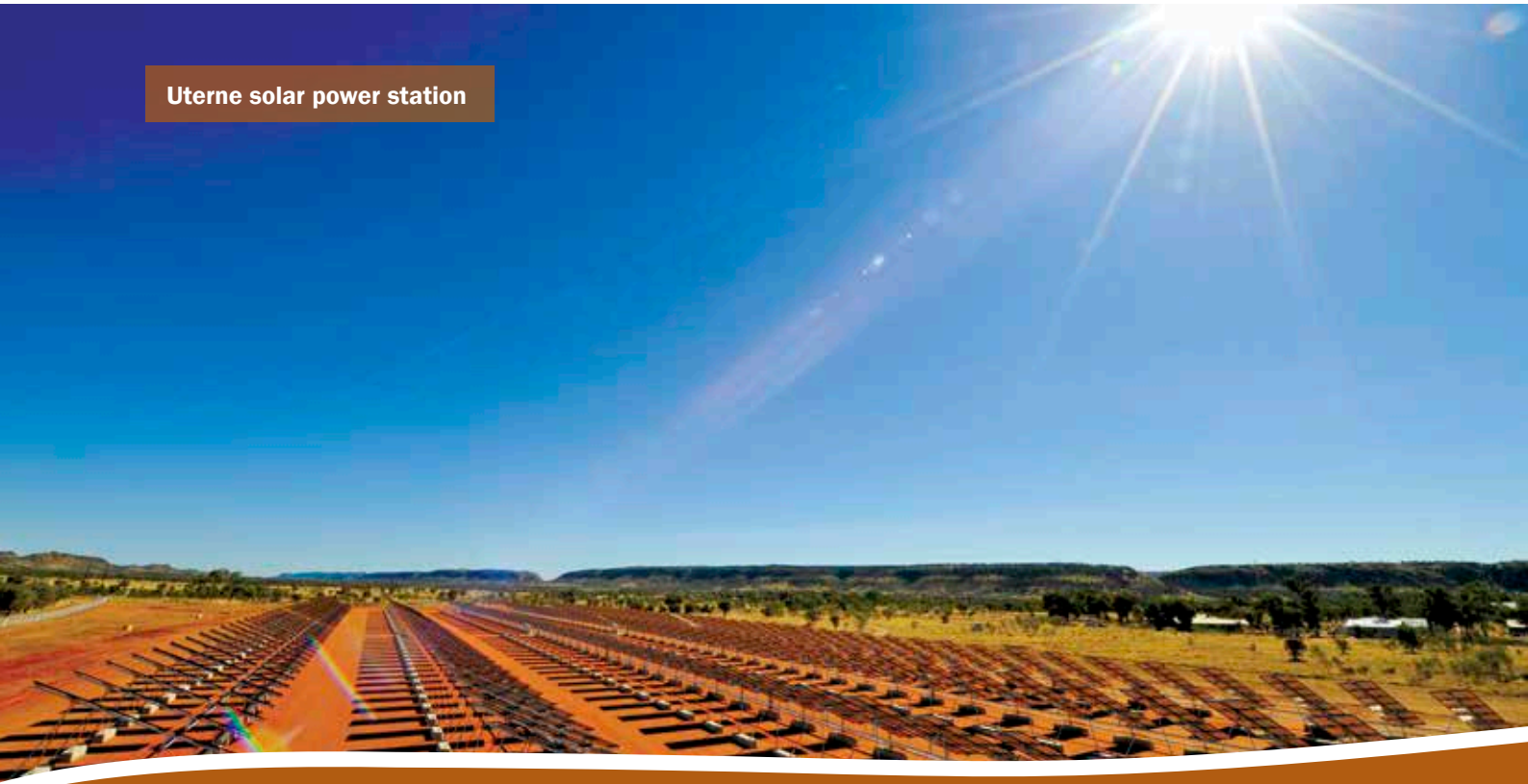
The residents of Alice Springs are passionate about their town and generally they possess a desire to protect its spectacular, but fragile natural environment. In early 2008 a benchmark study conducted within the Alice Springs community about Alice Springs as a Solar City (by MacGregor Tan Research), found that an overwhelming majority wanted to see Alice Springs as the leader in solar energy use and research in Australia.

The town's electricity comes from an isolated power grid that is run by diesel and natural gas generators.

Alice Springs has one of the highest levels of solar radiation in Australia, making it the perfect town for solar technology, including solar hot water and photovoltaic generation of electricity. It enjoys average annual sunshine of 9.6 hours per day and one of the highest solar insolations in Australia at an average of 6.1 kWh of solar energy received on each square meter per day. This is substantially higher than the major cities of Australia.

Figure 2: Average temperature and rainfall for Alice Springs





With the extremes in temperatures, Alice Springs residents are big users of their air-conditioners and heaters. Almost all houses have air conditioning installed, and also have electric, gas or wood heating for the cold winter nights. Swimming pool ownership is also high, with 30% of homes having a backyard pool.

Before Alice Springs became a Solar City, residents had already demonstrated a high level of uptake and support for traditional solar energy with about half of all households owning a solar hot water system – one of the highest rates in Australia. However, grid connected photovoltaic solar power was in its infancy, with only two installations on the grid.

Rising electricity demand was also an issue for the town, with summer afternoon demand peaking at over 55 MW, more than twice the town's average load of 25 MW.

The opportunity was ripe for a project that would increase the uptake of solar and energy efficiency technologies, and support the community in its aspirations to reduce local greenhouse gas emissions.

Figure 3: Average daily solar exposure for Alice Springs

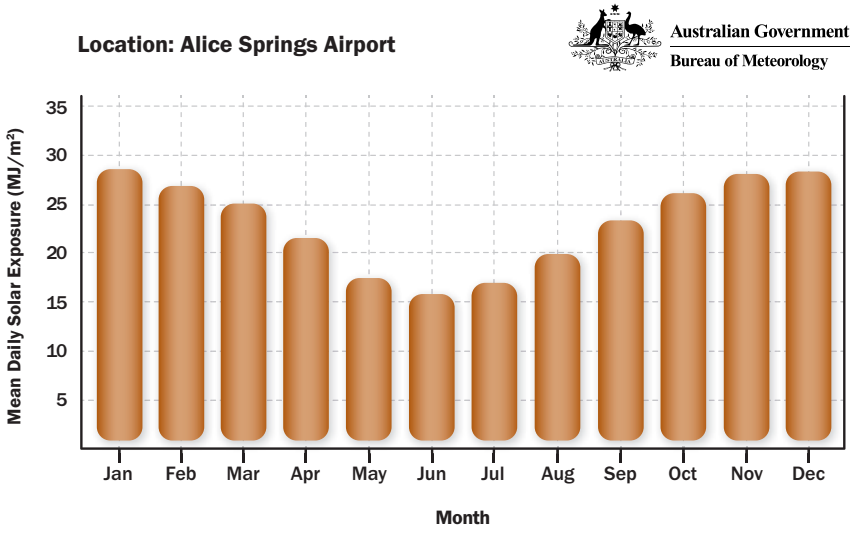
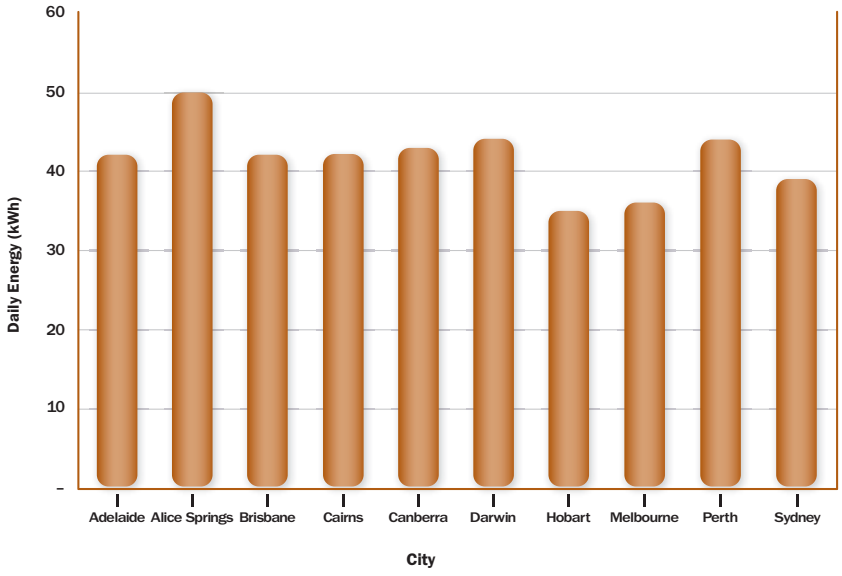


Figure 4: Daily energy generation estimates for a 1kW solar PV system at selected sites around Australia (Data Source: Clean Energy Council consumer guide 2012)



BUILDING A NATIONAL & INTERNATIONAL REPUTATION

Alice Springs enjoys 300 sunny days on average every year making it an ideal location for solar installations. The town has attracted solar investment from all over the world and has built a national and international reputation as a leader in solar technology.

Alice Solar City supported and encouraged the development of major 'iconic' projects in and around Alice Springs that played a critical part in the strategy of making Alice Springs a national and international showcase for sustainable living and the use of renewable energy.

These projects showcase large–scale renewable energy technologies, including a variety of cutting edge solar photovoltaic concentrator and solar thermal technologies. The projects were:

- A large 305 kW flat plate solar system at Crowne Plaza Alice Springs
- A 1 MW solar power station 'Uterne' south of Alice Springs
- A 235 kW solar power system at the Alice Springs Airport
- A 180 kW solar power system at the Araluen Arts Centre
- A large solar water heating project at the Alice Springs Aquatic Centre

All five iconic projects are of significance on a national level. Further, having all of these solar installations located in Central Australia has positioned the region, and indeed the Northern Territory as a national and international showcase for solar energy and renewable technology, with a reputation as a unique testing ground for future studies on the integration of solar energy into electricity generation and distribution systems.

These iconic projects have also instilled pride in the community, in the town's commitment to sustainable living; and they have also added a unique brand positioning and tangible attractions for the local tourism industry and visiting tourists respectively.

In addition to the large-scale iconic projects, the comprehensive energy efficiency programs that were available for Alice Springs' residential and commercial sectors created a groundswell of interest in incentives for residents and business owners to be more sustainable. Energy efficiency changes alone (not including solar PV) in the residential and commercial sectors resulted in a 27% of the overall CO_2 savings achieved.

The Alice Springs community is small enough that it can be innovative and experimental in energy efficiency technology and behaviour change, but it is large enough to matter on the national and international stage. The energy efficiency programs that were trialled in Alice Springs were unique for a number of reasons. The isolated electricity grid provided a

compact testing ground where results were easily determinable; the initial push to become a Solar City was led from within the community at a grass roots level, and the project was led and delivered by a single local government authority for its community (the Alice Springs Town Council).

Through this growing reputation, Alice Solar City was regularly approached by, and provided advice to other local Governments across Australia in regards to setting up a similar program in their region, and willingly shared the learnings and observations made throughout the project.

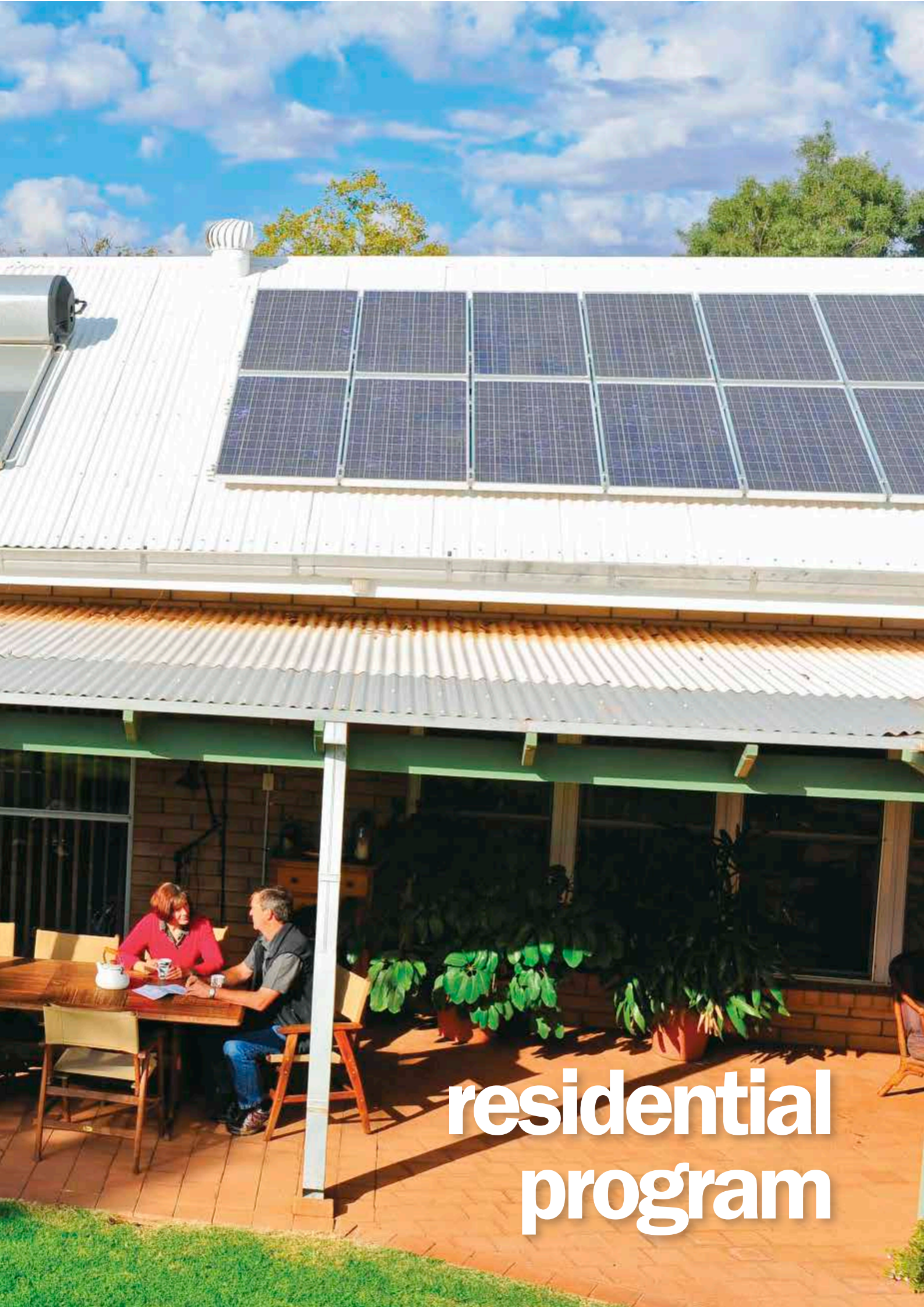
Additional solar projects in Alice Springs have contributed to Alice Springs' growing reputation as a leader in this technology. The Desert Knowledge Australia Solar Centre on the outskirts of Alice Springs showcases almost twenty different solar arrays operating in the sunny climate.

The Desert Knowledge site introduces the science of solar technologies, and a circuit walk around the Centre demonstrates the differences in the operation of the technologies. Solar technicians in Alice Springs train at the facility and a website with live data is a resource both for public education and for the solar industry.

In 2010, Alice Springs was chosen as the venue for Australia's premier solar industry event, the Appropriate Technology Retailers Association of Australia (ATRAA) conference. Industry delegates from around Australia and the world flocked to the town, attracted by its status and innovative projects.

Alice Solar City was regularly invited to present at national solar conferences and Alice Springs' reputation as a world leader in the use of solar technology was shared with a global audience at the World Solar Cities Congress in Dezhou, China in 2010, highlighting the experiences and innovative methods that were used to engage with the community through the integration of smart metering with the roll out of large and small solar power installations.


Solahart



residential program

RESIDENTIAL PROGRAM OVERVIEW

The Alice Solar City project aimed from the start to serve and benefit the full breadth of the Alice Springs community, and residents were at the centre of this. It was a big initiative in a small town. The message of community action to address climate change was inherent in the Alice Solar City project. It was about empowering the community to be aware of their energy consumption and emissions profile, and informing them of practical measures that could be undertaken, both behavioural and capital. And Alice Solar City was there to help residents to take the next step in implementing those measures.

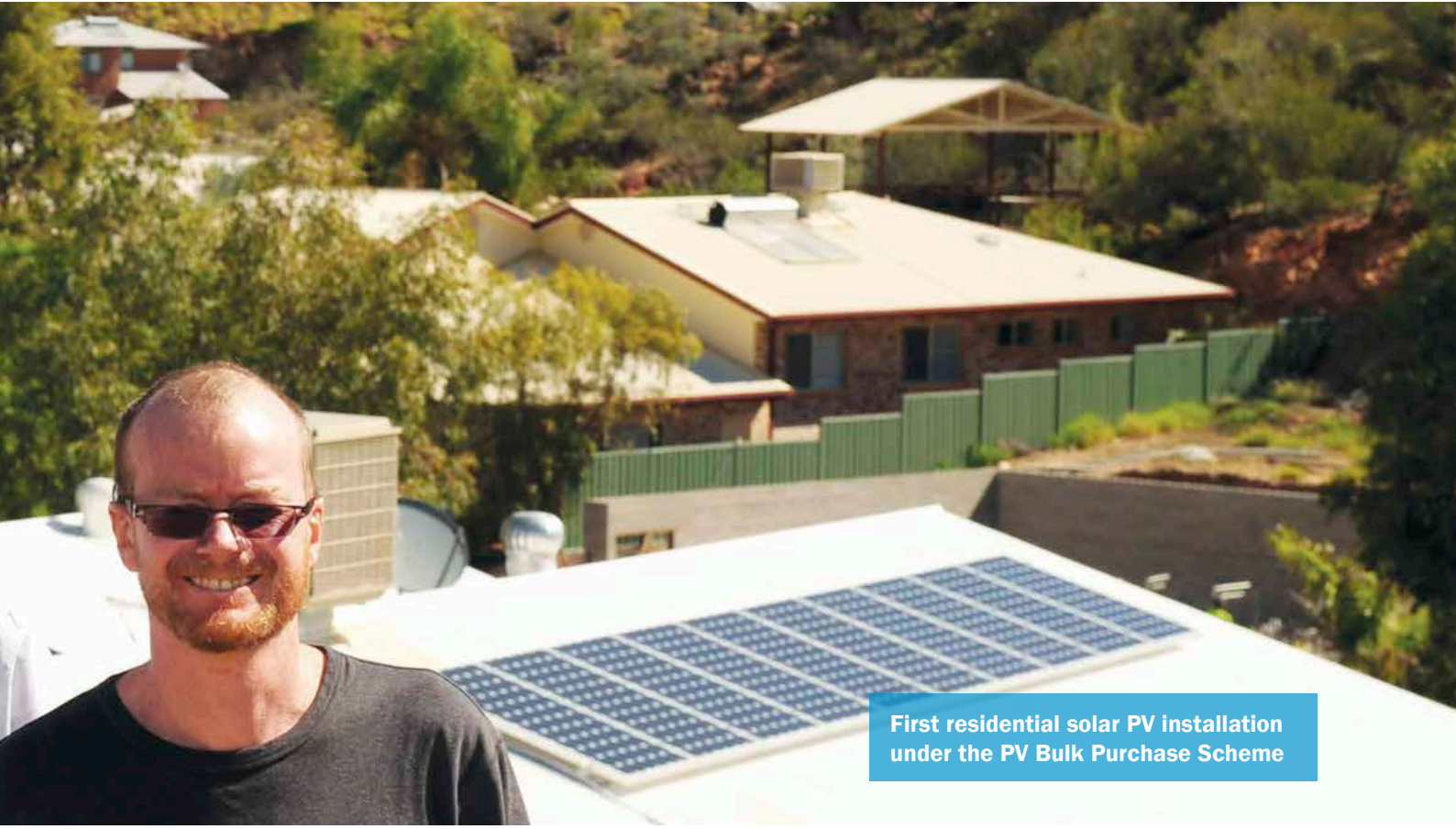
Given the relatively extreme climatic conditions of Alice Springs, the growing expectations of residents for thermal comfort and their consequent high energy use, a key goal of the Alice Solar City project was to promote the informed and intelligent use of electricity within the Alice Springs community.

Through the supply of personalised information and financial incentives, the residential program aims were:

- To increase household and community awareness of the range of energy efficiency and solar energy measures appropriate for Alice Springs, and to demonstrate they were effective options for Alice Springs residents
- To increase the uptake of household solar and energy efficiency measures, particularly based on advice relevant to individual household circumstances
- To contribute to reducing peak demand on the electricity network, and to a reduction in greenhouse gas emissions.

The Alice Solar City Residential Program included:

- Free home energy surveys (HES) with tailored advice and options for follow–up support
- Financial incentives for undertaking a wide range of energy efficiency measures (EEMs) and solar energy installations such as photovoltaic panels and solar hot water
- A new cost reflective tariff, which provided different electricity tariffs for household electricity use during off–peak and peak times, with a safety net for participants to reduce their risk of paying more
- Smart metering and in–house displays to provide interactive, visual information on electricity consumption, solar power generation, and costs
- An elevated buy–back tariff for homeowners who chose to install an Alice Solar City subsidised photovoltaic system and to sell electricity back to the grid



First residential solar PV installation under the PV Bulk Purchase Scheme

- Rewards for program participants who made set percentage reductions in their electricity consumption compared to their previous electricity accounts for the same billing period.

The Smart Living Centre (SLC) in the main street of Alice Springs was the operational hub for Alice Solar City. It provided both an office for staff and a public shop–front and one stop shop for enquiries, information, customer registrations and technology displays.

To participate in the project, eligible households had to be located within the Alice Springs municipality (local government area) and connected to the electricity grid.

More than 2,700 households voluntarily participated in the program over five years, far exceeding the initial goal of 1,500 households. This represented over 30% of Alice Springs' households participating, and close to 50% of all owner occupied homes. 277 homes installed solar PV systems with Alice Solar City support, 908 installed solar hot water systems and 2,154 other energy efficiency measures were implemented by participants. In total, households invested $12.93 million on measures supported by Alice Solar City.

In addition, 61 homes in Alice Springs town camps received comprehensive retrofits under the separate Tangentyere housing project.

"over 30% of Alice Springs households registered to become an energy champion."

COMMUNITY ENGAGEMENT & PARTICIPATION

BACKGROUND

Through community–based social marketing (a way of planning communication programs that aim to influence human behaviour), messages of community action to address energy use and climate change were inherent in the Alice Solar City project.

Further, by facilitating the uptake of visible solar energy measures, both on households, businesses, and in large iconic projects, the community and visitors alike were made aware of the town's move towards clean and green solar technologies for power generation.

Alice Solar City conducted strategic communication to take the community of Alice Springs on a journey to:

1. Engage businesses and the community in a debate about renewable energy sources
2. Prove the benefits of going solar
3. Convince businesses and community members to invest in the program
4. Support behavioural change among business, community groups and citizens, and
5. Create a community of energy champions whose behaviour would become a model for others to follow.

THE ENERGY CHAMPION JOURNEY

Alice Solar City's goal was to take the people of Alice Springs on a four step journey to become energy wise, energy savvy, energy committed and energy champions. Along the way, businesses, government, community groups and residents would be brought together to harness energy from the sun and be more energy efficient.

a) Communication goals:

At the highest level, the goal of the Alice Solar City project was to make lasting behavioural change among Alice Springs businesses, community groups and residents to:

- Shift power generation from nonrenewable to solar sources
- Reduce CO_2 emissions from power generation
- Address barriers to a Smarter Energy System.

b) Research

Initial research conducted in the Alice Springs community in March 2006 (as the bid preparation to become a solar city was taking place) helped project organisers to understand the motivators for change amongst Alice Springs residents as well as their support for such a project.

This showed that while Alice Springs was a very 'energy aware' community, there were key barriers to making change:

- People did not necessarily see the connection between the concept of energy efficiency and their own personal actions. This was particularly the case in the business community
- People lacked detailed information on energy saving options, their benefits and how to access them
- While people were prepared to make a financial commitment to energy efficiency, they did not see the tools and technologies as being affordable at this time.

The results indicated that Alice Solar City would need to concentrate its marketing and community engagement efforts in two broad areas to win the commitment, rather than just the support of the community:

1. Provide target audiences with detailed, credible and easy–to–understand information and research to enable their decision making
2. Make energy efficiency an affordable option for households and business.

c) The Alice Solar City brand

The overwhelming majority of research participants in 2006 indicated that they would like to see Alice Springs as the leader in solar energy use and research in Australia. In terms of motivating behaviour change to become more energy efficient, saving money and contributing to help the environment were the two main incentives. This eventually led to the brand 'Energy Champions'.

The statement 'Energy Champions' was chosen as inspirational and motivational, conjuring mental images of superheroes who champion a cause, in this case wise energy consumption. The statement also had familiarity for Territorians, who refer to others as a 'champion' when complementing or achieving something. This information helped to then plan the creative approach for communication activities.

d) Target audiences

The target audiences for the Energy Champion campaign were identified as follows:

- Alice Springs residents
- Alice Springs business community
- associated organisations and consortium member groups
- federal and Territory governments
- local and national media
- project stakeholders and funding bodies
- intrastate and interstate visitors to Alice Springs.

Alice Springs residents and businesses were the primary target audiences to achieve the communication goals and objectives. Stakeholders and media would help get the Alice Solar City message across locally, nationally and internationally, further building the Energy Champion brand.

An objective of the Australian Solar City program was to provide funding to cities and towns that would demonstrate to ordinary Australians that solar was a viable energy alternative. Interstate and intrastate visitors were therefore also a target of the project.

e) Communication strategy

The communication strategy was based on taking Alice Springs on a four step journey from being energy wise to energy champions. This was not to be a linear journey but a continuum through which the community moved at its own pace. A diagrammatic representation of this strategy is shown in Figure 5.

Energy Wise: Engage the community in a debate about saving energy (2006 – 2008)

- Educate the community about what it means to be a Solar City
- Engage local residents by presenting information in a meaningful, interactive manner, with an emphasis on benefits for the individual, their family and the community, and businesses
- Highlight that saving energy is achievable, they can become Energy Champions
- Reflect a strong sense of the Alice Springs community to encourage community ownership.

Energy Savvy: Prove the value of the tools and technologies (2008 – 2009)

- Recruit individual energy champions as role models
- Show target audiences the rewards available through energy efficiency
- Establish the Smart Living Centre and Sustainable Living House.

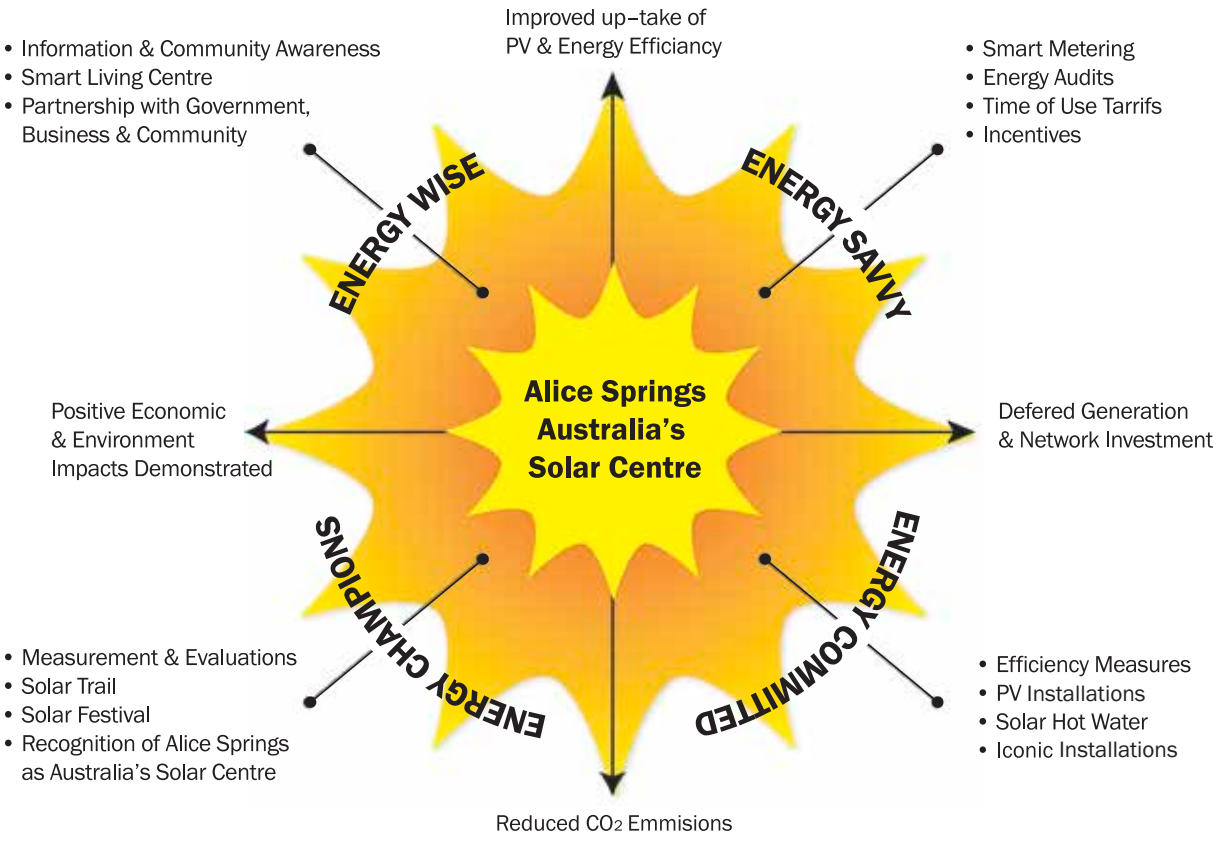
Energy Committed: Facilitate involvement in schemes and access to tools and technologies (2009 – 2013)

- Move people's mind-set from simply thinking about taking action, to doing
- Remind the community that there has never been a better time to take action
- Target promotions to existing customer database
- Support commercial partners in bringing tools and technologies within reach of registered homeowners and businesses.

Energy Champions: Showcase the achievements of Alice Springs in saving energy and reducing CO_2 emissions (2010 onwards)

- Instil pride in those residents who have taken action and show off their 'energy champion' status
- Publicly celebrate every success
- Investigate ways to make Alice Solar City a sustainable organisation
- Prepare Alice Springs for the future, so that energy saving is a behavioural norm.

Figure 5: Communication Strategy



RESIDENTIAL COMMUNITY ENGAGEMENT

Motivating residents to become Energy Champions

Promotional material and advertising was designed to inspire the community to become 'Energy Champions', appealing to their desire to change their energy behaviour and to take up different solar technologies.

We asked, *"Are you an Energy Champion"?* or *"Do you have what it takes to be an Energy Champion"?*

Breaking down the barriers to taking action

Communications highlighted the step by step process to becoming an Energy Champion. This approach was taken after research showed that becoming 'green' seemed overwhelming due to many similar messages out in the market.

Alice Solar City offered more than 20 different energy efficient activities that customers could undertake to become an 'Energy Champion'. These were broken down and promoted in separate and targeted campaigns. For example, when winter came the focus was on solar hot water; Earth Hour was leveraged to promote energy efficient lighting, and the first anniversary of being a Solar City was celebrated by inviting the whole community to an 'energy champion celebration'.

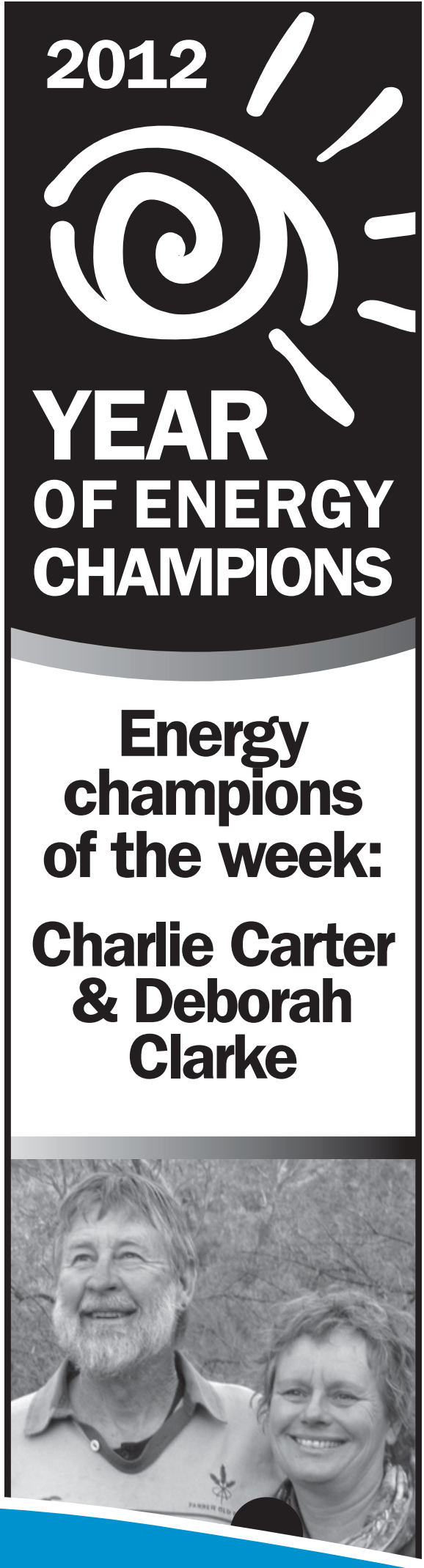
Linking energy consumption to environmental impacts

To help residents make the connection between their energy efficiency efforts and the broader environmental impacts they were making through these efforts, greenhouse gas savings were communicated in a variety of ways.

Enabling this connection using something a resident could relate to or visualise was one way to help them take pride in their energy champion status. Through promotional material such as brochures, print ads and media releases, kilowatt or dollar savings were translated into the number of tonnes of greenhouse gas savings made. This was then compared with a meaningful local measurement such as the average electricity use of a number of Alice Springs homes, or the equivalent of installing a number of solar panels on the roof. For example:

"The combined savings of the energy challenge was $6,000, representing greenhouse gas savings of almost 20 tonnes per annum, the equivalent of installing 100 solar panels."

Similar comparisons were also made in customers Home Energy Survey reports, In-house display units and online portal reports.



KEY COMMUNICATION TOOLS

Centrally located shop–front (Smart Living Centre)

A 'one–stop–shop' was created for the Alice Springs community to learn more about the program and to get involved. The Smart Living Centre provided residents and business owners with a range of interactive displays, and trained staff to talk with people and answer questions about becoming more energy efficient, solar power options etc. Having a tangible home for Alice Solar City was key in engaging the Alice Springs community.

Fact sheets

A series of colour fact sheets were prepared to provide localised information in plain language on the technologies and incentives promoted by Alice Solar City.

Online and social media

The Alice Solar City website was a key promotional tool throughout the project and was used as a call to action for many communication activities. It contained comprehensive information and tools for saving energy and it will be maintained as a legacy of the town's Solar City journey for years to come. Similarly, the Alice Solar City Facebook page (established part way through the project) provided a meaningful way to engage with the community, using a voice tailored to this media.

Advertising

Regular TV, print and radio advertising campaigns were conducted to educate the community about Alice Solar City. A regular column in the newspaper called the 'Solar Spot' was used to update the community about latest events and achievements during the first three and a half years. In 2012, weekly advertorials were placed in the local newspaper highlighting the achievements of one residential or commercial energy champion. In a small town, where people tend to know one another, this tactic promoted much discussion within the community.

TV and radio advertising was usually undertaken as part of broader Alice Solar City campaigns running at the time.

Public relations and media

As Alice Springs is a small and isolated community of about 25,000 people, regular media and PR in the local newspapers and on radio stations was identified as a very effective tool through which to communicate key messages. Regular media releases (at least 2–3 per month) were sent to media with the majority being published or on–air interviews conducted. Alice Solar City became the 'go to' organisation in Alice Springs for advice and comment about solar technology and energy efficiency.

Community events and sponsorship

Attending and participating in community events was a constant part of Alice Solar City communications. From the annual Alice Springs Show, the Desert Festival, a local EcoFair, school parades, conferences, hosting of Business at Sunset (a Chamber of Commerce business networking event) and film nights including An Inconvenient Truth, to major events celebrating Alice Solar City milestones, Alice Solar City ensured that it had a presence at all relevant community events. It also celebrated key environmental dates throughout the year, such as Earth Hour and World Environment Day.

Community updates

A full–colour community update flyer was delivered to every letterbox in Alice Springs (10,200 homes and post office boxes) around twice per year throughout the duration of the project. This provided a summary of Alice Solar City's achievements, activities and opportunities to the community.

Home energy audits

An integrated home energy audit process provided householders with instant, personalised, and informative energy efficiency advice, including a printed report.

Smart meters and In–house displays

Smart meters and In–house displays were provided to householders participating in new tariff trials to provide information on their energy use and associated carbon emissions at their fingertips.

Showcasing energy champion status to peers

In 2009, focus group discussions revealed that many customers wanted to "show–off" their energy efficiency achievements and energy champion status. Alice Solar City developed signs that householders could place at the front of their homes or garden to advertise their participation in Alice Solar City. This measure proved to be popular, particularly for solar powered homes. Further, the strategy was extended to businesses, who could showcase their involvement with a sign at the front of their premises.

Customer portal and personalised email updates

Alice Solar City launched an online personalised customer portal for customers to engage directly with their energy champion journey, and a regular personalised email provided login details and an overview report.

Once logged in to their portal, they could access information that showed how their energy consumption was tracking, the effect of climate on their consumption, and the effect of measures they had implemented through Alice Solar City to save energy.

These unique tools were developed especially for Alice Solar City and provided customers (and staff) with a much higher quality understanding of trends in consumption than previously available.

Car Wrap

Alice Solar City owned two small fuel efficient vehicles for use by staff as they travelled around town to conduct Home Energy Surveys. Therefore the vehicles were highly visible to the general community on a daily basis for five years. The vehicles were wrapped comprehensively in Alice Solar City branding with the fun statement on the back window 'I'm off to help someone be an energy champion'.

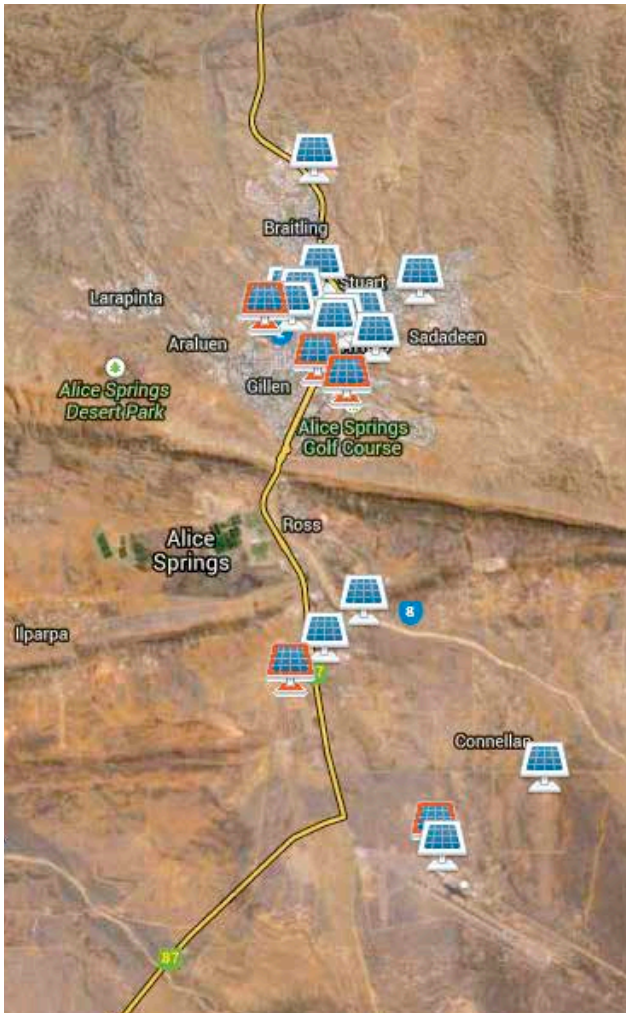
Throughout the five years of the project, Alice Solar City received a lot of exposure and had a presence around town, as noted by many residents.

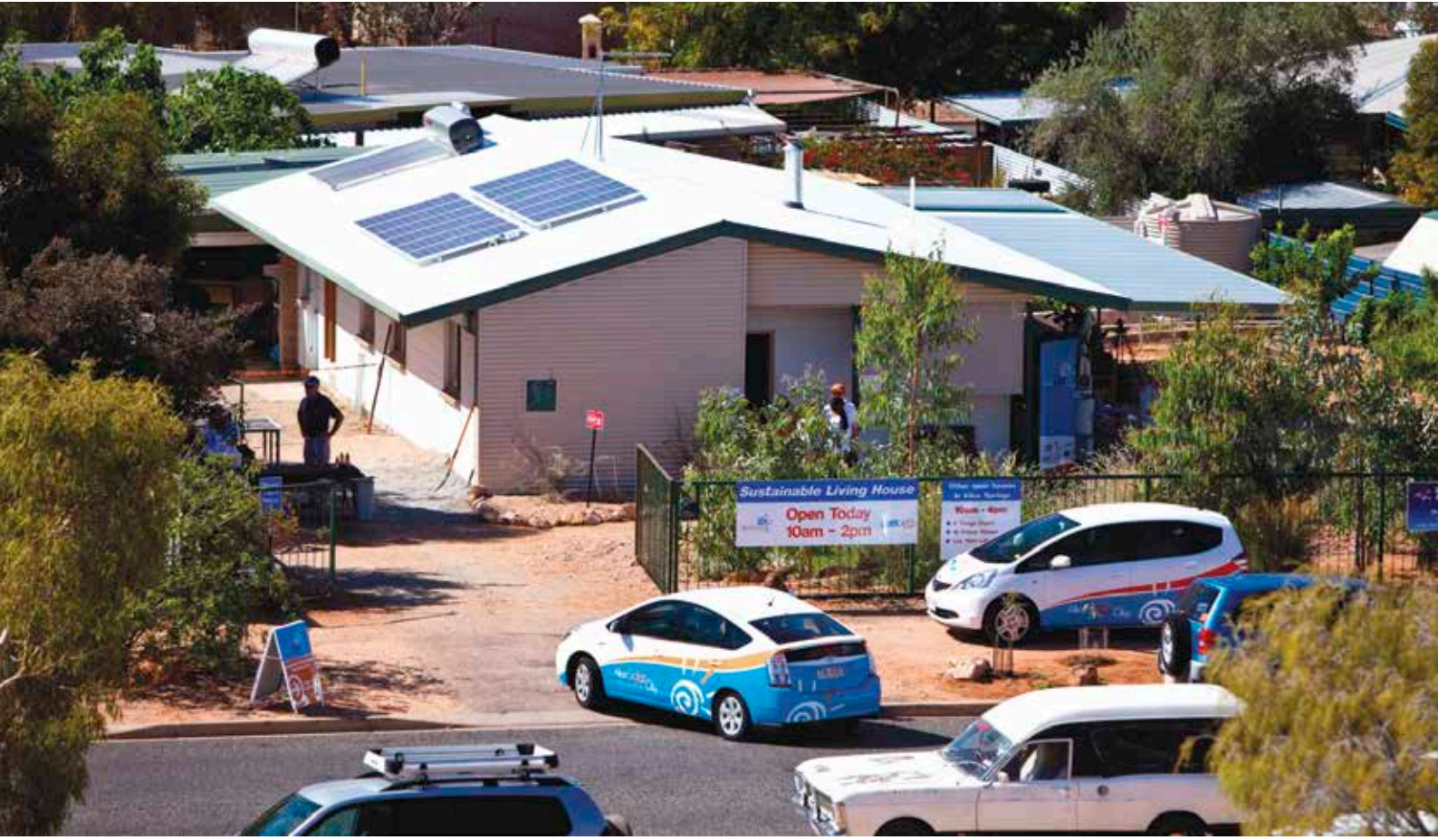
Solar trail on Google Maps

In March 2008 when Alice Solar City was launched, there were only two residential rooftop solar PV systems in Alice, and after five years there were over 700 residential and commercial installations (317 installed with Alice Solar City's support). Five large scale iconic projects were installed and 39 solar power systems were installed in the business sector.

As the solar installations grew in number, in 2011 a printed 'solar map' was produced and made available online and at the tourist Visitor Information Centre. In 2013, with even more installations around town, an interactive 'online tour' map was created using Google Maps. This highlighted an image of key solar installations and basic information, and will help leave a legacy of the solar installed under Alice Solar City.

Find the map by searching for *Alice Solar Trail* in Google Maps.





SUSTAINABLE LIVING HOUSE

In early 2009 Alice Solar City, in conjunction with desertSMART COOLmob, held a competition to choose an average existing house to undergo a sustainability make–over and become Alice Springs' Sustainable Living House.

The home in Kurrajong Drive, a typical 3 bedroom ex–government house of concrete block construction, was selected from more than 60 entries. A range of energy efficiency, water efficiency and renewable energy products were installed throughout the house and garden and the public were invited to view and interact with the house on a series of open days held over a two year period.

The Aims of the Sustainable Living House Project were:

- To provide for a demonstration home for members of the public to "touch and feel" the energy efficiency and solar energy measures being promoted by Alice Solar City and observe their benefits;
- To generate further public interest in Alice Solar City through holding an open selection process as a competition;
- To take Alice Springs residents on an energy efficiency 'journey', helping them to understand that the process was easy with the help of Alice Solar City, and to help remove barriers to them taking up the measures themselves;

- To generate on – going marketing and media opportunities as the project evolved, in terms of promoting the benefits of the energy efficiency measures installed and the experience of the residents living in the home;
- To transform the selected dwelling from an 'energy poor' house to an "Energy Champion house".

Over 18 energy and water saving devices were installed at the house. Energy efficient measures included installation of an external skin and adjustable shading, solar hot water, solar power, LED lighting, energy efficient appliances and a touchscreen LCD display showing energy generation and consumption information.

Over 1300 people visited the Sustainable Living House during the public open days with a large majority of visitors stating that they came away with an increased level of useful and practical knowledge about energy efficiency measures they could implement at home.

To ensure the legacy of the Sustainable Living House remains after Alice Solar City closes, an online virtual tour of the house was created. Residents will still be able to experience first hand the sorts of measures they can undertake in their own home to save energy. The virtual tour includes video and audio of the main measures installed at the house.

MAJOR CAMPAIGNS

Launch of Alice Solar City

Prior to the launch of Alice Solar City a series of TV and print 'teaser' ads were rolled out to create a feeling of 'build–up' to something big. Residents were also able to 'pre-register' their interest to participate and become the first Alice Solar City customers.

The launch itself in March 2008 was designed to be a large celebration to which the whole community was invited. The main street was closed to provide a space to hold the event outside the new Smart Living Centre, which would be unveiled on the day. Over 400 people attended the early morning breakfast event, which included an official launch by Federal Minister for the Environment Peter Garrett.

100 Days of Solar campaign

In July 2009, Alice Solar City issued a solar challenge to the Alice Springs community: for 100 home or business owners to commit to installing 100 rooftop solar systems in 100 days. Alice Solar City's target was to have 225 solar systems installed in Alice Springs by 31 December 2009, however sixteen months into the program only 70 solar power systems had been installed.

It was time to put the pressure on the residents of Alice Springs. Using an integrated communication plan that included traditional media, advertising, blogs and motivational tools Alice Solar City exceeded their overall program target by 54%. Just 50 days into the 100 day campaign, 103 residents had ordered a solar system. By the end of the campaign 400 more residents were on a waiting list.

Solar PV Bulk Purchase Scheme

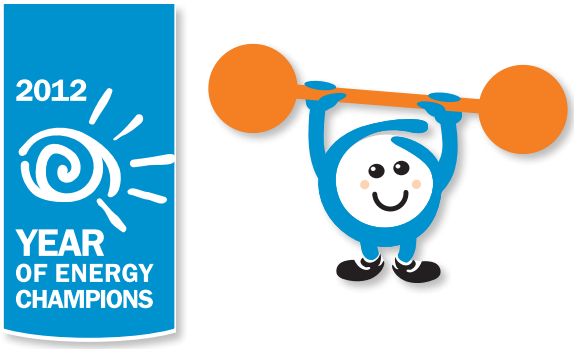
After Alice Solar City funding for solar power systems was fully committed, a large number of customers remained on a waiting list. To help these customers go solar, Alice Solar City initiated a Bulk Purchase Scheme, challenging the Alice Springs community to be the first town of its size in Australia to have 10%, or 1000 of its buildings run by solar. The '1000 Solar Roofs in 1000 Days' campaign aimed to see 1000 Solar PV systems installed by the time Alice Springs had been a Solar City for 1000 days. It was an ambitious target and was not reached for various reasons, but especially the effect of rapidly reducing rebates and increased building regulation and network connection costs on the price of installation.

The year of Energy Champions campaign (March 2012–2013)

A year long campaign was embarked upon to showcase Energy Champions across the community. Both business and residential champions were featured weekly on the website, in the local newspaper and via social media. This generated good news stories in the community and helped to promote achievements made, culminating in a celebration at Alice Solar City's 5th birthday party in March 2013.

Energy challenge

The fifth birthday also saw the completion of a 12 month Energy Challenge for residents and businesses, in which some chose to make a public commitment to reduce their use by 10% – 20%. It resulted in total energy savings of $16,400 per annum, with participants' commitments showcased on the website.



Put the chill on your bill campaign

At a time when the financial incentives were no longer available, but free home energy surveys still were, a campaign over the long, hot summer of 2012/13 took place highlighting the three measures that could achieve the biggest energy and financial savings in the home, installation of solar hot water, variable speed pool pumps and solar PV. This came at a time when the Northern Territory had just announced a 40% increase in the power tariff in January 2013, so the timing was perfect. Up–take of these measures remained steady throughout the campaign period.

Facebook your fridge competition

In November 2011 Alice Solar City brought in a new incentive to encourage homeowners to surrender or swap their old, rarely used or inefficient fridges. A $100 surrender voucher was introduced to encourage people to think about whether they really need their old or extra fridge or freezer, those taking up the offer will also have their old appliance collected, degassed and disposed at no charge.

The Surrender, Swap or Switch Off campaign asked homeowners to enter images of their old fridges as part of the Facebook your Fridge competition, the first major use of social media by Alice Solar City. The prize was either a summer supply of ice-cream or mega sized esky.

Cool summer campaign

In preparation for the summer of 2010/2011, Alice Solar City wanted to help educate residents on how they could reduce their energy use over summer while still keeping cool. Alice Solar City wanted to show it was possible for people to maintain their normal comfort level at home in summer, without having their electricity bills go through the roof. A small booklet was produced and delivered to every household to demonstrate the types of measures and habits that could be implemented and altered around air-conditioning, fans, pools, shading, roof colour, insulation and solar hot water, with a call to action to take advantage of the Alice Solar City incentives available. A print and TV campaign accompanied the booklet mailout.

Hot box competition

As part of the Cool Summer campaign, Alice Solar City put the call out to the community to find Alice Springs' most needy "Hot Box", a house that was a real 'stinker' in summer, to give it a $5000 summer cooling makeover. Dozens of residents entered the competition. Alice Solar City chose two winners, with one stating that her 'house was so hot, that she would often rather sleep in the backyard, 'roughing it' with the chooks, than in her home!'

Alice Solar City undertook energy efficient measures such as servicing the air-conditioner, painting the roof white and the installation of insulation and shading on west facing windows. This campaign received considerable coverage in the local media and worked well within the Cool Summer campaign.

EXAMPLES OF ALICE SOLAR CITY PROMOTIONAL COLLATERAL

MEDIA COVERAGE

Alice Solar City attracted 877 media coverage items (print, radio, television) over a five year period – 678 local (NT), 191 national and 9 international.

Pledge paying off

Katie Weiss

PEOPLE taking part in the Alice Solar City Energy Challenge have saved an average of 15 per cent on their power usage in the first six months of the competition, which ends in March.

They have made pledges to cut down on energy use through goals including buying energy efficient appliances and light bulbs, turning ... switches and air... installing ...

He said almost 20 tonnes of energy would be saved in the competition, the equivalent of installing 100 solar panels. The competition winner will be drawn randomly from participants who have reached the energy saving target of 10 per cent reduction by April next year. The prize is $2000 to be spent on home energy-saving devices.

Mayor Damien Ryan is one of the participants and has pledged ... switch his home airconditio... ...ooms being used.

Deputy ... plans to r... energy e... variable ... the hou...

POSITIVELY ALICE
N.T. WE LOVE CENTRAL AUSTRALIA

Alice Springs residents enthuse about Solar Cities innovation

Raggatt Street resident Bill Pechey is thrilled to be part of the Alice Springs' solar city community.

Energy use trial proves a winner

Erin Jones

NEARLY 300 homes in Alice Springs have in-house display units that show their energy consumption and household CO2 emissions.

It is part of the Solar City's Cost Reflective Tariff trial that encourages people to use their power during off-peak times.

Homes that took part in the trial have LCD touch screen ... installed.

The technology allows household... to see their power usage ... week or month and their ... during peak and off-... It works by a short... wireless system that ... information from ... in the meter box.

...city general man...

Brian Elmer explains to Judy Hoban how it works. Picture: KABIR DHANJI

...ager Brian Elmer said: "Having this information at their finger-...

this is one of the few places in the country where this sort of technology is being trialled. It is a great way to curb energy use.

"Currently there are 270 households in Alice Springs that have changed from being charged a flat rate for their electricity consumption, to a peak/off-peak pricing structure."

This means people have shifted their power use from peak time, which is Monday to Friday from 9am to 6pm.

Householder Judy Hoban said: "It's the way to go. We have a pool cover and the roof is painted white, so we're interested to see the difference from

Pool in hot water with solar

Erin Jones

SOLAR panels for the Alice Springs Aquatic centre will be the latest component of the Alice Solar City project.

Funding was allocated for 275 Helioso... solar collector panels to heat two indoor and outdoor pools.

Alice Springs town council and the Australian Government each contributed $150,000 to the project.

Alice Solar City general manager Brian Elmer said the panels are significant to the project.

"It is exciting to see solar considered as a first option for such a large and new development in Alice Springs."

"This project will further enhance the town's reputation as a leader in solar technology."

The solar panels on the roof of the centre will help reduce gas usage by 30 per cent.

They will meet 40 per cent of the heating requirement for indoor pools, which will increase to nearly 100 per cent during summer.

Mayor Damien Ryan was excited about the funding that was provided as part of the Solar City project.

"As the lead proponent of Alice Solar City, this project is a ...

Solar Cities' general manager Brian Elmer with a mini version of the solar panels that will be used for the pool.

Alice leads solar world

AN Australian study on the impacts of solar generation on urban electricity grids has revealed Alice Springs has valuable experience and expertise to share with the rest of the world.

Alice Springs was the first Australian town chosen to go under the microscope in the research by the Australian Photovoltaic (PV) Association.

The research will feed into Australia's active participation in the International Energy Agency (IEA) PV Power Systems program (PVPS), which provides a forum for all IEA countries to share knowledge and experiences on the integration of high levels of PV into electricity grids.

Alice Solar City general manager Sam Latz said: "It's all about the penetration level of solar in our town, the impacts and repercussions of that, and how our experiences can help the national and international industry.

"In the past three years Alice Springs has gone from a penetration level of virtually zero, to 2.5 per cent, which means that the town now meets 2.3 per cent of its electricity consumption per annum via solar PV.

"This increases to a peak of 8 per cent on sunny winter days.

"Alice Springs may just be a small dot on the Australian map, but we have a reputation as a leader in solar technology and have valuable solar lessons to share with the rest of the world."

A separate local study by Charles Darwin University is looking at the effect with the highest number of connected PV systems and how that affects the local and broader electricity network.

Alice Springs was selected as the first case study for the national research project because its electricity supply system is similar to many regional areas in Australia, it has extremely high solar exposure and because of the sheer amount of support for solar projects in the town.

To view the detailed report visit www.apva.org.au/AliceSprings-PVReport

Sam Latz

It takes a town like Alice to shine light on power

...sha Robinson

...E Springs's largest hotel is ...erect the biggest solar panel ...tion in Australia, which ...rovide between 40 and ...cent of the hotel's power ...ents.

...rowne Plaza, overlooking ...Donnell Ranges, has ...The Alice Solar City ...will erect a $3 million ...l of a push by the ...alian town to reduce ...ootprint.

...lion will be made ...arrays, comprising ...educed solar mod...ecreate 730,000 ...er each year — ...ergy required to ...olds for a year.

...allation is ex...the hotel's ...420 tonnes of ...year.

...also link a ...each guest's ...ail-time ex...wings. To...play in the ...nel will ...rooftop ...le power ...nerated ...be gas ...alia's ...em

Venture: Peter Garrett, right, with managers ...

...sunniest city ... is one of seven ...cities selected for ...federal ...$94 million Solar Cities program. ...The town is aiming to reduce its ...overall carbon footprint by 5 per ...cent each year.

Federal Environment Minister Peter Garrett visited Alice Springs ...yesterday and announced the ...solar installation. He also unveiled a world-first interactive ...website at the Desert Knowledge ...Australia Solar Centre that will ...monitor 15 solar installations and ...provide real-time scientific and ...technical data to the solar industry.

The Alice Solar City project is being led by the Alice Springs ...town council and also includes ...consortium members, the North... ...Territory ... Government, ...

Northern Territory Power and Water Corporation, Tangentyere Council, Northern Territory Chamber of Commerce, the Desert Knowledge Co-operative Research Centre and the Arid Lands Environment Centre.

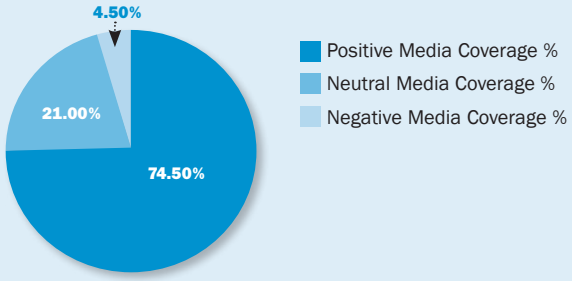
Under the project, several more large-scale solar power installations ... are ... will be offered discounted domestic solar hot water systems. The consortium is also carrying out energy audits of homes.

Perth, Adelaide, Townsville, towns of central Victoria, Blacktown, in western Sydney, and Coburg, in Melbourne's north, have also been selected as solar cities.

The chairman of the Alice Solar City Consortium, Grant Behrendorff, said: "For years and years, everybody has been saying that Alice Springs is such a logical place to have a solar project, but for years it hasn't happened," Mr Behrendorff said. "It's part of the great awareness ... of climate change. It still takes somebody or something to make it happen."

KEY RESULTS – Community Engagement & Participation

Table 2: Evaluation of Communication Strategy

OBJECTIVE	RESULT
Alice Springs will become energy wise, engaged in debate about energy efficiency, with: • 40 media mentions in Alice Springs or national media per quarter • 70% positive media coverage • 500 visits to The Sustainable Living House, a practical demonstration of the benefits of energy saving by June 2010	 • Average of 43 mentions per quarter • 1300 visits over 2 years of operation
Alice Springs will become energy committed, with widespread involvement in the Alice Solar City Project demonstrated by: • An average of 30 enquiries per week to the Alice Solar City Smart Living Centre • An average of 65 new Alice Solar City registrations per month from 2008 to 2013	• An average of 75 enquiries per week • An average of 74 registrations per month
Alice Springs will be an Energy Champion with: • 1500 Domestic registrations by 2013 • 50 Business registrations by 2013 • Installations of 225 photovoltaic solar power systems • Installation of 1000 solar hot water systems	• 2,700 Domestic registrations achieved by March 2013 • 193 Business registrations achieved by March 2013 • 316 PV systems installed by September 2012 • 908 solar hot water systems installed by December 2012

ONLINE ENGAGEMENT STATISTICS

Figure 6: Website visits per month

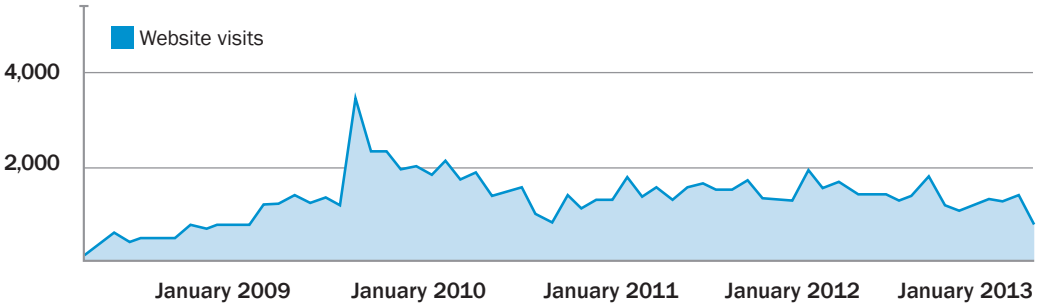


Figure 7: Website visits by type

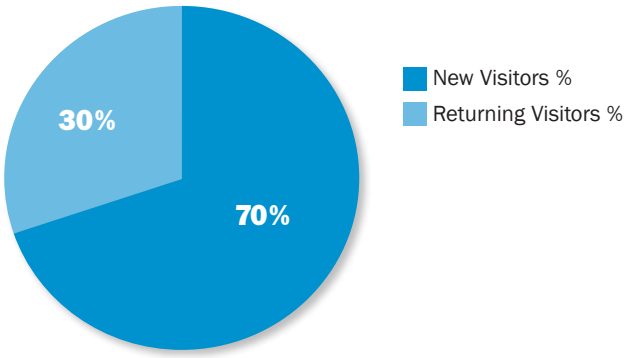


Table 3: Origin of website visitors (life of project)

Country/Territory	Visits	%
1. Australia	56,733	73%
2. United States	5,557	7.16%
3. United Kingdom	1,515	1.95%
4. India	1,449	1.87%
5. China	1,081	1.39%
6. Malaysia	1,058	1.36%
7. Canada	831	1.07%
8. France	732	0.94%
9. Germany	646	0.83%
10. (No Set)	500	0.64%

HOME ENERGY SURVEYS & FOLLOW–UP SERVICES

THE HOME ENERGY SURVEY

Household electricity use can often be an intangible aspect of living costs for many individuals. Understanding the relationship between household appliances, personal behaviours and electricity consumption may be overlooked or miscalculated, and the ways in which consumption choices influence environmental issues is often misunderstood.

For these reasons it was important to educate the Alice Springs community and create greater awareness around energy consumption and its impacts so residents could make informed and intelligent choices relevant to their circumstances. This was a major goal of the free Home Energy Survey provided by Alice Solar City, and it was designed as the launching point for access to all incentives. The other primary goal of the survey was to gather information including each household's demographics and existing appliances.

The first step for potential residential participants to become involved in Alice Solar City was to register their household and book a time for a Home Energy Survey.

Registration at the Smart Living Centre included the customer signing a release to enable their electricity consumption data to be made available to Alice Solar City from Power and Water Corporation.

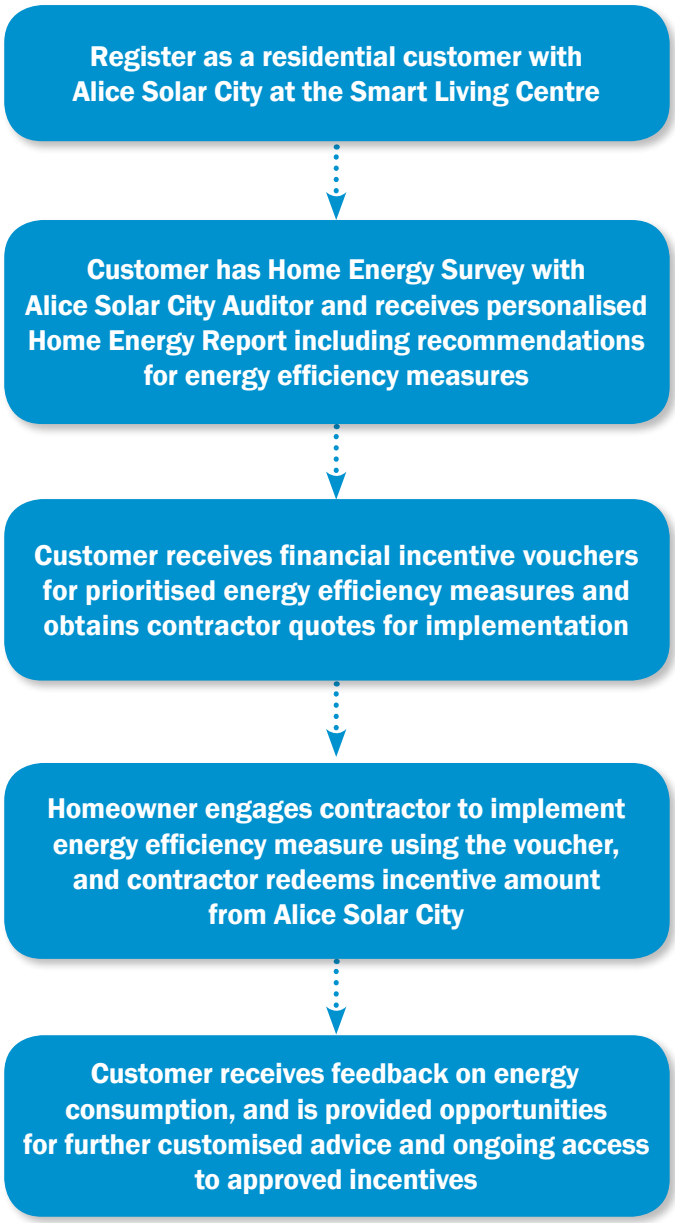
An Alice Solar City trained energy auditor then visited the customer's home for the Home Energy Survey.

This typically took 1.5–2 hrs and involved:

- A discussion about the household's historical energy consumption in relation to Alice Springs averages and an "Energy Champion" house
- A walk around and through the home with the customer, collecting data on appliances and home construction and to discuss house design, installed appliances, and appliance use with the customer
- A sit down discussion to collect demographic data and to prepare a customised and prioritised list of recommendations within the Alice Solar City database
- Printing the customer's personalised Home Energy Report and Incentive Report.

Homeowners then interacted with both Alice Solar City staff and registered suppliers to undertake energy efficiency measures and to use Alice Solar City incentive vouchers. This process is summarised in Figure 8.

Figure 8: Summary of registration process.



FOLLOW–UP SUPPORT

Existing Alice Solar City customers were offered a range of free follow–up services if they wished to gain advice to further reduce their energy use. This ranged from a brief discussion on the phone or in person at the Smart Living Centre, to having an auditor revisit their home for a follow up survey to provide specific advice or to do a full second Home Energy Survey. Customers were eligible to apply for further financial incentives any time after their initial survey.

Figure 9: Customer Home Energy Report (first page)

Home Energy Report

Australian Government Solar Cities

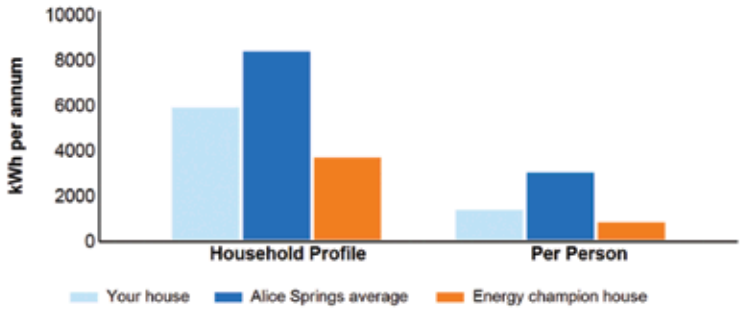
Alice Solar City ENERGY CHAMPIONS

Prepared on: 09/09/2008
For: Jo Blo
Address: [redacted] Street, Araluen

Present:
Auditor: Lyndon Hodges
Ph: 08 8950 4353

Your household electricity consumption

Estimated annual electricity consumption - kWh/year



Previous household electricity usage - kWh/day

Annual electricity consumption and cost* - **Your household**	6,000 kWh/yr	$1,230.40 /yr
Annual electricity consumption and cost - **Average Alice Springs household**	8,500 kWh/yr	$1,688.15 /yr
Annual electricity consumption and cost - **Energy Champion household**	3,800 kWh/yr	$827.58 /yr
Average daily electricity consumption for your household*	16 kWh/day	
Number of occupants	4	
Per person annual electricity consumption, for your household*	1,500 kWh/yr	
Annual household greenhouse gas emissions for your household*	4,140 Kg of CO2/yr	
Estimated annual gas consumption and cost - from available information	0 Ltr/yr	$0.00 /yr

** Estimates based on available data prior to Home Energy Survey*

Breakdown of your electricity consumption

Understanding your household energy use can help you consume less electricity and be more efficient, helping to save money on bills and reduce environmental impacts. Based on the assessment of your Alice Solar City auditor, we have ranked the key areas in which your household is consuming electricity, from highest to lowest. This knowledge can assist you in deciding where to focus your efforts to reduce your household's electricity consumption.

1.
2.
3.
4.
5.
6.
7.

SUMMARY OF UP–TAKE

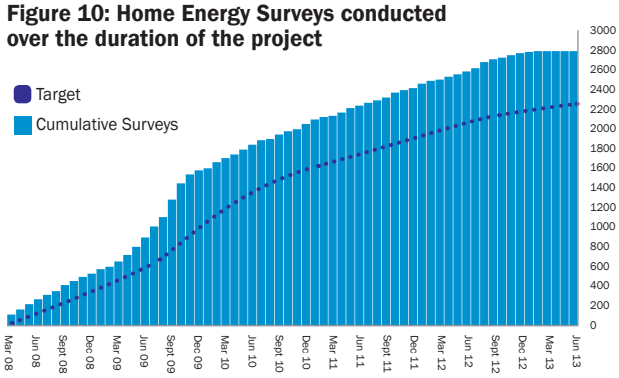
Home Energy Surveys

Alice Solar City had an initial target to provide 1,500 surveys. In mid 2009, this was revised upwards to 2,250 in recognition of the progress being made.

Alice Solar City offered new customers access to incentives from the residential program's launch on 17 March 2008 up until 31 August 2012. During that time, there were 2,797 registrations across 2,560 properties, with some properties having multiple registrations due to landlords also registering, and due to changing occupants. In total, 2,631 energy surveys were completed, well above even the revised target.

Due to demand, new customers were invited to register for a free home energy survey, after the close of financial incentives on 31 August 2012. These customers were not eligible for incentives. A total of 92 additional registrations were received with 80 audits conducted for these customers up until the very last survey on 1 June 2013.

Figure 10: Home Energy Surveys conducted over the duration of the project



Owner occupiers constituted 88% of customer registrations, and of this group 95% had a Home Energy Survey, approximately 22% terminated their registration (usually as they left the premises), and 1.8% moved into newly built homes. Rental tenants constituted 7.5% of registrations and landlords 5.5%.

Of the estimated 8,400 households in Alice Springs, 30% participated in Alice Solar City's residential program, representing over 37% of the total population. An estimated 4,400 of Alice Springs dwellings are owner occupied, and 51% of these joined the project. In contrast, just 9% of Alice Springs rental properties participated.

Follow–up support results

A total of 165 follow up visits were held with customers in their properties to address particular concerns or provide a review of overall energy consumption. A number of these were linked with promotions, such as a free summer pool energy consultation with a pool–pump prize offered to one lucky participant.

"51% of owner occupied households participated"

OUTCOMES & FINDINGS FROM ENERGY SURVEYS

Customer demographics

At the time of each Home Energy Survey the auditor requested the householder to provide optional demographic data such as education level, employment type, annual income, number of days the home was occupied each year and the number of occupants.

Key features of Alice Solar City customers' demographics were:

- 74% of households had a member employed full–time
- 54% of households had at least one member with a tertiary education qualification
- 12% of households had a combined income below $50,000
- The average number of occupants was three
- The average number of days the home was occupied per year was 347.

Building and appliance characteristics of customer homes

Building data for each customer's home was available from the Home Energy Survey.

The characteristics of a 'typical' Alice Solar City customer house were:

- Small to medium size, single story, detached with three bedrooms
- Constructed in the 1970s – 1980s
- Concrete slab floor
- Masonry walls
- Metal roof (unpainted or painted in light/white colour)
- 80% probability of ceiling insulation
- Single phase electrical supply and LPG or natural gas connection
- 26% of customers had a white roof, and 16% more had a light colour.

The data collected on appliances showed that while Alice Springs was a Solar City it was also 'cooking with gas', with around two thirds of homes using gas for cooking.

Other findings were:

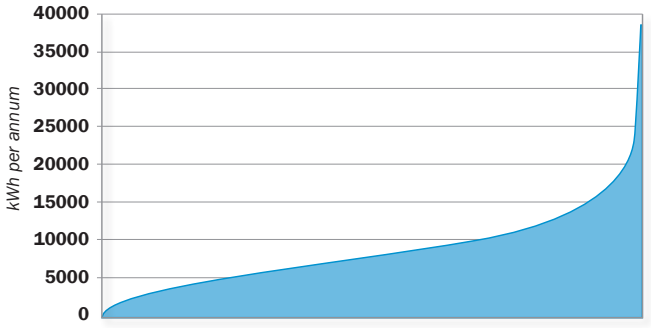
- 80% also had a microwave oven
- 60% had a solar hot water system
- 30% had a swimming pool or spa
- 78% had ducted evaporative cooling and at least one ceiling fan
- 48% had at least one reverse cycle air-conditioner (three quarters of those had ducted evaporative cooling in place also)
- Half had some form of electric heating, and a quarter had gas heating
- Average number of fridges and freezers per home was 1.8
- Other heating options were gas and wood.

A clear trend was that customers were in the process of migrating from relying solely on evaporative cooling to an increasing use of split systems, with the evaporative cooler still left in place.

Energy use prior to survey

The average electricity use of Alice Solar City customers for the 12 months prior to registration was 8,800 kWh, slightly higher than the Alice Springs residential average of 8,500 kWh for 2007/2008. This average represents a large range of consumption levels, as shown in Figure 11.

Figure 11: Residential consumption – year prior to audit



Pre-audit electricity consumption for 1900 Alice Solar City customers with prior data, sorted in ascending order.

Alice Springs Rooftop Aerial Study

In late 2012, Alice Solar City commissioned an analysis of aerial photography of Alice Springs rooftops by local firm CAT Projects. The primary purpose of the survey was to identify the practical available roof space for rooftop solar PV and to then estimate the theoretical maximum capacity using today's PV technology. In addition, the survey identified the number and types of solar hot water systems, backyard pools and white roofs. The aerial photographs analysed were from those taken in and around October 2011. For residential properties, the survey identified 4,700 rooftop solar hot water systems, 1,387 swimming pools, 427 rooftop solar PV systems, and 1,301 homes with white or near white roofs.

Based on an estimate of a total of 8,400 dwellings in Alice Springs, the results inferred that 55% of homes had a solar hot water system, 23% had a swimming pool, 21% had a white roof and 5% had rooftop PV.

Transferable Lessons

Over a five year period, Alice Solar City was able to engage with a very large proportion of the Alice Springs population. Not surprisingly, with Alice Solar City's strong focus on supporting private investment, those residents with the most to gain from investment in energy efficiency and solar (owner occupiers) were the most likely to join.

The rental market did not receive concerted or customised attention, and an opportunity therefore remains to target short stay tenants and their landlords to address this section of the community's population and housing stock.

FINANCIAL INCENTIVES SUMMARY

Overview

Once a household had registered with Alice Solar City and participated in a Home Energy Survey, it was then eligible to access financial incentives.

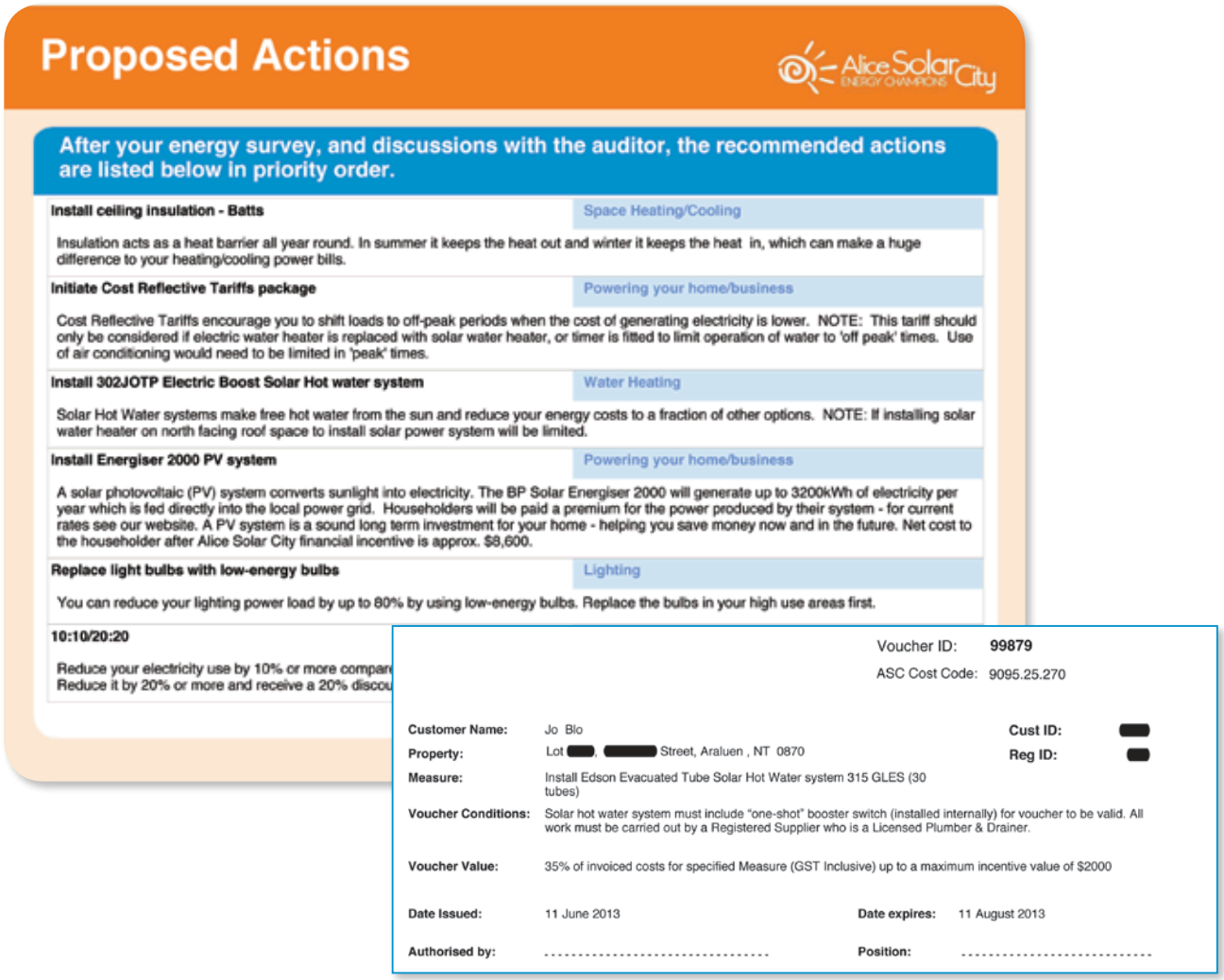
Alice Solar City offered more than 20 different energy efficiency and solar power financial incentives to homeowners. The financial incentive vouchers that were given to the homeowners after their Home Energy Survey provided discounts of up to 35% of the cost of undertaking measures, such as painting the roof white, installing a solar hot water system, window tinting, servicing air conditioners and installing low energy lighting, and up to 50% of the cost of Solar PV.* The discount was capped at a price linked to the estimated average price of installation of each measure, and each incentive was available only once per property (with a few exceptions).

In addition to the voucher based incentives, customers could join the Cost Reflective Tariff (CRT) trial and receive a free In–house display, and could claim credits on their bills through the 10:10/20:20 incentive (refer to later sections in this report for further information).

A complete list of the incentives offered is listed in Table 4. The table includes the estimated annual dollar savings per measure. These were derived from careful desktop analysis by Alice Solar City and its partners, taking into account the experience of auditors through the Home Energy Survey process.

**These differing percentages were based on the requirements of the Remote Renewable Power Generation Program (RRPGP) which was the major funder of these incentives. The RRPGP program also stipulated that each incentive could be claimed only once per property.*

Figure 12: Examples of the proposed actions listed in the Home Energy Survey Report and the Incentive Voucher issued



Proposed Actions

Alice Solar City

After your energy survey, and discussions with the auditor, the recommended actions are listed below in priority order.

Install ceiling insulation - Batts — Space Heating/Cooling

Insulation acts as a heat barrier all year round. In summer it keeps the heat out and winter it keeps the heat in, which can make a huge difference to your heating/cooling power bills.

Initiate Cost Reflective Tariffs package — Powering your home/business

Cost Reflective Tariffs encourage you to shift loads to off-peak periods when the cost of generating electricity is lower. NOTE: This tariff should only be considered if electric water heater is replaced with solar water heater, or timer is fitted to limit operation of water to 'off peak' times. Use of air conditioning would need to be limited in 'peak' times.

Install 302JOTP Electric Boost Solar Hot water system — Water Heating

Solar Hot Water systems make free hot water from the sun and reduce your energy costs to a fraction of other options. NOTE: If installing solar water heater on north facing roof space to install solar power system will be limited.

Install Energiser 2000 PV system — Powering your home/business

A solar photovoltaic (PV) system converts sunlight into electricity. The BP Solar Energiser 2000 will generate up to 3200kWh of electricity per year which is fed directly into the local power grid. Householders will be paid a premium for the power produced by their system - for current rates see our website. A PV system is a sound long term investment for your home - helping you save money now and in the future. Net cost to the householder after Alice Solar City financial incentive is approx. $8,600.

Replace light bulbs with low-energy bulbs — Lighting

You can reduce your lighting power load by up to 80% by using low-energy bulbs. Replace the bulbs in your high use areas first.

10:10/20:20

Reduce your electricity use by 10% or more compar
Reduce it by 20% or more and receive a 20% discou

Voucher ID: 99879
ASC Cost Code: 9095.25.270

Customer Name:	Jo Blo	**Cust ID:**	[redacted]
Property:	Lot [redacted], [redacted] Street, Araluen , NT 0870	**Reg ID:**	[redacted]
Measure:	Install Edson Evacuated Tube Solar Hot Water system 315 GLES (30 tubes)		
Voucher Conditions:	Solar hot water system must include "one-shot" booster switch (installed internally) for voucher to be valid. All work must be carried out by a Registered Supplier who is a Licensed Plumber & Drainer.		
Voucher Value:	35% of invoiced costs for specified Measure (GST Inclusive) up to a maximum incentive value of $2000		
Date Issued:	11 June 2013	**Date expires:**	11 August 2013
Authorised by:	----------	**Position:**	----------

Table 4: Incentives available to customers

Energy Efficiency Measure	Start Date	Maximum Incentive ($)	Estimated Savings (kWh p.a)
Install BP Energizer 1000 Solar PV System	Launch	$7,920#	1606
Install BP Energizer 1500 Solar PV System	Launch	$9,197#	2514
Install BP Energizer 2000 Solar PV System	Launch	$10,579#	3212
Install Solahart 302 JOTP (or equivalent) Electric Boost	Launch	$2,000##	1700–2600*
Install Solahart 302 JOTP (or equivalent) Gas Boost	Launch	$2,100##	0–2000*
Install Solahart 181 JOTP Electric Boost	Launch	$1,500##	1200–1500*
Install Solahart 181 JOTP Gas Boost	Launch	$1,750##	0*
Install Heat Pump Hot Water System	8/10/2010	$1,000	0–1500
Installation of "One–Shot" Relay for Solar Hot Water Systems	Launch	$150	400
Service of Solar Hot Water System	Launch	$200	900
Service of Evaporative Air-Conditioner	Launch	$100	150
Install Roof Ventilation Device	Launch	$300	20
Paint Roof White	Launch	$750	200
Replace Old Roof with New White Roof Sheeting	Launch	$2,500	200
Install Ceiling Insulation – Batts	Launch	$750	350
Install Ceiling Insulation – Loose Fibre	Launch	$1,500	350
Replace Ceiling Insulation – Batts	Launch	$1,000	230
Replace Ceiling Insulation – Loose Fibre	Launch	$1,500	230
Retrofit Insulation Into Walls	Launch	$1,500	200
Install Bulk Floor Insulation	18/04/2011	$750	150
Replace High Energy Usage Lighting with Energy Efficient Lighting	Launch	$200	400
Replace 12 V Halogen Downlight System with Low Energy Option	Launch	$350	400
Install Motion Sensors on External Lighting	Launch	$150	25
Tint Windows	Launch	$700	140
Install Double–Glazed Windows	Launch	$3,500	200
Install External Shading on Walls / Windows	25/02/2009	$1,000	300
Install Thermal "Skin" over External Walls	30/09/2009	$1,000	350
Replacement of perished fridge/freezer seals	Launch	$100	100
Replace old refrigerator with a new, Energy Efficient model	15/07/2011	$400**	300
Replace old freezer with a new, Energy Efficient model	22/07/2011	$400**	300
Surrender old refrigerator or freezer	25/07/2011	$400**	500
Purchase Swimming Pool Cover	12/06/2009 (closed 2/08/2011)	$350	600
Purchase Swimming Pool Cover Roller	2/08/2011	$200	
Supply & Install Variable Speed Pool Pump	1/12/2010	$400	1200
Initiate Cost Reflective Tariff	Launch		
Supply In–House Display for Cost Reflective Tariff	Launch ($100 charge dropped in 2008)		
10:10/20:20 Incentive	Launch		

Note: # PV incentive was reduced in June 2009.

Solar hot water incentive was increased in 2009.

* Savings from solar hot water installation were calculated based on the type of system being replaced. Replacement of a gas boosted system could result in an increase in electricity consumption (but a net reduction in total energy use).

** The fridge incentives also included pick–up and disposal of the replaced unit at Alice Solar City expense of $108.

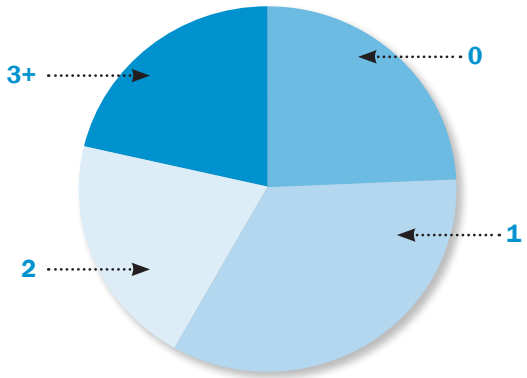
Summary of incentives up–take

Financial incentives were a major force in recruiting householders to the program, with half of all customers identifying access to a particular incentive as their primary reason for registering. Of the 2,515 registrations eligible for incentives, 1,902 claimed at least one incentive. The following table shows what percentage of eligible registrations took up each major incentive type.

Table 5: Take–up of major incentives

Incentive Type	Number of Registrations	Percentage of Registrations
All (one or more vouchers)	1,902 (out of 2,515)	76%
Energy Efficiency voucher	1,253	50%
Solar hot water	908	36%
CRT (inc BP–PV customers)	636	25%
Solar PV	277	11%
10:10/20:20	188	7%

Figure 13: Proportions of customers using 1 or more vouchers



There were 852 registrations who claimed only one incentive. For these customers, solar hot water was by far the most popular.

Table 6: Single incentives claimed

No. of customers claiming a single incentive	
Solar hot water	401
CRT only	71
Service evaporative air-conditioner	60
BP PV	51
Service solar hot water system	48
Window shading	45
Paint roof white	34
Other	142
Total	**852**

Table 7: Financial incentives offered and resultant claims

A total of 7,546 incentive vouchers were issued, of which 3,446 were claimed, as outlined below. Around one quarter of vouchers were requested and issued some time after the audit.

Incentive Type	Vouchers Issued		Incentives Claimed			
	Number	Potential Value $	Number	% Claimed	Incentive Value	Average Per Claim
Solar PV						
Install BP Energiser 1000 PV System	16	$88,800	14	88%	$90,464	$6,462
Install BP Energiser 1500 PV System	10	$56,950	9	90%	$78,154	$8,684
Install BP Energiser 2000 PV System	274	$1,967,868	254	93%	$2,165,447	$8,525
Solar PV Subtotal	**300**	**$2,113,618**	**277**	**92%**	**$2,334,065**	**$8,426**
Solar Hot Water						
Solahart 302JOTP Electric Boost Solar Hot Water System	1157	$2,314,000	835	72%	$1,571,400	$1,882
Install Edson 315 Evacuated Tube Solar Hot Water System	6	$12,000	5	83%	$10,000	$2,000
Solahart 302JOTP Gas In–Line Boost Solar Hot Water System	29	$60,900	9	31%	$18,201	$2,022
Solahart 181JOTP Electric Boost Solar Hot Water System	83	$124,500	40	48%	$56,594	$1,415
Solahart 181JOTP Gas In–Line Boost Solar Hot Water System	2	$3,500	0	0%	$0	-
Solahart 272 DJV Electric Boost Split Solar Hot Water System	12	$24,000	7	58%	$14,000	$2,000
Solahart DJV 272 Integrated Gas Boost Split Solar Hot Water System	2	$4,200	2	100%	$4,200	$2,100
Solahart DJV 272 Gas In–Line Boost Split Solar Hot Water System	1	$2,100	0	0%	$0	-
Heat Pump Hot Water System	14	$14,000	10	71%	$10,000	$1,000
Solar Hot Water Subtotal	**1306**	**$2,559,200**	**908**	**70%**	**$1,684,395**	**$1,855**
Other efficiency measures						
Replace old refrigerator with a new, energy efficient model	92	$36,800	53	58%	$21,030	$397
Replace old freezer with a new, energy efficient model	11	$4,400	8	73%	$2,555	$319
Surrender old refrigerator or freezer	58	$0	50	86%	$4,900	$98
Collection, disposal & de–gas of replaced refrigerator	55	$5,940	51	93%	$5,150	$101
Collection, disposal & de–gas of replaced freezer	5	$540	5	100%	$493	$99

Collection, disposal & de-gas of surrendered fridge or freezer	57	$5,985	51	89%	$4,947	$97
Installation of "One-Shot" relay for Solar Hot Water Systems	296	$44,400	111	38%	$12,446	$112
Service of Solar Hot Water system	435	$87,000	210	48%	$38,389	$183
Install roof ventilation device	228	$68,400	67	29%	$12,857	$192
Install Ceiling Insulation - Batts	241	$180,750	39	16%	$26,442	$678
Install Ceiling Insulation - Loose Fibre	5	$7,500	2	40%	$2,541	$1,271
Replace Ceiling Insulation - Batts	34	$34,000	4	12%	$2,655	$664
Replace Ceiling Insulation - Loose Fibre	0	$0	0	0%	$0	-
Install thermal "skin" over external walls	14	$14,000	3	21%	$2,424	$808
Install external shading on walls/windows	397	$397,000	181	46%	$137,389	$759
Tint windows	126	$88,200	68	54%	$26,219	$386
Install double-glazed windows (IGU's)	26	$91,000	12	46%	$23,386	$1,949
Replace high energy usage lighting with energy efficient lighting	1165	$233,000	208	18%	$11,663	$56
Replace 12V halogen downlight system with low energy option	427	$149,450	112	26%	$24,954	$223
Install motion sensors on external lighting	58	$8,700	10	17%	$855	$85
Purchase swimming pool cover roller	77	$15,400	44	57%	$8,153	$185
Purchase swimming pool cover	407	$142,450	234	57%	$62,828	$268
Supply and install variable speed pool pump	85	$34,000	51	60%	$19,150	$375
Replacement of perished fridge/freezer seals.	95	$9,500	23	24%	$1,677	$73
Install bulk floor insulation	1	$750	1	100%	$750	-
Energy Efficiency Subtotal	**5940**	**$2,817,165**	**2261**	**38%**	**$680,417**	**$301**
Vouchers Total	**7546**	**$7,489,983**	**3446**	**46%**	**$4,698,876**	**$1,364**
10:10/20:20			545		$41,894	$77
In-house Display Unit for Cost Reflective Tariff Package			337			
Initiate Cost Reflective Tariffs package			379		$180,025	$475
TOTAL All Incentives			**4707**		**$4,920,795**	**$1,045**

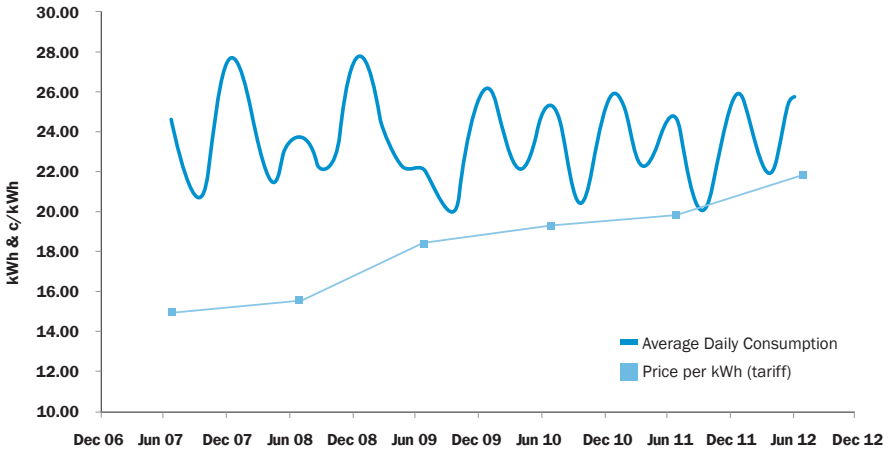
ACTUAL CHANGES IN ENERGY USE

Collection and analysis of customer electricity consumption data was a major focus for the project, both historical and ongoing consumption data. Emphasis was put on gathering data spanning a complete year on either side of Alice Solar City interventions to help smooth out seasonal variations. Separate or gross metering of solar power systems was also mandated wherever possible, to allow for the separation of on–site generation from total consumption.

Inevitably though, complete data could not be obtained for all customers, due in part to people moving in and out of homes, and in part to data collection and metering difficulties.

To help separate out the effect of Alice Solar City from other influences on electricity use (such as other tariff changes and incentives from other programs), Alice Solar City also obtained data representing the consumption trends of the broader residential population that were not participating in the program. This data showed that a step reduction in the background consumption of around 5% occurred around the same time as the 18% tariff increase of July 2009, but that otherwise consumption by non-participants remained more or less steady up until December 2012.

Figure 14: The average daily consumption of non-participants and electricity tariff applying in each year



Summary of trends in customer electricity consumption

Analysis of the electricity consumption data obtained for Alice Solar City customers shows that most interventions were followed by reductions in the customers' electricity consumption, with the 'big ticket items' like solar hot water resulting in the largest reductions. In broad terms*, the following changes in consumption for the year after an intervention were observed:

Action	Reduction observed
Replace electric hot water with solar hot water	16.4%
Replace solar hot water (old with new)	11.1%
Initiate Cost Reflective Tariff	7.0%
Install BP Solar PV system	4%
Supply In House Display (free to all CRT customers)	3.3%
Home Energy Survey in general	5.6%

**These figures have not been corrected for the effects of other incentives or background trends happening around the same time: for example, some of these interventions happened during or not long after the July 2009 step reduction in consumption observed in the data from non-participants.*

Alice Solar City's first residential solar PV installation.

ROOFTOP SOLAR PHOTOVOLTAIC (PV) SYSTEMS

OVERVIEW

At the commencement of the Alice Solar City project in March 2008, only two existing rooftop grid–connected PV systems were identified on homes in Alice Springs, despite both the climatic suitability and the uptake of such systems elsewhere in Australia.

At the end of the project, 277 PV systems were installed on homes with Alice Solar City's support, with an estimated 320 further systems installed independently, indicating the momentum gained in the town for this type of technology.

The PV system financial incentives that were offered through Alice Solar City were only available in the Alice Springs greater municipality, and to households that were connected to the local electricity grid and had registered as an Alice Solar City customer.

The aims of the Alice Solar City Residential PV component were:

- To increase the uptake of household PV
- To increase household and community awareness of the PV technology, and to demonstrate that PV is a viable option for Alice Springs households
- To reduce demands on the local electricity generation system, a service provided by the sole local utility, Power and Water Corporation
- To reduce greenhouse emissions due to household electricity consumption
- To trial the influence of a cost reflective tariff linked with the installation of residential PV.

The largest available system–2kW, was expected to cover a little less than half of the average household consumption. A key message communicated to customers was that a desire to spend more on larger systems was better channelled into taking action on the energy efficiency opportunities identified through their Home Energy Survey.

Project targets for PV system installation

The initial project target for the installation of Alice Solar City subsidised PV systems was 250, with a focus on 1 kW – 1.5 kW capacity systems. Due to the high demand from residents, this target was revised in March 2009 to 300 systems. This was reached and exceeded in December 2009 by approximately 80%, with a groundswell of community enthusiasm able to be supported via the introduction of the national Solar Credits scheme.

By far the most popular system was the Energiser 2000 (1.98 kW), of which 254 were installed; there were 14 installations of the Energiser 1000 (0.99 kW) system and 9 of the Energiser 1500 (1.55 kW). The total capacity of all systems installed was 531 kW (refer to Table 8), and the total cost was a little over $6 million. Alice Solar City contributed a direct incentive amount of around $2.3 million (38%).

BP Solar Pty Ltd as the sole provider

During the initial planning of Alice Solar City, a sole provider agreement was established with BP Solar Pty Ltd who was the only manufacturer of Solar PV modules in Australia at the time. The agreement provided for specified system packages at unit prices (subject to limited variations based on changes in market conditions). BP Solar engaged qualified and experienced installers to provide quotes, do the installations and the first year system check, and to undertake any warranty work.

Financial incentives for the purchase of PV systems

Alice Solar City PV customers were a self–selected group from the Alice Springs population, who were motivated and financially able to take up the offer and were effectively 'early adopters' of the technology in Alice Springs.

Customers paid somewhat less than half of the total cost of an installed system. The subsidies were provided as up–front discounts, and were:

- A financial incentive from Alice Solar City
- BP Solar's 'envirocashback', based on the value of the sale of certificates under the Australian Government's national Renewable Energy Target (RET) scheme.

In addition to these up–front financial incentives, customers were also entitled to an elevated buy–back tariff for electricity generated by their PV systems over the life of Alice Solar City (described below).

The packages included an In–House Display and a Smart Meter supplied by Power and Water Corporation to replace the existing accumulation meter that recorded gross consumption and gross generation at 30 min intervals.

Cost reflective and buy–back tariffs for PV systems

The tariff arrangements until June 2013 for PV customers were:

(i) Electricity Consumption

As a condition of receiving Alice Solar City financial support to purchase a BP–PV system, customers moved onto the cost reflective tariff (CRT). The CRT was based on the 30 min gross consumption data as recorded by the Smart Meter, with peak and off–peak periods and tariffs defined as follows:

Peak: 9am – 6pm Weekdays
Off–Peak: All other times (ie 6pm–9am Weekdays, and all Weekends).

(ii) Electricity Generation

A PV gross generation buyback tariff was provided to customers until the completion of the program. It had two components:

- The peak rate under the CRT, which increased in line with Power and Water Corporation's electricity price trends
- An 'elevated buy–back' subsidy provided from Alice Solar City funds and fixed at 22.65¢/kWh.

Residential PV performance

Alice Solar City collected all available interval data for the BP Solar installations, along with information on the tilt, orientation, capacity and shading characteristics of each system. Analysis of the generation data showed that the systems were on average performing at close to the performance estimated under the Renewable Energy Target (RET) legislation. Predictions were also derived from the SMA Sunny Design software package, incorporating the estimated

Table 8: Project targets & actuals for PV installations

	Targets		Actual Installed
	Initial – March 2008 (From Business Case)	Revised – May 2009	
Number of 1 kW Systems	175	Not Specified	14
Number of 1.5 kW Systems	50	Not Specified	9
Number of 2 kW Systems		Not Specified	254
Total Target Capacity (kW)	**225**	**Not Specified**	**277**
Total Installed Capacity (kW)	**250**	**300**	**531 kW**

shading losses, and these agreed very closely with the actual measured performance.

As a whole, the 277 residential installs are generating over 850,000 kWh per annum, saving over 670 tonnes of greenhouse gas emissions per annum.

Table 9: Estimated & actual performance of residential BP–PV installs

	Energiser 1000	Energiser 1500	Energiser 2000	Overall
System capacity (kW)	0.99	1.55	1.98	
Number of units with valid data	14	8	240	262
Average actual annual output 2011–12 (kWh/year)	1,485	2,440	3,182	3,069
Clean Energy Regulator annual estimate (kWh/year)	1606	2514	3212	3104
Sunny Design (SD) Annual Estimate with shading losses (kWh/year)	1558	2646	3193	3089
Number of units installed	14	9	254	277
Extrapolated total actual annual output (kWh/year)	20,785	21,961	808,303	851,050
Total SD Annual Estimate with shading (kWh/year)				**856,519**

General PV industry development

Alice Solar City occupied a central role in the development of the Alice Springs grid connect market, having funded over 65% of the town's total installed capacity at the end of the project. Alice Solar City maintained a focus on informed purchases of quality installations designed to last for the expected life–span of solar modules, and insisted on local industry involvement wherever practical. It encouraged practices such as quotations incorporating an on–site shading loss estimate, and the inclusion of extended inverter warranties.

The installers involved in the BP Solar packages received industry best–practice training and Alice Solar City continued to play a role in industry development after the end of its residential financial incentives.

With 400 customers on a waiting list at the end of the "100 Days of Solar" campaign, Alice Solar City facilitated a "bulk purchase" scheme with two new suppliers, with a focus on attractive pricing but also on building local capacity and ensuring long–term quality.

In late 2010, Alice Solar City facilitated an Australia–wide industry response to a clarification of building regulation requirements that had brought the local rooftop PV industry to a standstill by requiring a full building permit for each installation. The result was that a new NT building policy was issued that removed the need for a full building permit, allowing the industry to move forward.

KEY RESULTS

The Alice Solar City residential PV program resulted in a unique set of quality installations with a detailed dataset available on the installation and performance parameters. The measured performance of these systems matches closely the manufacturers' predicted performance given the actual installed parameters. But it is slightly below the average values used by the regulator to determine the value of renewable energy under the RET, perhaps reflecting an underestimate of the impact of real–world tilt, orientation and shading installation decisions.

An analysis of customer electricity consumption patterns before and after installation of their BP–PV system was carried out, again focusing on comparing 12 month periods before and after install. The BP–PV customers were seen to have a typical Alice Springs consumption level prior to installation.

This analysis found that far from increasing their consumption as might be expected due to the "rebound effect" of relaxed attitudes to consumption, customers on average reduced their consumption by 4% in the year after installation, and by a further 1.5% in the second year. This reduction is comparable to the background step reduction seen in Alice Springs around the same time, and is not corrected for any other actions that were supported by Alice Solar City, but it does indicate that customers did not see their PV installation as enabling an increase in consumption.

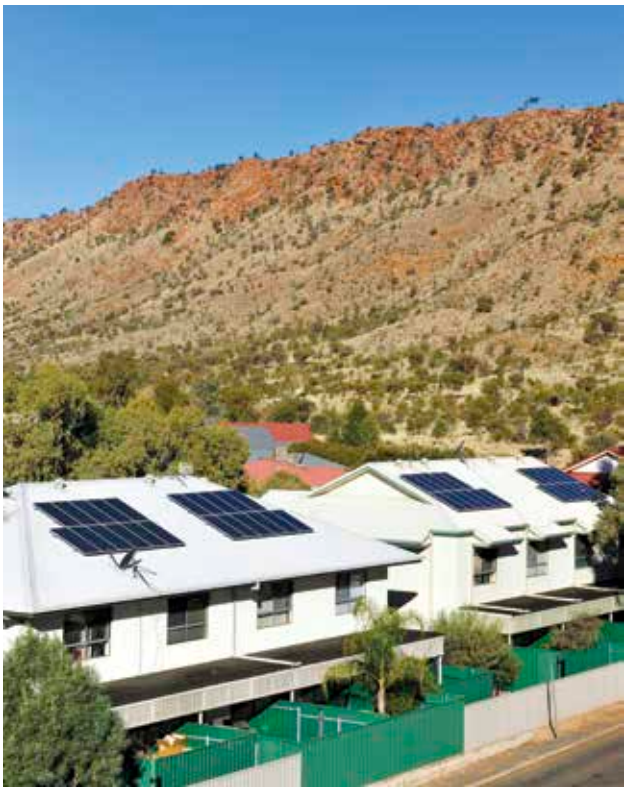
Table 10: Changes in annual average daily consumption

Number of Customers with Valid Data	Annual Average Daily Consumption (ADC) across all Customers, kWh			Change in Annual Average ADC across all Customers kWh		Percentage Changes in ADC %	
	Year Prior (YP1)	Year After (YA1)	2nd Year After (YA2)	YA1–YP1	YA2–YP1	YA1–YP1 %	YA2–YP1 %
246	23.64	22.69		–0.96		–4.04	
239	23.44	22.47	22.15	–0.97	–1.30	–4.13	–5.53

BP–PV CUSTOMER SURVEY

A survey of the residential BP Solar customers was conducted in late 2011. Key conclusions from the results of the survey are:

- Economic factors were the primary influence on the decision to install BP–PV. However, there was strong acknowledgement of the environmental benefits
- The main economic factors were associated with the large incentive available for a quality system, and the potential future reduction in the cost of electricity bills, with limited mention of the contribution of the elevated buy–back tariff
- There were high levels of satisfaction with system performance and the overall economic benefits
- A large proportion of respondents had electricity bills in credit, which can be assumed to be largely attributable to the elevated buy–back tariff.



Transferable Lessons

Alice Solar City's choice of a sole supplier leveraged the industry experience and capacity of Australia's most established solar company and its only solar PV manufacturer. However, the long term nature of the contractual arrangement limited the ability to respond to a rapidly changing market, and did not provide the responsiveness and flexibility that may have been better achieved with multiple suppliers.

Alice Solar City provided a small set of pre-designed packages to make selection easy for its customers. However a number of real world concerns impacted on this simple approach, including the need to cater for flat roofs which had to be addressed as the program progressed. Alice Solar City's decision to not provide its incentive for an upgrade to a larger inverter caused an issue with a few customers who felt that the system design was flawed, based on local word of mouth and/or their own interpretation of technical information.

Alice Solar City arranged to streamline the normal Power and Water Corporation paperwork involved with grid connection through a single registration form. Ultimately however Alice Solar City had to facilitate the completion of the full paperwork, and it may have been more efficient to have focused on streamlining completion of the full paperwork in the beginning.

SOLAR HOT WATER

OVERVIEW

At its inception, Alice Solar City commissioned a telephone survey of Alice Springs residents to establish current household energy–related technologies and practices and to elicit views towards energy savings and solar technologies. The survey indicated that in early 2008, approximately half (49%) of Alice Springs households had a solar hot water (SHW) system, which supported what most residents already knew: that the use of SHW was already a common experience and even an expected practice.

The aims of the promotion and funding of residential SHW were:

- To increase the uptake of household SHW, particularly in houses with electric or gas hot water storage systems
- To contribute to reducing demand on electricity generation and a reduction in greenhouse emissions by replacing existing hot water systems, whether end–of–life or severely faulty solar systems, or electric and gas storage systems.

Project targets for solar hot water system installation

The initial target was to install 1000 SHW systems over the course of the project. In March 2012 uptake was trending below target, and a review of the budget situation indicated that the remaining budget could not support this target with the increased level of support being provided per system. To address the budgetary constraints, the incentive level was retained but the final target was reduced to 900 (including heat pump systems). By the close of incentives in December 2012, 908 systems had been installed under the Alice Solar City project.

Solahart as the sole solar hot water system provider

In the Alice Solar City detailed business case (the basis of Australian Government funding), Solahart was nominated as the project's supplier of solar hot water systems. Solahart is an established Australian brand and manufacturer, the performance of whose products was well proven under local Alice Springs conditions, which included the calcareous (hard) nature of the water supply. Solahart hot water systems made up the majority of the systems already installed on close to 50% of Alice Springs homes.

In the latter years of the program, the sole supplier arrangement was relaxed to allow other manufactures products and technologies to be eligible for an incentive. Electric heat pump hot water systems (not manufactured by Solahart) were incentivised and made available to a limited number of customers for whom a Solahart system was not appropriate.

In 2012, evacuated tube solar hot water systems from Edson were also added to the eligibility list and a small number of systems were funded.

Financial incentives for the purchase of solar hot water systems

The maximum rebate from Alice Solar City was 35% of total installed cost (based on supplier quote) up to a maximum of $2,000. The 35% incentive amount was based on the funding program requirements, while the incentive cap was set by determining the market average price of SHW installation. In addition, as part of its relationship with Alice Solar City, Solahart provided a $150 cash–back to Alice Solar City customers.

In the case where customers already had a solar hot water system, but it was not working effectively, the same incentives were available (whatever the type of this pre-existing system). A faulty electric boost solar hot water system can have similar energy use to an electric storage system and if servicing was not likely to provide long-term improvement, then the unit was considered in need of replacement. Thus many faulty end–of–life solar hot water systems were replaced using the Alice Solar City incentive.

Later in the program, it was recognised that there were situations where a heat pump hot water system was the most effective choice for customers despite its higher electricity consumption, and in recognition of the high capital cost compared to an electric hot water system an incentive of $1,000 was added to the program. Access to the heat pump incentive was limited to customers where the home energy survey identified that solar hot water was not viable and a heat pump was the most practical choice.

Mandatory solahart solar hot water system components

Alice Solar City specified that subsidised solar hot water installations must be fitted with the following devices to improve the operation and sustainability of the systems:

1. **Over temperature protection (OTP)** for the heat exchange system (thermosiphon models only), to cope with the intense summer insolation, all units were required to be fitted with the new over temperature protection system for the heat exchange medium (the OTP was normally a Solahart optional extra).
2. **A one–shot booster relay switch (OSB)** for those systems with electric boost, to enable residents to control the electric boosting from inside the house. When pressed, the one–shot button latches on the power to the booster until its thermostat switches off, then disconnects until the next one–shot button activation (i.e. the thermostat will not continually cut in and out depending on the water temperature in the tank).

As more and more Home Energy Surveys were completed, it became clear that customers were generally not aware of the impacts and costs of leaving their solar hot water booster on in a sunny climate that meant boosting was rarely required. An intense community education campaign was implemented around this.

KEY RESULTS

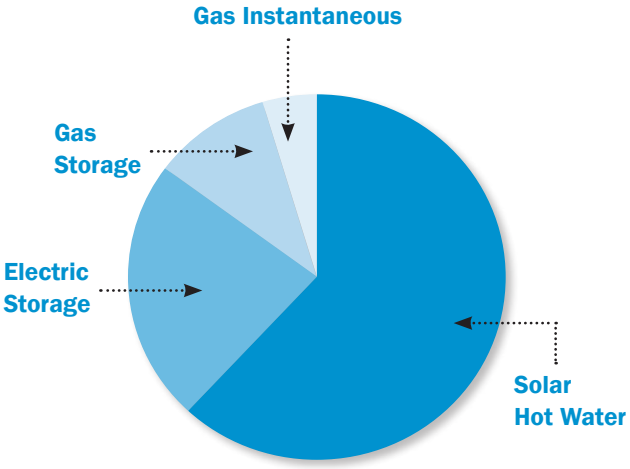
62% of customers were found to have a solar hot water system at the time of their survey, though very few had a convenient or visible booster control switch. This was significantly higher than the 50% average for dwellings in Alice Springs.

The 908 solar (and heat pump) hot water systems supported by Alice Solar City are estimated to be saving 1,848,000 kWh per annum, resulting in greenhouse gas emission reductions of 1,460 tonnes per annum.

Alice Solar City provided $1.684 million in funding, and customers invested $3.584 million (including other rebates received). The total spend of $5.268 million averages to $5,800 per install.

- Customers overwhelmingly opted for the 300 litre Solahart 302 JOTP system, with the 835 installs of this model representing 92% of all supported solar hot water installs. The single panel 181 JOTP system accounted for another 4.5%. Gas boost models were not popular, due to the relatively high cost of LPG bottled gas and to the additional capital cost involved. The few gas boosted installs were typically on high water use homes with an existing town gas connection
- Surprisingly the pre-existence of a solar hot water system did not correlate with below average electricity consumption for Alice Solar City customers, though demographic factors may in part be responsible, as could inappropriate or poor use
- Those customers receiving an incentive for SHW installation had historical consumption 10% – 15% higher than average, particularly for customers with pre-existing SHW
- Analysis of ongoing customer electricity consumption data showed that solar hot water installation resulted in the largest reductions in electricity consumption out of all of Alice Solar City's energy efficiency measures. Solar to solar replacement resulted in an average 11% reduction in annual consumption, while electric to solar resulted in a 16% reduction. These savings were found to be sustained and even enhanced in the second full year after install. These savings numbers represent about 80% of the theoretical estimates derived by Alice Solar City and its partners.

Figure 15: Types of hot water systems in customer properties at registration



Transferable Lessons

Solar hot water with a one – shot booster switch has proven to be an effective avenue to reduced electricity consumption, whether replacing existing electric storage or end-of-life solar systems.

Alice Solar City mandated the new OTP technology for SHW installs, in the context of very limited local industry experience with the product. It transpired that a number of the systems installed with OTP had a fault with the OTP valve that prevented proper operation, owing either to valve failure or incorrect installation. This was identified through customers' high use of their one shot booster switches, and the problem may not have been identified in the absence of this Alice Solar City mandated technology. A new valve arrangement was subsequently released by Solahart which appeared to resolve the issue.

Pilot installations of new technologies with careful monitoring is therefore worth considering in similar programs, even for modifications to well understood products.

OTHER ENERGY EFFICIENCY MEASURES

OVERVIEW

In addition to the big ticket items of solar PV and solar hot water, Alice Solar City supported a range of over 20 energy efficiency measures, covering the majority of retrofits that can be made to improve the energy efficiency of the average Alice Springs home.

The measures were selected based on their estimated energy saving potential, but also on their educational benefit and the likelihood of achieving savings. Controls were put in place where practical to reduce installations that would not result in any savings, for instance external window shades on windows without sun exposure.

Measures such as installing ceiling fans and upgrading split system air-conditioners were not supported because of the difficulty of ensuring a high likelihood that savings would be achieved. The late addition of a fridge replacement incentive to the list of supported measures was trialed as part of a process of vetting incentives to improve the chances of savings being achieved. This trial proved to be popular, but administratively complex both for Alice Solar City and the suppliers.

A total of 5,490 energy efficiency vouchers (EEV) across the range of measures were issued to 2,197 registered properties, and 2,261 were redeemed by 1,253 registered properties.

Table 11: Percentage take–up of vouchers issued (excluding PV and solar hot water vouchers)

Household Group	Number & Percentage	
	Number of households	Number of EEVs
Eligible Households	2515	
Households Issued EEVs	2197	5823
Households that used one or more EEVs	1253	2154
Percentage Up–take	57%	37%

In total, households received $680,000 of incentives to assist with a total spend of $2,274,000 on energy saving measures.

Compared to vouchers for solar hot water and solar PV, energy efficiency vouchers had the lowest conversion rate at 38%.

Table 12: The most popular measures implemented were:

Service of Evaporative A/C	411
Purchase Swimming Pool Cover	234
Paint Roof White	218
Service of Solar Hot Water System	210
Replace High Energy Usage Lighting with Energy Efficient Lighting	208
Install External Shading on Walls/Windows	181
Replace 12V Halogen Downlight System with Low Energy Option	112
Installation of "One-Shot" Relay for Solar Hot Water Systems	111
Tint Windows	68
Install Roof Ventilation Device	67

Barriers to using energy efficiency vouchers

It proved difficult to obtain good information on why vouchers were not used, with 75% of vouchers cancelled without determining a reason why. The 2012 McGregor Tan community telephone survey commissioned by Alice Solar City provided some additional information. Essentially financial reasons were the main reason given for not using vouchers, followed by "not getting around to it".

Given the high conversion rate of the much higher capital cost solar technology vouchers, it is likely that the low financial priority given to making use of the energy efficiency vouchers was a reflection of the vouchers not meeting an intuitive threshold of utility gained for the required investment of time, effort and money to implement.

Energy savings from energy efficiency vouchers

In total, an estimated 818,760 kWh of energy savings per annum is being made by the 1,253 households, equating to a 7% average reduction in annual energy consumption. This estimate is based on a series of conservative estimations of the expected real-world impact of the various measures.

The actual reduction observed for these customers is, less than the estimation. It is possible that the rebound effect came into play, meaning that households rewarded themselves with a relaxation of energy saving behaviours because of the structural efficiency gains made.

10:10/20:20 FINANCIAL INCENTIVE

Overview

The 10/10:20/20 Incentive rewarded residents who reduced their energy use with discounts on electricity bills. The more they were able to reduce their electricity use, the more money they saved.

After joining the Alice Solar City project customers could compare their quarterly electricity consumption bills with those for the same quarter the previous year.

If they reduced their electricity consumption by 10% or more compared to the same billing period of the previous year, Alice Solar City credited their next bill by 10%. If they reduced their average daily use by 20% or more they received a 20% credit.

Eligibility for the 10:10/20:20 incentive

Residents were able to claim the 10:10/20:20 rebate from the first complete billing period (generally 90 days) after they had registered with Alice Solar City. They must also have lived in the same house and had electricity bills under their name for the corresponding quarter of the previous year to be able to make the claim.

The process for claiming the incentive

The 10:10/20:20 rebate was calculated on the average daily electricity consumption measured in kilowatt hours (kWh) and the amount paid was based on the present value of electricity 'saved'. A successful 10:10/20:20 claim appeared as a credit on a following power bill.

Alice Solar City did not monitor customer billing records and instigate the claim process. Instead, customers who were interested and motivated to monitor and understand their electricity bills had to take the initiative and provide Alice Solar City with a copy of the electricity bill on which they wished to make a claim. Alice Solar City then checked claim eligibility before lodging successful claims with Power and Water Corporation, who in turn applied the credit to the customer's next power bill.

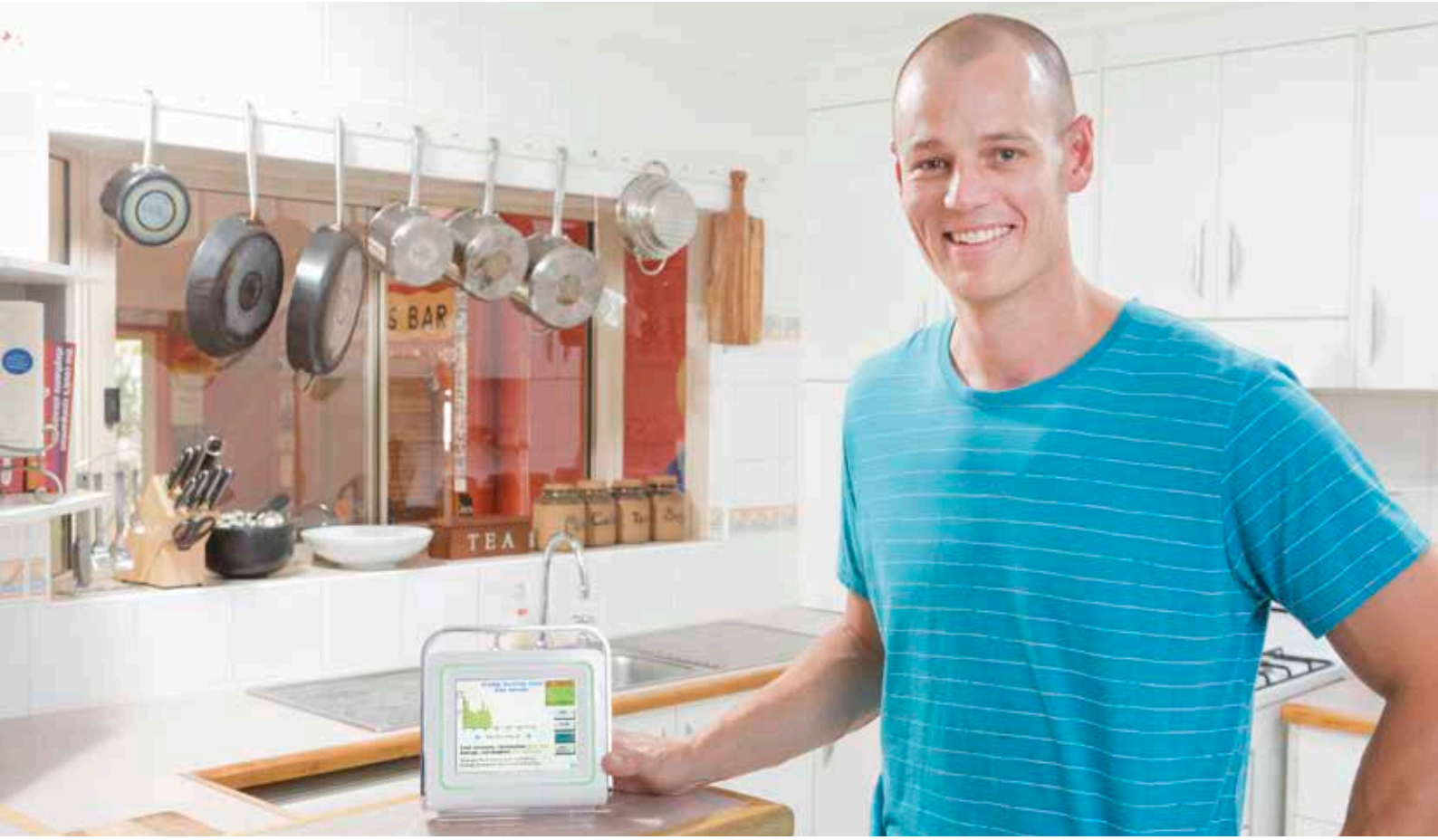
KEY RESULTS

- Alice Solar City provided just under $42,000 of credits on customers' bills for 545 claims, representing energy savings of over 500,000 kWh
- Of the 188 households making successful claims, two thirds made multiple claims, with 14 claims being the record representing almost four years of continual reductions in consumption
- The majority of claims showed a 20% or more reduction in electricity usage available to claim
- The total amount that could have been claimed by customers over the life of the program is estimated at over $500,000. There were more than 8,000 potential claims averaging $66 per claim. Customers therefore claimed less than 10% of the potential amount.

Transferable Lessons

Uptake was lower than originally anticipated for the 10:10/20:20 incentive and much lower than the potential it offered. This was despite regular promotion of the incentive at sign–up and through home energy surveys (with customers encouraged to "double their savings from using vouchers, by lodging claims"). The incentive was also promoted in general communications.

One limiting factor was the decision to not automatically calculate the incentive, but to instead urge the customer to read and understand their bill and them initiate a claim. The general low value of claimable amounts was another key issue. Customers would often bring in a year's worth of bills to lodge claims to limit the effort of making a claim. And finally, the complicated incentive name may have itself confused customers and reduced their likelihood of making a claim.



COST REFLECTIVE TARIFFS & IN–HOUSE DISPLAYS

OVERVIEW

As part of the Alice Solar City project a residential cost reflective tariff trial was conducted. It was the first trial of its kind in the Northern Territory.

Cost Reflective Tariffs encourage people to move their electricity consumption from peak to off–peak periods by adjusting the price charged at certain times each day. This helps reduce the overall peak load and is referred to as load shifting, a common practice in many other places in Australia. (It differs slightly from off–peak tariffs, which seek more to fill in night time lows than to reduce day time highs).

A range of factors including the extremes of climate in Alice Springs (eg very hot summer afternoons, cold winter mornings) contribute to peak demands on the Power and Water Corporation electricity network that are more than twice the annual average load. Reducing such peaks in demand may delay or obviate the need for investment in new generation and transmission ('poles and wires') capacity.

As part of the residential program, the Power and Water Corporation introduced a residential Cost Reflective Tariff (CRT) available only to Alice Solar City customers, with an associated In–house Display (IHD).

The aims of the CRT–IHD trial were:

- To trial a 2 level (peak/off–peak) cost reflective tariff for a group of Alice Solar City residential customers
- To trial the use of IHDs by providing them to all customers who were on the CRT (the initial plan to provide these as an option at a cost to the customer was dropped)
- To examine the influence of the CRT–IHD combination on households':
    - Total electricity consumption
    - Electricity consumption patterns, in particular the shifting of electricity consumption (load) from peak to off–peak periods, and/or reducing peak consumption
    - Electricity billing costs
- To raise awareness among the trial group of the economic benefits for Power and Water Corporation (and therefore ultimately its customers) of shifting load from peak to off–peak periods.

The CRT was available as an optional measure for Alice Solar City customers, as well as being a mandatory part of the subsidised residential BP solar PV system packages.

Smart meters and In-house displays

All customers who participated in the CRT-IHD trial had their existing accumulation meters replaced with Smart Meters, whose data was available to Alice Solar City (through Power and Water Corporation) in 30min intervals, and was used by Power and Water Corporation for time of use billing.

Each IHD communicated with the Smart Meter via the 'zigbee' short range wireless system to access instantaneous readings as well as the 30min interval data. The IHD had a set of interactive screens through which householders could access their electricity consumption and/or PV generation data. Every IHD was individually programmed to communicate with a specific Smart Meter. Customers were also provided with a simple instruction sheet on how to read their smart meter directly, so with effort they could monitor peak/off-peak consumption without an IHD.

Tariffs

The residential tariff design took into consideration typical household occupancy patterns (eg allocating weekends as off peak). The structure was such that to generate a financial saving compared to the flat rate tariff customers needed to allocate over 75% of total household electricity consumption to off-peak periods.

Peak: 9am-6pm weekdays (inc. public holidays)
Off-Peak: all other times (eg. 6pm - 9am weekdays, and all weekends).

Table 13: Residential tariff structure for CRT-trial

Tariff Structure	Cents per kWh						
	FY 2007-08	FY 2008-09	FY 2009-10	FY 2010-11	FY 2011-12	July-Dec 2012	Jan-May 2013
Flat Rate	15.1	15.52	18.31	19.23	19.77	21.77	25.83
Peak Rate 9am-6pm weekdays	22.35	23.11	27.27	28.63	29.43	31.07	37.75
Off-Peak Rate 6pm-9am weekdays & all day Saturday and Sunday	12.58	13.01	15.35	16.12	16.57	18.48	21.89

No worse – off safety net

All customers in the CRT – IHD trial were offered a 'No Worse – Off Safety Net', whereby if the cost of electricity consumed per billing period at peak / off – peak rates (ie the usage charges on the Power and Water Corporation invoice) was greater than what would have been the cost at the flat rate tariff, customers could be refunded the extra cost incurred. However the CRT – trial residents had to apply to Alice Solar City for the refund (after self-assessment) and the refund then appeared as a credit on a subsequent electricity bill (at Power and Water Corporation's expense).

Control group

A control group for the CRT – trial was established to provide baseline information on patterns of consumption in the absence of a time of use tariff. An effort was made to recruit households for the control group from outside the Alice Solar City residential program. In order to achieve the target numbers, existing customers with minimal interaction with the incentive program were also included in the control group, and a total of 169 control smart meters were installed (with no IHDs supplied and minimal information provided to the customers on their new meter).

Participation

The target of 350 participants for the CRT was exceeded with 379 customers placed on the tariff. In addition, all 277 BP – PV customers were placed on the tariff as part of their package (including some already on the CRT), resulting in a total of 636 CRT participants in two groups.

Rollout of the smart meters was undertaken by Power and Water Corporation staff and contractors up until June 2011 with the majority installed in 2009 and 2010 for both groups.

Development and deployment of the IHD

The In – house Displays for both groups were based on the same display device. Power and Water Corporation and Alice Solar City developed a custom set of screens for display of time of use information. BP Solar developed a separate set of display screens for solar power generation in comparison to consumption, and loaded both sets of screens when rolling out IHDs for the BP – PV group during July and August 2010. Few records were kept of exactly when the BP – PV IHDs were given to customers.

Power and Water Corporation staff delivered the majority of CRT – only IHDs in July and August 2010, and records of each installation were kept, which enabled analysis of the effect of the IHD on total electricity consumption, and on its time of use.

Effect of tariff and In – house display

CRT customer consumption data was analysed to determine the effect of the installation of the smart meter. A reduction of 5% – 7% was observed, though this did coincide roughly with the 5% step reduction observed in background consumption around July 2009.

In terms of shifting consumption from peak to off – peak periods, analysis of the interval data identified a clear trend: while the control group averaged 24.5% of consumption in peak periods, the BP – PV group averaged 22.3% and the CRT – only group averaged 20.4%, showing that the CRT – only and to lesser extent BP – PV group were successful in benefiting financially from the tariff structure.

Analysis of the effect of the IHD on overall consumption for the CRT – only group showed a 3.1% reduction, which was sustained into the second year where data was available. While the background consumption trend was stable around this period, further analysis is required to determine what other known interventions were occurring with CRT customers that could account for this reduction.

Behavioural survey

As part of the rollout of the IHDs, a set of pre and post – install surveys were given to all CRT customers. The majority of those who responded indicated that:

- They used their IHD at least every week (91%)
- They used their display every 1 – 2 days (64% CRT, 74% BP – PV)
- They had attempted to modify their energy habits after receiving their IHD (91% of CRT – only).

In comparison, only 71% of BP – PV participants indicated this, with a total of 29% of BP – PV respondents saying that they had not made any changes (post IHD).

Responses concerning the behavioural changes made after IHD installation are summarised in Table 14.

- The participants who responded that they had attempted to modify their habitual behaviours, indicated that they made an effort to use more off-peak power after receiving the IHD. The percentage of the participants using more off-peak power increased from 7% – 19% for CRT customers and from 5% – 16% for BP – PV customers
- The percentage of participants who were motivated to turn off standby appliances, change their use of appliances and / or who aimed to use more power saving appliances likewise increased
- Over 90% of participants indicated that they thought their new behaviours would continue.

Table 14: Response concerning the behavioural changes made after IHD installation

	CRT Respondents		BP–PV Respondents	
	Frequency	%	Frequency	%
Use more power saving appliances or changed use of appliance to save power	10	8.2	14	14.9
Stopped using certain appliances	1	0.8	0	0.0
Reduce or limit overall usage	6	4.9	1	1.1
Move pool pump to off-peak times	7	5.7	4	4.3
Moved washing machine/dryer to off–peak time	14	11.5	16	17.0
Moved hot water/Solar hot water booster to off–peak time	6	4.9	3	3.2
Moved other household appliance use to off-peak time	17	13.9	8	8.5
Use off–peak power (generalised)	24	19.7	15	16.0
Turn off lights/installed energy efficient lighting	13	10.7	7	7.4
Turn off standby appliances	16	13.1	18	19.1
Mental change e.g. more aware of usage & time of use etc.	7	5.7	6	6.4
Not Relevant	*1*	*0.8*	*2*	*2.1*
Valid Total	*122*	*100.0*	*94*	*100.0*
No Response	*14*	*0.0*	*24*	*0.0*

KEY RESULTS

The CRT–trial was an important first for the Northern Territory being the first major collection of interval data for residential customers, and so has provided valuable data for better understanding time of use behaviours in this sector.

It was a unique opportunity for Power and Water Corporation to trial a residential time of use tariff for a discrete community of customers, and provided them with a range of useful outcomes, from improvements to internal systems to learnings on deployment and technology.

While the CRT customers were able to benefit financially from the tariff, it was a small benefit with a resulting small leverage on behaviour.

The meters were also able to be reprogrammed to collect data such as voltage levels and power factor, providing a ready source of extra information for network control. This was utilised for a study of the effects of PV installation on domestic voltage levels (conducted by the Australian PV Association in a case study for Alice Springs in 2011).

Transferable Lessons

- A tariff needs to offer substantial financial attractiveness to have a sizeable leverage on energy behaviours.
- Careful consideration is required of the technical workload from smart metering specification, configuration and deployment, and for the storage and analysis of the ‘big data’ created by interval metering.
- Processes for fault finding metering problems should be established early on.
- The full life cycle and exit strategy for meters and displays under different scenarios should be incorporated into initial planning of such trials.

RESIDENTIAL CASE STUDY

ROLAND & MARIAN MADDOCKS

“we claimed back $1,000 on our power bills...”

At the time of their home energy survey in April 2008, Roland and Marian had lived in their home for 21 years, with four adult children gradually moving out in the years prior. Their home is set on a hill exposed to the elements and recently removed trees meant that the house was receiving a lot of afternoon sun through the west facing walls and windows. Their energy use dropped dramatically after joining Alice Solar City, from 43.3 kWh per day in 2008 to just 18.3 kWh per day by mid 2011

They achieved this by: Installing solar hot water and a one–shot booster; Painting the roof white; Installing low energy light bulbs. The Maddocks also claimed the 10:10/20:20 incentive 14 times, earning themselves $1,240 worth of credits on their power bills. They also installed a 2 kW rooftop solar PV system independently of Alice Solar City and in the first year were paid $500 for all the power they produced through the standard feed–in tariff.

If the Maddocks’ consumption had stayed the same, at current tariffs, their electricity would be costing $8.33 per day ($760 per quarter), but is now $3.63 per day ($330 per quarter), a saving of $1,715 per year.

RESIDENTIAL CASE STUDY

TIM HILL & LISA KINGMA

“we hardly need to use our air-conditioner...”

After their energy survey in September 2008, the Hill-Kingma family of five reduced their electricity consumption by over 30%, from 13.6 kWh per day to 8.5 kWh – around a third of the average Alice Springs household consumption.

It was a family effort and was achieved by:

- Installing a solar hot water system in place of their electric unit
- Having good shading around the home and painting the roof white
- Using fans to keep cool
- Not using the air-conditioner unless it was really hot
  (the Hill-Kingma’s only used it 4 times in the summer after painting the roof white)
- Installing energy efficient light bulbs.

LOCAL SUPPLIERS

LOCAL SUPPLIERS

Local businesses that provided energy efficiency services and products were essential to the success of the program, and building local capacity was a key desired outcome of the project.

In order for the incentive voucher process to work, suppliers needed to be selected, registered and trained. Although (with the exception of PV) customers would select and deal with their preferred supplier directly, the performance and conduct of the suppliers was of paramount interest to Alice Solar City.

How suppliers were engaged

Local (and in some cases out of town) service and product suppliers in Alice Springs could apply to Alice Solar City to become a 'registered supplier' for the incentive program, so that they could accept vouchers for energy efficiency measures undertaken by the customer.

Customers were then provided with a list of the suppliers that were registered to accept vouchers for each incentive type.

Alice Solar City contacted a range of local suppliers initially, inviting them to register with the program. In addition, customers who did not find their preferred supplier on the list would encourage that supplier to complete the requisite paperwork to become registered.

Through the application process, potential suppliers provided evidence of being a viable ongoing business, with appropriate insurances and industry experience. Evidence of specific licenses was also provided where appropriate.

WHO WERE THE SUPPLIERS?

A.N. Electrical Pty Ltd
A1 Plumbing Alice Springs
Active Electrical & Air Conditioning
Agnew Electrics
Airtemp Pty Ltd
AJ Services
Aldirect Plumbing & Gas Fitting Pty Ltd
Alice Maintenance Plumbing
Alice Mobile Blinds
Alice Pool & Spa Centre
Alice Roof N Gutter
Alice S & K Plumbing
Alice Springs Painting Service
Alice Tinting & Signmaster
Al's Plumbing Service
AMC Design / Edge Renovation & Carpentry
Araluen Plumbing
ASbuild NT
Asplum Pty Ltd
B & J Building Services Pty Ltd
B & S Home Timber & Hardware
B T Daley Contracting
Barry Harrison Painting
Barts Building
BG Electrical
Blue Sky Electrical
BP Solar
Bullet Plumbing NT
Carla Furnishers
Centre Plumbing
Chris Nuss
CKS Electrical T/A Lights are us
Clark Rubber Alice Springs
Clarklec Electrical Services
CMP Electrics
Coffey Environments Pty Ltd
Cool or Cosy
Cozywrap Insulation
Cross Connections Gas & Plumbing
Curt Tomlinson Painting
D J Gould Pty Ltd
Desert Painting Services
DLG Plumbing & Construction
DNA Steel Direct
Dona Plumbing
Exechtech KDR Electrical
Flavell Plumbing (NT) Pty Ltd
Focus Home Improvements
Gardner's Test & Tag Electrical
Geoff Scott
GGS Alice Glass & Aluminium
Gillen Plumbing Pty Ltd
Handy Helper
Hartung Plumbing
Harvey Norman
Heenan Carpentary & Construction
Hemmings Fabrications
Huoi Van Tran
I Was Just T/A K & S Windows
IG's Contract Building
Ingkerreke Outstation Resource Services
Insulfoam Solutions
J Seals
Janda Carpenters & Builders
JC Services
Jenko Electrical Services
Karl Marty Contractor
Kurlben Painting Contractors
LC's Property Improvements
LRB Building Contractors
Mallam Maintenance
Matthew Cunningham – Mastertrade
MB Building
Mecair Engineering
MM Electrical Merchandising
Morelli Plumbing & Building Contractors
Morris Plumbing & Gas Pty Ltd
MY Electrical
Neata Glass & Aluminium Pty Ltd
Neatys Plumbing & Machinery Hire
Nicholl Constructions
NKA Plumbers
NTP Constructions
Pool & Spa Doctor
Poolman Alice Springs
Principal Products
R Kleeman Plumbing
Ramjets Gardening, Plumbing & Gasfitting Services
Red Centre Carpentry
Red Rock Plumbing – Soren Hansen
Rick's Plumbing
S J Brown General Contracting & Electrical
SDA Plumbing
Sean Griffin
Shaedz of Alice
She Paints 2
SRH Electrical Contracting
SS Air-Conditioning Pty Ltd
Sunshield Tinting Alice Springs
Sustainable Focus Pty Ltd
T & D Brown Plumbing
Tapps Plumbing
Tassies Cool Air
TDC Refrigeration & Electrical Services
The Pomare Family Trust
Tradelink Electrical
Universal Desert Building Services
Wayne Richards Plumbing
WB Windscreens
Wright Plumbing Pty Ltd

ISSUES FOR SUPPLIERS

The handling of GST was a problem for the voucher process, in particular for the amount payable by Alice Solar City which was registered for the GST and could potentially claim GST credit, while residential customers typically could not.

A private tax ruling was obtained from the ATO, which ruled that Alice Solar City could not claim an input tax credit for the incentive payments, and that the supplier should not include a GST amount in the invoice sent to Alice Solar City.

In practice this was very difficult for the suppliers to configure in their billing systems.

In general, correct invoicing of Alice Solar City was an ongoing issue, with may suppliers struggling to correctly calculate the incentive amount and to provide the correct information with their claims.

Concerns around price escalation as a result of the provision of rebates led Alice Solar City to require itemised invoices for some incentives.

DEVELOPMENT OF SUPPLIER SKILLS & EFFICIENCY

An informal survey of suppliers conducted as part of the CDU review of Alice Solar City identified that some suppliers were able to increase their productivity as a result of participation in the project and the 'critical mass' of work received.

The local solar PV industry grew its capacity for grid connect PV considerably as a result of the direct and indirect support provided by Alice Solar City, and the best practice training mandated by BP Solar for its installers.

This topic is discussed further on page 97 in the Community Partnerships section.

Transferable Lessons

The use of the voucher system in combination with a select list of local businesses worked for Alice Solar City in an isolated town. It could be difficult to replicate this success in larger urban areas where the pool of potential suppliers is larger and in remote communities with limited local capacity.

TANGENTYERE COUNCIL ENERGY EFFICIENCY PROJECT

OVERVIEW

Tangentyere Council is the peak representative body for the 2000 – 3000 residents living in 18 Town Camps around Alice Springs, who comprise close to 10% of the Alice Springs population.

Over the period March 2008 – June 2011, 61 Alice Springs Town Camp houses had a range of energy efficiency measures retrofitted, with a focus on training and employment of town camp residents during the rollout.

Each Town Camp has an Aboriginal Housing Association, with the president of each representing the association on the Tangentyere Council board. The residential homes in the Town Camps have historically been thermally inefficient and overcrowded.

The energy efficiency upgrades included the installation of:

- Low energy lighting
- Canvas curtains
- Windows and seals
- Ceiling insulation
- Insulated cladding to external walls
- Evaporative air-conditioners
- Evaporative air-conditioner bleed – off irrigation to shade trees
- External door seals
- One shot solar hot water booster
- Timer controls for stoves and other circuits
- Ceiling mounted radiant heaters.

The installation of these energy efficient measures in the Town Camp homes has had broader social and economic impacts than just saving energy. Employment opportunities and improved health were an added benefit of the project partnership.

Stakeholders

The project was a partnership between Alice Solar City and Tangentyere Council. Tangentyere Council was a member of the Alice Solar City consortium and its role in Alice Solar City was focused on investment in improved energy and thermal efficiency in Town Camp housing, as well as providing training and employment for Town Camp residents as part of the housing upgrades.

KEY RESULTS

Alice Solar City contributed $0.76 million towards the $2.4 million energy efficiency upgrade program at the Town Camps. Alice Solar City also contributed a total of $0.15 million towards the training component of the housing upgrades.

The project saw the installation of targeted measures to make the homes warmer in winter, cooler in summer and cheaper to run:

- Temperatures inside the homes were measured before and after the project and were found to decrease by an average of 4°C in summer and to increase by 2 – 4°C in winter. This is a particularly important outcome for the health of the old and young generations who reside in the Town Camps
- In 2008 when the partnership launched, the then executive director of Tangentyere Council William Tilmouth also expressed his hopes that the upgrade program would provide some much needed employment for a small group of Town Campers. Tangentyere Council initially employed 12 Community Development Employment Projects (CDEP) trainee works and 3 builder / trainers, with further trainees employed later
- Of the 24 staff employed, 20 completed their Certificate II and went on to gain further full-time employment with Territory Alliance on the Strategic Indigenous Housing and Infrastructure Program (SIHIP)
- A survey of the residents found good acceptance of the changes, but that energy savings were difficult to measure, especially given that many of the houses did not have electric air-conditioning or heating prior to the upgrades.

"Tangentyere Council believes this program will reach across a number of social and economic levels.

We're hoping for it to have an impact on the health of our old and young generations, by providing houses that are warm in winter decreasing the likelihood of people developing chest infections and pneumonia, reducing the impact of overcrowding, and reducing dust levels in and around the house.

The project will provide employment for some Town Camp residents, who will be trained to undertake much of the upgrade work."

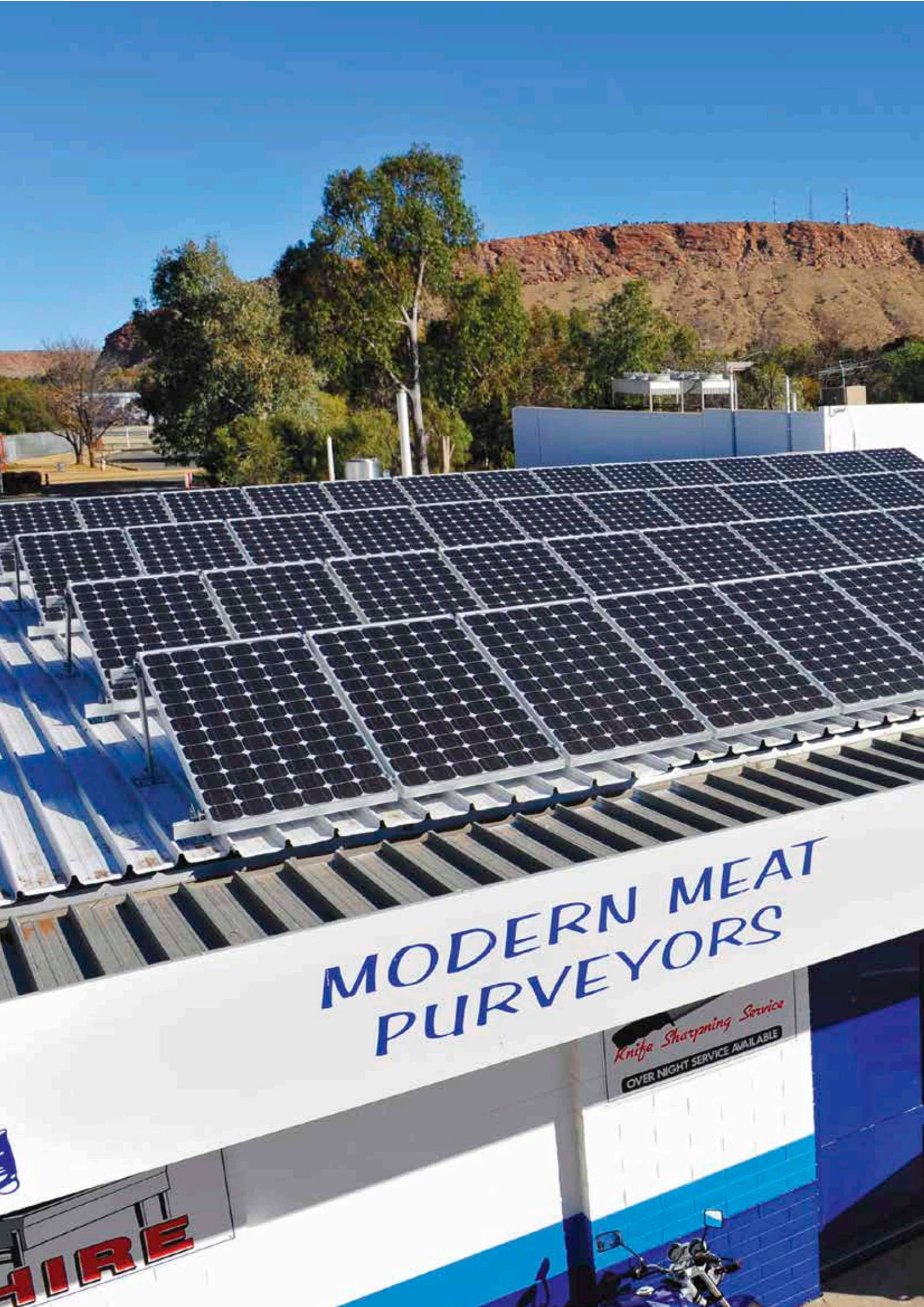
William Tilmouth (2006)
Executive Director Tangentyere Council

Transferable Lessons

The Tangentyere project did not have a budget allocated or linked to data collection and evaluation outcomes, and as a result these were not fully embedded in the rollout. Limited information was therefore available on the effect of the interventions for the residents and their electricity consumption.

An important finding was that improvements to housing previously in poor condition and with limited useful appliances in place is likely to lead to an increase in consumption. The more important goal is to ensure that the building and fixed appliance improvements embed energy efficiency and cap costs for the residents as much as practical.

A detailed report on this project is available from the Alice Solar City website.


MODERN MEAT
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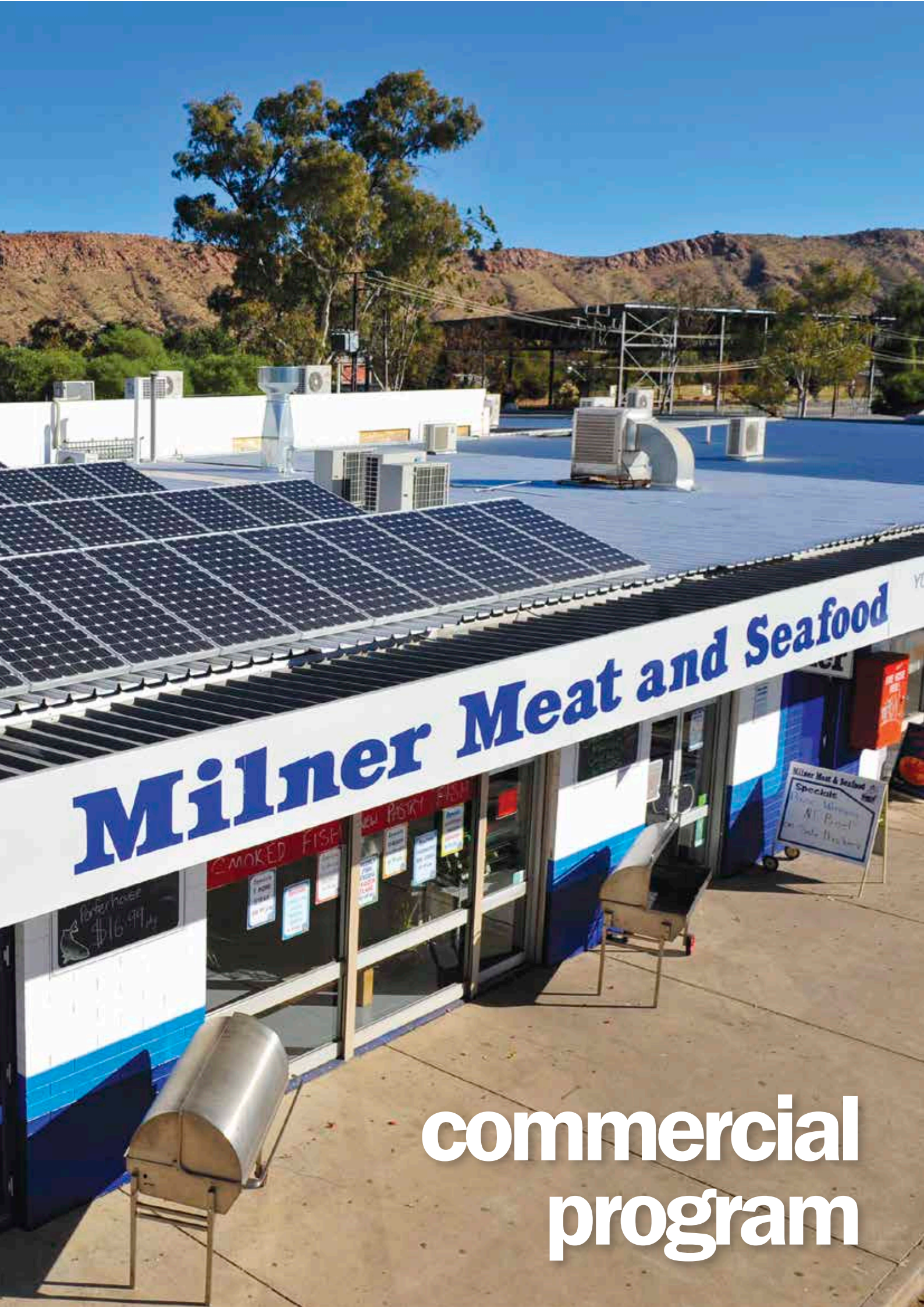
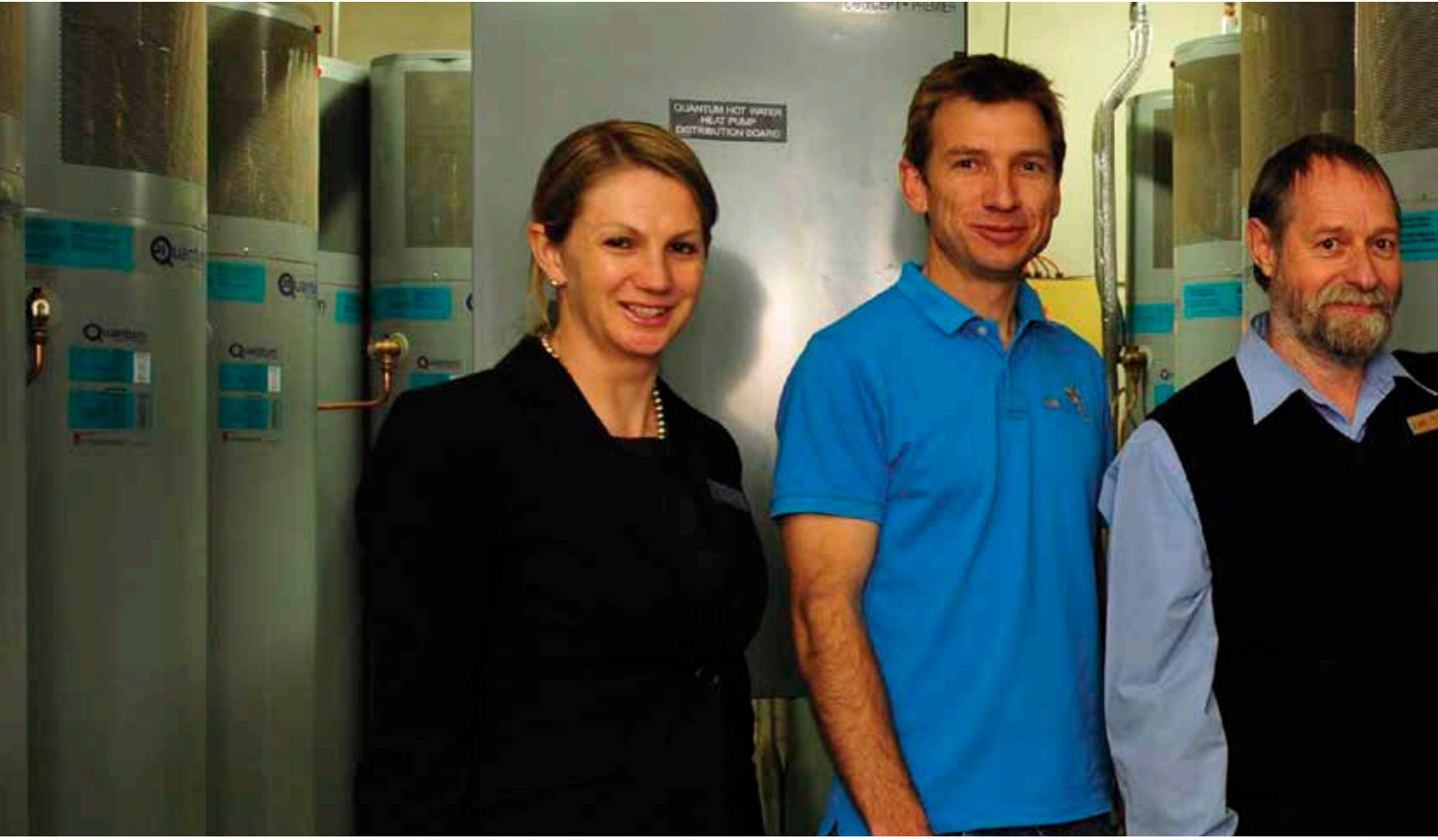


commercial program



COMMERCIAL PROGRAM

OVERVIEW

The commercial and public sectors consume over 50% of Alice Springs power and were integral to the success of Alice Solar City.

Alice Solar City included an integrated suite of services and incentives to engage with and support the commercial sector. By using less energy, being more efficient with the energy that is used, and adopting solar technology, organisations were encouraged to reduce costs, reduce their impact on the environment and make their organisation more competitive, on a journey to achieving energy champion status.

Alice Solar City employed a Commercial Services Manager to oversee the delivery of services and the program budget allocated to this important sector.

Alice Springs has a limited amount of heavy industry, and key sectors consuming energy in Alice Springs include power generation itself, tourism, health services, retail, education and administration.

MARKETING & COMMUNICATIONS

Marketing and Communication for Alice Solar City's offerings and benefits were tailored to the commercial sector. It took longer for businesses to take up incentives than it did the residential sector, so several specific campaigns were conducted to target this sector.

The communications objectives were:

- To demonstrate that there are many small and large measures that can reduce energy use in their business
- To increase awareness of the types of funding that is available to their business
- To educate the business community on the benefits of reducing their energy use
- To educate the business community on the impacts of individual and collective energy use
- To educate business owners and their staff about energy behaviours and the benefits that changes can bring to the business.

Heat pumps installed at Crowne Plaza Alice Springs

Many businesses had heard about Alice Solar City but did not know where to start, or were too time poor to get involved.

Targeted strategies included:

- One on one meetings with high energy use businesses, offering tailored advice and assistance
- Developing specific tools and resources to provide assistance and additional information for businesses
- Developing industry and media partnerships to help effectively roll out the mini campaigns, eg Chamber of Commerce, Tourism Central Australia and Tourism NT, and local business journalists.

Fact sheets, brochures and website pages were created, and a business e–newsletter was sent out regularly. Business case studies were developed to promote business participation and demonstrate real–world local actions that were being taken.

Tools and resources created specifically for the commercial sector included a free solar checkup service and a flyer specifically outlining the energy saving opportunities in a business, which was sent out with a letter via the local Chamber of Commerce. These tools provided the opportunity to follow up with businesses individually, which appeared to be effective.

Businesses and organisations were generally very proud of their solar and energy efficiency achievements and were keen to showcase this to their peer businesses and customers. Alice Solar City provided participating commercial customers with metal signs they could place at the front of their premises, 'This business is proud to run on solar' or 'This business is proud to be a part of Alice Solar City.'

Alice Solar City also actively attended and networked at business specific events such as Chamber of Commerce Business at Sunset events and October Business Month events.

Promotion of Commercial Energy Champions on the website and in print in the commercial section of the local paper, as well as a dedicated Commercial Energy Challenge competition which took place as part of the Year of Energy Champions campaign in 2012. Further, commercial achievements were often highlighted through PR and media, with many stories appearing in the local press.

LARGE BUSINESS PROGRAM

The top 50 single entity power consumers together represent 30% of the town's baseload demand and Alice Solar City's Commercial Services Program was designed to provide services customised to this "big end of town". The Alice Springs Hospital project and several of the iconic projects were examples of Alice Solar City initiatives that were specifically designed to support large consumers.

A large customer was defined by Alice Solar City as one that consumed more than 160 MWh per annum at its facility. Support for large consumers started with a general discussion about the organisations goals and priorities. The opportunity for a professional energy audit was discussed, and funding of 50% of the audit costs (up to $8,500) was made available. A written offer of funding, along with a list of accredited auditors was provided to customers to facilitate the process.

Large customers were then encouraged to develop an action plan based on the energy audit, and submit a funding application for implementation. Funding of 35% of the implementation costs was offered with a cap of up to $50,000 determined on a case by case basis.

For some large customers that did not proceed to a professional energy audit, the option of a more limited walk-through energy survey by Alice Solar City was available.

Outcomes – Large business program

A total of 56 large businesses signed up with the program, and six undertook a professional energy audit. Alice Solar City contributed a total of $25,000 towards five of these audits. The audits identified typical savings of 16% of total consumption with payback periods averaging 3.4 years.

An additional 42 large businesses had a walk-through survey conducted by Alice Solar City. Typical savings identified were in the order of 10%–15%.

A total of 19 large businesses received funding for one or more actions, with $0.274 million of Alice Solar City funding that supported a total investment of $1.115 million. The annual savings of this investment was estimated at 1,650 MWh and 1,303 tonnes of CO_2.

With energy costs typically constituting less than 5% of operational costs, medium sized commercial customers generally required extra motivation outside of simple economics to invest resources into energy efficiency. Larger organisations with Territory or national scopes were limited in their ability to engage with a relatively small local program. Large customers with local or national sustainability goals were the most active in the program, especially those in the tourism sector.

SMALL BUSINESS PROGRAM

Small businesses and organisations were offered services more closely aligned to the residential program. After completing a registration form, a time was made for a walk through energy survey to be conducted at the customer's premises. An initial discussion was held with the key staff member, presenting information on historical annual energy consumption.

A detailed report, with customised and costed recommendations was then prepared and presented to the customer, with opportunities for funding highlighted.

Customers who decided to invest were provided with a funding offer, typically after obtaining quotes for their action plan, and funding was provided direct to the customer after completion of the works.

Outcomes – Small business program

A total of 163 SME customers registered with the program, and 142 walk through energy surveys were conducted. Of these, 68 received funding for one or more energy efficient actions, with total Alice Solar City funding of $0.186 million supporting a total investment of $0.551 million.

The combined savings from the measures supported are estimated to be 316,436 kWh per annum and 250 tonnes of CO_2.

While some small business customers were happy to focus their efforts on energy efficiency opportunities, for many solar PV was the primary focus and potential 'easy fix'. Alice Solar City therefore tied PV funding to taking action on energy efficiency opportunities, and this successfully facilitated the implementation of a number of additionally funded energy efficiency projects.

PHOTOVOLTAIC INSTALLATIONS

A key part of the commercial program was funding for solar power installations. Initially, this was packaged as funding of up to 50% of costs for a 3 kW BP Solar installation.

Interest in this initial offering was low for a number of reasons. Many businesses operate from leased premises, and therefore have short investment horizons, generally expecting a return on investment of less than two years. For owner occupied businesses who could invest for the longer term, a 3 kW system represented a relatively small proportion of their annual energy needs, and only a much higher proportion generated by PV was of sufficient interest to warrant an investment.

In response to this slow uptake, the funding was expanded to allow for larger systems, and for suppliers other than BP Solar.

Interest in commercial solar power grew considerably over the life of the program. 39 installations totalling 411 kW of solar were funded with $1.116 million towards a total investment of $2.456 million.

All PV systems were supplied with smart metering, with gross metering specified wherever practical, and an In–house display (IHD) was supplied to businesses where their metering allowed for successful integration of the IHD communications.

Commercial customers were in general keen to install solar PV systems that would cover close to or above 100% of their annual consumption, and would do so even with Alice Solar City funding capped at supporting the capacity sufficient to cover up to 80%.

Commercial PV performance

Analysis of the performance data collected for commercial PV installations demonstrated that, like the residential installs, performance was on par with modelling predictions and estimates. Extrapolation of the available data provides an annual generation figure of 674,000 kWh per annum, resulting in savings of around $0.195 million and 532 tonnes of greenhouse gas emissions.

SUMMARY OF SUPPORTED PROJECTS

The key types of measures supported by the commercial program were solar and heat pump hot water systems, solar PV, air-conditioning improvements and lighting retrofits.

Table 15: Physical measures recommended and completed – costs and estimated kWh savings

Electrical Service	Claims	Total Cost ($)	Alice Solar City Incentive ($)	Estimated Savings (kWh/yr)
Solar PV	39	2,456,204	1,116,427	723,187
Water Heating	25	638,180	185,571	1,020,910
Space Cooling	4	18,238	6,383	8,463
Space Heating / Cooling	66	623,814	158,273	873,749
Lighting	38	265,038	69,638	428,302
Pool / Spa	3	25,223	5,640	115,017
Refrigeration	5	12,010	3,518	26,120
Energy Audits	5	52,258	25,455	0
Other	1	31,516	5,000	100,000
Grand Total	**186**	**4,122,481**	**1,575,904**	**3,295,748**

Key Results & Transferable Lessons

Overall, the commercial program achieved energy efficiency savings comparable to the residential program, and did this through the actions of only 88 customers, compared to the 1900 households that undertook measures. The larger commercial operations in particular produced some very significant energy and demand savings.

However, the conversion rate from an Alice Solar City supplied audit into implementation was lower than for the residential sector. Written reports by themselves resulted in little action, and many customers needed direct support to identify suitable products and contractors in order to implement actions. Businesses were less likely to contact Alice Solar City with a specific measure already in mind (with the exception of solar PV), looking instead for general advice on reducing energy costs. Commercial customers also had shorter investment horizons, especially with a high proportion of businesses operating from leased premises.

CASE STUDY – ALICE SPRINGS REPTILE CENTRE

"achieving eco accreditation is an important goal for our business, and Alice Solar City has been a big help in assisting us to achieve our goal, while saving money along the way..." Rex Neindorf – Director, Alice Springs Reptile Centre

Company Profile

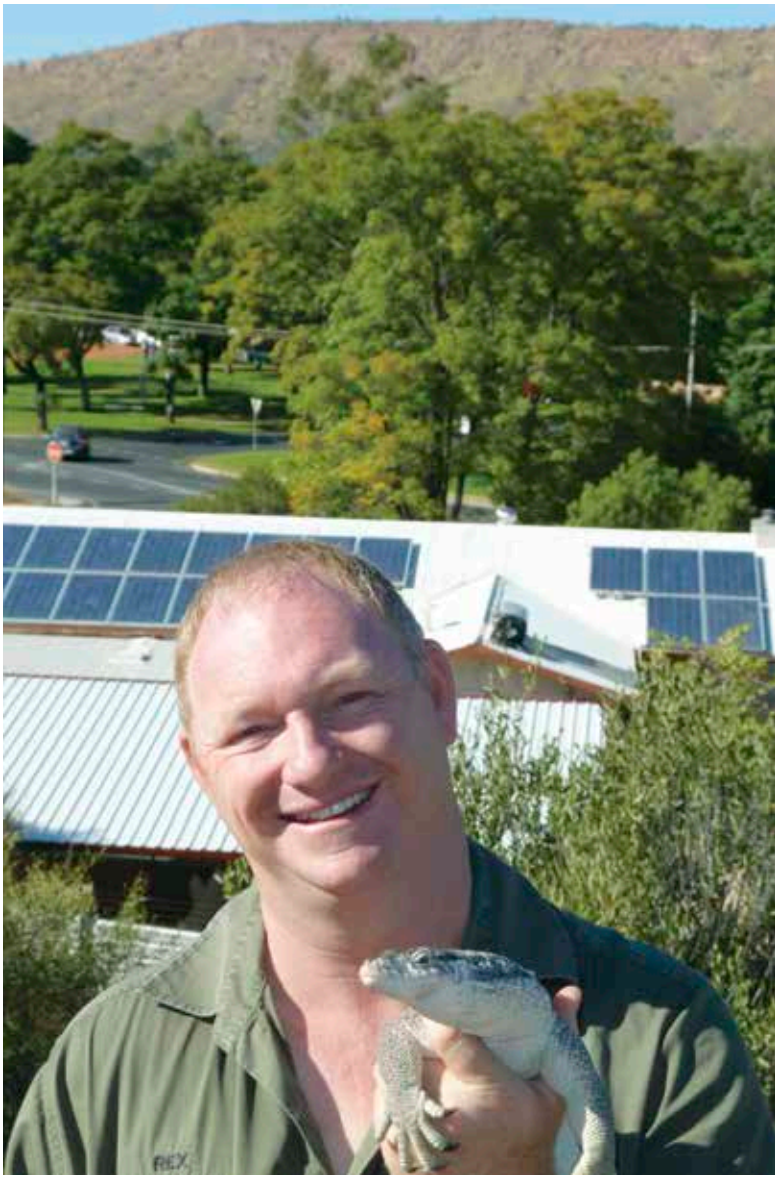
The Alice Springs Reptile Centre is a unique tourist attraction housing the largest display of reptiles in Central Australia, including Terry the saltwater crocodile. The business is housed within in a heritage precinct weatherboard building and the owner approached Alice Solar City with the goal of installing solar power and reducing overall energy consumption, in support of achieving Eco–tourism Accreditation.

Outcomes

The Alice Solar City energy survey identified a number of energy saving opportunities in addition to the potential for solar PV.

A 11.4 kW solar PV system was installed across all available roof–space. In addition a range of retrofits were undertaken, including a new solar hot water system, painting the roof white, tinting windows and improving window shadings, replacing inefficient lighting, insulating walls and ceiling, removing an inefficient drinks fridge and installing a variable speed pool pump.

As a result of the comprehensive energy efficiency investment and the solar power system, net consumption from the electricity grid has been reduced by 60%, saving $8000 and 22 tonnes of greenhouse gas emissions per annum.



ALICE SPRINGS HOSPITAL ENERGY EFFICIENCY PROJECT

OVERVIEW

In May 2013, the largest single electricity user in Alice Springs, the Alice Springs Hospital (ASH) completed a major energy efficiency overhaul to save over $200,000 on its annual power bill and 700 tonnes of greenhouse gas emissions per annum. The hospital is the second largest hospital in the Northern Territory with 189 beds and serves an area of 1.6 million km^2.

In addition to making big savings, the project helped inform and motivate energy management initiatives at the other four public hospitals in the Northern Territory.

Stakeholders

The Alice Springs Hospital Energy Efficiency project was a joint $631,000 project between the NT Department of Health and Alice Solar City, and formed part of the original Alice Solar City project plan.

Energy audit results

ASH had a detailed energy audit in 2009 and Alice Solar City worked closely with the hospital staff to assist them achieve the greatest financial and environmental returns possible. At the time of the audit it was found that 57% of electricity was used for heating, ventilation and air conditioning (HVAC) and 24% for lighting.

Figure 16: Itemised electricity use

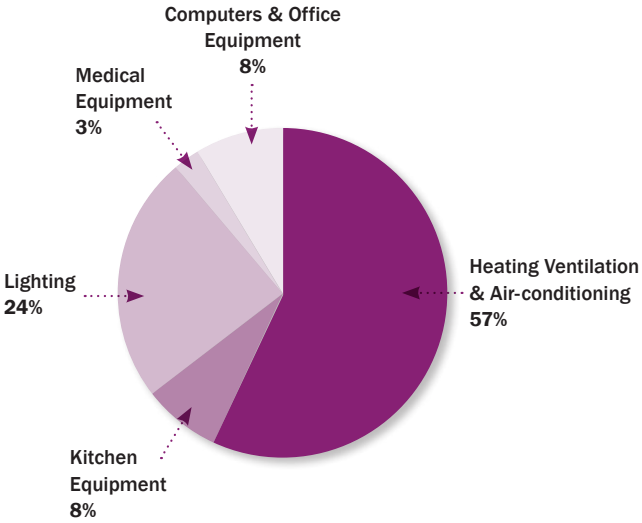
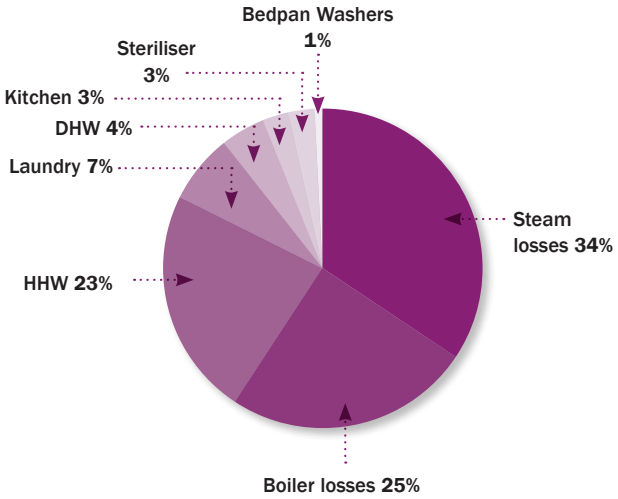


Figure 17: Itemised natural gas/steam system



DHW = Domestic water for showers

HHW = Heated hot water for buildings

MEASURES IMPLEMENTED

One of the most important changes made was to the HVAC system, where outside air brought into the hospital was evaporatively 'pre-cooled'. This allowed evaporatively cooled and filtered outside air to condition the hospital during mild conditions, substantially improving indoor air quality and reducing the use of energy intensive refrigerative air conditioning.

Stage two of the project saw the HVAC system fine tuned to allow for further energy savings, and Stage three saw the upgrade of an existing gas fired boiler to improve the efficiency of the hospital's piped steam system, used to pump steam around the hospital for a range of heating and sterilisation uses.

Other energy efficiency measures included:

- Evaporative pre-cooling of the nurse quarters and re-instating economy cycles
- Winding back air conditioning in the pathology laboratory after hours
- Installation of motion sensors and time delay switches for split system air conditioners in 16 residential units
- Replacement of electric hot water heaters in residential units with solar hot water
- Installation of automatic lighting controls in the pathology laboratory
- Variable speed drives on staff swimming pool pumps
- Installation of 160 low flow showerheads to save both water and the energy required to heat water.

KEY RESULTS

- Annual savings of $190,000 (at 2010–11 tariffs) and 700 tonnes of greenhouse gas are estimated to have been achieved through the Alice Springs Hospital Energy Efficiency Project
- However these figures alone do not tell the whole story. Through this project, Alice Solar City helped instigate a program that motivated engineering staff to pursue a range of additional smaller savings in building systems, and inspired the investment in the large savings possible through the installation of a co-generation system
- In addition, live and real time hospital greenhouse gas emission information (calculated from electricity and gas use) will be displayed on screens in the staff room and engineering office and be accessible via the ASH intranet
- It is anticipated that this information will motivate ongoing energy saving behaviour.

Transferable Lessons

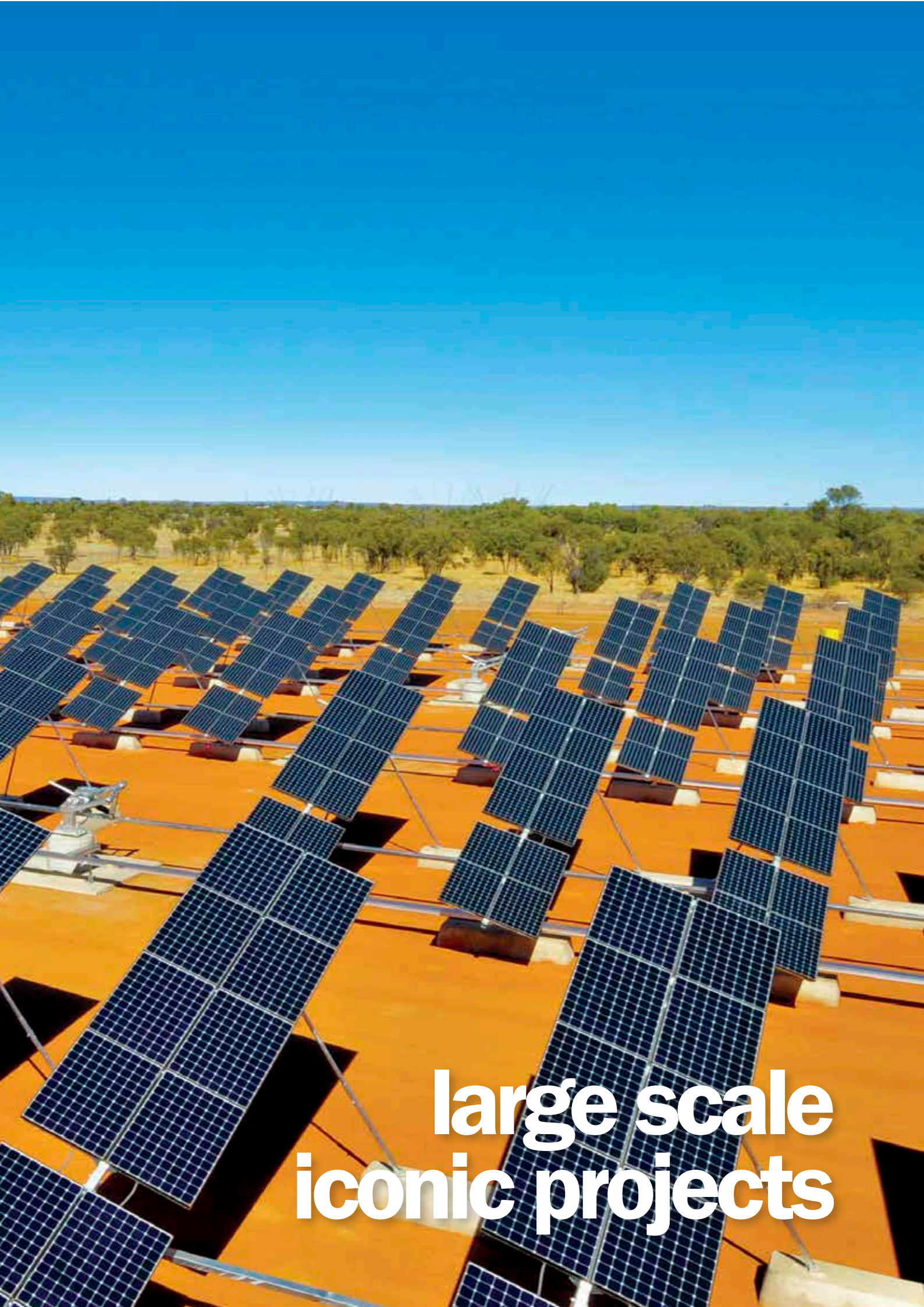
The Hospital engineering team noted that implementing such a wide range of measures takes long-term dedication from the people on site, but having the support of a specialist program such as Alice Solar City was important to help engineering staff to pursue further energy saving projects and ideas.

Energy management efforts at Alice Springs Hospital since 2008 have highlighted that improving commercial building energy efficiency, like so many things in life, is a journey not a destination.

Important lessons from this project include:

- An energy audit provides a useful snapshot of a site's energy use and savings opportunities but is no substitute for staff really getting to know how their equipment operates over time and under different conditions, doing their own research, and continuously improving the performance of building sub-systems.
- Building energy investigations need to cover multiple disciplines: electrical, mechanical and hydraulic engineering as well as building fabric issues. In addition, at ASH, steam expertise was required. Ideally, for a complex site, separate experts would be brought in to provide an energy audit for each major sub-system.
- After an energy audit report is delivered, implementation of the wide ranging recommendations takes long term dedication from the people on site. It is likely that many of the recommendations will need to be modified to deal with complexities that arise along the way and often staff are trying to fit this in with other priorities that are considered 'core business'.
- Having a dedicated Energy Manager, a staff member dedicated to driving the process, has greatly assisted the Department of Health's energy management efforts.

Crowne Plaza Alice Springs - *Commerial Program Participant and home of the first Alice Solar City iconic project*



large scale iconic projects

LARGE SCALE ICONIC SOLAR PROJECTS

OVERVIEW

Alice Solar City supported and encouraged the development of large scale "iconic" projects in and around Alice Springs. As well as being important trials of new solar technologies and large installations in their own right, their role was to stand as visible reminders of the community's energy champion journey and its transition to an increasing use of renewable energy.

There were five large scale iconic projects installed under the Alice Solar City project:

- Crowne Plaza Alice Springs (February 2009)
- Alice Springs Airport (November 2010)
- Alice Springs Aquatic and Leisure Centre (April 2011)
- Uterne Solar Power Station (July 2011)
- Araluen Cultural Precinct (December 2012)

Originally intended as a series of deployments of large concentrator dishes from the Australian company Solar Systems, the demise of Solar Systems during the global financial crisis in 2008 resulted in a re-visioning of the iconic projects into a set of unique technology trials and demonstrations.

Table 16: Technical details of Alice Solar City's large scale iconic projects

Project Location / Facility	Project Technology	Nominal capacity	Annual Production	Annual greenhouse gas saving (tonnes)
Crowne Plaza Alice Springs	Flat plate PV	305 kW	531 MWh	420
Alice Springs Airport	Dual-axis tracking concentrating PV	235 kW	600 MWh	470
Uterne Solar Power Station	Single-axis tracking flat plate PV	969 kW	2300 MWh	1540
Alice Springs Aquatic & Leisure Centre	Black pipe solar water heating	1700 m^2	3450 GJ (offset)	350
Araluen Cultural Precinct	Flat plate PV	180 kW	330 MWh	231

CROWNE PLAZA ALICE SPRINGS

Overview

As one of the largest hotels in Alice Springs, Crowne Plaza Alice Springs offers 236 hotel rooms and a range of restaurant, conference and other facilities. With the installation of more than 1,300 photovoltaic modules as part of a 304.98kW photovoltaic system, the Alice Springs Crowne Plaza Hotel was the first iconic project completed under Alice Solar City and helped put the town on the national solar stage. SunPower Corporation and Ogden Power installed the system and in 2009 the project won the Northern Territory Engineering Excellence Award.

Solar PV installation

Commissioned in early 2009, the system was at the time Australia's largest building mounted solar power system. The solar power installation has reduced the hotel's CO_2 emissions by 420 tonnes per year with an estimated 531,000 kWh being generated per annum. The installation supplies up to 100% of the instantaneous power demand during the day and is reducing the total load on the Alice Springs power grid by 0.5%.

Energy efficiency

Whilst the hotel is well known for its iconic photovoltaic power system project, behind the scenes, Crowne Plaza Alice Springs made an equally dramatic if somewhat less visible contribution to its sustainability drive.

In late 2007 the hotel commissioned a detailed energy efficiency audit, which highlighted a number of significant energy saving opportunities. With the support of the Alice Solar City commercial program, the hotel launched a project to implement a large range of the opportunities identified in their audit. An application to the Alice Solar City large business program saw them successfully secure $50,000 in funding towards a range of energy projects which when fully implemented would reduce energy consumption by approximately 20%.

Energy efficiency measures

- **Lighting Upgrades**
  Over 1,500 incandescent and halogen lights were replaced throughout the hotel with more efficient and longer lasting compact fluorescent lamps. ***Savings:*** $30,000 per annum and reducing electricity peak demand by up to 75 kW.

- **Lighting Controls**
  Sensors were installed in a number of utility rooms in order to turn lights off when ambient light levels are high enough, and when the spaces are not occupied. ***Savings:*** $4,000 per annum and a reduction in greenhouse emissions by 20 tonnes per annum.

- **'Energy eye' in hotel room air-conditioning controls**
  This system detects doors being opened and movement within the room and when the room is vacant, the room air-conditioning system is either turned off or moved to low energy settings. ***Savings:*** $19,000 per annum.

- **Jemflo Water Flow Controllers**
  Fitted throughout the hotel, these devices reduced water flow in existing fittings. ***Savings:*** up to $20,000 per annum through reduced water consumption of up to 10 million litres per annum.

- **Pool Solar Heating**
  A Heliocol solar pool heating system was mounted on a roof near to the guest pool. ***Savings:*** up to $5,000 a year in gas consumption.

A specialised Heating, Ventilation and Air-conditioning (HVAC) energy audit recommended suitable efficiency projects in the air-conditioning plant.

These projects included:

- Variable Speed Drives (VSDs) in air-conditioning motor systems, saving an estimated $20,000 per annum
- Optimisation of the HVAC control system
- Heat Pump Hot Water System – Crowne Plaza's ageing gas fired water heating system was another opportunity to make energy saving investments. 26 individual heat pump units were installed to connect together to form one large hot water system. ***Savings:*** $20,000 per annum and a reduction of 78 tonnes of greenhouse gases each year.

KEY RESULTS

- 36% reduction in annual electricity consumption.
- 49% reduction in natural gas consumption.
- 26% reduction in water consumption.
- 895 tonnes of greenhouse gas emissions saved per annum.

Incentive value:

PV system: $1.5million
Energy efficiency program: $50,000
Heat pump installation: $50,000

ALICE SPRINGS AIRPORT

Overview

Officially opened on 4 November 2010, the Alice Springs Airport's 235 kW solar project was the second Alice Solar City iconic project. In a first for the southern hemisphere, the project incorporates SolFocus technology, which utilises an innovative method of concentrating the sun's energy.

Twenty eight concentrating photovoltaic tracking arrays were constructed on land to the north west of the Alice Springs Airport, feeding electricity into the Alice Springs Airport. The project is meeting approximately 28% of the Airport's electricity needs, and will reduce carbon emissions by around 470 tonnes per annum.

Visitors to Alice Springs are not able to ignore the town's commitment to solar energy when they travel into town from the Airport.

Stakeholders

NT Airports Pty Ltd committed $1.132 million to the project with matching funds provided by the Australian Government through Alice Solar City. With the Airport being one of the biggest users of electricity in Alice Springs, they were commended for making such a big commitment to both the town and the environment with this major investment.

Technical

- The 235 kW 'power station' is producing around 600 megawatt hours of electricity a year, the equivalent to that used by 70 homes in Alice Springs
- The solar power station produces around 28% of the Airport's electricity needs and reduces its greenhouse gas emissions by around 470 tonnes of CO_2 per annum
- The installation comprises of 28 impressive SolFocus arrays, each eight metres wide and seven metres high, which magnify the sun's rays by 650 times and maximise energy generation by tracking the path of the sun across the sky
- The system incorporates highly efficient triple junction photovoltaic (PV) cells originally developed for satellites in space. These cells are about twice as efficient at converting light into electricity compared to the PV cells that many households have on their roofs.

CAT Projects designed the project with NT Airports, and it was constructed by Ingenero Pty Ltd using SolFocus technology.

Energy Efficiency

In addition to the solar power station project, Alice Solar City supported the Airport with a grant of $25,000 through its commercial program to make the terminal more energy efficient. Measures included the mass installation of energy efficient light globes, fitting motion sensors to control lights and timers on water boilers.

ALICE SPRINGS
AQUATIC & LEISURE CENTRE

Overview

Launched in April 2011, the third iconic solar project for Alice Solar City was the installation of 275 Helicol solar water heating panels installed on the roof of the new Alice Springs Aquatic and Leisure Centre.

The four pools being heated by the new system include the outdoor toddler's pool, 'learn to swim' pool, and two of the new indoor pools – the lap pool and leisure pool. The area of the solar collector panels is nearly equal to the total surface area of the pools to be heated.

With over 170 km of vermin, cockatoo and UV resistant piping being used, the project was one of the largest of its type in Australia at the time of installation.

The project was a practical demonstration of the Alice Springs Town Council's commitment to Alice Springs going solar.

Stakeholders

The total installation cost of the new Centre's solar heating system was $300,000, with Alice Springs Town Council and the Australian Government each contributing $150,000 as part of the Solar Cities program.

Technical

- The solar heating system is expected to meet on average 40% of the heating requirements for the indoor pools, increasing to nearly 100% of the heating requirement during summer
- The solar water heating system is reducing the Centre's gas usage by an estimated 30% and saving over 3450 GJ of natural gas per year (equivalent to 350 tonnes CO_2)
- The existing pool pump water is diverted to the solar pool heating system, passing through the boost pump to the solar collectors on the roof. The water heated by the sun's radiant energy is then returned to the pool to repeat the cycle until the pool is warmed to the desired temperature.

UTERNE SOLAR POWER STATION

Overview

In July 2011 Alice Springs reached new heights in its quest to create a sustainable energy future with the launch of the 1 MW Uterne Solar Power Station. Uterne (pronounced 'u turn ay') was the fourth iconic project to be installed under Alice Solar City and at the time was the largest tracking solar power station in Australia.

At its completion, the 0.969 MW solar power station increased Alice Springs total installed solar capacity to about 3.1 MW, equivalent to the annual energy consumption of 650 average Alice Springs homes.

With Alice Springs enjoying more than 300 clear days on average every year it was an ideal location for solar installations such as Uterne and the project further enhanced the town's reputation as a leader in solar technology.

An interpretive display at the Uterne site was also installed to give both locals and visitors to Alice Springs an opportunity to see up close the town's commitment to renewable energy production.

To help celebrate the completion of this milestone in Alice Springs' adoption of renewable energy, a public open day was held at the live power station.

The Uterne power station was supported by Power and Water Corporation signing an agreement to purchase electricity from the 1 MW system for 20 years.

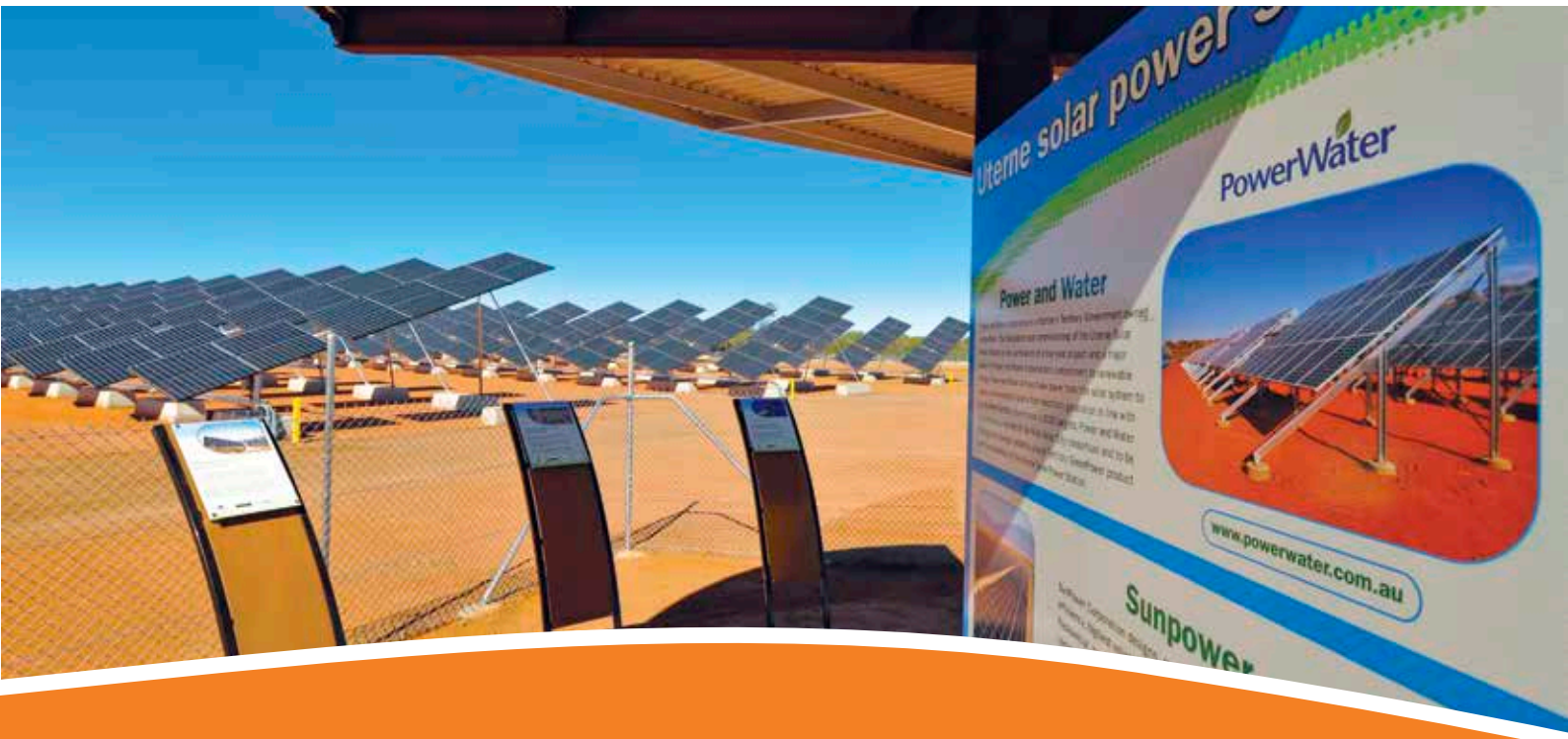
The energy generated by Uterne is fed into the Alice Springs grid, and forms part of the mix of energy supplied to residents and businesses. After a year of successful operation, the facility was sold to Epuron, an Australian renewable energy developer.

Stakeholders

Alice Solar City, working with CAT Projects, and Power and Water Corporation, led the first reverse auction tender process to determine the most appropriate developer – SunPower Corporation Australia. The $6.6 million power station was supported by $3.3 million in funding from the Australian Government through the Alice Solar City project. The installation covers more than 3 hectares of Power and Water Corporation owned land.

Technical

- Uterne consists of 3,048 ultra-efficient SunPower mono-crystalline panels installed across 254 tracking arrays
- The system is projected to produce 2,300 megawatt hours (MWh) of electricity per year, equivalent to the annual consumption of 288 average Alice Springs households
- Uterne will save approximately 1,564 tonnes of CO_2 per annum
- The solar power station is producing about 1% of Alice Springs' electricity use per year and can meet 3% of peak demand on a sunny day
- Uterne uses a novel and low cost tracking single axis system to increase its annual output. By using a tracking system the energy generated by a solar power system can be increased by up to 30%. Single axis tracking means the panels remain tilted to face north at an angle of 20°C above horizontal (close to the optimal angle for Alice Springs) and each tracker, which incorporates nine solar modules, follows the sun from east to west across the sky each day.



The trackers are grouped into blocks, with each block controlled by a single drive unit and mechanically independent of other blocks. Each block has a system controller that determines the optimum tracking angle for the array based on current time, date and geographic location using built–in Global Positioning Signal (GPS) to monitor time precisely and ensure that each block tracks the sun according to its individual latitude and longitude.

Results

Uterne performed at or above expectations since being commissioned in July 2011, and Power and Water Corporation have not reported any significant issues with its integration into the electricity network.

GreenPower

The power produced by Uterne was originally intended to form part of a DesertSMART power product, to be sold to homes and businesses that wanted to support solar power but were not able to install PV on their own property.

At the time of the completion of Uterne, Power and Water Corporation had in place an accredited GreenPower product called Territory GreenPower. Power and Water Corporation faced high up–front and ongoing accreditation costs for establishing Uterne as part of their scheme, and the decision was made to not accredit the facility for GreenPower. Instead, Uterne forms part of the Alice Springs generation mix and is included in Power and Water's mandated renewable energy quota, thereby supplying a portion of solar power to all consumers on the network.

ARALUEN ARTS & CULTURAL CENTRE

Overview

The 180 kW rooftop PV system at the Araluen Arts and Cultural Centre was the fifth and final of Alice Solar City's iconic projects.

The original iconic proposal for the Araluen Arts Centre was a solar thermal air-conditioning system. A detailed design was completed for a solar trough approach, but the end cost proved unviable. There was also community concern around the aesthetic impacts to this iconic site of the ground mounted troughs. As a result, the project was converted to a rooftop solar PV system on the near ideal north facing roofs of the main Araluen Arts Centre building.

The initial installation of 162 kW was completed in November 2012 and was extended by another 18 kW in March 2013. At the time the system took the level of electricity generated by solar in Alice Springs to just over 3%, one of the highest levels in Australia per capita.

The system consists of 720 solar modules, covering almost all available north, east and west facing roof spaces on the main building; over 1100 m^2.

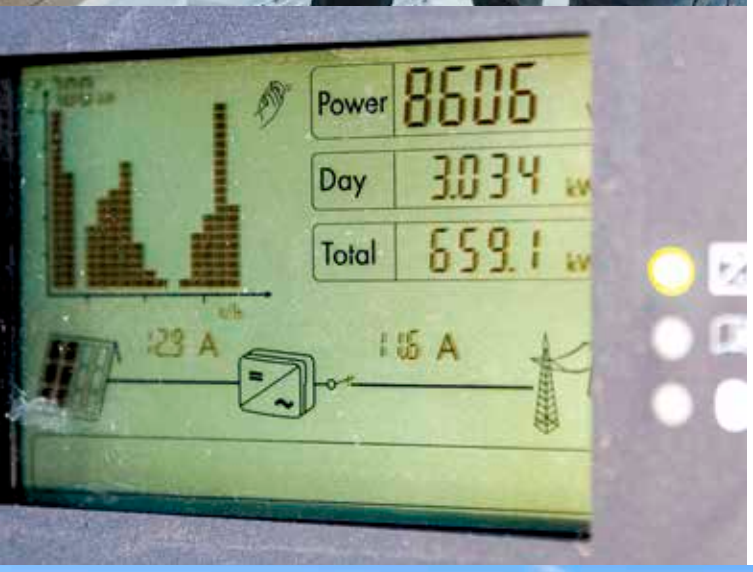
Alice Solar City supported the detailed design of the Araluen iconic solar project by CAT Projects, which identified that the installation of PV would significantly change the 'profile' of the Centre's electricity consumption. Basically, a large part of the power the Arts Precinct uses during the day would be met by solar and overnight consumption would make up the larger part of their remaining consumption.

Therefore it made sense for Araluen to shift to a 'demand tariff' which includes higher daytime (peak) charges but lower nighttime (off–peak) charges to significantly reduce net costs.

An interpretive display within the Arts Centre was installed and allows visitors to understand the operation of the solar system and its benefits to the facility.

Stakeholders

The project was a partnership between the Northern Territory Government's Department of Arts and Museums and Alice Solar City. It was designed by CAT Projects and installed by Ingenero Pty Ltd and Ogden Power using photovoltaic modules from Q.Cells. Alice Solar City also provided 50% of funding for CAT Projects to prepare technical details for the tender process and provide technical input into the installation of PV.



Technical

- The system is expected to generate 330 MWh of electricity and save 231 tonnes of greenhouse gas emissions per annum, enough to power 39 Alice Springs homes.
- The photovoltaic modules from Q.Cells are 250 watt capacity, and have a striking all–black finish. The use of the high contrast black solar panels on the white Araluen Arts Centre roof makes this solar installation a beautiful and highly visible demonstration of mono-crystalline photovoltaic technology.

Energy efficiency

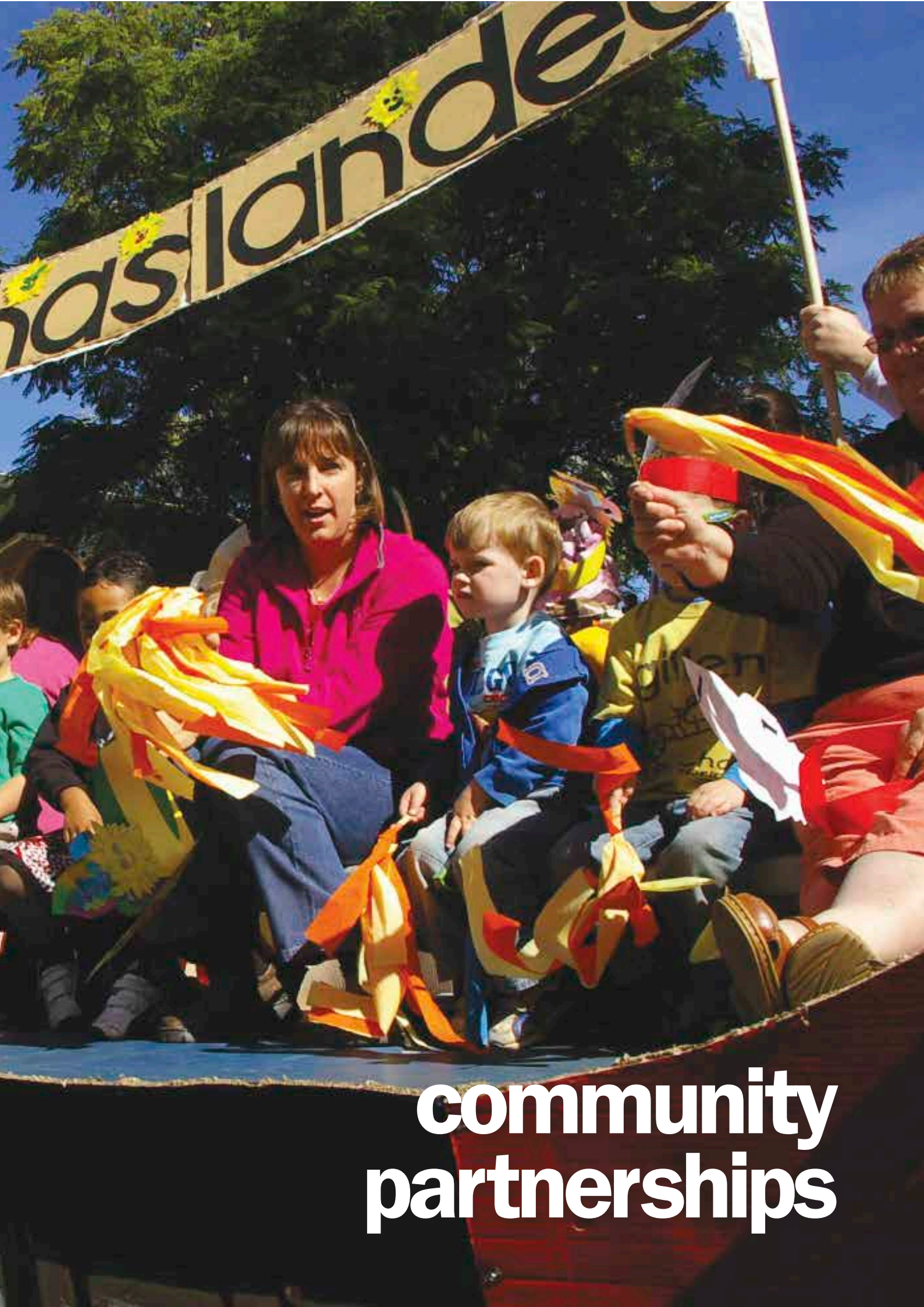
Energy efficiency was also a focus at Araluen with the installation of a new efficient air-conditioning system occurring in parallel to the solar PV project. In addition LED lighting was installed in place of incandescent lamps, and a smart device called a power factor corrector was installed to reduce the amount of ‘phantom’ electrical current (required by electrical motors, air compressors etc) being drawn during the peak times.

The energy efficiency measures are expected to save the Arts Centre around $90,000 a year in energy costs, reducing carbon emissions by more than 200 tonnes a year.

Alice Solar City staff at Uterne solar power station

Chamber of Commerce Business at Sunset event at the Airport solar power station.


Alice solar



community partnerships

COMMUNITY PARTNERSHIPS

OVERVIEW

Alice Solar City worked with several key organisations locally in partnerships that furthered the goals of all involved. Engaging with local environmental and community expertise helped gauge the needs and moods of the community, and assisted with the design of the various behavioural interventions and measures that were part of the program.

Arid Lands Environment Centre (ALEC)

As Alice Springs peak local environment body, ALEC was a key contributor to the successful Solar Cities bid for Alice Springs and a consortium member. Alice Solar City participated in a number of events organised by ALEC, such as its flagship DesertSMART eco-fair event, and contributed regular articles to the ALEC member newsletter 'the devil's advocate'.

DesertSMART COOLmob

Prior to the launch of Alice Solar City, ALEC's DesertSMART COOLmob program was Alice Springs' only offering of low cost home energy and water audits and advice. Alice Solar City worked closely with the COOLmob in using their learnings to inform its own program design. The COOLmob transitioned to a focus on supporting water efficiency and other sustainability opportunities for homes, and Alice Solar City promoted the COOLmob water audit service to its customers.

This partnership extended into the development of the Sustainable Living House, with Alice Solar City focusing on energy saving measures and DesertSMART COOLmob focusing on water saving measures. Both organisations were present at each public open day over a period of two years.

Schools and The Education For Sustainability Central Australia Network (EFSCAN)

Alice Solar City encouraged the uptake of the National Solar Schools program that offered funding of solar PV installations for schools. Alice Solar City also provided funding to EFSCAN to facilitate the development of a series of teaching aids for use in conjunction with Alice Springs iconic solar installations.

EcoBiz

EcoBiz NT is an environmental partnership program of the Northern Territory Government that helps Territory businesses adopt resource-efficient practices that are good for the financial bottom line as well as for the environment. Alice Solar City established a mutually beneficial partnership with the EcoBiz team, by Alice Solar City providing on the ground support to customers of both programs in Alice Springs, and facilitating access to funding from both programs where appropriate.

Department of Business (October Business Month)

Every year the Northern Territory Government's Department of Business hosts October Business Month (OBN), offering a series of training and lecture opportunities for business owners to develop and improve their business. Alice Solar City promoted the Alice Springs energy and sustainability workshops as part of OBN and worked with presenters and organisers to provide localised information and content including case studies from Alice Solar City customers.

Joint Defence Facility Pine Gap (JDFPG)

JDFPG is a major employer in Alice Springs, a significant contributor to the local economy, and owns and maintains 280 residential properties around the town. While JDFPG was not able to directly participate in Alice Solar City funding, it had several of its properties audited to provide ideas for its maintenance team and had In–house Displays fitted within two as a trial.

JDFPG then embarked on a major program of solar PV installation, with a total 130 properties having a 2kW system installed during the life of Alice Solar City. JDFPG was proud to receive and display Alice Solar City "solar powered home" garden signs for its solar properties.

Financial packages and Green Loans

The initial project plan for Alice Solar City included the establishment of finance packages with local banking organisations to help customers with the cost of Alice Solar City incentives. The Bendigo Community Bank and Territory Insurance Office were the two organisations involved initially, with discounts on their standard lending rates offered and promoted to Alice Solar City customers.

These did not prove popular, with most early adopters of Alice Solar City funding using other sources of capital. The announcement of the Australian Government's Green Loans program also stalled interest in the financial packages. Locally, Alice Solar City helped facilitate and promote the introduction of the Australian Government's Green Loans Scheme to Alice Springs.

Alice Springs residents could access interest free loans of up to $10,000 to install solar, water saving, and energy efficient products after a Green Loans assessor conducted a home audit (the Alice Solar City home energy survey was unfortunately not able to serve as a surrogate). Alice Springs residents were able to literally take two bites of the financial cherry by accessing both a Green Loan and the generous Alice Solar City financial incentives.

Desert Knowledge Australia Solar Centre (DKASC)

The DKASC, which showcases and demonstrates a range of solar power technologies, was developed by CAT Projects and Desert Knowledge Australia as a resource for the rapidly expanding solar industry in Central Australia. Solar technicians in Alice Springs train at the facility, and through mutual recognition, its development complemented Alice Springs' reputation as a leader in solar technology.

UP – SKILLING THE LOCAL INDUSTRY & SUPPLIERS

Whilst Alice Solar City provided advice and financial incentives for householders and local businesses to undertake energy saving measures, it was ultimately the electricians and local trade sector that carried out the work and offered customers further advice. Supporting the local trades industry with information and training opportunities in energy efficiency and solar energy was a key goal of Alice Solar City, so that they were better able to service the increased demand for these goods and services.

Alice Solar City's trials helped increase local business investment and saw significant indirect employment and training outcomes created through energy related services and equipment. A survey in 2012 of local businesses involved in the project found that increased labour productivity of energy efficiency suppliers and installers had led to a high degree of skills specialisation; a valuable asset in a town with skilled labour shortages.

Alice Solar City invested in a range of specific industry development initiatives, including a number of information nights for the trade sector and training courses through industry bodies.

EcoSmart Electrician training

In October 2008, eight Alice Springs electricians became qualified as 'EcoSmart' electricians when they completed an Alice Solar City funded specialist training course never before run in the Northern Territory.

It was conducted by the National Electrical and Communications Association. Local electricians were experiencing an increase in demand for more energy efficiency options in appliances such as down lights and air-conditioners, especially after the launch of Alice Solar City. The course provided the industry with a best practice update, enabling the attendees to offer specialist advice to their customers.

HVAC training

In July 2010, Alice Solar City subsidised a training course, "Dollars and sense of HVAC (Heating, Ventilation and Air-conditioning) maintenance for energy efficiency", for local mechanical services and maintenance contractors, equipment suppliers, facility managers and anyone influencing design, installation, operation and commissioning of HVAC systems.

This was the first known running of such a course in the Northern Territory. The two day course was presented by peak national body, the Australian Institute of Refrigeration, Air-Conditioning and Heating, and was conducted by an experienced industry specialist.

Large scale facilities such as shopping centres, hotels, indoor sporting facilities and office blocks are the biggest users of energy in Alice Springs and it was encouraging to have over 20 installers and facility managers attend.

Staff from Zone A Architects, the first Solar PV installation under the Alice Solar City Commercial Program

MONITORING & EVALUATION

OVERVIEW

Effective monitoring and evaluation was an important goal for Alice Solar City, to support management and continuous improvement, provide useful evaluations of the trials, and to meet the data and reporting requirements of the Solar Cities program.

With the initial focus of Alice Solar City on the successful launch of customer services and handling the very high uptake by the community, it was not until 2009 that a detailed monitoring evaluation and reporting plan was prepared, which included a relevant literature review.

Alice Solar City database

Central to the design of Alice Solar City was an online database application that embodied the full range of interactions with customers, from sign–up through to the energy survey report and claiming incentives.

It also stored electricity consumption records, both billing and smart meter readings, and documents relating to customer interactions. A customer portal was launched later in the program, providing self service access to customer data and reports.

The relational database underlying the application was complex, separately representing customers, properties, registrations, energy efficiency measures, vouchers, audit data and energy data. By the end of the program, the database housed over 50 million interval meter readings, and occupied more than 30 gigabytes.

This database served as the foundational data source for program evaluation, and a large effort was put into data entry, data cleansing, and developing tools and processes to analyse the huge and complex data set.

CUSTOMER SURVEYS

In addition to the data collected from customers during their interactions with the residential program, a series of phone and print / online surveys were conducted.

These commenced in early March 2008 with the commissioning of a phone survey of the community, to create a benchmark for Alice Solar City. A full list of the surveys is provided in Table 17 followed by highlights from the broader findings.

Pre–launch phone survey

The phone survey of 422 households conducted in the weeks prior to launch of the program found a high level of awareness and support for Alice Solar City.

Three quarters of those surveyed had lived in Alice Springs for 5 years or more. The survey identified an overriding belief that the responsibility for energy management should be shared amongst individuals, energy companies, business and government.

Financial incentives were clearly supported as a method of motivating behaviour change. Many of those surveyed had already undertaken measures to save energy, such as switching off lights and appliances and using solar power.

It found that 49% of homes already had a solar hot water system, 67% relied solely on evaporative air-conditioning, 31% had a pool, and there were on average 1.9 fridges per home.

2012 Community Phone Survey (Barriers to customer registration)

The objectives of this survey based research was to explore:

- The levels of awareness and knowledge of Alice Solar City
- Why households did not register with Alice Solar City
- The various impediments to further participation after registration with Alice Solar City
- The levels of public and customer satisfaction with the Alice Solar City Project.

Unprompted awareness of Alice Solar City was mixed, but a majority of those surveyed were aware of the program when prompted. For existing customers of Alice Solar City, it found a high level of satisfaction with Alice Solar City services, and a high level of support for similar services being offered in the future.

Table 17: List of surveys conducted

Survey Title	Survey Description
McGregor Tan Pre–Launch Research Survey	A benchmarking telephone survey of 422 Alice Springs residents, to establish awareness of the program as well the existing relevant technologies, attitudes and behaviours.
Energy/Attitude Questions asked at sign-up	Six questions asked up until June 2011. Five different questions after June 2011. Responses entered directly into the database during computer based registration.
HEA Customer Feedback Survey	Results of surveys, given to customers after their Home Energy Survey.
McGregor Tan Phone Survey (Alice Springs residents not registered with Alice Solar City, and defined groups of those registered)	A survey of Alice Springs residents completed in July 2012. A summary of the outcomes is published on the Alice Solar City website.
Knowledge, Attitude and Behaviour Survey (Pre and Post)	Started in June 2011 and given to customers at sign-up. Customers signed up before June 2011 given electronic / paper version. Post program survey conducted in March 2013.
CRT–IHD Study (2010–2011)	Additional research undertaken in relation to the Cost Reflective Tariff and In–house Display trials.
BP–PV Survey	Survey undertaken of BP–PV customers re satisfaction with BP–PV.
Alice Solar City Customers with non BP–PV	Survey undertaken of other PV customers re experience/satisfaction with their PV.
FUS Customer Feedback Survey	Results of surveys given to customers after their follow up support consultation.
CAT Projects / Alice Solar City Rooftop Study	Results of an aerial photography assessment of all Alice Springs rooftops. (useful data to feed into other analyses).
Sustainable Living House Report and Exit Survey	Survey undertaken by visitors to the Sustainable Living House after their visit.
Commercial Customer Feedback	End of Program Survey of commercial customers.

MONITORING & EVALUATION PARTNERS

The Alice Solar City consortium initially included the Desert Knowledge CRC (DKCRC) whose key role in the project was to provide expertise in the design and operation of a comprehensive monitoring, evaluation and reporting plan.

In May 2010, the DKCRC came to the end of its funding cycle and formally withdrew from the Alice Solar City consortium, and the monitoring and evaluation function was brought in–house as part of Alice Solar City.

Subsequently a relationship was established with Charles Darwin University, a collaboration that produced a range of useful additional analyses including the publishing of the first peer reviewed paper based on the project's data. The collaboration with CDU was extended past the end of Alice Solar City to ensure a legacy of further useful analyses.

EXTERNAL PROGRAM EVALUATION

Alice Solar City commissioned a program evaluation by CDU in mid 2012. The focus of the evaluation was on the economic and additional outcomes of the project in the community. In addition to identifying a $100 million impact on the local economy, the evaluation conducted a tourism survey and a small survey of suppliers and the real estate sector.

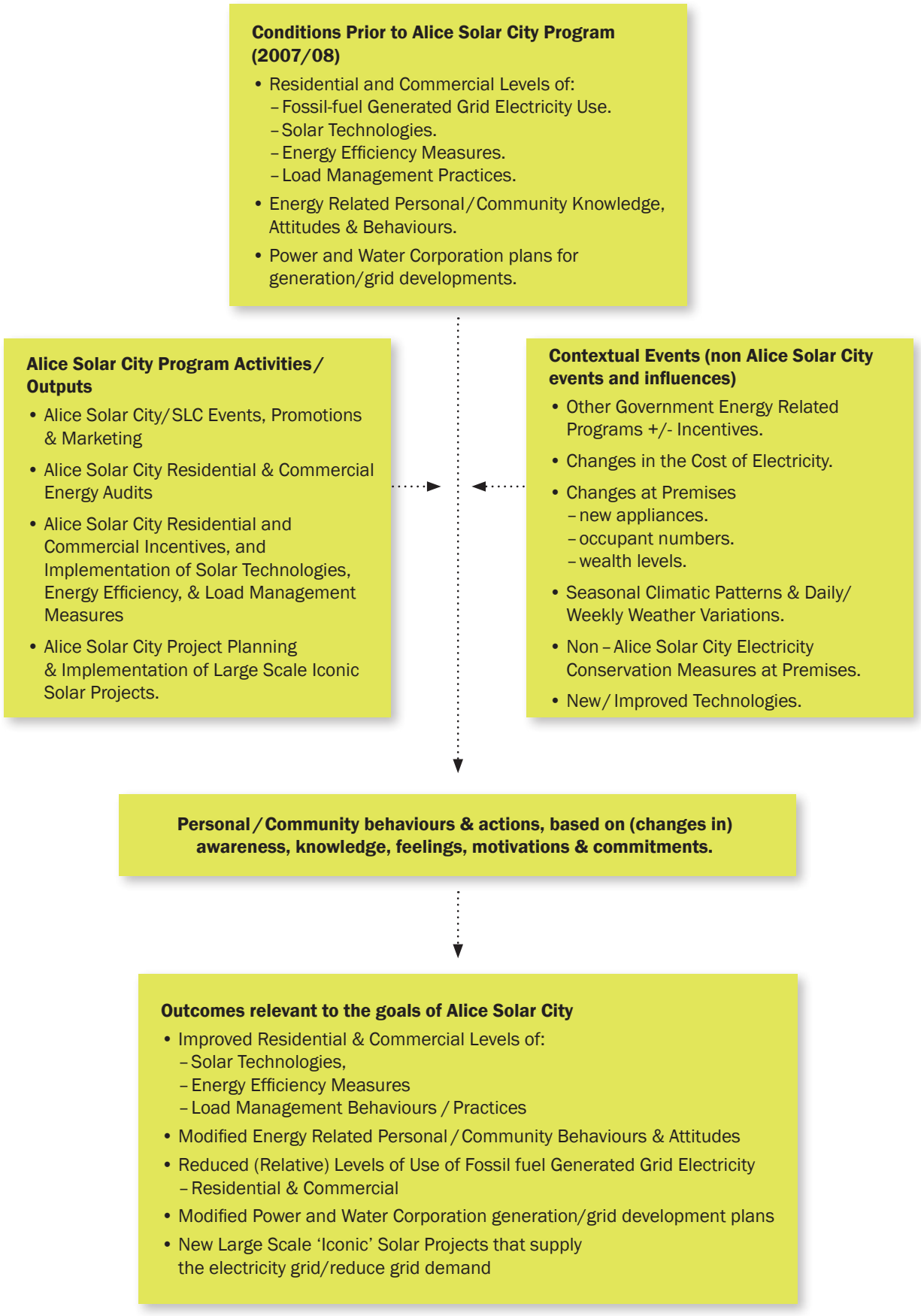
Insights included:

- Solar and energy efficiency improvements to homes are now being recognised by the Alice Springs real estate market as expected features for home buyers.
- A positive contribution to the 'brand value' of Alice Springs as an attractive tourist destination, with most visitors noticing the presence of solar and being very interested.

Alice Solar City detailed evaluation reports can be found at www.alicesolarcity.com.au

Community engagement with visitors to the Sustainable Living House

Figure 18: Theoretical Framework for Alice Solar City outcomes



Alice Solar City consortium

GOVERNANCE & FINANCE

GOVERNANCE

Alice Solar City employed a successful governance model and consortium agreement, that has since been adapted for use by other consortium–based projects such as the Alice Springs based Alice Water Smart Plan and the Darwin based East Arnhem Low Income Energy Efficiency project.

The Alice Springs Town Council was the lead agent for the consortium and entered into the core Funding Agreements with the Australian Government's Solar Cities program and the Northern Territory Government administered Renewable Remote Power Generation Program (RRPGP).

A separate consortium agreement was then put in place to bring together the six consortium partners with an independent chairperson. The consortium agreement laid out the cash and in–kind commitments to the project from each consortium member, and detailed the tasks that each would perform in contributing to the various elements of the project.

The consortium governance was arranged in two tiers. The first tier coordinating committee comprised the organisations providing cash funding of the project budget, being the Alice Springs Town Council, NT Government and Power and Water Corporation, and this committee made decisions on project spending and major project changes, typically through the adoption of recommendations in decision papers presented to the committee by the General Manager.

The remaining consortium members then joined in the joint advisory committee, providing vital broader community input into the project governance.

The Alice Springs Town Council took on the trading name of Alice Solar City, and employed a team of staff who were responsible for overall coordination and management of the project and delivered the majority of the customer facing services and incentives. A Communications and PR consultant was engaged to design and provide ongoing communications and community engagement expertise for the project.

Other consortium members including Power and Water Corporation, the Northern Territory Government and Tangentyere Council were responsible for delivering components of the project, and sub–agreements were created to capture the details of these arrangements.

Third party agreements or contracts were put in place with key organisations that had formed part of the original project funding submission, including BP Solar, Solahart and Imparja Television.

FINANCIAL REPORT

Alice Solar City resulted in the expenditure of $21.45 million of direct funding, derived from five main funders. This was matched by $20.47 million of participant and consortium in-kind contributions.

Details of the total project expenditure, including spend by participants and consortium members, is provided below. $20.6 million was spent directly on the installation of Solar PV technology, representing just under 50% of total project investment.

Table 18: Funding sources

Funding Source	Amount ($M)
RRPGP (NT Government Administered)	8.30
RRPGP (Australian Government Iconic Projects)	6.00
Solar Cities (Australian Government)	4.00
Northern Territory Government	2.30
Alice Springs Town Council	0.49
Power and Water Corporation	0.36
Total	**21.45**

Table 19: Alice Solar City expenditure

Total Expenditure			
Area	**Item**	**Alice Solar City ($M)**	**Participants ($M)**
Residential	Solar PV	2.28	2.53
	PV Tariff and Metering	0.67	
	Solar Hot Water	1.68	3.53
	Energy Efficiency Retrofits	0.73	1.70
	10:10/20:20	0.04	
	Tangentyere Housing	0.91	1.81
	Smart Metering	0.32	
Commercial	Solar PV	1.15	1.26
	Energy Audits	0.02	0.02
	Energy Efficiency Retrofits	0.44	0.88
	Alice Springs Hospital	0.51	0.10
Management and Delivery	Community Engagement	3.47	
	Consortium Management	1.75	1.94
	Energy Auditing	0.54	
	Monitoring and Evaluation	0.95	
Iconic Projects		6.00	6.70
Total		21.45	20.47
Total Project Expenditure		**41.85**	

CONCLUSION

As a response to the original Solar Cities program guidelines, and measured against its targets, Alice Solar City can be counted a resounding success.

The benefits of the project to the Alice Springs community went beyond the Solar Cities goals. For example the total economic impact of the project was estimated at over $100 million. But just as importantly, Alice Solar City created and provided a shared positive vision for the town, with benefits extending well beyond the financial and carbon emission savings achieved.

Alice Solar City was the successful realisation of a broad community aspiration to put the town's endless solar resource to work... to be a true solar city.

Alice Solar City
ENERGY CHAMPIONS

Australian Government

Solar Cities