Demand Management Innovation Allowance Submission

2012-2013 Report to the AER

September 2013

Demand Management Innovation Allowance Submission

September 2013

Contents

1 Introduction

This submission has been prepared under the Demand Management Innovation Allowance (DMIA) scheme applied to Ausgrid by the Australian Energy Regulator (AER) in the 2009 regulatory determination.

Under Section 3.1.4.1 of the AER's final determination for The Demand Management Incentive Scheme for the ACT & NSW 2009, Ausgrid is required to submit an annual report on expenditure under the DMIA for each regulatory year. The annual report must include:

1. The total amount of the DMIA spent in the previous regulatory year, and how this amount has been calculated.
2. An explanation of each demand management project or program for which approval is sought, demonstrating compliance with the DMIA criteria detailed at section 3.1.3 with reference to:
   a) the nature and scope of each demand management project or program,
   b) the aims and expectations of each demand management project or program,
   c) the process by which each project or program was selected, including the business case for the project and consideration of any alternatives,
   d) how each project or program was/is to be implemented,
   e) the implementation costs of the project or program, and
   f) any identifiable benefits that have arisen from the project or program, including any off peak or peak demand reductions.
3. A statement signed by a director of the DNSP certifying that the costs of the demand management program:
   a) are not recoverable under any other jurisdictional incentive scheme,
   b) are not recoverable under any other state or Commonwealth government scheme, and
   c) are not included in the forecast capital expenditure (capex) or operating expenditure (opex) approved in the AER's distribution determination for the next regulatory control period, or under any other incentive scheme in that determination (such as the D–factor scheme for NSW).
4. An overview of developments in relation to projects or programs completed in previous years of the next regulatory control period, and any results to date.

Accordingly, this submission details DMIA projects undertaken by Ausgrid in the 2012-13 financial year.

2 Governance

2.1 DMIA spending in 2012-13

There were five (5) ongoing DMIA projects and nine (9) new projects under implementation for which we incurred costs or revenue forgone in 2012/13. Ausgrid's submission identifies claimable costs incurred totaling $934,071. All costs incurred were a part of operating expenditure (opex) budget.

Actual costs incurred are collected from project codes in Ausgrid's SAP reporting system. The amounts claimed are those booked to each project in the applicable year. Costs include development of projects, implementation costs, project management and other directly related costs.

2.2 Compliance with DMIA criteria

Information addressing items 2 a, b, d, e and f from Section 3.1.4.1 of the AER's final determination for The Demand Management Incentive Scheme for the ACT & NSW 2009 are found in the progress update for each individual project detailed in Section 4 and 5. Item 2c of Section 3.1.4.1 is addressed in Section 2.2.1 below.

2.2.1 Project selection process

Ausgrid has developed templates & guidelines for projects or programs under the DMIA allowance that seek to investigate non-network alternative to reduce demand and defer network investment. When opportunities are identified for new projects, Ausgrid uses the following methodology when assessing projects for funding under the DMIA allowance:

- For new concepts, approval for project research and development is by the Manager – Demand Management & Forecasting who ensures that the proposed project meets the funding criteria specified under the DMIA Scheme. This component of the project is defined as a Stage 1 project.

- Where early stage research and development indicates a potential viable demand reduction solution, the project is approved to proceed to Stage 2 where a project proposal for a full trial is prepared. Approval to proceed to Stage 2 is by the Manager – Demand Management & Forecasting.
- The project proposal is prepared according to the Ausgrid DMIA template and guidelines, including additional criteria specified by Ausgrid (repeatability, suitability to geographically specific network constraints, and potential to be cost effective ($/kVA)).
- The project proposal is reviewed by the Manager – Demand Management & Forecasting to ensure it meets the funding criteria specified under the DMIA Scheme and checks are also made to ensure that budget projects costs are within the DMIA allowance. Projects approved to proceed to a full trial are defined as Stage 3 projects.

2.3 Statement on costs

In submitting this program for inclusion in the DMIA Scheme, Ausgrid confirms that the program costs:

- are not recoverable under any other jurisdictional incentive scheme;
- are not recoverable under any other State or Commonwealth Government scheme;
- are not included in the forecast capex or opex approved in the AER's distribution determination for the next regulatory control period; and
- are not eligible for recovery under the D-Factor Scheme.

3 DMIA program summary

Project	**FY 2012/13 Actual Cost (excl GST)**
New Projects (initiated in 2012/13)	
AS4755 air conditioner and pool pump load control	$175,008
Grid battery	$7,115
Off peak 2 summer scheduling	$1,343
Verification of demand savings from energy efficiency programs	$37,562
Co-managing home energy demand	$8,486
TransGrid triage database	$14,240
Large customer power factor correction	$18,859
Load control of irrigation pumping	$39,565
Small customer power factor correction	$21,940
New Projects Sub-total	**$324,118**
Existing Projects (initiated prior to 2012/13)	
Dynamic load control of small hot water systems	$120,463
CBD embedded generator connection	$6,440
Subsidised off-peak hot water connections	$35,818
Market research for residential air conditioner & pool pump options	$65,124
Dynamic peak rebate for non-residential customers	$382,107
Existing Projects Sub-total	**$609,952**
Total	**$934,071**

4 New projects

4.1 AS4755 air conditioner and pool pump load control

4.1.1 Project nature and scope

Air conditioners and pool pumps are the largest residential appliances with no load control option currently available to customers and offer the most potential for residential demand reductions. The summer peak demand from residential air conditioners and pool pumps for the Ausgrid network area is estimated to be 1300-1700 MW and 70-100 MW respectively. The focus of this trial will be to test low cost direct load control options that are independent of a smart meter interface.

The voluntary adoption of the AS4755 interface standard by a number of air conditioner and pool pump manufacturers and the development of commercially available demand response enabling devices (DREDs) has substantially lowered the cost to introduce load control to these appliances.

The project will explore the potentially cost effective method of controlling residential air conditioners and pool pumps using AS4755 compliant devices and how this solution could form a component of demand management programs.

The project scope is considered to be complementary to existing and proposed trials by other Australian DNSPs.

4.1.2 Project aims and objectives

The primary objective of the trial is to test a minimum of two communication platforms and associated Demand Response Enabling Devices (DREDs) by which AS4755 compliant appliances can be controlled.

Secondary objectives of the trial include testing of the customer acquisition options to determine take-up rate and acquisition costs, to trial various dispatch methods and monitor customer acceptance and satisfaction and to measure and verify the peak demand reduction potential from air conditioner and pool pump direct load control.

4.1.3 Implementation plan

The project consists of the following phases:

a. Project research and development (Stage 1 & 2) including review of existing programs and activities, detailed research into options and technology followed by preparation and approval of a detailed project proposal.

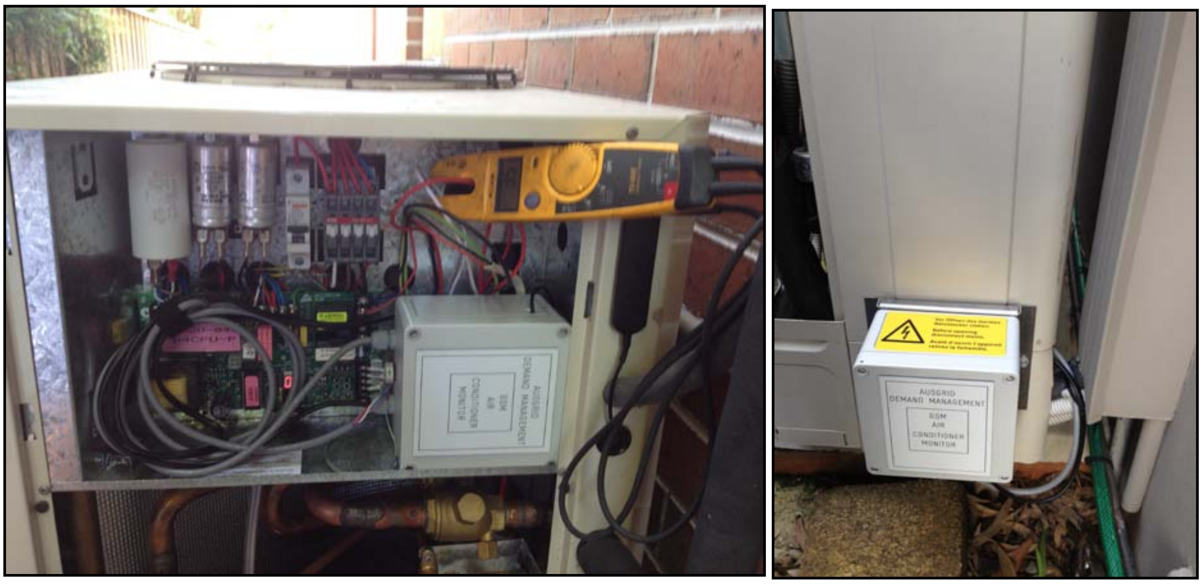
b. Stage 3 - Phase 1 of the project includes testing and verification of the two communication platforms to be used for the trial through laboratory testing and a pilot with a small number of participants. The pilot and lab testing includes establishment and testing of the dispatch systems and protocols as well as development of the Demand Response Enabling Devices (DREDs) to be used. A secondary objective in phase 1 is to test customer acceptance of the appliance control with a controlled group of participants (small pilot).

c. Stage 3 - Phase 2 of the trial will be to develop techniques to identify and sign up participants from the general public (with around 100 participants planned), determine take-up rates and acquisition costs, further verify the communication platforms and DREDs, determine the response rate from customers to reduce demand and monitor customer acceptance and satisfaction.

4.1.4 Results

The project research and development stages including project proposal were completed during the 2012/13 year leading onto the implementation stage. The Phase 1 pilot was mostly completed during Summer 2012/13 with a small number of participants but will continue until 30 September 2013 to capture more data on performance as well as include a small number of winter peak event dispatch trials.

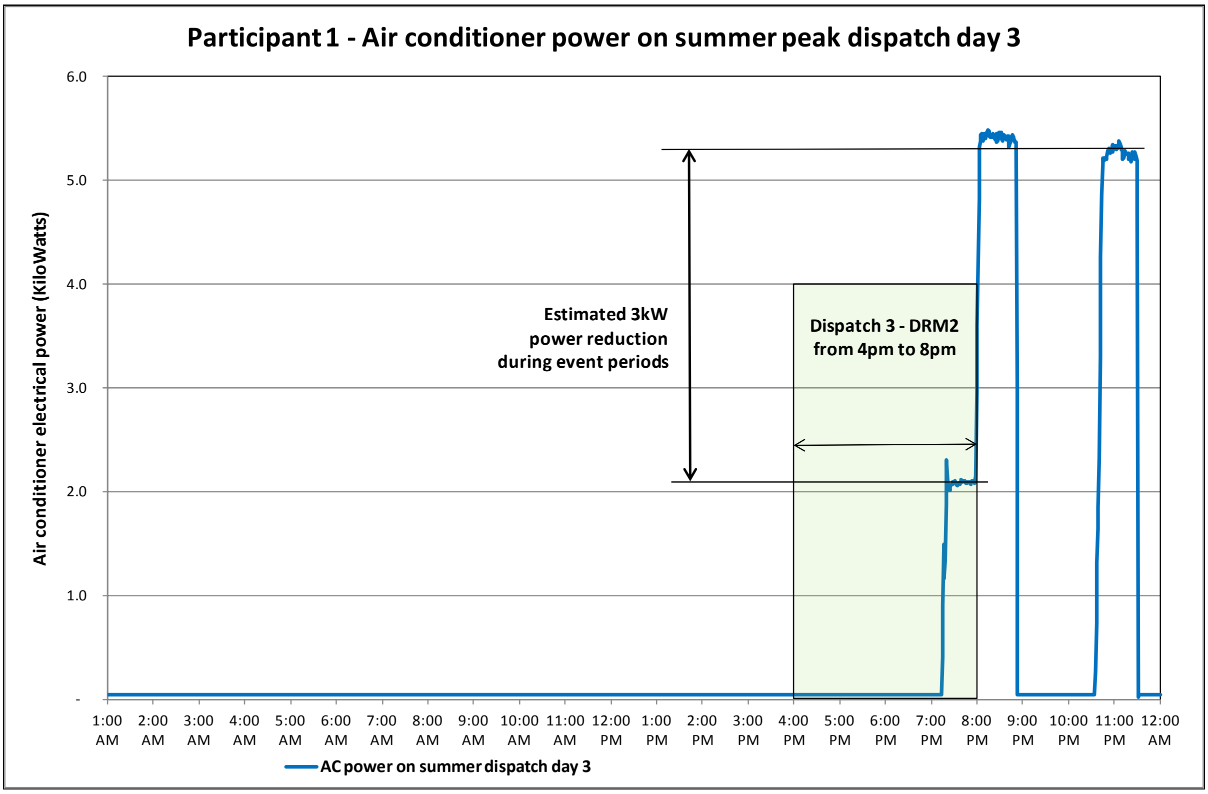
Phase 1 work also included development of a prototype DRED that utilises the publicly available mobile phone telecommunications network. A number of prototype DREDs were installed on AS4755 compliant air conditioners at participant homes, with a total of four peak event dispatches trialled over the summer 2012/13 period. Below are photographs of the prototype DRED installed on two different air conditioners, the left hand picture demonstrating an installation where the DRED is placed inside the air conditioner unit with an external aerial, and the right hand picture showing an installation with the DRED mounted to the outside of the air conditioner. All installations were performed by a qualified technician and the models of air conditioners in the pilot were ducted systems manufactured by Actron Air or Daikin, all requiring an additional retrofit kit to be installed to make the air conditioner AS4755 compliant before the installation of the DRED.

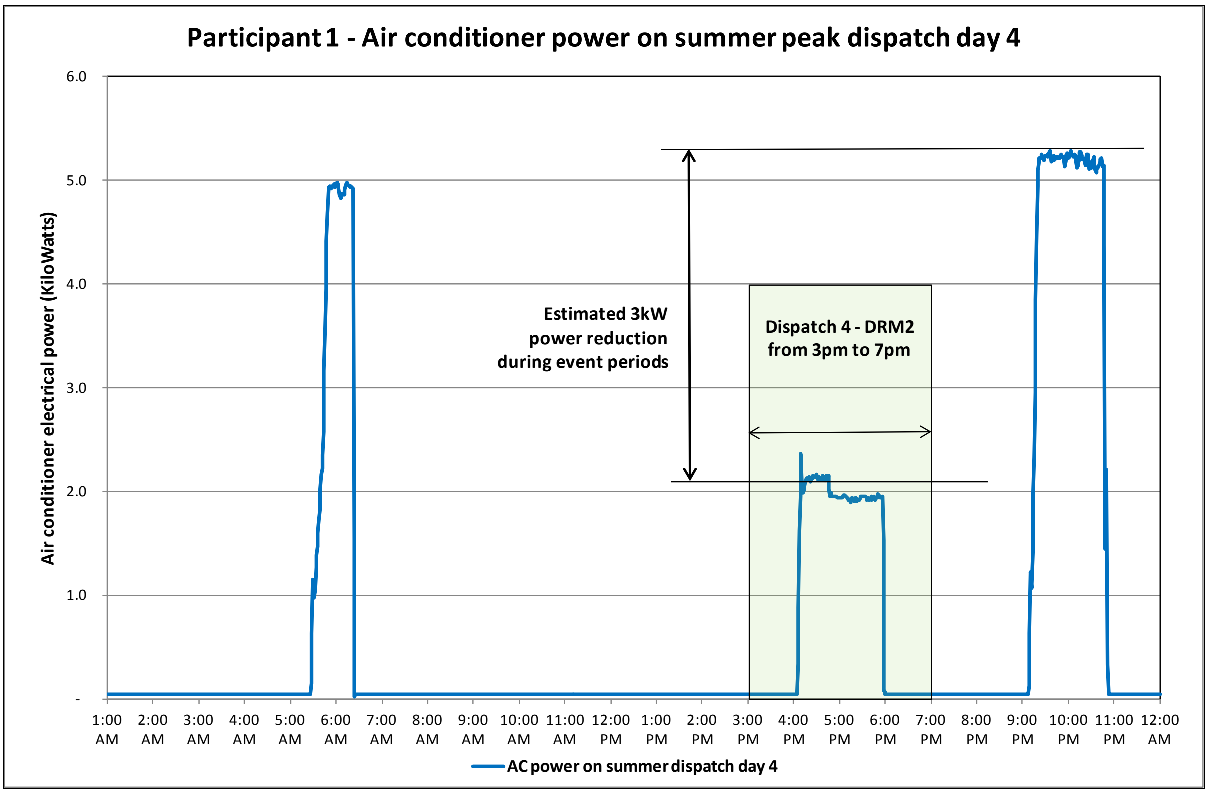


Picture: Two mobile phone DRED installations on air conditioners

In order to measure and verify the potential demand reductions, household circuit monitoring equipment was installed on the individual electrical circuits at the meter switchboards of the participant's houses. Shown in the following charts is the electrical power use from a participant's air conditioner during two days in the summer period, where a peak event dispatch occurred. The dispatch period on day 3 was between 4pm to 8pm (AEDST) when the air conditioner was put into Demand Response Mode 2 (DRM2), reducing the air conditioner electricity consumption to less than 50% of its rated capacity during this time. The dispatch period on day 4 was between 3pm to 7pm (AEDST) and also activated Demand Response Mode 2 (DRM2) of the air conditioner. The estimated peak demand load reduction of this particular air conditioner was estimated to be around 3kW.

Further testing and analysis is in progress to determine the diversified peak demand reduction across the group of participant's in the pilot for each of the summer peak dispatch events.





Phase 1 will continue into FY13/14 with winter peak dispatch testing to be completed with the existing pilot participants and further testing of the ripple signal receivers that utilise Ausgrid's existing ripple communication system.

Phase 2 is currently being developed and will involve engaging with customers to participate in the air conditioner or pool pump load control trial, with a planned roll-out to around 100 customers. Customers will be contacted in late 2013 for participation in the summer trial period starting in summer 2013/14. Phase 2 also includes further development phases of the mobile phone DRED in order to miniaturise and customise the functionality to be used for the Phase 2 trial.

4.1.5 Summary of actual and projected costs

A summary of the project actual and projected costs are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	**FY 12/13 Actual**	**FY 13/14 Projected**	**Total Projected**
Project research and development	$18,666	$0	$18,666
Phase 1 – Pilot, lab testing and Demand Response Enabling Device (DRED) development	$140,342	$20,000	$160,342
Phase 2 – Customer trial	$16,000	$470,658	$486,658
Total (excl GST)	**$175,008**	**$490,658**	**$665,666**

4.1.6 Program progress & identifiable benefits

Progress so far includes the successful development of a new prototype DRED utilising the publicly available mobile phone telecommunications network and the installation of these prototypes on several air conditioners involved in the Phase 1 pilot. A prototype dispatch and control system has also been developed including the ability for the customer to override the demand response event via mobile phone text.

Four summer peak event dispatches were tested over the Summer 2012/13 trial period with preliminary analysis completed and further write-up required to complete Phase 1.

At this stage there are no material peak demand reductions achieved from this program.

4.2 Grid battery trial

4.2.1 Project nature and scope

This project will investigate the potential benefits of using battery storage as a means for reducing peak demand on the network with a trial over the summer 2013/14 period. This project will seek to investigate how a network grid-side battery can be operated reliably and effectively for summer peak reduction purposes and to potentially improve power and supply quality parameters of the network. Another area of importance is an assessment of the reliability and performance of battery storage devices during the hotter summer months as well as the optimum battery management and control methodologies.

4.2.2 Project aims and objectives

Primary objectives:

- Summer peak reduction network benefits: To trial the control and scheduling methodology of the grid battery during the hotter summer months to reduce summer peaks in the local area
- Summer battery performance and reliability: To test the grid battery performance during the hotter summer months when battery performance may be more adversely affected by temperature.

Secondary Objectives:

- Renewable load smoothing (Solar PV): Simulate using the battery to store renewable energy generation from local solar systems.
- Power quality issues: To further test the power quality benefits of installing a grid battery in an urban network.
- Customer benefits: To test the potential customer benefits of installing a battery to reduce customer energy bills for a typical larger customer (e.g. demand and peak energy charges).

4.2.3 Implementation plan

The project will involve conducting a set of grid battery trials over the summer 2013/14 period using the grid battery previously installed under the Smart Grid Smart City (SGSC) project. The project would build upon learnings and trial outcomes from the SGSC project. The 60kVA/ 120kWh Lithium Ion battery system will be installed and operated in Aug/Sep 2013 in the Sydney suburb of Newington as part of the SGSC project.

This DMIA project involves the continuation of the battery trial over the summer 2013/14 period with the aim of further exploring the benefits of battery storage to networks and customers. The project will continue to use the ongoing leasing arrangement with the battery supplier during the trial period.

4.2.4 Results

No results from the project can be reported as yet, with the majority of the project being planned to occur in the FY2013/14 period.

4.2.5 Summary of actual and projected costs

A summary of the project budget and actual costs are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	FY 12/13 Actual	FY 13/14 Projected	Total Projected
Project research and development	$7,115	$0	$7,115
Summer 2013/14 testing	$0	$357,500	$357,500
Total (excl GST)	**$7,115**	**$357,500**	**$364,615**

4.2.6 Program progress & identifiable benefits

Up until the end of June 2013 the main progress made was in the research and development stages of the project including commencement of the project proposal.

No identifiable benefits have yet been defined for this project.

4.3 Off peak 2 summer scheduling

4.3.1 Project nature and scope

Ausgrid currently has around 160,000 customers on their Controlled Load 2 tariff (Off Peak 2), predominantly controlling domestic hot water systems. This tariff was originally intended for shifting load outside of peak times in the winter period but summer peaks are becoming the predominant driver for much of Ausgrid's growth related network investment.

This project involves trialing a new summer load control schedule for summer peak reduction for customers with Controlled Load 2 tariffs. We estimate that the existing Controlled Load 2 customer load contributes 20 to 25 MW of load during the 4 to 5pm time period on network peak days in summer.

4.3.2 Project aims and objectives

The main objective of the trial is to investigate the potential issues and barriers for implementing a summer scheduling regime for Controlled Load 2 customers across the whole network. Potential barriers include:

- <u>Customer response</u> due to customers having less hours of electricity supply for their controlled load 2 electricity supply during the summer months. The hot water demand requirements during the summer months is less than the winter months due to temperature effects (water and ambient air) and it is envisaged that this will not be a significant issue, but is an important aspect to be tested as part of the trial. However, in some cases other approved loads such as heating, charging or pumping loads may have been connected to the off peak 2 tariff. Any changes to the control schedule during the summer will adhere to the terms and conditions of the Controlled Load 2 tariff, but may affect customer's expectations of how the control should be scheduled. Customer complaints through our call centre will be assessed to determine the impact on customers.
- <u>Load control operational issues</u> due to changing of the scheduling for summer and then back to a regime for the rest of the year. For example, a summer schedule could be implemented between 1 November to 31 March and a winter/ shoulder season schedule for the rest of the year. Operational issues also include how to implement the "summer" and "rest of the year" load control schedule with the existing load controllers for all areas of the Ausgrid network.

4.3.3 Implementation plan

The project is proposed to consist of two phases:

<u>Phase 1 (2013-14):</u> Phase 1 of the project will be to test a summer schedule of OP2 load control in two to three areas of the Ausgrid network area over the summer 2013/2014 period. The trial areas will most likely be chosen by targeting specific summer peaking zone substation areas with high levels of OP2 customers.

<u>Phase 2 (2014-15):</u> Where the Phase 1 outcome demonstrates potential viability, then a Phase 2 trial will be implemented across further parts of the Ausgrid network, focusing on areas where different operational or customer issues may be encountered. At the end of the Phase 2 part of the trial, the objective is to have investigated most of the issues that would help to inform a roll-out of the summer scheduling methodology across the whole network area. The various stages of Phase 2 would roughly follow that outlined in Phase 1 with more focus on identification of areas with different operational or customer issues.

4.3.4 Results

No results from the project can be reported as yet, with the majority of the project being planned to occur in the FY13/14 period.

4.3.5 Summary of actual and projected costs

A summary of the project actual and projected costs are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	**FY 12/13 Actual**	**FY13/14 Projected**	**Total Projected**
Project research and development	$1,343	$0	$1,343
Phase 1 – Trial in 2 to 3 areas	$0	$150,000	$150,000
Total (excl GST)	**$1,343**	**$150,000**	**$151,343**

4.3.6 Program progress & identifiable benefits

Up until the end of June 2013 the main progress made was in the research and development stages of the project including commencement of the project proposal.

No identifiable benefits have yet been defined for this project.

4.4 Verification of demand savings from energy efficiency programs

4.4.1 Project nature and scope

There is currently a range of energy efficiency programs funded or run by government organisations which offer potential peak demand reduction benefits; however few organisations complete any assessment of the peak demand impacts for their programs. While this is primarily due to the fact that peak demand reductions are not a direct objective of the program, it is in part due to a lack of understanding about the differences between energy and peak demand. This project aims to identify which of these energy efficiency programs or initiatives are effective at reducing peak demand. The scope of this project involves providing in-kind support and data provision for the purpose of measurement and verification of energy and demand savings of existing energy efficiency programs.

4.4.2 Project aims and objectives

The primary objective of this project is to obtain evidence-based evaluation outcomes of the effect of energy efficiency programs on peak demand savings that can be used for the development of demand management programs. To achieve this objective an approach of collaboration with the NSW government was identified as a cost effective and mutually beneficial approach, as it leverages the outcomes and learnings from the existing state-wide energy efficiency programs. By providing electricity consumption data and expertise to inform an evidence-based evaluation of government energy efficiency programs a more detailed understanding of the effect of energy efficiency programs on peak demand savings can be achieved.

4.4.3 Implementation plan

A Memorandum of Understanding (MOU) was signed with the NSW government with the purpose of collaborating on Data Analysis Projects of mutual benefit where electricity consumption data can be used to measure and verify the energy and demand savings of energy efficiency programs.

The projects that have been assessed under the MOU during FY2012-13 include the Home Power Savings Program, the Energy Efficiency for Small Business Program as well as the NSW Home Saver Rebate program.

a) The **Home Power Savings Program** (HPSP) is a program run by the Office of Environment and Heritage (OEH) under the NSW Energy Efficiency Strategy which provides free home power assessments and power savings kits to low-income families. More information on the program can be found at http://www.environment.nsw.gov.au/homepower/index.htm

b) The **Energy Efficiency for Small Business Program** (EESBP) is a program run by OEH under the NSW Energy Efficiency Strategy which provides subsidised energy assessments and energy action plans for eligible small businesses in NSW. For further information see http://www.environment.nsw.gov.au/sustainbus/smallbusenergy.htm

c) The **NSW Home Savers Rebate** was run by OEH and provided rebates for the installation of ceiling insulation and eligible solar, gas and heat pump hot water systems. More information on the program can be found at: http://www.environment.nsw.gov.au/rebates/

The proposed approach for these evaluations was for Ausgrid to provide in-kind support for the evaluation projects through expertise and providing electricity consumption data that involved data matching, extraction, cleansing and quality checking. The detailed statistical evaluations are performed by third party providers funded by the NSW government.

4.4.4 Results

During FY2012-13, three Data Analysis Projects were initiated. Electricity consumption data was provided to the third party providers who were engaged by the NSW government to perform the detailed evaluation work. Below is a summary of the data provided for the purposes of the evaluations.

a) Home Power Saver Program: Stage 2 Savings Evaluation. Over 5 years of electricity consumption data for 14,274 participants in the program plus control group data were provided to the analysis consultant for the detailed savings evaluation.

b) Energy Efficiency for Small Business Program: Stage 2 Savings Evaluation. Over 5 years of electricity consumption data for 707 small businesses who participated in an energy efficiency retrofit as well as control group data were provided to the analysis consultant for the detailed savings evaluation.

c) Home Saver Rebate Program: Savings Evaluation. Over 7 years of electricity consumption data for 50,769 households that received a rebate in the program plus control group data were provided to the analysis consultant for the detailed savings evaluation.

4.4.5 Summary of actual and projected costs

A summary of the project budget and actual costs are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	FY 12/13 Actual	FY13/14 Projected	Total Projected
Project research and development including, • Project agreements following by data matching, extraction and quality checking for each Data Analysis Project	$37,562	$40,000	$77,562
Total (excl GST)	**$37,562**	**$40,000**	**$77,562**

4.4.6 Program progress & identifiable benefits

By the end of FY2012-13, data provision by Ausgrid for all three Data Analysis Projects had been completed. For each evaluation, an external organisation was engaged by the NSW government to conduct the detailed measurement and verification evaluation including demand savings. This work was in progress as at the end of June 2013.

No identifiable benefits have yet been defined for this project, but it is anticipated final evaluation reports will be delivered in FY2013-14 for projects progressed in FY2012-13.

4.5 Co-managing home energy demand

4.5.1 Project nature and scope

The contribution to peak demand from residential households is increasing due to the increasing use of air conditioning systems and solutions to reducing peak in many areas will require the contribution of peak demand reductions from households. To help understand householder's level of knowledge on peak demand and how they are responding to current demand management activities will assist in developing strategies and programs to reduce peak demand from the residential sector.

4.5.2 Project aims and objectives

The objectives of the co-managing home energy demand research project were to:

- Review previous demand management research undertaken by Ausgrid to identify key research findings and areas for further investigation;
- Provide greater depth regarding how householders understand, and are responding to, demand management activities;
- Identify potential strategies and opportunities to improve or expand existing demand management initiatives delivered through smart meters/smart grids, such as opportunities to engage with customers through education/information provision or other strategies;
- Gain further insight into householder's perceptions, fears and attitudes towards smart meters and how to counteract negativity; and
- Inform future demand management research, strategies and products.

4.5.3 Implementation plan

The research project used in-depth qualitative research with householders conducted by research leaders from RMIT University in collaboration with, and substantially funded by, TransGrid. It used a qualitative methodology to provide survey depth in a small number of households. This research approach avoids the assumptions in much quantitative research and large-scale surveys, where questions are often designed around multiple choice answers or where they direct research participants towards specific answers which may bias results. Qualitative research also identifies connections, contradictions and complexities in householder views and actions.

The project was comprised of three phases:

- Phase 1 reviewed a range of variable pricing research conducted by or on behalf of Ausgrid over recent years with Ausgrid's residential and small business customers. A total of 13 individual studies were reviewed.
- Phase 2 represented the first of three stages of in-depth qualitative research with householders in the Ausgrid and Endeavour Energy distribution areas. This research focused on householder understandings of peak demand issues; existing and hypothetical understandings and acceptance of time-based pricing concepts; and discretionary and non-discretionary practices during peak times. Stage 2 research was conducted in May 2012 with households in the south Sydney local government areas of Sutherland, Kogarah, Hurstville and Rockdale. A total of 26 households and 37 individuals participated in interviews.
- Phase 3 of the project was conducted in August 2012 in the same region of the Ausgrid distribution area as Phase 2. The research focused on consumer trust in the electricity industry and explored opportunities for household demand management participation. A total of 24 households and 34 individuals participated in interviews.

A fourth stage of research is proceeding with input from Endeavour Energy and TransGrid. Ausgrid may collaborate with further research.

4.5.4 Results

There were extensive learnings from the three phases of the Project.

a) The Phase 1 interim report made the following observations and findings:

Customer perceptions, understandings and knowledge	• Trust in the electricity system and utilities is lacking • Understanding of home electricity use and how it relates to peak demand is limited • Recognition of the TOU concept is low, particularly in NSW • Details of TOU billing have not been well understood • Negative attitudes towards smart meters and TOU have emerged
Communicating time-based pricing to customers	• Informing customers about time-based pricing is challenging • Customer contact centre support is important for explaining time-based pricing to customers • TOU may be more effectively communicated in an informational, non-marketing style
Impact of time-based pricing on customers	• Acceptance of peak demand initiatives can be high • Residential customers respond to TOU and DPP tariffs
Gaining broader customer acceptance of time-based pricing	• Beliefs that TOU tariffs mean unacceptable lifestyle compromises or higher bills need to be addressed • Customers are interested in the broader benefits of TOU tariffs o Grid (and future electricity price) benefits o Benefits for utilities o Benefits for the environment o Fair electricity pricing
Customer motivations	• Financial savings • Environmental issues • Social responsibility • Sense of control • Trust in utilities • Lifestyle

b) The Phase 2 program identified the following observations:

Understandings of peak demand issues: Understandings of peak demand were fragmented. Links between peak demand, Time-of-Use (TOU) pricing, infrastructure needs, electricity price rises, and the potential for electricity shortages were usually missing. Householders understood and largely accepted weather-related blackouts, and drew on a range of analogies to better understand peak demand, such as water restrictions, congested highways and peak shopping times.

Changing views of peak demand issues: Most householders had not thought much about peak demand prior to participating in the research. Through the course of the interview, householder understandings usually increased, and the researchers observed strong signs of engagement and an increased willingness to respond.

Understandings of TOU pricing: Householders' understanding of TOU pricing was mixed and their awareness of tariff times was incomplete. Most householders were supportive of TOU pricing, despite thinking that other households (particularly families) are adversely affected by TOU tariffs. Media and solar photovoltaic systems had varying impacts on TOU demand responses.

Acceptability of capacity charging concept: Capacity charging was very difficult for householders to understand, particularly as they didn't know whether their house would be classified as 'small', 'medium' or 'large'. The overwhelming response to capacity charging was that it would be an unfair and wasteful way to price electricity.

Discretionary and non-discretionary practices during peak times: Understandings of discretionary and non-discretionary practices during peak times were highly malleable between and within households. Using the dishwasher was consistently mentioned as an easily shifted practice during peak times. Watching television and using computers were consistently mentioned as non-discretionary practices during peak times. Clothes drying, ironing, vacuuming, heating, cooling and cooking were considered discretionary and non-discretionary.

Willingness to respond to critical peak events: There was a high level of support for receiving alerts about critical peak days and/or the home's peak demand. Most households were willing to minimise their usage on a critical peak day/time period. Like understandings of peak demand, householders drew on analogies with bushfire alerts and water restrictions to conceptualise a peak event and their likely response. Perceptions of discretionary and non-discretionary practices changed noticeably when householders were asked what they would do if alerted to a peak event (household or network scale).

Change and diversity in heating and cooling practices: Heating and cooling practices were particularly diverse and malleable across the sample. Although over three quarters of the sample had air-conditioning installed, all householders reported using a range of non-energy strategies to keep warm and cool. Non-energy related understandings, such as those concerning health and wellbeing, were particularly influential in accounting for diversity in the use of heating and cooling appliances.

Householder perceptions of waste and responsibility: Regardless of whether households were low or high electricity consumers, nearly all householders believed they were 'doing their bit' to save electricity and avoid 'waste'. Householders compared themselves to 'wasteful others' using visual and bill comparisons in order to form this view.

Forgotten electricity use in the home: Electricity is invisible and most householders do not commonly think about it. Standby power was known to many householders, but often considered too small to take action on. Home tours highlighted a wide range of electricity devices that don't 'count' as energy uses in the home.

The Phase 2 report concluded that,

- there is opportunity to improve customer understandings of peak demand.
- improving householder understanding of peak demand is a necessary prerequisite in efforts to reduce peak demand.
- there is scope and opportunity to improve householder understandings of TOU tariff times. This is a necessary prerequisite in efforts to improve demand response.
- capacity charging may aggravate and confuse householders because it conflicts with common understandings of fairness (paying for what you use) and waste (saving energy and money).
- communications campaigns that make assumptions about non-discretionary practices may have unintended, and potentially counter-productive, consequences about how householders view these and other energy practices.
- promoting and encouraging diversity in discretionary practices may expand this category of electricity consumption during peak times and increase opportunities for demand response.
- developing a peak alert system that either alerts consumers to a network peak or to their own household peak represents a demand management opportunity.
- a peak alert system modeled on a similar alert system (bushfire alerts or water restrictions) is likely to be relatable and understandable to households.
- householder perceptions of non-discretionary practices are more malleable in the context of a peak event.
- diverse household heating and cooling practices and understandings represent an opportunity to reduce heating and cooling electricity demand during peak times.
- there is considerable potential to reduce the gap between what households perceive as low peak period energy use and the level of action sought by utilities.
- there is potential to expand energy-saving promotion from 'standard' energy consumption messages and actions to include common, unusual, new and outdoor energy uses.

c) The Phase 3 program identified the following observations:

Trust in the supply side of the industry:

- Householders are mostly satisfied with the provision of electricity supply to their homes.
- Ausgrid and TransGrid's roles in the electricity industry are often confused with the roles of other electricity companies, particularly energy retailers.
- Householders take Ausgrid and TransGrid's activities for granted.

Distrust in the electricity system:

- Householders are confused about the overall structure of the electricity system and are distrustful of a system they don't understand.
- Confusion about Time-of-Use tariffs and smart meters is generating anxiety for some householders and increasing their distrust of the electricity system.
- Householders have a poor understanding of peak electricity demand, its causes, and its impacts. Misunderstandings contribute to scepticism of demand management initiatives.
- Householders are anxious and concerned about current and future price rises. They don't fully understand the reasons for price rises.
- Recent changes in the electricity industry (such as privatisation and disaggregation) are increasing some householders' scepticism of the industry and generating speculation about the industry's profit-driven motives.
- Some householders feel that they are being unfairly 'punished' by the electricity industry's mistakes or are being made to pay for other consumers' increasing demand (e.g. large industrial consumers).
- Householders believe that the electricity industry is currently lacking vision and strategic direction.
- Householders are concerned that electricity utilities are over-investing in electricity infrastructure to increase their profit margins.
- Householders are concerned that electricity infrastructure is 'run down' and are looking for visible evidence that major projects and upgrades are underway.
- Expectations for underground power lines are associated with future planning, progressive thinking and modernity.
- Householders think that 'simple' solutions, such as building more generation capacity, will 'solve' peak demand problems because they do not fully understand this issue.
- The politicisation of electricity is contributing to distrust in the electricity industry, a general distrust in information about electricity-related issues, and a sense that no-one is responsible for looking out for the interests of householders.
- Retailers are the visible face of the electricity industry and unsatisfactory or impersonal retailer and customer service experiences contribute to distrust of the electricity industry as a whole.

Media and communication:

- Householders are genuinely seeking answers from the electricity industry to explain recent price rises. They want to hear the industry's perspective.
- Householders are receptive to hearing the electricity industry's vision for the future and its 'good news stories'.
- Repetitive energy-saving tips are aggravating some householders in the context of rising electricity prices.
- Carefully prepared statements aggravate some householders and contribute to distrust of the industry.
- Householders are receptive to a communication style that treats them as intelligent, interested and competent people.
- Householders respond positively to a conversational style of communication. Conversations are non-threatening and assist with alleviating confusion and distrust about electricity-related issues.

Expectations of uninterrupted electricity supply:

- Expectations of reliable and uninterrupted electricity supply are associated with modernity and developed nations.
- The provider-consumer relationship potentially undermines demand management initiatives by positioning utilities as being responsible for solving supply problems.
- Infrequent blackouts are not a major inconvenience for most householders.

Consumer participation in demand management initiatives:

- When householders understand peak demand issues, they demonstrate a willingness to participate in demand management initiatives, and adopt a collaborative relationship with utilities.
- Householders have innovative ideas and strategies about how to manage peak electricity demand.
- Communicating about peak electricity demand in the context of public health and heat stress may increase householders' willingness to respond to peak alerts and other demand management initiatives.
- Positioning electricity as a limited resource for short periods of time resonates with the successful positioning of water as a precious and restricted resource during the recent drought.

4.5.5 Summary of actual and projected costs

A summary of the project budget and actual costs are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	**FY 12/13 Actual**	**FY13/14 Projected**	**Total Projected**
Project assistance / collaboration	$8,486	N/A	N/A
Total (excl GST)	**$8,486**	**N/A**	**N/A**

4.5.6 Program progress & identifiable benefits

The three project phases in which Ausgrid participated are now complete. The program consisted of research, so no material peak demand reductions were achieved by it.

4.6 TransGrid triage database

4.6.1 Project nature and scope

The project was a collaborative effort with TransGrid, the transmission network in NSW, to develop a database of information to support the investigation of non-network solutions for transmission network investments. As TransGrid does not have visibility of the customer level electricity use and demand data, investigations for non-network solutions to transmission network investments are hampered by this lack of information.

4.6.2 Project aims and objectives

To produce a database of aggregated large consumer information which would enable TransGrid to estimate the likely demand management potential in an area, and hence to determine whether non-network solutions are likely to be viable.

4.6.3 Implementation plan

Implementation included two main components for Ausgrid:

a) Discussion of the requested scope of data provision and how this could (or could not) be provided, and what other alternatives might be suitable and most useful.

b) Obtaining and aggregating this data for provision to TransGrid.

4.6.4 Results

The most useful and accessible data was determined by Ausgrid to be an aggregation of large customer interval data (>160MWh per year consumption) by Transmission Node Identifier (TNI). Meter data for energy and demand was obtained, cleansed and aggregated to ensure individual customer data was not discoverable from the dataset. The aggregated data was provided with information to allow TransGrid to properly interpret the information.

4.6.5 Summary of actual and projected costs

A summary of the project actual costs are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	FY 12/13 Actual	FY13/14 Projected	Total Projected
Project assistance / collaboration	$14,240	$0	$14,240
Total (excl GST)	**$14,240**	**$0**	**$14,240**

4.6.6 Program progress & identifiable benefits

At this stage no additional work is expected in 2013/14 and no peak demand reductions have been achieved from this program.

4.7 Large customer power factor correction

4.7.1 Project nature and scope

Power factor correction (PFC) is recognised as a cost effective technique for lowering the peak demand in electrical infrastructure. The power factor is defined as the ratio of real power to apparent power. The real power, or active power, is measured in watts and represents the work provided at the load (e.g. light, motor etc). The apparent power is measured in volt-amperes (VA) and due to the resistance, inductance and capacitance of the load, can be greater than the real power.

An example of a device which has a power factor less than 1 is a motor. Where the power factor is less than 1, the network infrastructure must be sized larger to deliver the apparent power.

Correcting power factor at customer premises lowers the peak demand in kVA and reduces the electrical infrastructure requirements for networks. Ausgrid and many other networks use a kVA demand or capacity charge in their medium-to-large customer tariffs to reflect this cost and encourage customers to address poor power factor.

Encouraging customers to install power factor correction equipment is an established method for reducing peak demand and deferring network investment, but less is known about the level of customer response to various incentive levels and the customer response for a range of customer sizes (energy use) and types.

The proposed project is directed at medium to large customers whose tariffs contain a kVA capacity charge and whose power factor (PF) is currently below network standard (0.9) during peak periods. It will attempt to encourage these customers to install PFC equipment.

4.7.2 Project aims and objectives

The primary objectives of the project are to:

a) Discover an optimal methodology to the implementation of PFC programs by trialing a range of incentive & customer payback levels, and marketing approaches.

b) Test the widespread implementation of PFC at target customers within Ausgrid network areas that are likely to have medium-term constraints.

4.7.3 Implementation plan

The project is currently in development, but any implementation plan is expected to include the following components:

- Establish relationships with PFC providers
- Gather and filter customer information to establish customer target list
- Develop trial structure and customer approach methods
- Implement customer trial
- Analysis and report on findings

4.7.4 Results

A significant amount of investigation work has been undertaken on this proposal with the analysis of the interval meter data for all customers whose tariffs contain a kVA capacity charge. This analysis has identified the technical potential from power factor correction and resulted in a project proposal designed to cost effectively achieve the project objectives. A procurement exercise to set up a panel of suitable PFC installation contractors is in progress, as is collection and analysis of more recent customer data.

4.7.5 Summary of actual and projected costs

A summary of the project actual and projected costs are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	**FY 12/13 Actual**	**FY13/14 Projected**	**Total Projected**
Project research and development	$18,859	N/A	N/A
Total (excl GST)	**$18,859**	**N/A**	**N/A**

4.7.6 Program progress & identifiable benefits

The project is currently in the project research and development stages with a detailed project proposal in progress. The Stage 3 trial implementation is expected to occur in 2013/14. No peak demand reductions have been achieved from this program to date.

4.8 Load control of irrigation pumping

4.8.1 Project nature and scope

Irrigation and other water pumping loads in the Hunter Valley are a significant component of demand, offering opportunities to reduce electrical demand during peak periods and deferral of network investment in the Hunter Region. Horse stud farms, large agricultural businesses including wineries and coal mines common to the area will typically have pumping systems for their operations and load shifting of pumping load for these operations is likely to be possible. At present, little is known about the viability of load control of these customer loads. The scope of the project is to explore the viability of load control of these systems.

4.8.2 Project aims and objectives

The primary objective of the project is to investigate the likely scale and location of pumping systems in the Upper Hunter region, the viability of load control from these systems and the projected value from the use of pumping load control to defer network investment.

4.8.3 Implementation plan

The project was approved for early stage research and development in August 2012. The project consisted of the following phases:

a) Review of the network assets in the Hunter Region where pumping systems are common and identify the possible scale of pumping demand and the potential for future deferral of network investment.

b) Research the types of pump system demand response programs in existence elsewhere.

c) Visit large water pump/irrigator users in each major Hunter Valley Zone, to determine the size, type and extent of the system and categorize them for further analysis.

d) Develop a project plan to effectively trial the concept to reduce peak demand by load control of pumping systems.

4.8.4 Results

The use of pumping for irrigation and mining operations in the Hunter Valley was found to be sizeable with an estimated 65 MVA of connected load from pumping systems. An estimated 40-45 MVA of this load operates during peak periods.

This estimate was based upon a review of the customer meter data and 12 sites inspections covering a range of pump users. These site inspections included horse studs, coal mines, cattle ranches, dairy farms, vineyards and municipal water providers. Ausgrid also met with local irrigation equipment suppliers.

The range of sites was selected based upon information collected from preliminary discussions with industry and customers. These discussions indicated that pumping use in the region included the following:

- Lower Hunter Water Pipeline Project providing irrigation water to over 250 properties in the lower Hunter vineyards,
- water supply for dust suppression and coal washing facilities at coal mines across the Hunter Region. For example, several mines were found to have water pumping systems rated for 1200 kVA.

- sizeable pumping systems to irrigate the paddocks and fields for the horse breeding and training industry located near Scone. Indication that 500 to 1000 KVA dedicated systems are common for dams and 20 - 500 KVA systems for rivers
- pumping of about 40 – 250 kVA for deep bore wells used in Upper Hunter farms
- small to medium sized pumping systems for sheep and cattle or vegetable and fruit crop properties
- residential property owners and hobby farms sited within 500m to 1000m from small rivers, streams, brooks and other water courses generally use small sized irrigation and stock watering systems. These were found to be in the range of 15 – 50 KVA.

A more detailed review of customers served by an electrical feeder on the Aberdeen Zone substation indicated about 6100 kVA of pumping capacity comprised from about 80-90 separate pumping systems.

Up until approximately 2007, ripple control was used on major agricultural irrigation and water pumping stations for load control. However, with the advent of demand tariffs and time of use metering the bulk of ripple control relays have been removed. Other smaller water pumping facilities have traditionally been operated by time clock rather than ripple control but are expected to have been changed to operate on time of use tariffs. The past use of ripple control and time clock operation would indicate that load control of pumping systems would be acceptable to customers.

4.8.5 Summary of actual and projected costs

A summary of the project budget and actual costs are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	FY 12/13 Actual	FY13/14 Projected	Total Projected
Stage 1 Project research and development	$15,826	N/A	N/A
Stage 2 Review of customer data and analysis	$23,739	N/A	N/A
Total (excl GST)	**$39,565**	**N/A**	**N/A**

4.8.6 Program progress & identifiable benefits

Early stage research and development of the concept is complete. The project identified that significant opportunities for demand reduction from pumping systems in specific rural areas of Ausgrid's network area is possible. But, due to other project priorities, progress to a Stage 3 implementation stage for this project has been delayed. This project remains under consideration.

4.9 Small customer power factor correction

4.9.1 Project nature and scope

As with medium to large customers, correcting for power factor for small customers lowers the peak demand in kVA and reduces the electrical infrastructure requirements for networks. Traditionally however, it is uneconomic to install Power Factor Correction (PFC) for smaller customers where the amount of correction needed is less than approximately 75 kVAr. This is because the installed cost per kVAr increases significantly for small PFC units. One of the reasons behind this is that small PFC units are really just scaled down version of the large units – they still employ a sophisticated microprocessor controller and multiple steps of VAr correction.

This project set out to explore the potential for peak demand reductions from the development and installation of low cost single step, small PFC units in the range of 12.5 to 75 kVAr. The installed cost of a single step PFC unit should be significantly less than the cost of a more sophisticated multi step unit offering an improved payback for customers.

4.9.2 Project aims and objectives

The objectives of the trial were to:

a) investigate the potential for peak demand reductions from small customers power factor correction,

b) identify the technical and economic viability of single step PFC units in the range of 12.5 kVAr to 75kVAr,

c) assess the value of an analytic tool that would allow a quick analysis of meter data to determine the most appropriate unit size. Ultimately this tool could be made available to PFC suppliers and installers to facilitate their site assessments.

4.9.3 Implementation plan

The project was approved for early stage research and development in April 2013 and a detailed project proposal was completed. The project proposal consisted of the following implementation phases:

a) Review meter data for small customers to identify the scale of peak demand reductions viable.

b) Research, develop and lab test a low cost single step PFC.

c) Potentially test the customer response from an offer to install power factor correction equipment.

4.9.4 Results

The results from the research and development stages indicate that the concept of small, single-step PFC for customers is potentially technically and commercially viable. This was concluded after discussions with local and international vendors of PFC equipment and performing desktop analyses on customer meter data. As a result of the research, it was concluded that a single step unit needs to be more closely matched to the customer's actual kVAr requirements as it does not have the flexibility of a multi-step unit. However, it is not necessary to correct the power factor to unity and in fact the biggest benefits are achieved with the first level of correction. The closer one gets to unity power factor, the lower the benefit for each additional kVAr of correction. Preliminary desk top analysis indicates that a single step PFC unit would perform satisfactorily for customers with a low kVAr.

In order to attain the customer take-up rate typically required for a demand management program, the return on investment will need to be such that a customer will invest in the power factor correction installation. Based upon the desktop analysis, a two year payback would appear to be achievable.

4.9.5 Summary of actual and projected costs

A summary of the project budget and actual costs are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	FY 12/13 Actual	FY13/14 Projected	Total Projected
Project research and development	$21,940	$0	$21,940
Total (excl GST)	**$21,940**	**$0**	**$21,940**

4.9.6 Program progress & identifiable benefits

The project research and development stages were completed during FY2012/13 including drafting of a detailed project proposal. As the success of such a demand management technique would be highly dependent on take-up rates, a customer trial targeting small customers is required. As marketing techniques and take up rates are proposed to be tested under another customer PFC program (Large customer PFC), it has been decided to test the response from smaller customers as part of the large customer PFC project. If customer response is found to be sufficient to offer a viable demand reduction program, further testing of single stage PFC units will be considered.

At this stage no additional work is expected in 2013/14 and no peak demand reductions have been achieved from this program.

5 Existing Projects

5.1 Dynamic load control of small hot water systems

5.1.1 Project nature and scope

Ausgrid estimates that there are approximately 400,000 electric hot water systems in our network area not currently connected to a controlled load tariff (Off Peak 1 and 2). The majority of these systems would not be eligible for one of the existing controlled load tariffs due to their size (e.g. small electric storage hot water tanks in apartments less than 100 litres). In addition, there may also be systems that are eligible for an off peak tariff but the customer may have chosen not to connect, these systems may include medium or large size electric storage systems, solar electrically boosted or heat pump water heaters.

This project is aimed at trialling a load control option for small and medium sized hot water systems that involves turning off electricity supply to the tank for periods of typically three to five hours but only as necessary to actively manage network demand (5 to 10 days per year).

5.1.2 Project aims and objectives

The primary objective of this project is to determine the level of technical and financial viability for the dynamic control of small and medium sized hot water cylinders. Specific objectives can be summarised as follows:

a) To determine a dispatchable control regime for application to small hot water heaters that provides satisfactory customer service and reductions in relevant peak demand.

b) To determine the proportion of customers for whom this would likely be acceptable, and what level of marketing effort would be needed to achieve various take-up rates. Also to test the relationship between the take-up rate and the size of reward offered.

c) To determine the level of diversified demand reduction per customer referenced to typical zone substation peak demand characteristics.

d) To accurately estimate the costs of such a program for local, commercial implementation.

5.1.3 Implementation plan

The main elements of the project implementation plan are summarised below:

a) Pilot (Phase 1): The concept of the pilot is to trial control of small hot water cylinders at approximately ten customer's premises. This pilot will test the workability of controlling such cylinders and will be demonstrated by the customer experience. Assuming the majority of installations pass the customer experience test then additional data from the trial will be evaluated in terms of, demand impact, metering profiles – pre and post control, percentage of time reset button used, etc. Phase 1 will also include having the data read and analysed for 30 random cylinders that have dedicated interval meters installed as part of a previous research project. This data will be used to provide an initial view of the load profile and diversity of usage of continuously supplied hot water cylinders; be the basis of analysis of the potential for control and design of the control regime; provide an element of the control group for analysis of impact of control on coincident demand. Some of these customers may become members of the larger trial.

b) Market Research (Phase 2): Assuming that the pilot trial meets customer acceptability requirements, the next stage is to conduct survey / market research to refine product offerings. Typically a market survey would be undertaken to better understand the potential take-up rate, what reward structure would be required and how sensitive the take-up rate would be for the reward structure.

c) Larger Trial (Phase 3): If the results of the pilot trial are positive, and the results of the market survey indicate that a satisfactory take-up rate could be achieved, then a larger trial will be undertaken to further prove the product viability as well as establish better information on performance and cost structure. This trial would cover up to 100 participating customers and as far as possible mimic the product, including enabling communications to the devices, realistic dispatching, and recovering meter data. Following this element, results will be analyzed and any issues arising from the trial will be addressed to determine how and if a further trial should proceed.

d) Full Scale Trial (Phase 4): A final optional phase is to undertake a full scale trial comprising about 1,000 participating customers to provide statistically significant results. Such a trial would also test all operational aspects as well as technical aspects of an actual deployment.

5.1.4 Results

During the 2011/2012 and 2012/2013 years the project progressed from the Phase 1 proof of concept pilot to the Phase 2 and 3 parts of the project. Results from each of the Phase 2 and 3 parts of the project are summarized below:

a) Phase 2 – Market research results

Research undertaken as part of Phase 2 found that about 45% of customers would consider having a control switch if their hot water system was suitable. With a $120 up-front incentive, this increased to 58% who would consider the offer, with 31% extremely likely to take it up.

b) Phase 3 – Customer trial

The Phase 3 customer trial aimed to test a range of different marketing approaches and incentives with the objective of establishing potential take-up rates and the experience of customers when their hot water system was occasionally turned off.

Marketing was targeted at residents of apartments most likely to have small electric hot water systems. In order to target the marketing materials a single zone substation area was chosen and apartment buildings were targeted that had high average electricity consumption and therefore were likely to have electric hot water systems rather than gas hot water.

Two different levels of incentives were tested ($50 and $100) as well as two different forms of direct marketing via the post, in the form of either a letter (costing around $1) or direct mail piece (costing around $3). Some customers also received an outbound call one to two weeks after the mailout to check awareness of the offer, answer questions and encourage program registration. Registration was via the Ausgrid website or contact centre, with installations completed by a contracted electrician. Payment was made via a cheque sent out by Ausgrid following the completed installation.

Marketing Results

Take up rates following the initial mailout were between 1% ($50 incentive) and 3% ($100 incentive) for the letter. The more expensive direct mail piece offering a $100 incentive achieved a slightly lower take up rate of 2.5% when compared to the letter offering the same financial incentive.

In the case of the letters, outbound calls more than doubled the take up rate. An additional 5% take up was achieved for the $50 letter recipients and an additional 4% was achieved for the $100 letter recipients. An additional 1.5% take up was achieved by calling the $100 direct mail participants.

The results in the table below show that there appears to be no compelling reason to spend additional funds on producing a more complex direct mail piece compared to the cheaper standard letter. The best results were from a letter with a follow up phone call.

Marketing	Incentive	Take-up rate
Letter	$50	1%
Letter with follow up phone call	$50	6%
Letter	$100	3%
Letter with follow up phone call	$100	7%
Direct mail piece	$100	2.5%
Direct mail piece with phone call	$100	4%

The larger incentive value did make a difference to the take up rate from the initial mailout (1% for the $50 vs 2.5-3% for the $100 offer). However, when combined with the follow-up call, the $50 and $100 incentives achieved a similar total take up rate (6% vs 7% for the $50 and $100 letter respectively).

The total number of registrations in the trial was 64 but around a third of registrations did not become completed jobs.

Total registrations	64
Total completed jobs	44
Unable to be completed	20

The main reasons for cancelled jobs were the inability to contact the customer (12%), jobs cancelled by the customer (9%) and customers ineligible for the trial as they were not the property owner (6%). There were also a smaller number of customers who had gas hot water systems (2%) and who required connection to controlled load (2%) which was offered via an alternate hot water trial.

The barriers to program take up were varied, with many different reasons for non-participation. The key barrier to program take up was apathy (28%) and a lack of customer interest in making a change. Customer feedback via the outbound calls showed that many viewed the trial as “too much hassle” and wanted to “leave it as is” and “don’t think it’s worth it". A number of customers were interested and would have liked to participate but did not qualify as they were renting (18%). Few people were actually worried about the size of the incentive (4%), running out of hot water (3%) or having to be home for the installation (1%).

When looking more closely at the 'other' reasons for not taking up the offer (33%) it was found that many people wanted more time to read/consider the offer and said the following: "need to talk to husband", "haven't read it yet", "want to do it in my own time", and "thinking about it". The short offer period and structure of the trial was found to be a deterrent to the uptake rate due to this issue.

Technical Results

Part of the Phase 3 trial objectives were also to test customer response to how well the small cylinders withstood occasional control. The objective was not specifically to develop new control methods of switching the cylinders off, but to use available means and where practical refine or develop new techniques.

Initially small industrial time switches were used to control the cylinders. Control was implemented to switch the cylinders off for 4 consecutive hours on one evening per week. Later in the trial electronic meters with an internal time switch were used to control the cylinders, also for 4 hours (5pm to 9pm) once a week. As these meters were significantly larger than the industrial time switches the purpose was to test the customers' tolerance to size of device installed within their home. There appeared to be no significant negative response from the customers in relation to the size of the control device installed. An additional benefit of using the electronic meters is that the meter load is logged and when the meters are finally removed in summer 2013 the analysis of the consumption patterns will add value to the project.

Most of the installs were complete before the end of winter 2012 and will be left in place through to the end of winter 2013. To date nobody has opted out of the trial due to running out of hot water. Only one participant has opted out and this was within days of the install having been done – possibly just to receive the incentive payment.

In addition to the use of time switches for control for the majority of participants, work commenced on the development of a device utilizing the mobile phone telecommunications network to dynamically control one of the participants hot water cylinders via text message. This was done as a proof of concept development and only one unit was commissioned for this purpose. Development of this concept has however been continued under the more recent AS 4755 air conditioner and pool pump program, and is so far proving very successful.

Summary of learnings

- Take-up rate is challenging on a moderate marketing budget.
- Personally addressed letter is more effective than a personally addressed marketing piece.
- Amount of financial incentive, or level of subsidy, is only one of many factors affecting outcome.
- Strong sales support is needed to prevent registrations from dropping away.
- Install costs need to be reduced further for the method to be a cost-effective demand management solution for a targeted deployment. Development of a standardized demand response interface under the AS 4755 Australian standard for hot water cylinders may help to reduce complexity of installing a load control device and associated costs in the future.
- Small cylinders (<100L) show good tolerance for dynamic control.
- Insufficient justification at this stage to undertake Phase 4.

5.1.5 Summary of actual and projected costs

A summary of the project actual and projected costs incurred are shown below. All costs incurred for this project are categorised as opex. In 2012/13, total project costs to Ausgrid were $120,463.

Given the potential demand management benefits for the whole electricity network, the project is in collaboration with Transgrid, the transmission network service provider for the Ausgrid network area. Ausgrid and Transgrid have agreed to a 50/50 split in program costs for phases 1 and 2, with phase 3 and 4 costs by Ausgrid only.

Actual and projected project costs:

Budget Item	FY 10/11 Actual	FY 11/12 Actual	FY12/13 Actual	FY13/14 Projected	Total Projected
Actual Ausgrid Expenditure (excl GST)	$15,296	$91,102	$120,463	$60,000	$286,861
Actual Transgrid (phase 1 & 2 only)	$0	$27,000	$0	$0	$27,000
Total (excl GST)	**$15,296**	**$118,102**	**$120,463**	**$60,000**	**$313,861**

Transgrid has been invoiced for phase 1 and 2 only. Phase 3 operations are funded 100% by Ausgrid. Project scheduled for completion in 2013/14.

5.1.6 Program progress & identifiable benefits

The program has provided significant knowledge and learning as to the cost structure of undertaking such a demand management technique. One of the biggest benefits of the project is that it has identified that typically small to medium hot water cylinders can withstand a reasonable amount of dynamic control. This point was not clearly understood prior to the trial. This outcome has resulted in Ausgrid being optimistic about the possible uptake of the AS4755 interface on small to medium hot water cylinders in future, as this would help the economic viability of controlling such cylinders.

As the trial was relatively small there are no material peak demand reductions achieved from this program.

5.2 CBD embedded generator connection

5.2.1 Project nature and scope

To develop, design and test an alternative embedded generator connection in the Sydney CBD that addresses the potential fault level and feeder imbalance issues which are considered to be potential barriers to their widespread uptake in these types of network locations.

5.2.2 Project aims and objectives

The objectives of the project are to:

a) Develop a cost effective technical solution to the two key connection issues of equipment fault level limitations and feeder imbalance for high voltage (11 kV) connections to the triplex distribution network.

b) Design, install and test an alternative embedded generator connection.

5.2.3 Implementation plan

The Implementation Plan included two main components:

a) Phase 1: Consideration and analysis of the network design options to enable connection of generators at 11kV level while addressing the fault level and feeder imbalance issues, and identification of the preferred approach and conceptual design of the preferred option.

b) Phase 2: Identification of suitable site and installation of alternative embedded generator connection including detailed connection design. Monitoring and verification of connection to verify utility as demand management resource.

5.2.4 Results

Phase 1 of the project is complete. The preferred design for the auto switching scheme comprised of three main features:

a) Logic functions in a PLC within the distribution substation

b) Control mode switches on the circuit breakers on the LV side of the distribution transformers at the distribution substation

c) Integration of status and control signals from the Sydney CBD triplex network and embedded generation.

The conceptual design showed that an embedded generator can be connected in such a way that installation costs are minimized, yet with no adverse impacts on the network or customer reliability. Although there are significant issues which would need to be resolved before the proposed solution could be implemented, the conceptual design and the costing provide an excellent basis for ongoing work.

Planning for Phase 2 has begun with a potential trial site identified with an existing customer owned generator. A draft connection design has been completed with a preliminary scope of works identified. A review and decision on the viability of a full customer connection trial is expected in early 2013/14.

5.2.5 Summary of actual and projected costs

A summary of the project budget and actual cost incurred in 2011/12 are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	FY 11/12 Actual	FY12/13 Actual	FY13/14 Projected	Total Projected
Phase 1 – Design options and conceptual design	$39,251	$714	N/A	N/A
Phase 2 – CBD connection trial		$5,726	N/A	N/A
Total (excl GST)	**$39,251**	**$6,440**	**N/A**	**N/A**

Project scheduled for completion in 2013/14.

5.2.6 Program progress and identifiable benefits

Phase 2 project development is currently underway. Until a final decision on the viability of a customer connection trial is reached, the projected costs in 2013/14 are not known. No peak demand reductions have been achieved from this program to date.

5.3 Subsidised off-peak hot water connections

5.3.1 Project nature and scope

There are up to 100,000 large electric hot water systems in houses across Ausgrid's distribution area that are currently connected to continuous electricity supply but could potentially be connected to off peak supply. These systems include electric storage, solar and heat pump models which can contribute up to 600 watts to winter peak demand and 300 watts to summer peak demand each year.

The subsidised off peak connection program was aimed at encouraging customers to connect large electric hot water systems to off-peak electricity supply by providing a connection subsidy. The program includes market research, development of marketing materials, implementation of conversions and delivering a close-out report.

5.3.2 Project aims and objectives

To develop & demonstrate marketing approaches that will achieve high take-up rates of conversion of electric hot water systems from continuous supply to off peak electricity supply for the purposes of reducing peak demand in specific network locations. The program also has significant potential to reduce household energy bills.

5.3.3 Implementation plan

The program includes two major phases of work:

a) Market research to determine why large systems are not currently connected to controlled load and what barriers need to be overcome for customers to move them to off peak supply. This research was used to refine estimates of market size, marketing messages for customers, demand savings and determine take up rates for various price points.

b) Offer subsidised off peak connections for eligible households with existing large electric hot water systems (over 100 litres) not connected to controlled load. For most customers, a flat fee (for example $199) was charged for this service, which included the meter and installation, wiring and documentation.

5.3.4 Results

The program commenced with market research in September 2011 to determine current customer perceptions and barriers to connecting to controlled load. This research was followed by customer offers.

a) Market research

Research conducted prior to the trial showed that about 46% of customers would consider switching to controlled load (Off Peak supply) if their hot water system was suitable. The likely take-up would be about 15% for $199 meter installation offer and 27% for $99 installation offer. While the research showed that a 67% take-up rate might be achieved if free controlled load connections were offered, this was not economical to trial.

b) Customer trial

The trial tested a range of different marketing approaches and incentives with the aim of establishing potential take-up rates. Marketing materials targeted residents of freestanding houses without controlled load and with a higher than average electricity consumption. Four separate areas in Ausgrid's suburban Sydney network were targeted for the trial.

Two different incentives were trialed - $199 (subsidy of $220) and $99 (subsidy of $320). Customers received an initial program offer via the post in the form of either a letter (costing around $1) or direct mail piece (costing around $4.50). Some customers also received an outbound call one to two weeks after the mailout to check awareness of the offer, answer questions and encourage program registration. Registration was via the Ausgrid website or contact centre, with installations completed by Home Energy Services (a division of Ausgrid). For non-standard sites, additional works were quoted for by the electrician following a site inspection.

Take up rates following the initial mailout were between 0.6% ($199 direct mail) and 1.4% ($199 letter). The $99 letter achieved an initial take up rate of 1.2%. As with the small hot water system control trial, outbound calls more than doubled the take up rate. An additional 1.2% take up was achieved for the $99 letter recipients and an additional 2.0% was achieved for the $199 letter recipients.

A further 3.7% take up was achieved by calling the $199 direct mail participants, however, it is estimated that about 2% of this additional take-up was due to issues with the outbound calling procedure. Contact centre employees were offered an incentive to increase program registrations but this resulted in the registration of a number of customers who were not ready to go ahead with the installation. The larger meter installation subsidy did not make a difference to the take up rate from the initial mailout (1.4% for the $199 offer letter vs 1.2% for the $99 offer letter). This indicates the offers were similarly attractive.

Marketing	**Take-up rate**
Letter - $199	1.4%
Letter - $199, with follow up phone call	3.4%
Letter - $99	1.2%
Letter - $99, with follow up phone call	2.4%
Direct mail piece - $199	0.6%
Direct mail piece - $199 with phone call	2.3%

The barriers to program take up were mixed. Feedback following outbound calls showed more than 60% were classified as ‘other’ and 20% were not interested in the offer. A small portion of customers (2%) didn’t want to run out of hot water and another 2% thought the incentive was too small.

When we looked more closely at the ‘other’ reasons for not taking up the offer we found that more than half of the customers who had received the offer had other systems such as gas hot water and were therefore not eligible to participate in the program. This highlights the difficulty in identifying our target audience when there is a lack of information on the type of hot water systems our customers currently have.

There were also a number of misconceptions and information gaps that created barriers to take up. Customer feedback included “Ausgrid is not my retailer, I am with someone else”, “I already have off peak hot water” and “I don’t want my appliances to be faulty”. A large number of customers also wanted more time to consider the offer.

Just over one third of customers (37%) who registered for the subsidised off peak connection went ahead with the meter installation. Of the jobs cancelled, the key reasons were customers not prepared to pay the quoted amount for additional works/upgrades required (23%), tanks smaller than 100 litres and therefore not qualifying for off peak (21%), taking up offer after pilot closed (23%), site not suitable (16%) and customers not wanting to move to time-based pricing (12%). The latter of these has now been addressed with customers remaining on their existing tariff following a meter upgrade.

A high level summary of the registrations and installations completed are:

Total registrations	282
Total completed jobs	104
Jobs cancelled	178
Total offers made	14,800

A key learning for this trial is that there is a potential sales gap between making an offer to customers and then booking installations. To adequately manage this phase would require significant additional project resources. Many customers would like to think through the offer, speak to someone qualified to provide more information – sometimes on more than one occasion, consider the offer and then be assured that they have the knowledge required to proceed to the next step.

Summary of learnings

- Take-up rate is challenging on a moderate marketing budget.

- Personally addressed letter is more effective than a personally addressed marketing piece.
- Amount of financial incentive, or level of subsidy, is only one of many factors affecting outcome.
- Strong sales support is needed to prevent registrations from dropping away.

5.3.5 Summary of actual and projected costs

A summary of the project budget and actual cost incurred in 2012/13 are shown below. All costs incurred for this project are categorised as opex.

Given the potential demand management benefits for the whole electricity network, the project is in collaboration with Transgrid, the transmission network service provider for the Ausgrid network area.

Actual and projected project costs:

Budget Item	FY11/12 Actual	FY12/13 Actual	FY13/14 Projected	Total Projected
Ausgrid expenditure (exc GST)	$79,007	$35,818	$100,000	$214,825
Transgrid expenditure (exc GST)	$12,000	$95,000	$0	$107,000
Total (excl GST)	**$91,007**	**$130,818**	**$100,000**	**$321,825**

5.3.6 Program progress & identifiable benefits

The program has provided significant knowledge and learning as to the cost structure and practical issues associated with the marketing of such a demand management technique. The trial has indicated that this approach to reducing peak demand is viable but as a long term broad based approach rather than for specific near term constraints due to the low take-up rate and likely resultant low volume of demand reductions.

Another benefit of the trial to date is that it has identified gaps in our knowledge as to the exact mix of reasons why customers migrate away from a controlled load tariff. The decline in controlled load customers for the Ausgrid network area, is less than one percent per year of customers, however, it is important to understand the various factors involved and it is planned to do further work under this project. In 2013/14 we plan to further expand our understanding of customers migrating away from controlled load tariffs by doing additional market research and in addition we are exploring opportunities for conducting a small pilot offering off peak connection subsidies to low income households.

As the trial was relatively small there was no material peak demand reductions achieved from this program.

5.4 Market research for residential air conditioner & pool pump options

5.4.1 Project nature and scope

This market research project aimed to test take-up rates and product attributes for residential air conditioner and pool pump direct load control programs. One of the primary objectives was to understand how take-up rates can be influenced for a range of customer incentives and product attributes.

The scope includes calling a market sample of air conditioner and pool pump owners in the Ausgrid network area, presenting various control options and product parameters, and finding out the required level of financial incentives for them to participate in the program.

5.4.2 Project aims and objectives

The main objective is to discover the likely customer acceptance rates of various air conditioner and pool pump control options for a range of financial incentives to customers.

5.4.3 Implementation plan

The intention was to conduct similar choice modelling market research as conducted by other electricity distributors for their air conditioner and pool pump demand management programs. The intended results from the research is to gain an understanding of the acceptance rates for varying product offers including both varying customer incentives and control options (e.g. with and without override option). The percentage acceptance rates of the various scenarios will help to inform the number of households that might participate in a program and the costs required to obtain that participation rate.

5.4.4 Results

The procurement process for the external market research services was completed during the 2012/2013 year followed by development of the detailed market research brief. Customer research was conducted in December 2012 with a total number of participants of 1,000 from the Ausgrid network area, consisting of 600 air conditioner owners or potential purchasers, and 400 pool owner or potential purchasers. Customer's response to two main types of load control product offerings were tested for each of the appliances (air conditioners and pool pumps):

- a dynamic load control option where the appliance is only controlled for a few peak days each year for a annual incentive or payment.
- a more traditional off peak option where the appliance is connected to a separate circuit and controlled more regularly, and the customer pays a lower tariff for all appliance electricity consumption.

The main product attributes tested are shown in the table below with an example of the levels tested for the air conditioner dynamic load control option. Each appliance and load control option (dynamic or off peak separate wiring), representing a total of four cases, had different attribute levels customised for that particular scenario.

Example of product attributes and levels of attributes tested for the air conditioner direct load control:

Type of attribute	Product attribute	Levels of attribute tested
Upfront costs/incentives	Installation costs for the customer	(a) $0, (b) $100, (c) $200
	Sign up bonus (paid to the customer)	(a) $0, (b) $100, (c) $250
Ongoing benefits/ rewards	Annual incentive payment	(a) $0, (b) $50, (c) $100 (d) $150
	Annual incentive payment method	(a) Direct deposit (b) Cheque (c) Bill rebate, (d) Debit/ Cash Card
	Annual bill savings	(a) None (b) Minimal bill saving (under $10pa)
Appliance control	Reduction in power to appliance	(a) Turn off cooling (b) Runs at 50% of normal operation (c) Cycles 30 mins on/off (d) Runs at 75% of normal operation (e) Cycles 45 mins on/ 15 mins off
	Number of peak days	(a) up to 5 days per summer (b) up to 10 days per summer (c) up to 20 days per summer
	Duration of peak reduction	a) 2 hours per day (b) 4 hours per day (c) 6 hours per day
	Customer override switch	(a) None provided (b) Override switch - inside house (c) Override switch – outside house (d) Override by phone call

A final report, presentation and choice models for each appliance type were supplied by the market research company in early 2013. Two of the key findings from the market research for air conditioner demand response products are below:

a) Only 8% of the market have a strongly positive disposition (definitely would) to allowing their electricity provider to reduce power to the air conditioner on peak use days, with many more claiming they probably would (25%) or might consider it (36%). Around three in ten have a negative disposition to the idea.

b) For those air conditioner survey respondents that would or might consider an air conditioner load control product, there was up to a 20% higher interest when the product is offered with override functionality.

The results from the market research have already begun to inform Ausgrid as to the potential product attributes that are important to customers and be useful for other project activities. For example, as a direct result of learnings from the market research, we are currently developing options for providing customers with an over ride capability in response to a peak event dispatch.

5.4.5 Summary of actual and projected costs

A summary of the project actual and projected costs incurred are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	FY 11/12 Actual	FY 12/13 Actual	FY 13/14 Projected	Total Projected
Choice Modelling (external contract)	0	$50,000		$50,000
Internal labour cost	$863	$15,124	$5,000	$20,987
Total (excl GST)	**$863**	**$65,124**	**$5,000**	**$70,987**

5.4.6 Program progress & identifiable benefits

The project is substantially complete with some further expenditure in FY13/14 to complete a close out report for the project.

There will be no peak demand reductions directly achieved from this project. The benefits are intended to be in the form of increased knowledge and information about customer's perceptions and response to different direct load control options and offers for controlling their air conditioner or pool pumps. This will help to inform other demand management projects and programs being developed or planned.

5.5 Dynamic peak rebate for non-residential customers

5.5.1 Project nature and scope

The Dynamic Peak Rebate (DPR) trial provides a financial incentive to medium to large non-residential customers to reduce their demand during the peak period on the 10-20 days of the year when network assets are operating at capacity.

5.5.2 Project aims and objectives

The high level objective is to determine the level of demand response available from the medium to large, low voltage, non-residential customer sector from a dynamic peak rebate program.

Specific objectives are to:

a) determine a program structure which encourages market participation from aggregators,

b) develop a methodology which fairly and accurately estimates expected customer electricity demand and determines the rebate levels from the customer response,

c) identify the take-up rate for various incentive levels and for a range of customer types for both interruptibility and generator supply.

5.5.3 Implementation plan

The work program included a number of phases:

a) Program Design & Development: Trial Program development included the preparation and release of a discussion paper to seek the views of key stakeholders (aggregators, energy consultants, technology providers, big retail customers, energy associations etc) about key issues of a final program design.

b) Phase 1 – summer 12/13 dispatch trial: The phase included the release of the DPR offer, selection of aggregators, dispatch events, analysis of results and determination of recommendations for phase 2.

c) Phase 2 – summer 13/14 dispatch trial: The implementation plan for the summer 13/14 dispatch trial consolidated the recommendations from the 12/13 dispatch trial, with an earlier offer release date to allow a longer lead time for aggregators to identify and contract demand response from customers. Final project analysis and reporting will occur at the conclusion of the summer 13/14 dispatch season.

5.5.4 Results

A preliminary program design was developed and the DPR discussion paper released to key stakeholders in July 2012. The discussion paper included a proposed trial area for the Phase 1 dispatch season and a draft measurement methodology. A discussion forum was held on July 19, 2012 and was attended by more than 20 stakeholders. Formal responses to the discussion paper were received from five key stakeholders.

Following a review of the stakeholder feedback, a DPR offer was released in September 2012 for the summer 12/13 season. The offer was communicated directly to six (6) interested parties, those on the Demand management Register of Interested Parties and via the notice section of a Sydney newspaper. A new Baseline Methodology (High 4s of 5 Asymmetric Dynamic Baseline) was developed to determine the demand reductions for each customer and communicated to all prospective bidders.

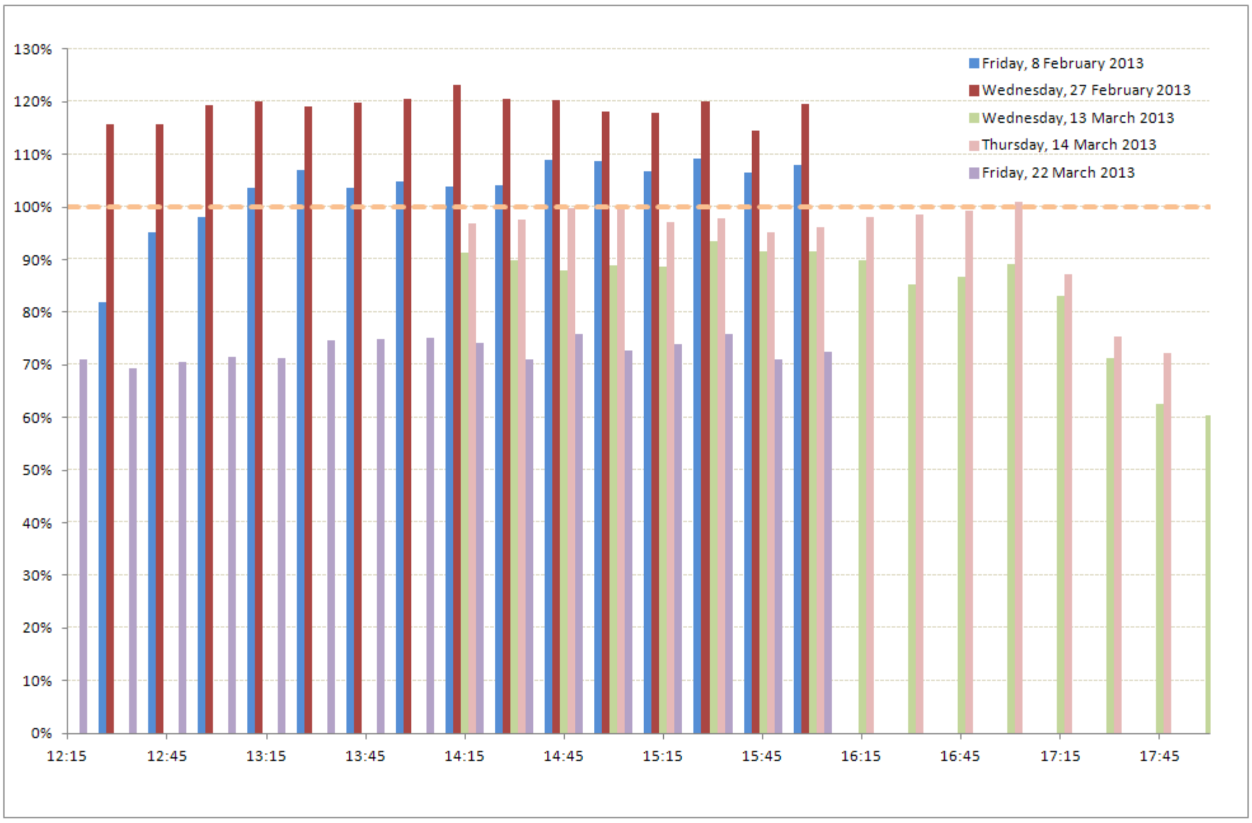
A total of two bids were received. One of these providers later withdrew as it was unable to secure suitable sites to provide the demand response. Following assessment of the sole bid, a network support agreement was executed with the remaining aggregator. This aggregator enrolled a total of 18 facilities including both interruptibility and generator supply. Peak demand reduction capability at each accepted site ranged from 40 to 600 kVA, providing a total committed demand response of 2.2 to 2.8 MVA, between the hours of 12 noon to 6 pm on working weekdays. Some larger generator sites on the original list provided by this supplier were rejected as they had been involved in previous DM activities and were not viewed as being sufficiently innovative. This reduced the average size of the participating sites and increased the proportion of load reduction from interruptibility.

Ausgrid attempted to dispatch each site four times over the support period. We determined that a suitable dispatch criterion was a forecast weekday temperature at Parramatta of 30°C or more. This gave a sufficient number of dispatch days and differentiated a typical dispatch day from a more average day. We called five dispatch events of four hours each during February to March 2013 on this basis. Three of these were from 12 noon to 4 pm and two were from 2 pm to 6 pm. The last two events were partial dispatches, so each site was dispatched for a total of four times. The aggregator introduced a new online dispatch portal during the trial. Ausgrid's network control room was informed of each dispatch.

Overall performance was calculated to be 73.1%. This is the ratio of 15 minute intervals in which each site successfully delivered its committed demand reduction (CDR) compared to the total number of 15 minute intervals within dispatch events. The main reasons for under-performance were equipment malfunction, other business priorities, dispatch processes not well understood and unavailability of key staff during dispatch events.

It should be noted that this metric, and the program as a whole, was based on individual site performance. Average aggregated performance over all dispatch periods was much higher - 96% in fact – as, while one site may under-perform, another may over-perform.

A chart of aggregated performance during each dispatch event is shown below. Some providers were not adequately prepared for the first dispatch on 8 February, hence the ramp up in the first hour. In the dispatches that continued to 6 pm (13 and 14 March), target reductions were not achieved in the last hour at a couple of sites, even though the target was often lower at these times. The worst performance in aggregate terms was recorded on the final dispatch on 22 March. This was due to equipment failures at two sites and operational priorities at a third site.



Key lessons learnt from the phase 1 dispatch period were:

a) Time required to make customers dispatch-ready: Sufficient time is required for aggregators/service providers to recruit customers, deploy technology and prepare customers for delivery of network support capacity during the support season. Aggregator activities including marketing of program, development of aggregator program structure, contracting with customers, activating customer meter pulse ports and installing site servers for real-time monitoring and control, training site personnel and configuring utility portals. The short timeframe leading to the phase 1 dispatch season restricted aggregators in recruiting more customers, completing advance testing for performance and deploying platform/hardware for real-time monitoring.

b) Baseline Methodology: The High 4 of 5 Asymmetric Dynamic Baseline Methodology used in the Phase 1 dispatch season was found to offer a better model of a facility's load reduction on the event day than the alternative static baseline used elsewhere in Australia. The High 4 of 5 baseline takes into account load on a number of preceding days to calculate the load reduction on the dispatch day.

c) Variations in nominations/Committed Demand Reductions (CDR): The selected aggregator was responsible for nominating the CDRs based on its forecast of each site's baseline, and its estimate of the site's load reduction capacity for each 15-minute interval. This phase of the trial did not allow the aggregator to adjust the available CDR for the participating sites during the rest of the network support period. This restricted the ability of the site to discover their demand reduction potential without incurring financial penalties. To encourage broader market participation, it is proposed that the phase 2 dispatch period will allow participating aggregators and customers/sites to vary their nominations/CDRs more frequently.

d) Allowance of tolerance between Delivered and Committed Demand Reductions (CDR): The phase 1 trial did not allow for a tolerance between the delivered and committed demand reductions. This penalised aggregators financially and resulted in under-performance. For example, if a participating site committed to deliver 100 kVA for a 15 minute interval and delivered anything less than 100 kVA, the payment for this 15 minute interval was zero.

   It is proposed that the phase 2 dispatch season will allow a part payment for under-performance to about 70% of CDR. This follows the typical commercial practices in more mature markets such as US.

5.5.5 Summary of actual and projected costs

A summary of the project budget and actual costs incurred are shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	**FY 11/12 Actual**	**FY 12/13 Actual**	**FY 13/14 Projected**	**Total Projected**
Phase 1 – summer 12/13 dispatch trial	$16,248	$315,918	$0	$332,166
Phase 2 – summer 13/14 dispatch trial	$0	$66,189	$1,600,000	$1,666,189
Total (excl GST)	**$16,248**	**$382,107**	**$1,600,000**	**$1,998,355**

5.5.6 Program progress & identifiable benefits

The summer 2012/13 dispatch trial has been completed and preparation for the summer 2013/14 is well advanced.

The summer 2012/13 dispatch trial showed that significant demand reductions can be achieved by a DPR program, even with short notice and if larger sites are excluded. Alternative aggregators (aggregators) were encouraged, even if they did not participate in the 2012/13 season dispatch. The innovative High-4-of-5 Baseline methodology was successfully trialed, as were new dispatch criteria and a new dispatch portal. Significant new knowledge was gained with respect to use of the CDR, particularly around allowing revisions to this during the program, and allowing tolerance in verification of results, so that an equitable outcome is achieved for all parties. This knowledge will be incorporated into the 2013/14 dispatch trial. We are also confident that additional aggregators and greater peak demand reductions can be achieved in the summer 2013/14 dispatch trial.