Demand Management Innovation Allowance Submission
2014-2015 Report to the AER

May 2016

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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).

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 2014/15 financial year.

2 Governance

2.1 DMIA spending in 2014/15

There were nine (9) ongoing DMIA projects under implementation and two (2) new projects under development for which we incurred costs in 2014/15. Ausgrid's submission identifies claimable costs incurred totaling $1,362,980. 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 research and 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 the development and implementation of 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:

1. **Concept Stage**: For new concepts, approval for project research and development is carried out 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 Concept Stage 1 project.
2. **Development Stage**: Where early stage research and development indicates a potential viable demand reduction solution, the project is approved to proceed to the Development 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)).
3. **Implementation Stage**: 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. After consideration of the available DMIA budget, proposed projects will be selected for inclusion in the DMIA program and recommended for authorisation at the appropriate delegation level. 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 project summary

Project	2014/15 Actual Cost (excl GST)	Year initiated
New projects (initiated in 2014/15)		
CoolSaver Maitland Program	$442,803	2014/15
Non-residential Energy Efficiency Program	$19,294	2014/15
New projects sub-total	**$462,097**	
Existing projects (initiated prior to 2014/15)		
Dynamic load control of small hot water systems	$7,027	2010/11
Subsidised off-peak hot water connections	$23,379	2011/12
Dynamic peak rebate for non-residential customers	$79,415	2011/12
CBD embedded generator connection (Phase 1 and Phase 2)	$37,130	2011/12
AS4755 air conditioner and pool pump load control	$83,708	2012/13
Grid battery (Newington)	$331,268	2012/13
Off Peak 2 summer scheduling	$71,540	2012/13
Customer power factor correction	$264,636	2012/13
Pool pump demand study	$2,780	2013/14
Existing projects sub-total	**$900,883**	
Total	**$1,362,980**	

4 New projects

4.1 CoolSaver Maitland Program

4.1.1 Project nature and scope

Phases 1 and 2 of the CoolSaver trial (see section 5.5) have confirmed the technical viability of both the ripple and SMS signal receiver (Demand Response Enabling Device) solutions, and there has been a positive customer response to the product offering. Customer participation in the CoolSaver customer trials in the Central Coast and Lake Macquarie areas involved direct marketing via letter to customers inviting those with an existing eligible air conditioner model to participate. Although this approach was reasonably effective, it was desired to explore the potential for lower cost customer acquisition methods that could be used to achieve a cost-effective and commercial ready demand management product.

The experiences of Energex in Queensland with their PeakSmart program indicate that an appliance retailer and air conditioner industry led customer acquisition model is viable where the product offer is available to a large metropolitan area. However, it is not clear whether such an approach would be sufficiently attractive to appliance retailers and air conditioner manufacturers where the offer area is bounded geographically to align with emerging network constraints.

This project will identify a trial area to investigate the appliance retailer and industry led customer acquisition approach that will aim to leverage the initial purchase and installation of new compliant air conditioners at the point of sale. This trial will test whether this approach results in a lower cost of acquiring customer participation and so lower overall program costs, and whether the process is simpler for customers and the network.

4.1.2 Project aims and objectives

The project objectives are:

<u>Primary</u>

1. Test lower cost customer acquisition models and their effectiveness and verify the viability of establishing new sales channels for the product through leveraging point of sale channels through air conditioner industry, installers and appliance retail stores.

<u>Secondary</u>

2. To make a more informed decision about whether there would be a preference for either a ripple or SMS signal receiver solution for an air conditioner load control demand management program, including consideration of customer preference, cost and functionality.
3. Explore whether customer take-up varies when dispatch override is offered as a product feature.

4.1.3 Implementation plan

Phase 3 of the CoolSaver project will focus on developing a lower cost customer acquisition model. Secondary objectives will focus on refining the technology choice and customer offer. The primary actions are:

1. Identify appropriate commercial supplier to develop a 3G signal receiver based on prototype specifications and purchase a quantity for the customer trial
2. Identify appropriate industry stakeholders including appliance retailers, manufacturers and installers and develop engagement model
3. Identify trial target area
4. Develop and produce marketing materials
5. Identify and deliver necessary training for installers and retail staff
6. Develop and introduce fulfilment solution for marketing materials and signal receivers (DREDs)
7. Coordinate efforts to recruit trial participants and monitor take up rates
8. Operate dispatches over summer periods (2015-16, 2016-17)
9. Develop and operate program options such as advance notice of dispatch and override capability
10. Collect and analyse data (signal receiver data logs, customer meter data and participant surveys) to determine demand reduction performance (quantitative), customer acceptance (qualitative) and technology performance
11. Report findings and conclusions

4.1.4 Results

There are no results to report as the program has not yet recruited any trial participants and the summer trial season is not due to start until November 2015.

4.1.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 is shown below, as well as projected costs for the 2015/16 year. All costs incurred for this project are categorised as opex.

Budget Item	2014/15 Actual	2015/16 Projected	2016/17 Projected	Total Projected
Total project costs	$442,803	$200,000	$75,000	$718,532
Total (excl GST)	**$442,803**	**$200,000**	**$75,000**	**$718,532**

4.1.6 Project progress & identifiable benefits

Significant project progress had been made to the end of June 2015, with all setup processes established including development and delivery of a new 3G signal receiver, selection of the trial area, agreement with key local industry participants, marketing and training material developed and distributed and program launch in February 2015.

In the first phases of the CoolSaver project (see section 5.5), a 3G signal receiver was developed in-house by Ausgrid using off the shelf componentry and these were used in the Central Coast trial area. Each signal receiver was considered to be high cost and for this project, it was desired to test a lower cost signal receiver sourced from a commercial supplier. The 3G signal receivers used for the Maitland project were sourced by first identifying an appropriate supplier, and requesting prototypes for quality and functionality testing. After bench and field testing of the prototype verified performance, an order for a sufficient quantity for Phase 3 of the project was placed in 2014 and these were delivered in January/ February 2015. In preparation for program launch, signal receiver setup and provisioning processes were developed as well as installer documentation and instructions to accompany each signal receiver. This process has helped to guide cost projections for commercial supply of the devices for any potential demand management program.

Figure –3G signal receiver (DRED) installed at test site

The Maitland LGA was identified as the trial area for two reasons. One is that it is a high growth area with a large number of new residential dwellings. It is also a distinct area with relatively little overlap with other metropolitan areas, which is useful when trying to measure the effectiveness of marketing campaigns and sales channels.

Various air conditioner appliance retailers and specialist installers were approached to act as sales channels in the program. For program launch, legal agreements were in place with one appliance retail store and two large, local air conditioner installation companies. At July 2015, negotiations were ongoing with two further appliance retail stores with expectations that agreements would be in place for the upcoming spring/summer sales season.

Marketing collateral, such as brochures, application forms and in-store signage were developed (see figure below) and distributed to the industry participants in early 2015 (January/ February), along with a stock of signal receivers set up for installation on customer sites. Information such as eligible air conditioner models, installer information, eligibility and program information were also made available on Ausgrid's website at http://www.ausgrid.com.au/coolsaver.

Figure – CoolSaver point of sale materials

To end of June 2015, there were no registered participants in the Maitland area. The lack of take-up was due to both the late season launch of the program and the mild summer conditions which affected sales of air conditioner units. Promotional activities are scheduled to re-start in spring 2015.

Further information, including an interim report for 2015, can be found on Ausgrid's website at www.ausgrid/dm. There are no peak demand reductions achieved from this project to date. The trial activities do not form part of a deferral of a real network need.

4.2 Non-residential energy efficiency program

4.2.1 Project nature and scope

Energy efficiency improvements have been widely acknowledged to have contributed to a slow down or decline in both electricity consumption and overall peak demand. Energy efficiency improvements of equipment that are normally operating at peak times will reduce both energy consumption and peak demand contributions from that equipment. Although energy efficiency improvements contribute to an overall reduction in peak demand, whether it makes a material difference for a specific network investment will depend on the characteristics of the network investment including customer types in that area (eg. commercial, industrial or residential), the end-uses that the energy efficiency improvements apply to (eg. lighting, heating/ cooling, refrigeration) and weather characteristics in that location (eg. summer or winter peak demand).

Demand management programs utilising energy efficiency improvements are relatively rare in Australia but have been successfully implemented by utilities in the past. One example is Ausgrid's Drummoyne demand management project in 2006-07 which offered free installation of compact fluorescent lights in residential homes to defer a network investment in a predominantly residential winter peaking area of the network. Other electricity utilities have conducted commercial and industrial energy efficiency programs to reduce peak demand but reported peak demand reductions and cost-effectiveness have varied considerably.

About two-thirds of annual electricity consumption and 50-60% of system peak demand is due to electricity demand from non-residential customers. And at points on the network where residential customers comprise a smaller component of the demand, reductions from non-residential customers are likely to be critical to achieving a viable network investment deferral. For about 1/3 of Ausgrid's zones substations, residential customers comprise less than a 1/3 of the load and so are likely to offer a smaller component of any demand reduction.

4.2.2 Project aims and objectives

The project objective is to trial alternative cost-effective methods of facilitating and/or incentivising non-residential customers to implement energy efficiency improvements that are additional to baseline energy efficiency activity and therefore result in additional peak demand reductions. One of the aims of the project will be to measure and verify the peak demand reductions achieved above baseline activity.

4.2.3 Implementation plan

The project was still in development as of June 2015. The first part of the project development was to review the likely energy efficiency initiatives and programs that would provide the highest peak reduction potential for customers in different parts of the Ausgrid network area. The second part of the project development involves engaging with industry service providers and government organisations delivering energy efficiency programs to explore the potential of leveraging these programs and channels for the project to reduce costs.

A more detailed implementation plan for the project will be developed in 2015/16 once the project research and development stages are complete.

4.2.4 Results

There are no results to report as the program is still in development.

4.2.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 is shown below, as well as projected costs for the 2015/16 year. All costs incurred for this project are categorised as opex.

Budget Item	**2014/15 Actual**	**2015/16 Projected**	**Total Projected**
Project research and development	$19,294	$30,000	N/A
Total (excl GST)	**$19,294**	**$30,000**	

4.2.6 Project progress & identifiable benefits

Up until the end of June 2015 the main progress made has been in the research and development stages of the project.

A review of results and potential from previous commercial and industrial energy efficiency programs and initiatives was completed during the year including the substantial number of energy audits conducted as part of the NSW Demand Management Planning Project (2004 to 2009), the NSW Government's Energy Saver and Small Business Energy Efficiency programs, the NSW Government's Energy Savings Scheme, and a range of Ausgrid demand management investigations (Sydney inner-metropolitan area, Cammeray and Brookvale). Importantly, there are few studies in

Australia which have measured and verified the peak demand reductions achieved above baseline activity for delivered energy efficiency programs. To provide confidence that any energy efficiency solution can deliver the required peak demand reductions, the level of free-ridership and spillover effects will need to be determined.

A broad range of potential end-uses were reviewed, with preliminary findings indicating that energy efficiency improvements in non-residential lighting offers the greatest potential for peak demand reductions due to the widespread applicability of the end-use across different customer types, the repeatability of the initiative across different areas of the Ausgrid network and sufficient scale of potential to offer a material reduction for a typical network need.

The review also found that there was a high variability of cost-effectiveness for the range of energy efficiency initiatives. To offer a competitive alternate to other demand management solutions such as customer demand response, such a solution will need to address both cost and performance concerns. Future work will explore the potential for a low cost to leverage existing industry service providers and/or government programs such as the NSW Energy Savings Scheme to design a cost-effective facilitation and/or incentive method for the project.

No identifiable benefits have yet been defined for this project.

5 Existing projects

5.1 Dynamic load control of small hot water systems

5.1.1 Project nature and scope

Heating water for showers, laundry and washing makes up more than a third of an average household's energy use and has the potential to increase peak demand for electricity. There are about 1.5 million households connected to Ausgrid's network and hot water supplies for these homes are heated fully or partially (e.g. solar hot water) by either electricity or natural gas. As of June 2015, there were about 0.5 million households with a storage hot water system supplied from a controlled load connection (tariffs Off Peak 1 and 2) and about 0.6 million with a gas heated hot water system. For these 1.1 million households, electricity supply is either controlled to avoid impacting peak demand or not supplied by electricity.

The remaining 0.4 million households use some form of electric hot water supply which has the potential to increase peak electricity demand. Some of these systems are medium to large size electric storage, solar boost or heat pump systems that are eligible for an off peak tariff but where the customer has not chosen a controlled load tariff. These customers are the subject of a separate DMIA study; please refer to Section 5.2.

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 of less than 100 litres). This project is aimed at trialing a load control option for those customers using small hot water systems not currently eligible for a controlled load tariff.

5.1.2 Project aims and objectives

The primary objective of this project is to verify the technical and financial viability for the dynamic control of small and medium sized hot water cylinders not currently eligible for a controlled load tariff. 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:

1. **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, and 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.
2. **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.
3. **Larger Trial (Phase 3)**: Where 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.
4. **Full Scale Trial (Optional 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.

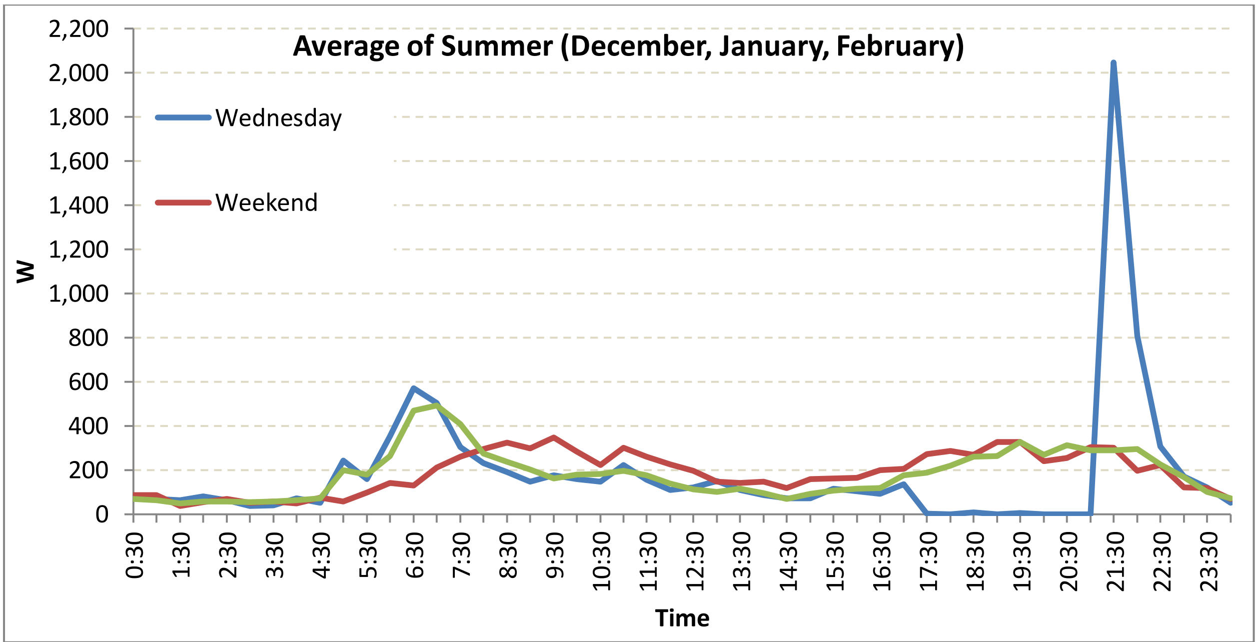
As reported in Ausgrid's DMIA submission to the AER for 2012/13, it was decided that there was insufficient justification to progress to Phase 4.

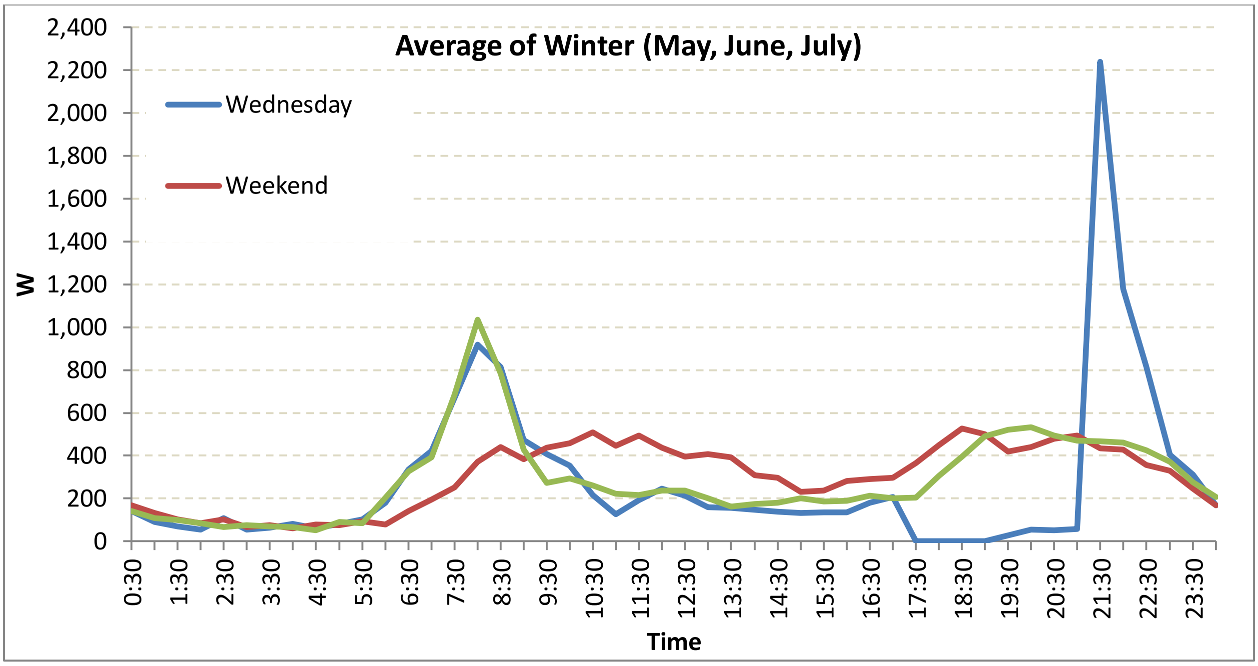
5.1.4 Results

During the 2011/12 and 2012/13 years the project progressed from the Phase 1 proof of concept pilot to the latter phase 2 and 3 parts of the project which encompassed a trial of controlling small electric hot water cylinders at approximately 60 customers premises. The marketing and technical results of this project were recorded in some detail in Ausgrid's DMIA submission to the AER in 2012/13 and 2013/14.

During 2014/15 the main activities involved the decommissioning and removal of the control equipment from participating households after running the Phase 3 customer trial for two winters and one summer (Winter 2012, Summer 2012/13 and Winter 2013). Data collected from 19 electricity data loggers were recovered from customers' hot water electricity circuits and the data was analysed to determine the potential peak demand reductions achievable from this technique. The intention of the data loggers was to confirm, from a representative sample of cylinders, that the cylinders were actually switching off during the required time slots, and also to calculate the after diversity demand reduction that was actually achieved by switching the cylinders off during the control period.

Two graphs which summarise the summer and winter results respectively are shown below. The graphs compiled from the logger data confirm that the hot water cylinders were in fact being controlled according to program (off for four hours every Wednesday evening during the trial). Also the data gives indication of the after diversity demand, during the period of the whole day, for such cylinders. It can be seen that the after diversity demand at say 7pm in winter is in the order of 500 Watts per cylinder, whereas for example at 3pm on a summer afternoon the after diversity demand is only in the order of 180 Watts per cylinder. This information is essential in calculating any prospective benefits from programs that may contemplate controlling these HW systems. The large restoration spike at the end of the control period is only because the cylinders in the trial were subject to the same control period. In practice this would be managed by staggering the restoration time of hot water cylinders.





A summary of the key learnings from the phase 3 trial include:

- A personally addressed letter was more effective than a personally addressed marketing piece.
- The amount of financial incentive, or level of subsidy, is only one of many factors affecting outcome.
- Strong sales support was needed to prevent registrations dropping away.
- Take-up rate was challenging on a limited customer acquisition (marketing) budget.
- No negative feedback was received from customers as a result of having their small hot water systems cylinders turned off occasionally for several hours on one evening per week.
- The after diversity demand reduction for controlling the small hot water cylinders (afternoon or evening) was in the range of 180 to 500 Watts per cylinder depending on the time of day and the season.
- Install costs need to be reduced further for the method to be a cost-effective demand management solution. 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.
- Until a lower cost acquisition model is verified, there is insufficient justification at this stage to undertake a broader rollout of the solution or its use for targeted demand management projects.

5.1.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 and previous years is shown below, as well as projected costs for the 2015/16 year. All costs incurred for this project are categorised as opex.

The phase 1 and 2 parts of the project were in collaboration with Transgrid, the transmission network service provider, considering the potential demand management benefits for the whole electricity network. Transgrid provided funding to conduct activities for the first two phases of the project.

Actual and projected project costs:

Budget Item	**2010/11 Actual**	**2011/12 Actual**	**2012/13 Actual**	**2013/14 Actual**	**2014/15 Actual**	**2015/16 Projected**	**Total Projected**
Actual Ausgrid Expenditure (excl GST)	$15,296	$91,102	$120,463	$20,642	$7,027	$30,000	$284,530
Actual Transgrid (phase 1 & 2 only)	$0	$27,000	$0	$0	$0	$0	$27,000
Total (excl GST)	**$15,296**	**$118,102**	**$120,463**	**$20,642**	**$7,027**	**$30,000**	**$306,530**

Transgrid has been invoiced for phase 1 and 2 only. Phase 3 operations are funded 100% by Ausgrid.

5.1.6 Project progress & identifiable benefits

The project has provided significant knowledge and learning on the cost structure of undertaking such a demand management technique. A key outcome from 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. When the AS4755 interface is introduced for small to medium hot water cylinders, Ausgrid would revisit this approach to identify the cost effectiveness of controlling AS4755 compliant hot water cylinders in order to defer network investment.

During 2014/15 the main project progress was the completion of the phase 3 activities. Due to difficulties in contacting some of the participants, the completion of the trial was delayed such that final analysis of the trial data and completion of the final report will occur in 2015/16. The final report for the dynamic load control of small hot water systems trial will be published as a consolidated hot water report with the subsidized off-peak hot water connection trial (see Section 5.2) and Off-peak 2 summer scheduling trial (see Section 5.7) on Ausgrid's website at www.ausgrid.com.au/dm.

As the trial was relatively modest in scale and temporary in nature, there are no permanent, material peak demand reductions achieved from this project. The trial activities did not form part of a deferral of a real network need.

5.2 Subsidised off-peak hot water connections

5.2.1 Project nature and scope

It is estimated that there are up to 100,000 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 200 to 300 watts to summer peak demand each year.

The subsidised off peak connection project was aimed at encouraging customers to connect eligible electric hot water systems to off-peak electricity supply by providing a connection subsidy. The implementation of the project initially included two phases; a market research phase and a customer trial including direct marketing of a subsidised off peak connection offer to customers in four different areas of the Ausgrid network area.

A third phase of the project was implemented in 2014/15, involving a collaborative pilot project with NSW Land and Housing Corporation (LAHC) to market a subsidised connection offer to NSW Housing tenants.

5.2.2 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. This demand management technique also has significant potential to reduce household energy bills.

5.2.3 Implementation plan

The initial project included two major phases of work in the implementation plan:

1. **Phase 1:** 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.
2. **Phase 2:** A market offer of a subsidised off peak connection for eligible households with existing large electric hot water systems (over 100 litres) not connected to controlled load. For most customers, a flat fee of $99 or $199 was offered for this service, which included the meter and installation, wiring and documentation.
3. **Phase 3:** Subsidised off peak connection pilot offer to NSW Housing tenants. This phase involves the trial of a collaborative approach to customer acquisition so as to reduce program costs and improve cost effectiveness. In this phase, Ausgrid and NSW LAHC shared property and hot water system data to better identify eligible households.

5.2.4 Results

Summary of results for Phase 1 and 2

The project 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 in the Phase 2 part of the trial with letter and marketing materials sent to 14,800 residential customers in four different areas of the Ausgrid distribution network area. The total completed jobs of those customers who registered interest was 104 giving an overall take up rate of only 0.7%.

For Phase 1 and Phase 2, the results were reported in detail in the 2012/13 DMIA Ausgrid annual report. Some of the key learnings from Phase 1 and Phase 2 included:

- Personally addressed letter was more effective than a personally addressed marketing piece.
- Amount of financial incentive, or level of subsidy, was only one of many factors affecting outcome.
- Strong sales support was needed to prevent registrations from dropping away.
- The acquisition cost per customer was high using this method and subsidy structure.
- Take-up rate was challenging on a moderate marketing budget.
- Until a lower cost acquisition model is verified, there is insufficient justification at this stage to undertake a broader rollout of the solution or its use for targeted demand management projects.

Summary of results from Phase 3 pilot

Given the high cost of customer acquisition and relatively low take up rates of the Phase 2 customer trial, an alternative approach was investigated to explore more cost-effective customer acquisition approaches and to also target the offer towards low income and vulnerable households where the reduction in electricity costs might be more attractive. This alternative approach involved collaboration between Ausgrid and NSW LAHC who own and manage NSW government assets including 144,000 social housing properties across NSW. NSW LAHC hold details of the hot water system types and sizes at all of the properties they manage, which allows more efficient identification of properties for receiving an offer.

A project agreement between Ausgrid and NSW LAHC was signed during 2013/14 which allowed data sharing and identification of eligible properties in three Local Government Areas for an offer to be sent to around 100 selected households.

During 2014/15, NSW LAHC was engaged to provide services for the project including the distribution of letters, management of customer inquiries and scoping visits by an electrician and any associated electrical works for connecting eligible hot water systems to an off peak tariff. A total of 127 potential customers were identified and contacted by letter, of which 79 (62%) expressed interest in taking up the offer. The high acceptance rate was considered to be primarily due to the initial offer made to customers of a no cost conversion to off peak provided that the costs of the electrical work were under a reasonable threshold. This threshold was not communicated with customers. Of the 127 potential sites, 99 had no off peak metering in place and 28 had off peak metering with zero consumption recorded over a year indicating that the hot water system was no longer connected to the off peak tariff.

Following completion of the scoping visits, it was identified that while the stand alone cost of installing a new meter was generally acceptable, the costs of the additional works required to achieve switchboard compliance were not. This meant that nearly all sites that did not already have an off peak meter in place were deemed too expensive and above a reasonable level of subsidy (>$500). Similarly, unit and townhouse sites were virtually ruled out due to the fact that the hot water circuits are usually remote from the main meter board, making the electrical work necessary for conversion far too expensive. As a result, 69 of the 79 sites were found to be not feasible under this project's cost targets.

Of the remaining 10 sites, 9 of the 10 interested customers with existing off peak metering were reconnected at a minimal cost of about $100 per site. This represents 32% of the original 28 sites with existing controlled load metering and equipment, which is a very satisfactory level of uptake for this sub segment of customers that were approached.

The overall success of the pilot was that 9 out of 127 customers approached (7%) ended up reconnecting an eligible size hot water system to the off peak tariff. The results from this pilot indicate that there is potential for customers to reconnect to controlled load metering and equipment that is already present. However, the upfront metering and installation costs associated with installing a new controlled load metering circuit may be cost prohibitive in a vast majority of cases even when a customer has an eligible hot water system size.

5.2.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 and previous years is shown below, as well as projected costs for the 2014/15 year. All costs incurred for this project are categorised as opex.

The Phase 1 and 2 parts of the project were in collaboration with Transgrid, the transmission network service provider, considering the potential demand management benefits for the whole electricity network supply chain. Transgrid provided funding to conduct activities for the first two phases of the project.

The project is scheduled for completion in 2015/16.

Actual and projected project costs:

Budget Item	**2011/12 Actual**	**2012/13 Actual**	**2013/14 Actual**	**2014/15 Actual**	**2015/16 Projected**	**Total Projected**
Phase 1 & 2: Ausgrid expenditure	$79,007	$35,818	$0	$0	$0	$114,825
Phase 1 & 2: Transgrid expenditure	$12,000	$95,000	$0	$0	$0	$107,000
Phase 3: Ausgrid expenditure	$0	$0	$10,602	$23,379	$30,000	$63,981
Total (excl GST)	**$91,007**	**$130,818**	**$10,602**	**$23,379**	**$30,000**	**$285,806**

5.2.6 Project progress & identifiable benefits

The project 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 more likely 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.

Final analysis of the trial data and completion of the final report will occur in 2015/16. The final report for the subsidized off-peak hot water connection trial will be published as a consolidated hot water report with the dynamic load control of small hot water systems trial (see Section 5.1) and Off-peak 2 summer scheduling trial (see Section 5.7) on Ausgrid's website at www.ausgrid.com.au/dm.

As the trial was relatively modest in scale, there are no material peak demand reductions achieved from this project. The trial activities did not form part of a deferral of a real network need.

5.3 Dynamic peak rebate for non-residential customers

5.3.1 Project nature and scope

The Dynamic Peak Rebate (DPR) trial provided a financial incentive to medium to large non-residential customers to reduce their demand during the summer peak demand period on the 5-10 days of the year when network assets are operating at maximum demand.

Demand response is a common approach to reducing peak demand for short periods to defer capital investment and remove or reduce load at risk. In North America, some networks offer customers the opportunity to place their bid for demand reductions into an open bidding system in much the same way that the Australian energy market operator (AEMO) manages electricity generation.

In the non-residential sector, the equipment type, usage and the financial and operational factors associated with demand reduction are likely to be highly variable and so the source of the demand reduction is also expected to vary. The DPR approach allows the customer to discover their own least cost demand reduction to supply reductions for network deferral.

The rebate approach is an alternative to the tariff approach where customers are penalised for electricity use during these peak events. For a distribution network business, rebates offer a number of benefits in comparison with tariffs:

- Rebates are believed to be viewed more favourably than tariffs (carrot vs. stick), potentially leading to higher takeup rates and lower acquisition costs
- Rebates do not require retailer participation, avoiding negotiation and billing management costs.
- Formal tariffs would have higher setup costs, whereas the lower setup costs for rebates would allow for a more nimble and responsive program operation, often required when delivering demand management programs

Only those customers from Ausgrid network tariffs 305 and 310 have been selected for the trial. These customers use more than 160 MWh per year each and are supplied at low voltage. There are about 13,000 customers in this group and they use 9100 GWh of electricity each year (more than 30% of total network delivered electricity).

5.3.2 Project aims & objectives

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

Specific objectives are to:

(a) determine an offer 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.
(d) identify the response rate from customers to reduce demand at peak periods in winter and summer.
(e) discover price point for range of DR types.

5.3.3 Implementation plan

The implementation plan included the following main phases:

1. **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.
2. **Phase 1 – summer 2012/13 dispatch trial**: This phase commenced with the preparation and release of a discussion paper to seek the views of key stakeholders (aggregators, energy consultants, technology providers, large retail customers, & energy associations) about key issues of a final project design. This was followed by the release of the DPR offer, selection of aggregators, dispatch events, analysis of results and determination of recommendations for Phase 2.
3. **Phase 2 – summer 2013/14 dispatch trial**: The implementation plan for the summer 2013/14 dispatch trial consolidated the recommendations from the 2012/13 dispatch trial, including an offer release date earlier in the year to allow a longer lead time for aggregators to identify and contract demand response from customers.

5.3.4 Results

Summary results from Phase 1

The Phase 1 dispatch trial was completed in 2012/13 and is reported in more detail in Ausgrid's submission to the AER for 2012/13. Phase 1 results showed that significant demand reductions can be achieved by a DPR program targeted at non-residential customers, even with short notice (day ahead notice) and where larger high voltage sites are excluded. The baseline methodology was also successfully trialed, as were new dispatch criteria and a new dispatch portal. The selected aggregator for Phase 1 enrolled a total of 18 facilities which were able to deliver demand reductions through both load curtailment and generator dispatch. 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. Each site was dispatched 4 times and each event lasted for 4 hours. Knowledge from Phase 1 was incorporated into the second phase for the summer 2013/14 dispatch trial.

Preliminary results from Phase 2

Phase 2 of the dispatch trial (or DPR II) was conducted during 2013/14. There were a number of key differences compared to the Phase 1 trial including:

(a) A larger trial area encompassing Epping/Ryde/Macquarie Park north of Sydney Harbour and Revesby/Padstow/Milperra to the south.
(b) Testing a variety of rebate levels depending on:
    i. type of advance notification (including "day of" and "day ahead")
    ii. type of demand response (ie load curtailment or generator dispatch)
    iii. location on the electricity network.
(c) Extending the marketing and customer enrolment time to five (5) months.
(d) Testing of a new *Adjusted High 4s of 5* baseline methodology.
(e) Allowance of compensation for partial delivery between 70% and 100% of committed demand reductions (CDR).

Four companies responded to the Invitation to Bid for Phase 2, and two aggregators were selected for the trial program. An important learning from Phase I was to allow sufficient time for customers to become "dispatch ready". Subsequently, the marketing and customer enrolment time was extend to 5 months in Phase 2. This timeframe was to allow for:

(a) Marketing, development proposals and executing contracts
(b) Activating customer meter pulse ports (which can take up to 2-3 months)
(c) Installing site servers for real time monitoring and control
(d) Training of site personnel and acceptance testing of dispatch activation.

Demand reductions for the Phase 2 trial were sourced from a total of 38 customers representing a wide variety of types including telecommunication exchanges, schools, retail centres, RSL clubs, hotels, data centre, commercial buildings and manufacturing facilities.

A summary of the dispatch performance for Phase 2 of the DPR trial is shown in the table below & on the following page.

Aggregator #1 Event date	Type of dispatch	No of participating customers	Committed demand reduction (CDR) in kVA	Average delivered demand reduction (DDR) in kVA	DDR/CDR%
10-Dec-13	DO & DA	34	7,330	6,900	94%
20-Dec-13	DO & DA	28	5,568	5,513	99%
16-Jan-14	*DO only**	*6*	*2,874*	*2,671*	*93%*
17-Jan-14	DO & DA	23	5,399	4,518	84%
31-Jan-14	DO & DA	24	5,358	5,109	95%
26-Feb-14	DO & DA	26	6,495	6,068	93%
5-Mar-14	*DA only**	*21*	*3,596*	*2,991*	*83%*
Aggregator total			**36,620**	**33,769**	**92%**

Aggregator #2 Event date	Type of dispatch	No of participating customers	Committed demand reduction (CDR) in kVA	Average delivered demand reduction (DDR) in kVA	DDR/CDR%
10-Dec-13	DO & DA	4	1,495	1,688	113%
20-Dec-13	DO & DA	4	1,354	1,392	103%
16-Jan-14	*DO only**	*No dispatch - contract limited to only 4 events*			
17-Jan-14	DO & DA	*No dispatch - contract limited to only 4 events*			
31-Jan-14	DO & DA	4	1,452	1,321	91%
26-Feb-14	DO & DA	*No dispatch - contract limited to only 4 events*			
5-Mar-14	*DA only**	*4*	*1,482*	*1,376*	*93%*
Aggregator total			5,783	5,778	100%
Program Total			**42,403**	**39,548**	**93%**

DO = “day of”, DA = “day ahead”

Each site was dispatched up to seven (7) times over the summer 2013/14 trial period , with five (5) of these events including both “day of” (DO) and “day ahead” (DA) notification, and one (1) event each for DO notification and DA notification only.

Summary of Aggregator #1 Performance

Aggregator #1 made an initial demand response offer of 10MVA. The maximum contracted demand reduction for any one event was 7.3MVA across 34 sites, or 73% of the initial claimed capability. For the events with both DO & DA notification, the total demand reductions delivered ranged from 4.5 to 6.9 MVA. When compared to the maximum potential contracted demand reduction of 7.3MVA, the average performance ranged of 62% to 94%. It is interesting to note that the best performance was at the start of the summer trial period, and the worst performance was in the traditional Christmas/January holiday period, with performance improving again in the late January and February period. The three main reasons identified for the reduction in demand response during the holiday period were:

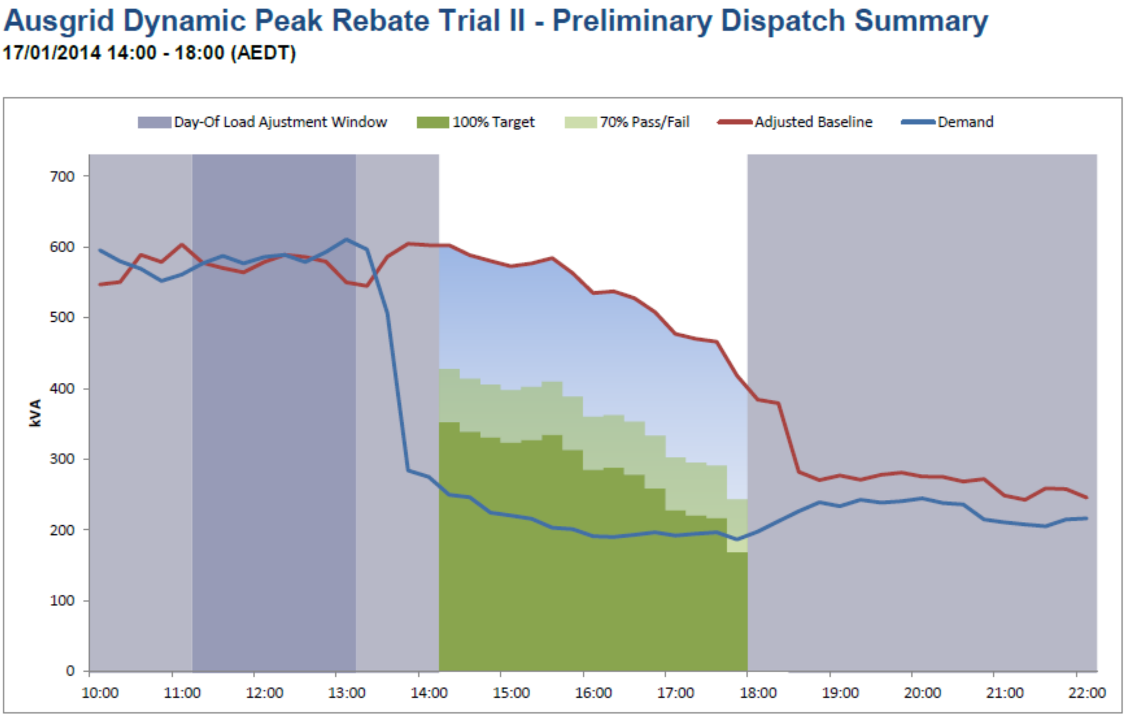
- Business activity commitments related to the Christmas period
- Manpower and BAU demand reductions due to shutdowns during the Christmas and New Year holiday period
- On-site technical issues.

Summary of Aggregator #2 Performance

Aggregator #2 made an initial demand response offer of 4.5MVA. The maximum contracted demand reduction was 1.5MVA across four (4) sites, or only 33% of the initial claimed capability. For the events with both DO & DA notification, the total demand reductions delivered ranged from 1.3 to 1.7 MVA. When compared to the maximum contracted demand reduction of 1.5MVA, the average performance per event is in the range of 88% to 113%.

For the entire program across both aggregators, 60% of the reductions were from customer generation and 40% from load curtailment.

The figure below shows an example of a successful dispatch event on 17th January 2014 at one of the participating customer sites. It shows the calculated baseline demand (red), the committed demand reduction (CDR) level (dark green), 70% of the committed demand reduction level (ie the threshold at which part compensation becomes payable to the customer) in light green, and the actual measured demand during the dispatch event (blue).



5.3.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 and previous years is shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	**2011/12 Actual**	**2012/13 Actual**	**2013/14 Actual**	**2014/15 Actual**	**Total Actual**
Phase 1 – summer 2012/13 dispatch trial	$16,248	$315,918	$0	$0	$332,166
Phase 2 – summer 2014/15 dispatch trial	$0	$66,189	$1,269,686	$79,415	$1,415,290
Total (excl GST)	**$16,248**	**$382,107**	**$1,269,686**	**$79,415**	**$1,747,456**

5.3.6 Project progress & identifiable benefits

As a demand management solution, the dynamic peak rebate model for demand response was shown to be a viable and low cost method of reducing peak demand so as to defer network investment. And while the dispatch day delivery performance ranged from a low of 62% to a high of 113%, the relatively low cost of the solution and the diversified source of demand reductions could allow networks to achieve demand reduction needs with sufficient certainty by contracting demand response assets moderately in excess of the requirement. Trial outcomes provide Ausgrid with greater knowledge of this technique to guide future demand management deferral projects.

The Dynamic Peak Rebate trial is now complete. Final results will be detailed in the final report to be published on Ausgrid's website at www.ausgrid.com.au/dm.

As the trial was temporary in nature, there are no permanent peak demand reductions achieved from this project. The trial activities did not form part of a deferral of a real network need.

5.4 CBD embedded generator connection

5.4.1 Project nature and scope

It has been identified in numerous studies that embedded generation can defer or avoid the need for network augmentation investments by reducing peak demand. In addition, connection applications for the installation of cogeneration plant using natural gas fired generators have increased in recent years.

To optimise potential benefits for both the customer and the network, the generators should be able to operate in parallel with the Ausgrid network. However because of the configuration of the electricity network in the Sydney CBD (triplex system), parallel operation can cause particular technical issues which are prohibitively expensive to resolve using current approaches.

Fault levels on the Sydney CBD triplex system are generally high due to the high load densities, high capacity network assets, and a high capacity source. In many situations, the existing fault level is close to the specified fault duty limit of both network assets and customer equipment such that there is not a significant amount of fault duty “headroom”. The connection of embedded generators results in an additional contribution to the fault level, and can often result in equipment fault duty limits being exceeded. Fault limiting approaches such as changing network topology, changing the point of connection, or installing fault level mitigation equipment are possible, but are only useful in limited circumstances and also relatively expensive. This factor has been the most common reason that embedded generation projects proposed for connection to the CBD system have failed to proceed or are smaller in scale.

The development of a technically feasible, economic, and practical connection solution is likely to promote a greater uptake of embedded generation in the Sydney CBD and other similar network locations. This in turn could defer or avoid the need for network capital investment by expanding the extent to which embedded generation can play a role in network support during peak demand periods.

5.4.2 Project aims and objectives

The aim of the project is to develop, design and test an alternative embedded generator connection in the Sydney CBD that is cost effective and addresses the potential fault level issues which are currently a barrier to their widespread uptake in these types of network locations.

Further, the proposed solution should be applicable to typical generator sizes in the majority of CBD locations and be substantially less expensive than current solutions.

5.4.3 Implementation plan

The implementation plan included two main components:

1. **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.
2. **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.

5.4.4 Results

Phase 1 of the project is complete and results have been reported in previous Ausgrid DMIA submissions. The preferred design is for an auto switching scheme that is comprised of three main features:

a) Logic functions in a programmable logic controller (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 sufficient basis for ongoing work.

Phase 2 began in 2014, with work on the detailed design. This initial stage involved defining the relay requirements, and completing the relay allocation. A trial site was identified, field inspection conducted, and an engineering brief drafted. Detailed design work is now substantially complete. Implementation of the auto switching scheme at the trial site is tentatively scheduled to occur in 2014/15, subject to trial site scheduling restrictions and resource availability.

5.4.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 and previous years is shown below, as well as projected costs for future years. All costs for this project are categorised as opex.

Actual and projected project costs:

Budget Item	2011/12 Actual	2012/13 Actual	2013/14 Actual	2014/15 Actual	2015/16 Projected	2016/17 Projected	Total Projected
Phase 1 – Design options and conceptual design	$39,251	$714	$548	$0	$0	$0	$40,513
Phase 2 – CBD connection trial		$5,726	$101,088	$37,130	$25,000	$40,000	$208,944
Total (excl GST)	**$39,251**	**$6,440**	**$101,636**	**$37,130**	**$25,000**	**$40,000**	**$249,457**

5.4.6 Project progress and identifiable benefits

The use of embedded generation is a common method for reducing network demand so as to defer network investment and so verification of this approach can clear a barrier to greater volumes of embedded generation in the Sydney CBD network. Where field testing verifies the approach, this arrangement can offer a business as usual connection to the triplex network for future customers and so ensure that in future, sites are 'generator ready' with no material additional costs to connect. Results from the trial will be published on Ausgrid's website at www.ausgrid/dm.

No peak demand reductions have been achieved from this project to date. The trial activities do not form part of a deferral of a real network need.

5.5 AS4755 air conditioner and pool pump load control

5.5.1 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 greatest 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 50-150 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 (Framework for demand response capabilities and supporting technology for electrical products) 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

5.5.2 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), also known as signal receivers, 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.

5.5.3 Implementation plan

The project initially consisted of a research and development stage, followed by the two main implementation phases.

1. **Phase 1** of the project included 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 included 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 was to test customer acceptance of the appliance control with a controlled group of participants (small pilot).
2. **Phase 2** of the project involves a customer trial which includes testing and development of 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.

5.5.4 Results

Phase 1 – technology pilot, technology development and customer response

The Phase 1 pilot was mostly completed during Summer 2012/13 with a small number of participants recruited to test the new DRED technology. The Phase 1 work included development of a prototype SMS signal receiver (DRED) that utilises the publicly available mobile phone telecommunications network. Results from the Phase 1 part of the project have been reported in the previous Ausgrid DMIA report for 2013/14. These participants have been incorporated into the Phase 2 customer trial which is scheduled to continue until March 2015 to capture more data on performance, with the option to continue for an additional summer if deemed necessary for data quality.

Phase 2 – CoolSaver customer trial in Lake Macquarie and Central Coast areas

Phase 2 of the project is a customer trial, with the aim of testing a product offer with customers for direct load control of AS4755 compliant air conditioning systems, including the testing of the two signal receiver communications platforms (ripple signal and SMS communications). Participants in the trial areas were recruited to participate over the period from December 2013 to early February 2014 with the trial scheduled to occur over two summer periods (Summer 2013/14 and Summer 2014/15).

The acquisition of 68 customers with SMS signal receivers controlled in the Central Coast trial area, and 40 with ripple signal receivers in the Lake Macquarie trial area was completed and 2013/14 and is detailed in the previous Ausgrid DMIA report for 2013/14.

During the 14/15 summer period only three demand reduction dispatches were carried out due to a lack of sufficiently hot days over the summer period (1 November 2014 to 31 March 2015), where the temperature was forecast to exceed 32ºC,. The details can be found in the table below:

Date	Day	Start time	Finish time	Demand response modes*	Max. Daily Temp (ºC)	Customer Override
3 December 2014	Wed.	15:00	19:00	DRM2 – Central Coast DRM3 – Lake Macquarie	35.7	0
17 February 2015	Tue.	15:00	19:00	DRM2 – Central Coast DRM3 – Lake Macquarie.	28.1	0
20 March 2015	Fri.	14:00	19:00	DRM2 – Central Coast DRM3 – Lake Macquarie.	37.3	0

*Demand Response Mode 2 (DRM2) = 50% limit on rated electrical input power
Demand Response Mode 3 (DRM3) = 75% limit on rated electrical input power

Participants in the Lake Macquarie trial area did not have the option of opting out of the dispatches because the ripple signal receivers fitted to their air conditioners do not have the functionality of individual addressability. However, participants in the Central Coast trial area were able to opt out of individual power saving mode activations (dispatches) as their signal receivers are controlled by SMS via the mobile phone 3G network.

Using data logged by the devices themselves, the diversified load reductions during these power saving mode activations were calculated. The peak demand reduction was estimated to be an average of 1.5kVA per customer with an air conditioner with a rated cooling capacity of 10kW or greater and 0.7kVA per customer with an air conditioner with a rated cooling capacity between 4kW and 10kW. Due to the small sample size, the estimate of the diversified load reduction is not conclusive. The results are shown in the following figures.

Figure – Average diversified load reductions (>10kW rated cooling capacity)

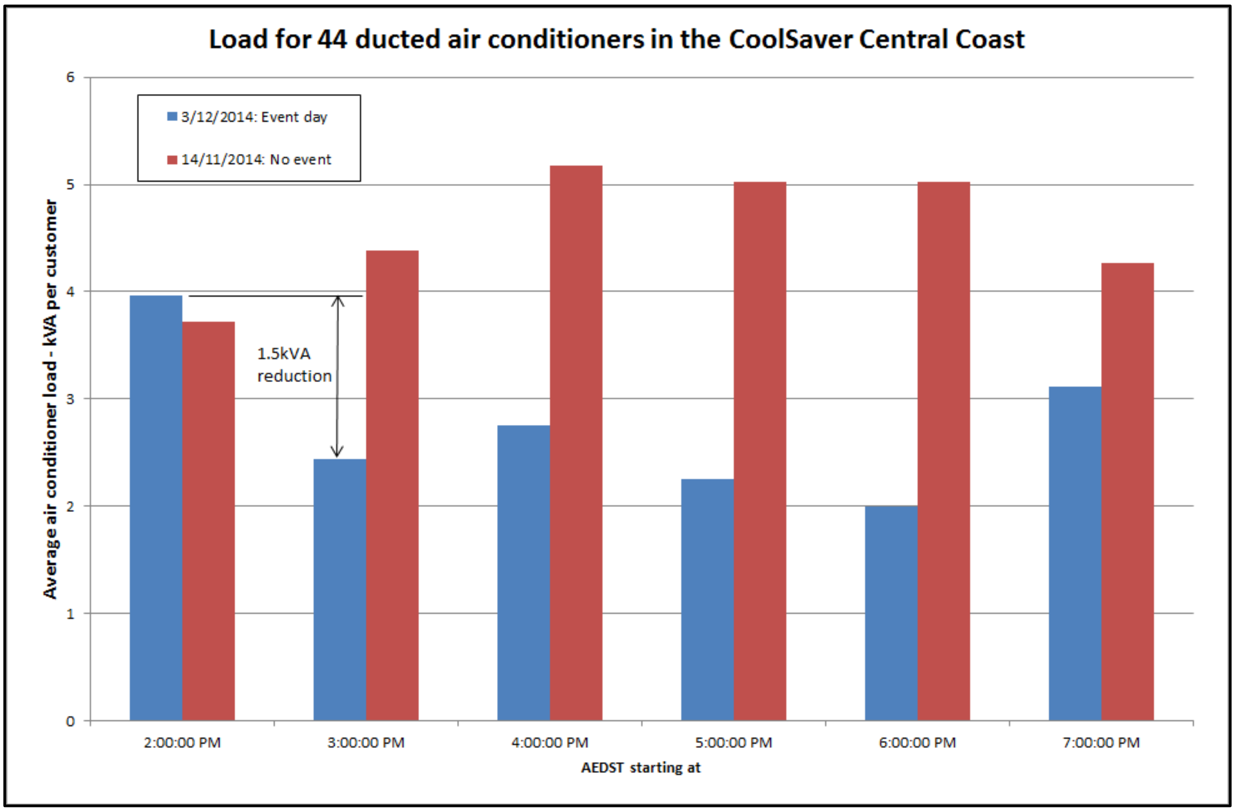
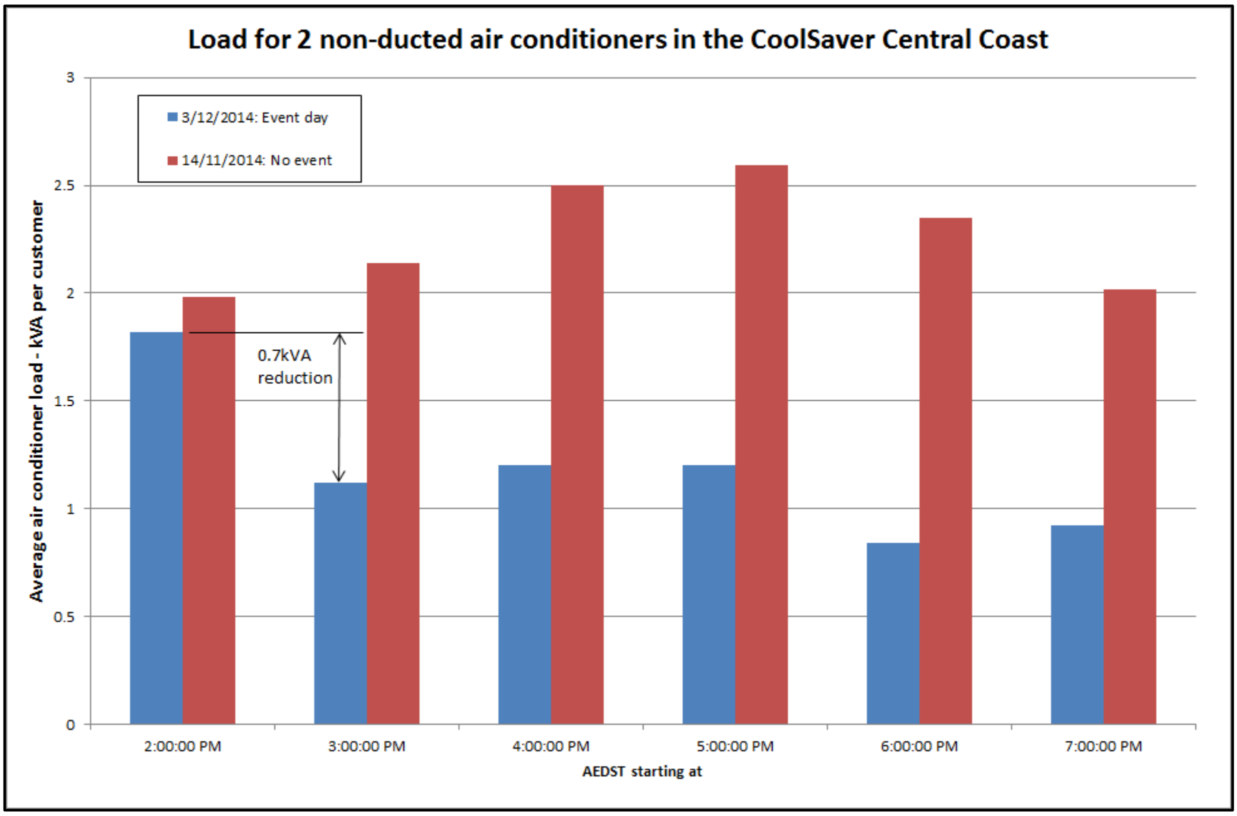


Figure – Average diversified load reductions (4-10kW rated cooling capacity)



Customers were surveyed after the conclusion of the 14/15 summer period with responses being generally positive about their experiences throughout the trial. However, it is not clear whether or not the customer experience will remain as positive during a summer period with extended periods of very hot weather and a higher number of dispatch events. See table below for a snapshot of the overall survey responses:

	Central Coast	Lake Macquarie
Survey response rate	53%	52%
Rated experience 8+ (out of 10)	98%	99%
Experienced slight or no difference to cooling	95%	90%
Found opt out (override) feature useful	54%	N/A
Participated due to financial incentive	50%	33%

Following the end of the two year contract period with customers and the two mild summers in 2013/14 and 2014/15, the decision was made to extend the program to the 15/16 summer period in order to build a more accurate and reliable dataset with regard to:

- Opt out rates and customer response during higher temperature periods
- Diversified demand reductions
- Program participation retention/dropout rate (year to year)

5.5.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 and previous years is shown below, as well as projected costs for the 2014/15 year. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	2012/13 Actual	2013/14 Actual	2014/15 Actual	2015/16 Projected	2016/17 Projected	Total Projected
Project research and development	$18,666	$0	$0	$0	$0	$18,666
Implementation Phase 1 – Pilot, lab testing and Demand Response Enabling Device (DRED) development	$140,342	$0	$0	$0	$0	$140,342
Implementation Phase 2 – Customer trial and further DRED development	$16,000	$585,715	$83,708	$80,000	$40,000	$805,423
Total (excl GST)	**$175,008**	**$585,715**	**$83,708**	**$80,000**	**$40,000**	**$964,431**

5.5.6 Project progress & identifiable benefits

In addition the progress and benefits identified in the previous Ausgrid DMIA report for 2013/14, this trial has:

1. continued to test the consumer response to peak demand response dispatch events through the 14/15 summer,
2. gathered load reduction data from households to indicate the effectiveness of the load control events, and
3. gathered customer feedback on their experiences from participating in the trial.

Measurement and verification of the results from the summer 2014/15 period for both trial areas is in progress, and the trial will continue through to March 2016 to collect a further summer of customer response results. Interim results from the trial, including details on the customer survey, have been published on Ausgrid's website at www.ausgrid/dm.

At this stage there are no material peak demand reductions achieved from this project. The trial activities have not been part of a deferral of a real network need.

5.6 Grid battery trial (Newington)

5.6.1 Project nature and scope

This project investigated the potential benefits of using battery storage as a means for reducing peak demand on the network. The project seeks 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.

5.6.2 Project aims and objectives

Primary objectives:

(a) 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

(b) 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:

(c) Renewable load smoothing (Solar PV): Simulate using the battery to store renewable energy generation from local solar systems.

(d) Power quality issues: To further test the power quality benefits of installing a grid battery in an urban network.

(e) 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).

5.6.3 Implementation plan

The following table outlines the implementation plan and project activities for the Newington grid battery project.

<table>
<tr><td rowspan="9">Project development and setup</td><td rowspan="3">2013</td><td>October</td><td colspan="2">Investigation of battery location options
Council Approval – 14th of October 2013
Formal Letter of Request to SOPA – 23rd of October 2013</td></tr>
<tr><td>November</td><td colspan="2" rowspan="3">Development of detailed trial design
Detailed network connection design
Licence Agreement drafting - 30th of January 2014</td></tr>
<tr><td>December</td></tr>
<tr><td rowspan="13">2014</td><td>January</td></tr>
<tr><td>February</td><td colspan="2">Environmental Impact Statement – 17th of February</td></tr>
<tr><td>March</td><td colspan="2">Licence Agreement Signed – 14th of March 2014
Site Layout Design – 18th of March 2014</td></tr>
<tr><td>April</td><td colspan="2">Protection Design – 14th of April 2014
Site preparation</td></tr>
<tr><td>May</td><td colspan="2">Site preparation
Battery Commissioned on 24th May</td></tr>
<tr><td rowspan="7">Trial Period</td><td>June</td><td rowspan="7">Feeder configuration
1. May 24th to Oct 22nd (Original SGSC configuration: 9 low voltage DCs)
2. Oct 22nd to Nov 25th (Trial configuration: 2 low voltage DCs)
3. Nov 25th to Dec 30th (Temporary configuration: 6 low voltage DCs)</td><td rowspan="7">Trials conducted
Various trials were performed throughout the whole trial period, alternating to achieve the project objectives:
• Peak demand reduction
• System reliability
• Round trip efficiency
• Power quality
• Solar PV smoothing
• Customer benefits
• Customer benefits with network control</td></tr>
<tr><td>July</td></tr>
<tr><td>August</td></tr>
<tr><td>September</td></tr>
<tr><td>October</td></tr>
<tr><td>November</td></tr>
<tr><td>December</td></tr>
</table>

	2015	**January**	4. Dec 30th to Mar 29th (Trial configuration: 2 low voltage DCs)	
		February		
		March		
		April	Battery decommissioning and make good of site	

5.6.4 Results

The Newington grid battery was commissioned on-site in May 2014 and trials commenced in June 2014 with preliminary results reported in the 2013/14 DMIA report.

During 2014/15, the trial period continued through to end of March 2015 with the battery fully decommissioned and removed from site in May 2015. Detailed analysis of the project results were ongoing as at end of June 2015.

A summary of some of the preliminary trials and results are shown below.

Trial Objective	Description
1. Network peak reduction	The preliminary results from testing the ability of the grid battery to reliably reduce peak demand indicate that: • Storage capacity of the battery is an important consideration when assessing the ability of a storage system to reduce peak demand. The battery system used in the trial had an energy/power ratio of 2. • Battery testing has been successful in reducing peak demand with a maximum of 43 kW reduction achieved using the 'load management' battery system functionality. • The use of the 'load management' battery system functionality requires the ability to integrate an external meter to track a target maximum feeder or asset demand.
2. Battery performance and reliability	Preliminary trial results has shown that: • System availability was 67% across the trial period, improving to 90% in the final three months. Primary issue was related to integration of remote meters into the battery management system. • Battery round trip efficiency was about 70% to 80% with lower efficiency in summer. Standby power consumption for the system is about 8-12 kWh per day, or 7-12% of battery storage capacity.
3. Solar smoothing and power quality trials	Preliminary trial results indicate that: • Using the 'ramp rate' battery system functionality, the variability associated with intermittent solar generation was substantially smoothed out confirming the 'solar smoothing' capability. • No power quality impacts were observed, though this was not unexpected due to the robust nature of the urban network in Newington.
4. Customer benefits trial	Preliminary trial results has shown that storage of solar exports can reliably be accomplished. Detailed analysis of the customer benefit will occur in 2015/16.

The charts below show selected preliminary results from daily operations of the battery trial.

Figure: Peak reduction trial using constant power output function 8 Feb 2015

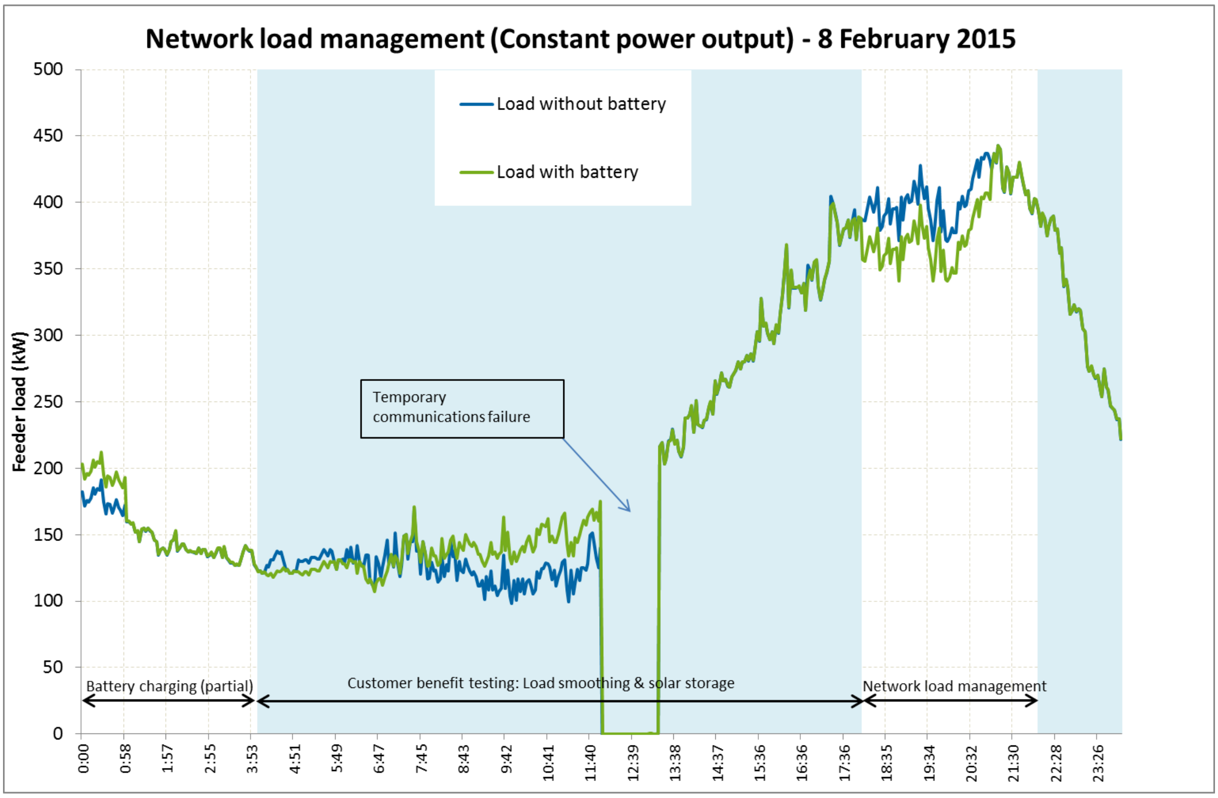


Figure – Peak reduction trial using load management output function 9 Jan 2015

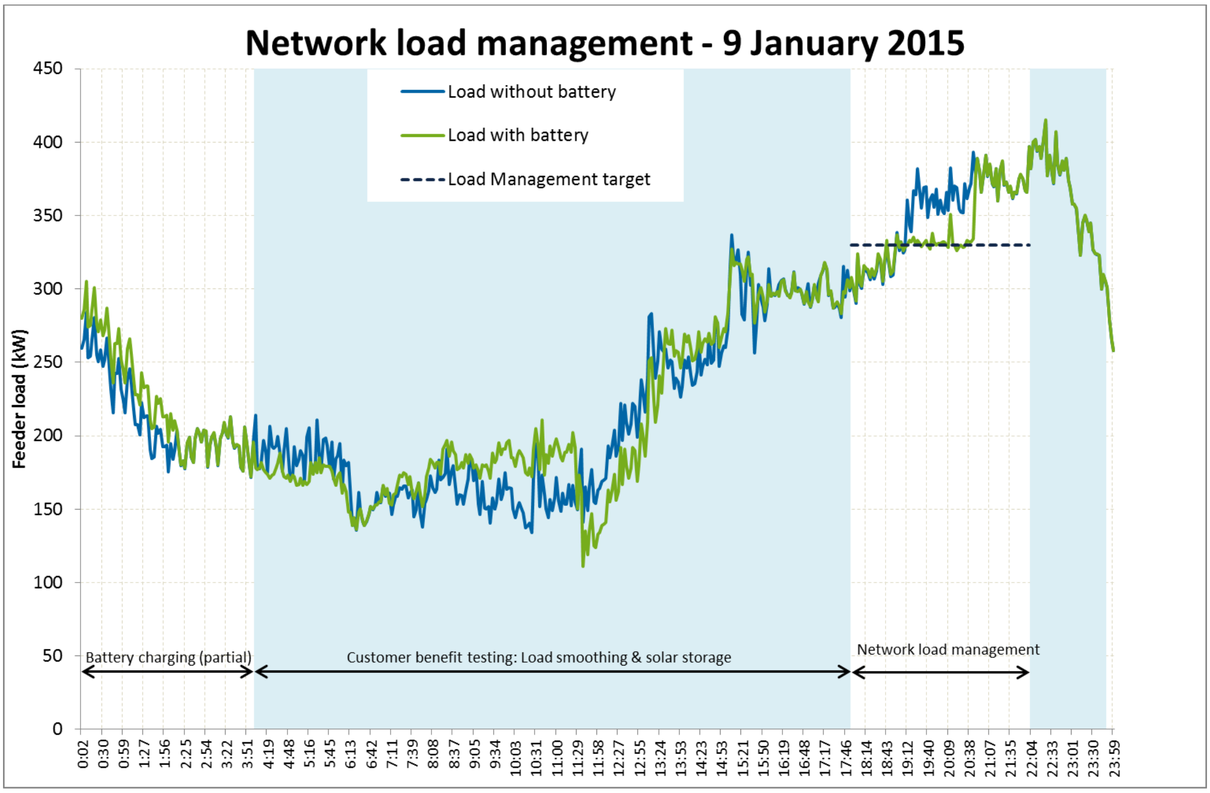


Figure – Peak reduction trial using load management output function 14 Jan 2015

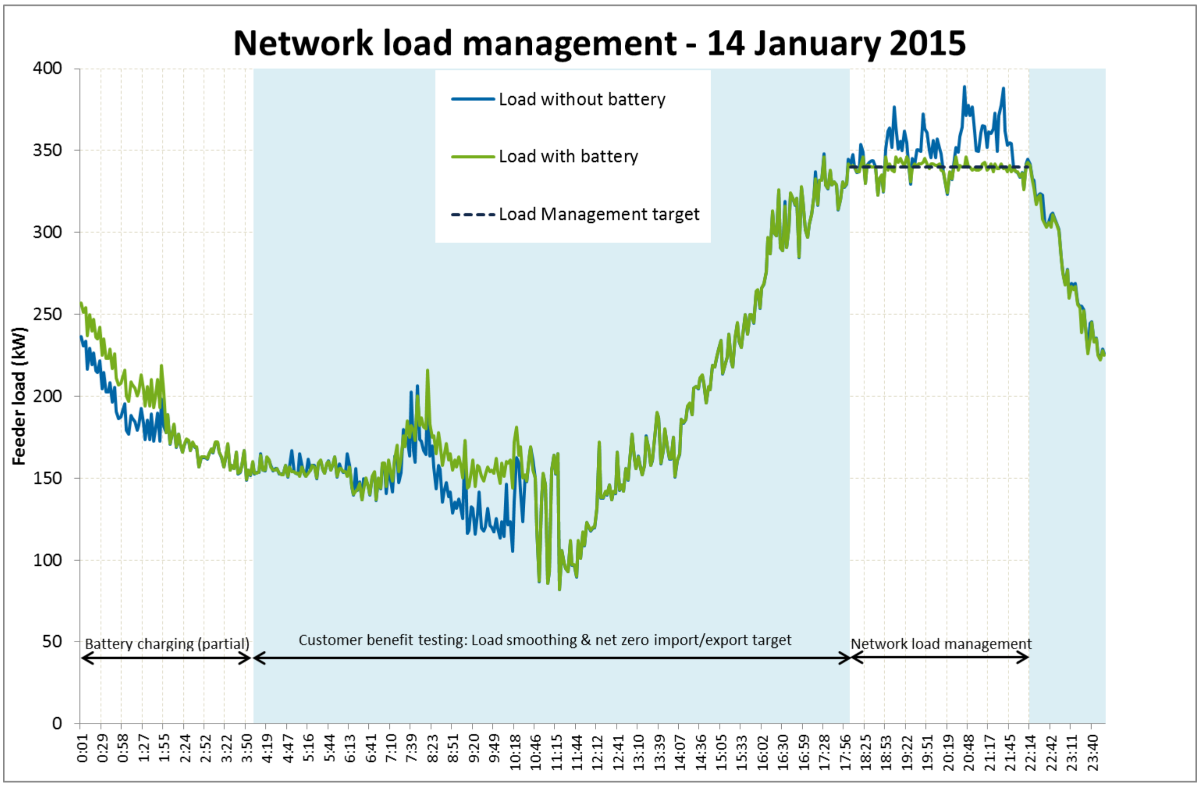
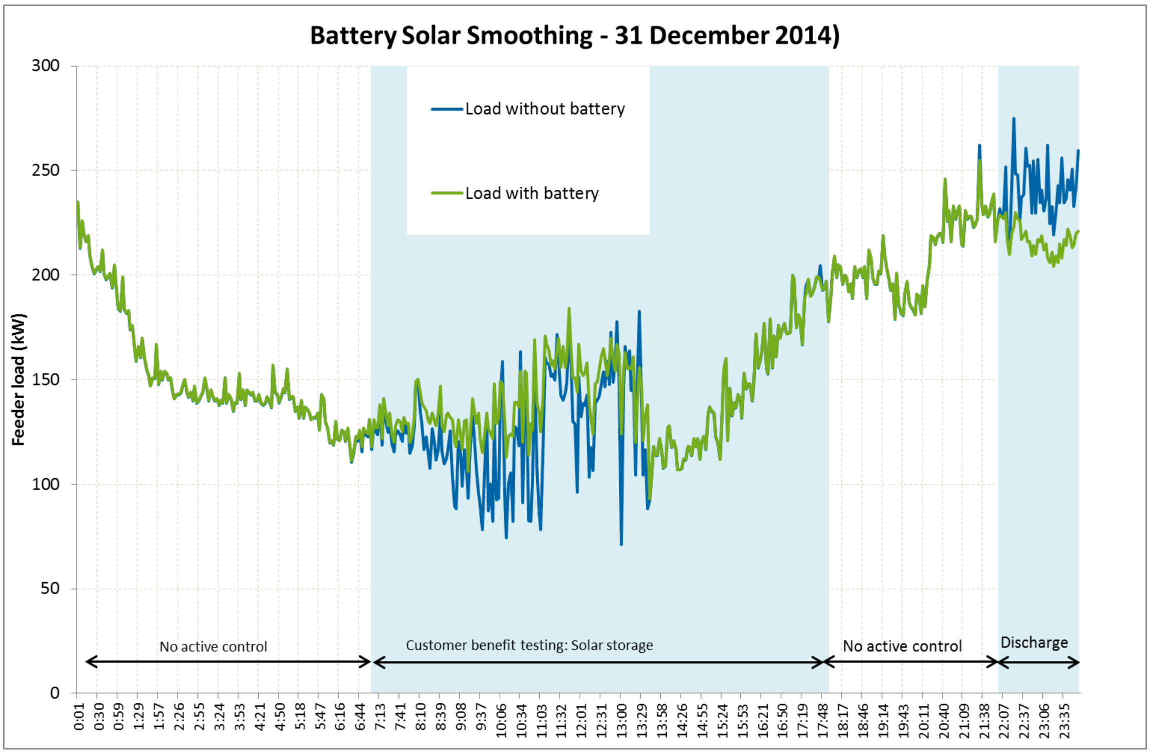


Figure – Solar smoothing trial using ramp rate function 31 Dec 2014



5.6.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 and previous years is shown below, as well as projected costs for the 2015/16 year. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	**2012/13 Actual**	**2013/14 Actual**	**2014/15 Actual**	**2015/16 Projected**	**Total Projected**
Project research and development	$7,115	$12,035	$0	$0	$19,150
Trial activities and reporting	$0	$246,991	$331,268	$70,000	$648,259
Total (excl GST)	**$7,115**	**$259,026**	**$331,268**	**$70,000**	**$667,409**

5.6.6 Project progress & identifiable benefits

During 2014/15, the grid battery testing was finalised with removal of the grid battery occurring in May 2015. Preliminary analysis of the trial results indicate that grid based energy storage can be a viable solution to managing network demand once the product matures and energy storage prices lower. In addition to a lower cost per megawatt-hour of storage capacity, improvements to system reliability will be required to compete with existing alternative demand management solutions. Final analysis of the trial data and completion of the final report will occur in 2015/16. The final report will be published on Ausgrid's website at www.ausgrid.com.au/dm.

As the trial was relatively modest in scale and temporary in nature, there are no permanent, material peak demand reductions achieved from this project. The trial activities did not form part of a deferral of a real network need.

5.7 Off peak 2 summer scheduling

5.7.1 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 currently 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. It is estimated 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.

5.7.2 Project aims and objectives

The main objective of the project 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:

(a) **Customer response** 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 Off Peak 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.

(b) **Load control operational issues** 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 network.

5.7.3 Implementation plan

The project was initially proposed to consist of two phases:

1. **Phase 1 (2013/14)**: Phase 1 of the project will be to test a summer schedule of Off Peak 2 load control in two to three areas of the Ausgrid network area over the summer 2013/14 period. The trial areas will be chosen by targeting specific summer peaking zone substation areas with high levels of Off Peak 2 customers.
2. **Phase 2 (2014/15 and beyond)**: Where the Phase 1 outcome demonstrates potential viability, and further research is warranted, a Phase 2 trial would be implemented across further parts of the Ausgrid network, focusing on areas where different operational or customer issues may be encountered.

5.7.4 Results

The phase 1 part of the project was successfully completed during the 2013/14 year which involved changing the summer control schedules for the Controlled Load 2 ripple channels over the period from 1 November to 31 March for three zone substations in the Hunter region of the network (Cardiff, Mount Hutton and Edgeworth zone substations). The revised ripple control schedules implemented involved turning off electricity supply to the Controlled Load 2 load from 2.30pm in the afternoon (AEDST), and leaving the timing of the restoration of electricity supply to the original restoration times, occurring generally between 8pm to 10pm (AEDST) depending on the ripple channel.

Results from the phase 1 trial showed that it is possible to achieve a summer peak reduction of between 140 to 200 Watts per Controlled Load 2 customer with ripple controlled load equipment between the hours of 2.30pm to 6.00pm. No negative feedback from any of the customers in the trial area (about 4,000 customers on the controlled load 2 tariff) was received. Operational issues related to the revised schedules were modest and it was decided to progress to phase 2 of the project by widening the trial area for summer 2014/15 to more customers.

During 2014/15, phase 2 of the project was implemented with the summer schedule for controlled load 2 customers being changed across the entire Newcastle controlled load area for all zone substations that had the necessary zone substation controllers. The Newcastle load area consists of 28 zone substations with a total of around 36,000 controlled load 2 customers being supplied from these zone substations. Results from an analysis of interval meter data from around 3,500 customers indicate that diversified demand reductions per customer was about 230 watts per Controlled Load 2 customer with working ripple controlled load equipment between the hours of 2.30pm to 6.00pm. No significant customer complaints or inquiries were received due to the change in operation times, with only two customers noticing a significant change which required investigation. One of these customers had an electrically boosted solar system whilst the other customer had a small hot water cylinder that was still eligible for the controlled load 2 tariff.

In addition during 2014/15, customer site surveys were conducted to better understand why some controlled load equipment at customer's premises was not behaving as expected. A total of 125 customers within the three initial 2013/14 trial zones were selected based on analysis of interval meter data according to three criteria (1) zero off peak consumption (2) Uncontrolled load profile (3) Intermittent or unexpected load profile.

The results showed that for the zero off peak consumption customers many had switched to a gas or a solar hot water system. A fair proportion of the customers with uncontrolled or continuous operation controlled load were due to equipment failure (equipment broken or faulty meter programming). For the customers with an intermittent or unexpected load profile, no conclusions have been made as yet.

5.7.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 and previous years is shown below, as well as projected costs for the 2015/16 year. All costs incurred for this project are categorised as opex. The project is scheduled for completion in 2015/16.

Actual and projected project costs:

Budget Item	2012/13 Actual	2013/14 Actual	2014/15 Actual	2015/16 Projected	Total Projected
Project research and development	$1,343	$0	$0	$0	$1,343
Phase 1 – Trial in 2 to 3 areas	$0	$100,531	$71,540	$35,000	$207,071
Total (excl GST)	**$1,343**	**$100,531**	**$71,540**	**$35,000**	**$208,414**

5.7.6 Project progress & identifiable benefits

During 2013/14 the revised controlled load schedules were implemented for three zone substations and average demand reductions of between 140 to 200 Watts per controlled load 2 customer with a ripple switch were observed during the hours of 2.30 to 6.00pm (AEDST) on a summer afternoon. For the three zone substation areas as part of the trial, it is estimated that the total demand reductions during the 2:30pm to 6pm (AEDST) time period was between 250 and 360 kW.

During 2014/15 the revised summer controlled load schedules were implemented for 28 zone substations across the lower Hunter region of the Ausgrid network (Newcastle load area) with an estimated demand reduction of about 4 MW across the entire area.

Further analysis and reporting activities for the trial are planned for 2015/16. The final report for the controlled load 2 summer scheduling trial will be published as a consolidated hot water report with the dynamic load control of small hot water systems trial (see Section 5.1) and subsidized off-peak hot water connection trial (see Section 5.2) on Ausgrid's website at www.ausgrid.com.au/dm.

No decision has been made as to whether the revised controlled load 2 schedule might become Ausgrid's business as usual approach to controlled load operation in summer for future years. The trial activities did not form part of a deferral of a real network need.

5.8 Large customer power factor correction

5.8.1 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.

Although power factor correction is commonly a cost effective investment by businesses, there remains a significant technical potential demand reduction available from customers. Looking only at customers supplied from low voltage and charged on a tariff with a kVA demand charge (about 13,000 customers), there is a technical potential of 160 MVA in demand reductions from these customers. For these customers, although their tariff penalizes them with higher bills when they have low power factor, the costs savings alone are insufficient to encourage investment.

There have been numerous studies detailing the range of barriers to investment in more energy efficient equipment. Reports such as the Productivity Commission's 'Private Cost Effectiveness of Improving Energy Efficiency' and the Prime Minister's Task Group on Energy Efficiency have detailed barriers such as a lack of information, skills gaps, behavioural factors and split incentives. This trial aims to explore ways to clear these barriers so as to improve the effectiveness and efficiency of future power factor correction programs for network deferral projects.

The proposed project will be directed at the 13,000 medium to large customers whose tariffs contain a kVA capacity charge.

5.8.2 Project aims and objectives

The objectives of this PFC program are to:

1. Commence a Power Factor Correction (PFC) campaign which is as cost effective as possible and which will assist larger customers to improve their power factor.

2. Incrementally refine PFC sales, marketing and procurement approaches with the aim of identifying the optimal program design.

5.8.3 Implementation plan

The proposed program will include the following elements:

1. Analyse customer billing and connection data to determine the power factor correction opportunity for each customer exposed to a kVA demand charge.
2. Contact customers in person and by phone, email, letter and/or other identified mechanism.
3. Trial alternative approaches which may improve the cost effectiveness of program delivery.
4. Explore opportunities to leverage service provider's relationship with customers to increase the implementation of PFC at customer sites.

5.8.4 Results

In 2013/14, preparatory work for the program was completed including:
An important first stage in the project was the development of the preferred sales, marketing and delivery approach. A number of tasks were carried out in this stage, including:

- comprehensive analysis of interval meter data for customers whose tariff contains a kVA capacity charge was carried out to identify the technical potential of demand reductions from customers
- review of the methodology and outcomes from previous PFC programs conducted by Ausgrid and others
- survey of customers who participated in past Ausgrid led PFC programs

- identification of target areas and customers

In 2014/15, the trial tested a “high facilitation” approach whereby customers were individually identified, contacted and managed on a case by case basis. This approach sought to improve both awareness of the investment opportunity and information provision to educate customers on the issue and how they could lower their bills using power factor correction.

Customers contacted were provided information about their site electricity use, how they are penalised for poor power factor via their tariff, how they could implement the installation of power factor correction equipment and encouraged to invest to save on their bills. This approach also sought to discover and catalogue site specific barriers to implementation, as well as ways these barriers might be addressed.

The contact methods employed were:

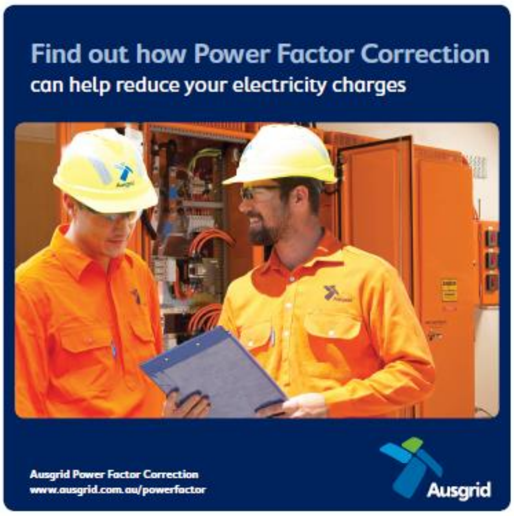
i. a phone contact method over a wider area
ii. face-to-face contact in a targeted area.

The results of the contrasting approaches are summarised in the table below:

Principal method	Target area	No. of customers contacted	Customer take up	Take up rate	kVAr installed	kVA reduction	Program cost	Program cost per kVA
Phone	Network wide	706	23	3.3%	3,175	1,040	$145,300	$140
In person	Single zone area	13	5	38.5%	1,000	250	$46,900	$188

Marketing collateral, such as letter templates, brochures and web content, were also developed in 2014/15 to support the trial.

Figure: PFC brochure cover



In addition to supporting the customer approaches used, the collateral was used to test the comparative effectiveness and customer responses to different contact messages. In this aspect of the trial, a letter was directed at a sample of 191 residential strata building customers who had poor power factor. A total of 96 customers were sent a letter with a strong compliance message, while the remaining 95 were sent a letter highlighting the potential savings of rectifying their power factor. Of the 191 customers approached, 26 were return to sender and 15 (8%) contacted Ausgrid’s Sydney based project manager for further information. Final results on this element of the trial will be more evident in 2015/16, but as of June 2015, there was no apparent difference in response to the contrasting messages contained within the strata customer mail out.

A key difference with some past programs is that Ausgrid proposes to facilitate rather than lead the implementation of customer power factor correction. For this to occur, customers require a pathway to engaging the necessary expertise to correct their power factor. To this end, development of a PFC service provider register was undertaken to inform customers of businesses in the marketplace to help them do this. This included determining the register structure and inclusion criteria, consulting with industry, addressing legal and probity concerns and compiling the register.

5.8.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 and previous years is shown below, as well as projected costs for the 2014/15 year. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	2012/13 Actual	2013/14 Actual	2014/15 Actual	2015/16 Projected	Total Projected
Project research and development	$18,859	$11,355	$0	$0	$30,214
Project implementation	$0	$64,151	$264,636	$120,000	$448,787
Total (excl GST)	**$18,859**	**$75,506**	**$264,636**	**$120,000**	**$479,001**

5.8.6 Project progress & identifiable benefits

2014/15 concluded with a clear indication of customer response to the "high facilitation" approach. It showed that phone contact method was comparatively cheaper per kVA of reduction achieved, but that face-to-face contact was a more effective means of ensuring reductions in a targeted area. This process also improved our knowledge about some of the site specific barriers to PFC implementation such as the lack of an isolation switch on the meter board. Where a site does not have a service protection device, it is generally the practice that one will be required prior to any new equipment being installed. Retrofitting a service protection device to an existing site is often complex and usually costly. In such cases, installation of PFC equipment indirectly incurs considerable extra costs resulting in a longer payback period and a weaker business case.

Support for customers approached as part of trial efforts in 2014/15 will continue in 2015/16 but no additional customers will be introduced to the trial. Analysis of customer meter data and requests for billing power factor reset will continue to assist in refining the results for take-up and cost per kVA from this part of the trial.

While costs of $140-190 per kVA for a permanent demand reduction are competitive for some demand management opportunities, there are many network investments where lower cost non-network solutions are required. To explore lower cost solutions, in 2015/16 a contrasting "low facilitation" approach will be developed and tested. This will aim to test whether it is possible to achieve kVA reductions at lower marginal cost but also in sufficient volumes to materially contribute to a network deferral project. This strategy will aim to provide succinct information and website materials with a clear pathway for customers to access expertise and services from the market, rectify their power factor and lower their electricity costs. It will also aim to test different levels of involvement from PFC service providers with the aim of creating a market led approach that allows Ausgrid to leverage the service providers' sales channels to assist with driving uptake while not compromising customer privacy. Results from the trial will be published on Ausgrid's website at www.ausgrid/dm.

Peak demand reductions achieved from this trial have been modest in scale at about 1-2 MVA. The trial activities have not been part of a deferral of a real network need.

5.9 Pool pump demand

5.9.1 Project nature and scope

Pool pumps are a large residential appliance with an estimated 180,000 pool owners in Ausgrid's network area. The summer peak demand from residential pool pumps is estimated to be between 50 to 150 MW across the Ausgrid network area. The intention of the project is to first assess the potential peak demand contribution and reduction potential from residential pool pumps in Ausgrid's network area by analysing customer interval meter data. If found to be significant a trial would follow targeted at offering an energy efficient pool pump rebate offer to a sample of customers in a selected area of the Ausgrid network.

5.9.2 Project aims and objectives

The first objective of the project is to determine the average summer peak demand contribution of pool pumps for a sample of Ausgrid customers with and without time-of-use price signals. Based on these results the project would continue to a trial phase with the following primary objectives:

(a) To test customer take up rates and marketing approaches for offering an energy efficient pool pump rebate in a selected trial area of the Ausgrid network.

(b) To measure and verify the diversified summer peak demand reduction achievable when an energy efficient pool pump (5-star or more) replaces a standard pool pump, taking into account real world conditions for customers in the Ausgrid network area.

5.9.3 Implementation plan

The project was still being developed as at June 2015 with implementation anticipated to proceed in 2015/16. The project will be conducted in two phases

Phase 1: Estimate the diversified load contribution of existing pool owners with and without time-of-use network tariffs using customer interval meter data and pool pump identification techniques. Based on the results of the pool pump diversified load analysis for Ausgrid customers a decision would be made whether to proceed to an implemented project or second phase of the project.

Phase 2: Energy efficient pool pump rebate offer to customers in a selected area of the Ausgrid network area for the purchase and installation of an energy efficient pool pump (5-star or greater). As part of the project, the demand reductions achievable across a sample of participants will be measured and verified.

5.9.4 Results

No results from the project can be reported as yet as it was still in development and implementation was pending the initial analysis of pool pump load profiles from phase 1. The majority of the project being planned would occur from the 2015/16 period.

5.9.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2014/15 is shown below, as well as projected costs for 2015/16. All costs incurred for this project are categorised as opex.

Budget Item	**2013/14 Actual**	**2014/15 Actual**	**2015/16 Projected**	**Total Projected**
Project research and development	$8,450	$2,780	$10,000	$21,230
Project implementation	$0	$0	$0	N/A
Total (excl GST)	**$8,450**	**$2,780**	**$10,000**	**N/A**

5.9.6 Project progress & identifiable benefits

Up until the end of June 2015 the main progress made has been in the research and development stages of the project including gathering of information and identification of Ausgrid customers with pools that have an interval metering system.

At this stage there are no peak demand reductions achieved from this project. The trial activities have not been part of a deferral of a real network need.