Demand Management Innovation Allowance Submission

2016-2017 Report to the AER

September 2017

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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 2016/17 financial year.

2 Governance

2.1 DMIA spending in 2016/17

There was one new project and seven (7) ongoing DMIA projects under implementation or development for which Ausgrid incurred costs in 2016/17. Ausgrid's submission identifies claimable costs incurred totaling $373,186. 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	2016/17 Actual Cost (excl GST)	Year initiated
New projects (initiated in 2016/17)		
Demand management for replacement needs	$5,552	2016/17
New projects sub-total	**$5,552**	
Existing projects (initiated prior to 2016/17)		
AS4755 air conditioner and pool pump load control	$21,518	2012/13
Customer power factor correction	$45,042	2013/14
CBD embedded generator connection (Phase 2)	$0	2013/14
CoolSaver Maitland	$92,321	2014/15
Winter air conditioner load control	$36,070	2015/16
DMIA stakeholder engagement	$37,700	2015/16
Solar and battery customer research	$134,983	2015/16
Existing projects sub-total	**$367,634**	
TOTAL	**$373,186**	

4 New projects

4.1 Demand management for replacement needs

4.1.1 Project nature and scope

This project aims to test the viability of using non-network options to defer or manage the load at risk associated with network investments that involve retiring/ replacing aged assets. Around 80% of Ausgrid's capital investment expenditure over the next 5-10 years is related to the retirement / replacement of aged assets and this will be an important project in building demand management capability for this type of application.

Using non-network solutions to manage risk from replacement driven investments differs markedly from typical overload risk and requires an innovative approach to build a portfolio of permanent and temporary load reductions across the daily profile. The project proposes to leverage the capability of market participants, including electricity retailers, solar installers, energy efficiency providers and other key market participants.

The project will consist of conducting a request from market providers for two independent project components:

Part A – An incentives program to encourage permanent demand reductions (eg. additional solar power systems and energy efficiency activity) in a defined geographical area(s).

Part B – Feasibility studies into the use of traditional demand response solutions for a network equipment failure scenario which can result in unserved customer demand (supply outage).

This project will use the lessons learned from the non-residential energy efficiency project, detailed in the previous Ausgrid DMIA report for 2015/16, to inform the energy efficiency activities under Part A of the project. Results from the solar and battery research project (detailed in section 5.7) will also be used to inform activities for the project.

4.1.2 Project aims and objectives

The two primary objectives of the project would be to:

A. Test the effectiveness of an incentives program in a targeted geographic area(s) that lead to new installations of technologies that offers permanent demand reductions (eg. solar power and energy efficiency retrofits). This trial aims to quantify the volume of additional customer activity (i.e. above business as usual) from targeted incentives, and whether the scale of new activity is of sufficient scale to form part of a viable demand management solution to a network need.

B. Study the viability of typical demand response options to manage load at risk in the event of a network outage. This objective would be more focused on exploring the potential of using customer generation, battery storage, load shedding or other flexible demand response options for longer durations typical of a network outage scenario.

Secondary objectives include

- Identification of strategies to build effective solution portfolios to manage risk;
- Policy and contract mechanisms to support agreed non-network solutions with customers; and
- Identification of network connection process changes to improve customer outcomes.

4.1.3 Implementation plan

The project consists of a research and development stage and the following proposed implementation phases:

Phase 1: Market engagement and partner selection – invite submissions/proposals from market to clarify specific trial operational issues and select preferred project partners.

Phase 2: Establish service contracts with project partners, initiate and operate trial activities.

Phase 3: Assessment of trial objectives with project partners, reporting and sharing of lessons learned.

Although this project is still in development, it is envisaged that over 80% of the project costs will be in payments to market providers for delivering new permanent demand reductions in the incentives program in Part A, or providing contracted services for assessment or studies in Part B.

4.1.4 Results

This project is at the development stage, so there are no results at present.

4.1.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2016/17 is shown below.

Actual and projected project costs:

Budget Item	2016/17 Actual	2017/18 Projected	2018/19 Projected	Total Projected
Project research and development	$5,552	$14,448		$20,000
Project implementation		$850,000	$1,330,000	$2,180,000
Total (excl GST)	**$5,552**	**$864,448**	**$1,330,000**	**$2,200,000**

4.1.6 Project progress & identifiable benefits

Up until the end of June 2017 the main progress made has been in the research and development stages of the project.

Although still at a development stage, preliminary estimates indicate that the range of permanent peak demand reductions possible from Part A of the project is expected to be in the range of 2-6MVA.

Part B of this project is research only; therefore it is not expected to achieve any material peak demand reductions.

The project activities do not form part of a deferral of a real network need but are designed to build capability and capacity and explore efficient demand management mechanisms with market providers.

5 Existing projects

5.1 AS4755 air conditioner and pool pump load control

5.1.1 Project nature and scope

Air conditioners and pool pumps are the largest residential appliances with no load control option currently available to customers and offer the 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 70-100 MW respectively. The focus of this trial is 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 explores 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.

5.1.2 Project aims and objectives

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

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

5.1.3 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.

5.1.4 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 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 were incorporated into the Phase 2 customer trial.

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 from December 2013 to early February 2014 with the trial originally planned to occur over two summer periods (Summer 2013/14 and Summer 2014/15).

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

Due to a shortage of sufficiently hot days, whereby the temperature was forecast to exceed 32ºC, only three demand reduction dispatches were carried out during the 2014/15 summer period. The details can be found in the previous Ausgrid DMIA report for 2014/15. Due to the lack of high demand days to effectively test customer response, the trial was extended to include the 2015/16 summer period and details can be found in the previous Ausgrid DMIA report for 2015/16.

The offer was further extended for the 2016/17 summer period in order to build a more accurate and reliable dataset with regard to:

- Override rates and customer response during extended high temperature periods
- Diversified demand reductions
- Program participation retention/dropout rate (year to year)
- Customer response to more onerous dispatch conditions (longer length or greater reduction)

See table below for details of peak event dispatches during the 2016/17 summer period:

2016/17 Dispatch events in Central Coast (SMS)							
Date	**Day of week**	**Start Time**	**Finish Time**	**Mode**	**Max. Daily Temp (°C)**	**Participants**	**Number of Overrides**
13/12/2016	Tuesday	3:00pm	8:00pm	DRM2	38.1 °C	46	1
14/12/2016	Wednesday	2:00pm	7:00pm	DRM2	38.3 °C	46	1
11/01/2017	Wednesday	3:00pm	8:00pm	DRM2	41.7 °C	46	4
17/01/2017	Tuesday	3:00pm	8:00pm	DRM2	37.3 °C	46	4
24/01/2017	Tuesday	2:00pm	7:00pm	DRM2	39.1 °C	44	2
30/01/2017	Monday	2:00pm	7:00pm	DRM2	38.8 °C	44	2
10/02/2017*	Friday	3:00pm	8:00pm	DRM2	41.2 °C	44	3
2016/17 Dispatch events in Lake Macquarie (Ripple Receivers)							
13/12/2016	Tuesday	3:00pm	8:00pm	50%	35.5 °C	34	n/a
14/12/2016	Wednesday	3:00pm	7:00pm	50%	36.2 °C	34	n/a
11/01/2017	Wednesday	3:00pm	7:00pm	50%	37.5 °C	34	n/a
17/01/2017	Tuesday	3:00pm	8:00pm	50%	36.1 °C	34	n/a
24/01/2017	Tuesday	2:00pm	6:00pm	50%	38.7 °C	34	n/a
30/01/2017	Monday	2:00pm	6:00pm	50%	31.9 °C	34	n/a
10/02/2017*	Friday	4:00pm	8:00pm	50%	32.7 °C	34	n/a

Note: * Date of Ausgrid Summer 2016/17 maximum demand

Customers were surveyed after the conclusion of the 2014/15 summer period with responses being generally positive about their experiences throughout the trial. However, it was not clear at that point whether or not the customer experience would remain as positive during a summer period with extended periods of very hot weather and more peak event dispatches. Customers were surveyed again after the 2015/16 and 2016/17 summer periods. See table below for a snapshot of the responses, comparing the three summer periods:

	Summer 14/15		**Summer 15/16**		**Summer 16/17**	
	Central Coast	**Lake Macquarie**	**Central Coast**	**Lake Macquarie**	**Central Coast**	**Lake Macquarie**
Response rate	53%	52%	75%	76%	49%	67%
Rated as a very positive experience (8+ out of 10)	98%	99%	79%	85%	85%	91%
Experienced slight or no difference to cooling	95%	90%	58%	89%	65%	91%
Participated due to financial incentive	50%	33%	58%	50%	45%	59%

One particularly interesting finding from the survey is that the Lake Macquarie residents' response to "Experienced slight or no difference to cooling" was unchanged from previous years. This is despite the fact that the DRM2 (ie. 50% load reduction) mode was used, when DRM3 (25% load reduction) was used in previous years.

Including customers moving home, the resultant retention rates over the whole length of the program were:

- Central Coast trial area (since 2014/15) 67%
- Lake Macquarie trial area (since 2014/15) 85%

5.1.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2016/17 and previous years is shown below. All costs incurred for this project are categorised as opex.

This project concluded in 2016/17 and no further costs will be incurred.

Actual project costs:

Budget Item	**2012/13 Actual**	**2013/14 Actual**	**2014/15 Actual**	**2015/16 Actual**	**2016/17 Actual**	**Total**
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 DRED development	$16,000	$585,715	$83,708	$72,915	$21,518	$779,856
Total (excl GST)	**$175,008**	**$585,715**	**$83,708**	**$72,915**	**$21,518**	**$938,864**

5.1.6 Project progress & identifiable benefits

In addition to the progress and benefits identified in the previous Ausgrid DMIA reports for 2013/14, 2014/15 and 2015/16, this trial has:

1. tested the consumer response to peak demand response dispatch events through the 2016/17 summer
2. gathered further load reduction data from households to indicate the effectiveness of the dispatches
3. gathered further customer feedback on their experiences of participating in the trial
4. gathered data about participant drop-out rates which will assist with future prediction of the longevity of demand reductions gained through such programs

Measurement and verification of the results from the summer 2016/17 period for both trial areas is in progress. Interim results from the trial have been published on Ausgrid's website at www.ausgrid/dm.

Project activities were completed during 2016/17 and a final report for all three air conditioner demand response projects (section 5.1, 5.4 and 5.5) will be completed during 2017/18. When complete, the final report will be published on Ausgrid's website at www.ausgrid/dm.

No material peak demand reductions were achieved during the course of this project and there are no ongoing demand reductions following the completion of the trial. The trial activities have not been part of a deferral of a real network need.

5.2 Customer power factor correction

5.2.1 Project nature and scope

Power factor correction (PFC) is recognised as a highly 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 for all customer 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.

5.2.2 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.

5.2.3 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.

In 2014/15, the trial tested a facilitated approach and details can be found in the previous Ausgrid DMIA reports for 2014/15 and 2015/16.

5.2.4 Results

In 2014/15, the trial tested a facilitated 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. The results from this approach can be found in the previous Ausgrid DMIA reports for 2014/15 and 2015/16.

One outcome of the facilitated approach was that it highlighted the significant barriers to customer take up. Despite the obvious effectiveness of the technology in many scenarios, the number of customers who follow the process through to installation are relatively few.

In 2015/16, the trial transitioned to an alternative approach which used a lower cost facilitation model. The intention of this approach was to create customer awareness of the issue and to give the customer the necessary knowledge and tools to rectify their site power factor. In addition to the above market "pull" effects, the project attempted to also create market "push" through providing the PFC Service Providers with information about where we were contacting customers and what the installation potential in these areas might be.

This approach targeted customers across distinct areas within the Ausgrid network by completing the following tasks:

1. Divided trial areas into four groups – this created separate customer groups that were similar in makeup on which to test varying approaches
2. Identified all customers with installation potential and an estimated payback of under 10 years – previous power factor correction initiatives had assumed that customers would only pursue a solution when their power factor was below 0.9 and their payback period was 3 years or less, this may have led to some opportunities being neglected
3. Developed customer letters to mail out – these serve as the initial point of contact with the customer and were crafted to call the customer to action
4. Developed the site specific power factor report, plus the tool to generate customised reports for individual sites – this report provides the customer with the useful information about their supply and potential savings and was designed to help the customer approach the market directly to procure power factor correction services.
5. Launched the PFC Service Provider register – this register was a resource for customers and provided a list of service providers offering power factor correction services
6. Developed and launched customer registration web page – this allowed customers to register their details and receive a site specific power factor report from Ausgrid
7. Updated customer support web pages to address common customer concerns and questions
8. Engaged mail house to send out customer packs – this coordinated all the customer contact details and information packs sent to approximately 1,100 customers
9. Published "zone potential" maps for use by the PFC Service Providers, with the intention that they use this information to target their sales and marketing to these areas.

Approximately 1,100 customers across the trial areas were contacted via letter explaining the potential savings of power factor correction. The following variations were introduced to test their effectiveness:

- Customer provided with a complimentary site specific power factor report (Pro: critical information directly available for customer to see potential savings and act upon, Con: unable to track customer behaviour or follow up)
- Customer invited to register details and be sent a complimentary site specific power factor report (Pro: customer provides details for "trackability" and information gathering, Con: extra step for customer, may inhibit action)
- Notified PFC service providers (on the register) of calculated installation potential and number of customers contacted in zone areas (Purpose: to leverage the sales and marketing capability of service providers in the market by highlighting the installation – and hence, sales - potential in such a way that does not compromise customer privacy)

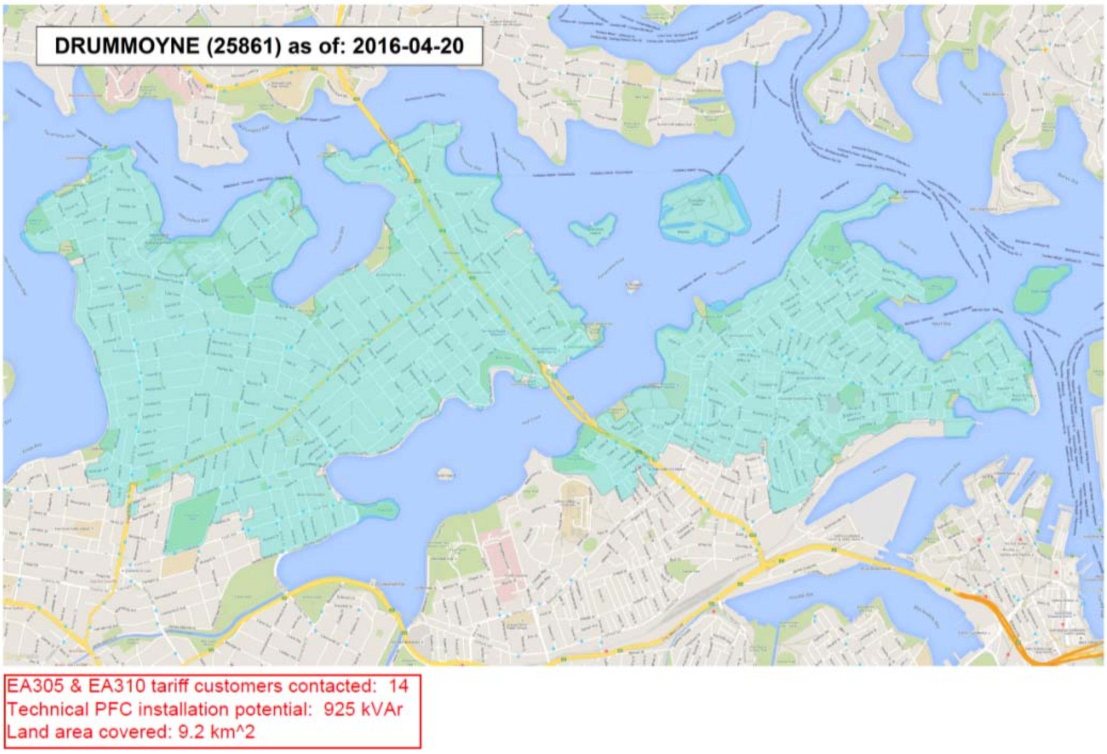
The zone substation areas were analysed and divided into four groups that contained roughly the same cross section of customer sizes and tariff classes. The marketing approach variations were applied as per the table below.

Group #	Letter	Invite to register online	Power factor report provided	PFC service providers notified
1	✓	✓		
2	✓	✓		✓
3	✓		✓	
4	✓		✓	✓

The intention was to determine the quantitative difference in uptake rates between:

A) Groups 1+3 and 2+4, to gauge the effect of introduction of additional sales channels through the PFC service providers.
B) Groups 1+2 and 3+4, to gauge the effect of providing the site specific power factor report as opposed to inviting customers to register. That is, whether the additional "trackability" justifies the extra effort required by the customer at the start of the process.

The "zone potential" maps published showed the geographical area targeted (corresponding to the area covered by an Ausgrid zone substation), how many customers involved, total technical installation in kVAR (i.e. how many PFC units could be sold) and the geographic area covered. An example using the Drummoyne zone substation area is shown below:



The intention was to give service providers as much information as possible to help them target their sales and marketing approaches. It was not possible to provide more detailed information without the risk of identifying customers and breaching their privacy.

The letters were mailed out in August 2016 and results shown in the tables below.

	No. Customers Contacted	Equivalent Reduction Potential (kVA)	Installable Potential (kVAr)	No. Reports Requested	% Requested Report	Equivalent Reduction Potential (kVA)	Installable Potential (kVAr)
Group 1	258	8,709	23,475	20	8%	523	1,425
Group 2	274	9,324	25,225	21	8%	699	1,875
Group 3	243	7,660	20,525	N/A	N/A	0	0
Group 4	257	8,738	23,100	N/A	N/A	0	0
TOTAL	**1,032**	**34,431**	**92,325**	**41**	**8%**	**1,222**	**3,300**

The letter mail-out led to direct enquires and then installations (hence, demand reductions)

	No. Customer Enquiries Received	% Enquiries Received	Equivalent Reduction Potential (kVA)	Installable Potential (kVAr)	No. PFC Installations	% PFC Installations	Assumed Reduction (kVA)	Assumed Installed (kVAr)
Group 1	7	3%	296	775	0	0%	0	0
Group 2	2	1%	144	425	5	2%	160	475
Group 3	2	1%	45	125	1	0.4%	22	75
Group 4	3	1%	118	300	3	1.2%	74	200
TOTAL	**15**	**1.5%**	**604**	**1,625**	**9**	**0.9%**	**256**	**750**

Looking at the customer groups who did not automatically receive a PFC report (Groups 1 and 2), the trial results show that 8% of customer contacts for both groups requested the report. This would suggest that the inclusion of PFC Service Providers in the process did not influence how likely a customer was to take the next step and request a report.

In contrast, the data does show that groups 2 and 4 (PFC providers notified) have discernably higher installation rates. This suggests that there is a clear benefit to notifying PFC service providers of target areas and potentials. However, the general level of take up was lower than anticipated indicating that information campaigns alone are ineffective at encouraging a material level of PFC take-up by customers.

Common feedback from PFC service providers was that it is very difficult to drive additional sales without offering incentives to improve the customer's financial return and shorten their payback period. There were also repeated requests to supply more detailed customer data to aid in the targeting of sales and marketing resources. Provision of such private customer data is not possible without breaching Ausgrid's legal obligation to customer privacy protection.

5.2.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2016/17 and previous years is shown below. All costs incurred for this project are categorised as opex.

This project concluded in 2016/17 and no further costs will be incurred.

Actual project costs:

Budget Item	**2012/13 Actual**	**2013/14 Actual**	**2014/15 Actual**	**2015/16 Actual**	**2016/17 Actual**	**Total**
Project research and development	$18,859	$11,355	$0	$0	$0	$30,214
Project implementation	$0	$64,151	$264,636	$106,140	$45,042	$479,969
Total (excl GST)	**$18,859**	**$75,506**	**$264,636**	**$106,140**	**$45,042**	**$510,183**

5.2.6 Project progress & identifiable benefits

2014/15 concluded with a clear indication of customer response to the "high facilitation" approach, which is described in detail in the previous Ausgrid DMIA report for 2014/15.

2015/16 saw a transition to a contrasting "low facilitation" approach which continued through 2016/17. It aimed to test whether it was possible to achieve greater kVA reductions at lower marginal cost through widespread targeting of customers with a concise contact and follow up strategy. This strategy aimed 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 also tested different levels of involvement from PFC service providers, creating a market led approach to leverage the service providers' sales channels to assist with driving uptake while not compromising customer privacy. This project has given Ausgrid a greater understanding of the cost and effectiveness of different customer acquisition strategies and how they may best be deployed for future network needs.

When complete, the final report 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.

5.3 CBD embedded generator connection

5.3.1 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.

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.

5.3.2 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.

5.3.3 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.

5.3.4 Results

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

a) Logic functions in a PLC within the distribution substation

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

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

The conceptual design showed that an embedded generator can be connected in such a way that installation costs are minimized, yet with no adverse impacts on the network or customer reliability. Although there are significant issues which would need to be resolved before the proposed solution could be implemented, the conceptual design and the costing provide 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. The capex funded component of the program is now substantially complete with final programming and commissioning of network and customer controls scheduled for 2017/18. As this trial involved the upgrade of existing network equipment, this portion of the project expenditure was not drawn from DMIA funding, but from Ausgrid’s capex budget. Following final commissioning, DMIA trial activities will resume.

5.3.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2016/17 and previous years is shown below, as well as projected costs for 2017/18.

As this project involves upgrading Ausgrid network equipment, it has both capex and opex expenditure components. The DMIA opex costs for this project are detailed below. Only opex expenditure has been allocated to the DMIA. As mentioned in the previous section, there are no DMIA costs allocated in 2016/17 as this phase of the project involved only capex related installation work.

Actual and projected DMIA opex project costs:

Budget Item	**2011/12 Actual**	**2012/13 Actual**	**2013/14 Actual**	**2014/15 Actual**	**2015/16 Actual**	**2016/17 Actual**	**2017/18 Projected**	**Total Projected**
Phase 1 – Design options and conceptual design	$39,251	$714	$548	$0	$0	$0	$0	$40,513
Phase 2 – CBD connection trial	$0	$5,726	$99,612	$37,130	$1,767	$0	$40,000	$184,235
Total (excl GST)	**$39,251**	**$6,440**	**$100,160**	**$37,130**	**$1,767**	**$0**	**$40,000**	**$224,748**

5.3.6 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.

At time of writing, the construction phase of the project was completed. Further work is required to program, test and commission the logic controller and communications link to the customer generator. The trial operation period will commence once these tasks are completed.

An interim report has been published on Ausgrid's website at www.ausgrid/dm. A final report will be published upon project completion.

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.

5.4 CoolSaver Maitland Program

5.4.1 Project nature and scope

Phases 1 and 2 of the CoolSaver trial (see section 5.1) had confirmed the technical viability of both the ripple and SMS signal receiver solutions, and there had been a positive customer response to the product offering. The remaining barrier to achieving a commercially ready demand management product is the lack of a viable low cost customer acquisition model.

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

This project sought to identify a trial area to investigate an alternative approach that aims to leverage the initial purchase and installation of new compliant air conditioners and so lower the cost of customer acquisition and participation, whilst simplifying the process for customers.

5.4.2 Project aims and objectives

The project objectives are:

Primary

- 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.

Secondary

- To make a more informed decision about whether to proceed with either a ripple or SMS signal receiver solution for future demand management programs, including consideration of customer preference, cost and functionality.
- Explore whether customer take-up varies when dispatch override is offered as a product feature.

5.4.3 Implementation plan

Phase 3 of the CoolSaver project focused on developing a low cost customer acquisition model. Secondary objectives were to refine the technology choice and customer offer. The primary actions were:

1. Identify appropriate supplier of DRED units and procure
2. Identify appropriate industry stakeholders including 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 DREDs
7. Coordinate efforts to recruit trial participants and monitor take up rates
8. Operate dispatches over summer period
9. Develop and operate program options such as advance notice of dispatch and override capability
10. Collect and analyse data - DRED 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

5.4.4 Results

2015/16 saw the launch of the CoolSaver Maitland program and the first summer season. Details regarding the customer acquisition strategies and issues, as well as dispatches for that year can be found in the previous Ausgrid DMIA report for 2015/16.

No further customer acquisition was conducted in 2016/17, however the offer was extended for the 2016/17 summer period in order to build a more accurate and reliable dataset with regard to:

- Override rates and customer response during extended high temperature periods
- Diversified demand reductions

- Program participation retention/dropout rate (year to year)

5.4.4.1 Peak event dispatches

Dispatches were conducted during the 2015/16 summer period and details can be found in the previous Ausgrid DMIA report for 2015/16.

See table below for details of peak event dispatches during the 2016/17 summer period:

2016/17 Dispatch events in Maitland							
Date	**Day of week**	**Start Time**	**Finish Time**	**Mode**	**Max. Daily Temp (°C)**	**Participants**	**No of Overrides**
13/12/2016	Tuesday	3:00pm	8:00pm	DRM2	37.0 °C	28	3
14/12/2016	Wednesday	2:00pm	7:00pm	DRM2	37.9 °C	28	2
11/01/2017	Wednesday	3:00pm	8:00pm	DRM2	39.6 °C	28	2
17/01/2017	Tuesday	3:00pm	8:00pm	DRM2	40.9 °C	28	2
24/01/2017	Tuesday	2:00pm	7:00pm	DRM2	40.6 °C	28	3
30/01/2017	Monday	2:00pm	7:00pm	DRM2	40.0 °C	28	4
10/02/2017*	Friday	3:00pm	8:00pm	DRM2	43.7 °C	20	2

Note: * Date of Ausgrid Summer 2016/17 maximum demand

Customers were surveyed after the conclusion of the 2015/16 and 2016/17 summer periods with responses being generally positive about their experiences throughout the trial.

Survey item	**Summer 15/16 - Maitland**	**Summer 16/17 - Maitland**
Response rate to survey	90%	58%
Rated as a very positive experience (8+ out of 10)	84%	100%
Experienced slight or no difference to cooling	53%	50%
Found override feature useful	58%	50%
Participated due to financial incentive	63%	63%

Some key insights from the survey were:

- a high proportion of survey respondents were satisfied with their overall experience in the trial with 84% rating their experience as being 8/10 or higher. This rose to 100% the following year, although fewer people responded to the survey;
- in both years, just over half (53%) of the respondents did not notice or only noticed a slight difference in their cooling experience during the power-saving activation periods; and
- the largest motivator for respondents to take part in the trial was consistently the monetary incentive (63%) – followed by reduction in overall network charges (26%) and interest in new technology (11%).

5.4.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2016/17 and previous years is shown below, as well as projected costs for 2017/18. All costs incurred for this project are categorised as opex.

This project is projected to be completed in 2017/18.

Actual and projected project costs:

Budget Item	2014/15 Actual	2015/16 Actual	2016/17 Actual	2017/18 Projected	Total Projected
Project research and development	$6,635	$0	$0	$0	$6,635
Project implementation	$436,897	$205,673	$92,321	$50,000	$784,891
Total (excl GST)	**$443,532**	**$205,673**	**$92,321**	**$50,000**	**$791,526**

5.4.6 Project progress & identifiable benefits

Project progress up the end of June 2016 can be found in the previous Ausgrid DMIA reports for 2014/15 and 2015/16 and in the latest interim report published on Ausgrid's website at www.ausgrid/dm.

Results from and experience of the program so far suggest that customers have a positive view of the program once enrolled and participating, however there is significant difficulty in securing customer participation through third party sales channels. There are additional difficulties and risks with regard to safety and quality that must be managed throughout the installation and commissioning process. Experience so far suggests that this can be achieved within acceptable additional costs, provided customer acquisition is large enough to provide the necessary economies of scale.

Measurement and verification of the results from the summer 2016/17 period is in progress. The final report for all three air conditioner demand response projects (section 5.1, 5.4 and 5.5) will be completed in 2017/18. When complete, the final report will be published on Ausgrid's website at www.ausgrid/dm.

No material peak demand reductions were achieved during the course of this project and there are no ongoing demand reductions following the completion of the trial. The trial activities have not been part of a deferral of a real network need.

5.5 Winter air conditioner load control

5.5.1 Project nature and scope

This project involved making a winter air conditioner load control offer to existing demand management trial participants who took part in the Central Coast CoolSaver trial (see Section 5.1). This leveraged previous DMIA project activities and load control equipment already in place for these customers.

There were 54 participants in the Central Coast trial area and 80% of 40 survey respondents from the 2015/16 survey indicated that they used reverse cycle air conditioners as their primary heating source. In addition, 74% of survey respondents indicated they would participate in a winter season air conditioner load control program, with 23% being unsure if they would participate.

An offer was made to participants in June 2016 and the trial period ran during Winter 2016.

5.5.2 Project aims and objectives

The main rationale of the project was to test the viability of a residential winter peak demand reduction program focused at reducing the electrical load from air conditioners used for heating. Approximately 20% of Ausgrid's zone substations are winter peaking and a further 30% have similar summer and winter utilisation factors.

There are currently ten zone substations with over 80% utilisation of their winter firm capacity which also have a >50% residential annual consumption from customers supplied by that zone. This indicates that a residential demand management solution in winter would have potential applicability in certain parts of the Ausgrid network.

The main objectives were to:

(1) Understand the customer response and acceptance to an offer for reducing the electrical input power of their reverse cycle air conditioner to reduce winter peak demand

(2) Measure and verify the peak demand reductions achieved per customer during winter

5.5.3 Implementation plan

Ausgrid would email customers in the Central Coast trial and offer a Winter 2016 program offer.

The offer structure for the winter period would be the same as for the preceding summer, which is $50 or $100 per participant (depending on whether the participant has 4-10kW or 10+kW unit) for a maximum of 8 peak event dispatches, with $10/$20 being deducted each time the participant chooses to override a dispatch event.

The winter period for the project ran from June to August 2016.

5.5.4 Results

In June 2016, an offer was made to the participants in the Central Coast trial area to participate in a winter *CoolSaver* trial. A total of 27 (48%) accepted the offer and participated in the trial. The winter period ran from late June until the end of August 2016.

During the 2016 winter period, there were 5 dispatch events using Demand Response Modes 2 only. Winter peak events were initiated when the minimum temperature at a local weather station was forecast to below about 5-6°C on working weekdays. Table 9 below has a summary of all winter peak dispatch events. The Demand Response Mode 2 activation decreased the average load of the customers by around 0.5kW.

Date	Day of week	Start Time	Finish Time	Mode	Min. Daily Temp (°C)	Participants	No of Overrides
2016 Dispatch events							
27/06/2016	Monday	5:00pm	8:00pm	DRM2	6.8	27	1
14/07/2016	Thursday	5:00pm	8:00pm	DRM2	2.5	20	0
29/07/2016	Friday	5:00pm	8:00pm	DRM2	2.8	25	0
12/08/2016	Friday	5:00pm	8:00pm	DRM2	4.9	25	0
22/08/2016	Monday	5:00pm	8:00pm	DRM2	5.3	25	1

To test customer satisfaction levels for the winter trial, a slightly modified survey to reflect the different season was prepared and sent to the winter trial participants in October 2016. A total of 19 (70%) customers responded to the winter survey, with responses also indicating a very high level of satisfaction with the program.

Winter Peak Demand Trial Survey Insights:

- Nearly three quarters of the participants (14) did not notice a difference or noticed only a slight difference to the heating output to their air conditioning heating during the activation periods;
- Half of the participants surveyed said that they wore more layers of clothing during the activation periods, rather than turning on other forms of heating (eg. gas heaters or other electric heaters)
- Almost half of the participants (9) surveyed said the main reason for participating in the trial was for the money incentive, followed by the reduction in network charges (7).
- Just over half of the participants (11) felt the override option was useful when they received the SMS notification, and a strong majority of them (17) felt that even if there was no override option available to them, they would still participate in the trial;
- All the participants surveyed rated their experience with participating in the winter trial above 7 out of 10, with half rating it a 10 out of 10.
- 53% of respondents did not notice a difference in their air conditioning heating experience on the very cold days we activated their power saving mode.

The Coolsaver interim report published on Ausgrid's website at www.ausgrid/dm contains the results from the winter trial.

5.5.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2016/17 and previous years is shown below. All costs incurred for this project are categorised as opex.

This project concluded in 2016/17 and no further costs will be incurred.

Actual and projected project costs:

Budget Item	2015/16 Actual	2016/17 Actual	Total
Project development and implementation	$11,753	$36,070	$47,823
Total (excl GST)	**$11,753**	**$36,070**	**$47,823**

5.5.6 Project progress & identifiable benefits

Project activities were completed during 2016/17 and a final report for all three air conditioner demand response projects (section 5.1, 5.4 and 5.5) will be completed during 2017/18. When complete, the final report will be published on Ausgrid's website at www.ausgrid/dm.

This project showed a positive customer response to air conditioner load control in winter, making it possible to reduce winter peak demand using this method. This knowledge was gained at relatively little cost as it leveraged the existing technology and customer relationships from another project.

No material peak demand reductions were achieved during the course of this project and there are no ongoing demand reductions following the completion of the trial. The trial activities have not been part of a deferral of a real network need.

5.6 DMIA stakeholder engagement

5.6.1 Project nature and scope

This project will formally consult with Demand Management (DM) stakeholders to identify new and innovative DM solutions for potential Ausgrid Demand Management Innovation Allowance (DMIA) projects.

While informal discussions with electricity networks, key DM providers and stakeholders has provided important input into Ausgrid's DMIA program to date, there had been no formal engagement with DM stakeholders on the DMIA. To canvas the views of a broad range of stakeholders, it was proposed to engage through a formal consultation process.

5.6.2 Project aims and objectives

The primary objective of this project is to discover new and innovative DM solutions which might form potential cost effective demand management solutions for deferral of network investment.

A secondary objective of the stakeholder consultation is to directly engage with DM stakeholders more broadly on Ausgrid's future demand management plans, DM decision making process and DM innovation research outcomes.

5.6.3 Implementation plan

To ensure that stakeholder views are effectively canvassed, a range of consultation techniques will be investigated. The project is planned to be conducted in two phases.

Phase 1 – Preliminary stakeholder engagement

The first phase of the project will involve preliminary engagement activities with our DM stakeholders on key issues around the Demand Management Innovation Allowance (DMIA) such as views on the past, present and future projects conducted under this scheme.

The main objective of phase 1 is to canvas views from stakeholders on a range of DMIA related topics and their preferred format of future engagement activities.

Phase 2 – Detailed stakeholder engagement

The results from Phase 1 will largely influence the scope of Phase 2 engagement activities and which may include the publication of a consultation paper, promotion via social and traditional media, web-based and in-person seminars and workshops or other techniques or tools. The focus of Phase 2 will be getting more specific detail around potential DMIA project ideas and solutions from our stakeholders.

The use of a consultation paper to solicit community views is a common technique employed by the energy industry (AEMC, AER etc) and would be well understood by key stakeholders. Similarly, in-person or virtual workshops or seminars are widely used by the industry and might encourage participation, allow a more informal channel for stakeholders to be informed of the context in which their views would be considered, and allow for an early interchange of information.

5.6.4 Results

The preliminary stakeholder engagement (Phase 1) was implemented during 2016/17 with the launch of an online discussion forum in November 2016 which continued until February 2017. A total of 249 stakeholders on Ausgrid's Demand Management Engagement Register (DMER) were invited to share their views on demand management and participate in the online forum. A total of 43 stakeholders actively registered to become part of the online forum. These participants included demand management providers, electricity retailers, equipment suppliers, consultants as well as consumer advocacy groups, research and government organisations.

Topics included in the discussion forum included:

- What is demand management, innovation and the Demand Management Innovation Allowance (DMIA)
- Evaluation of the DMIA to date
- Ideas about future DMIA projects
- Opinions on nine possible DMIA projects (presented to the stakeholders)

The discussion indicated that some stakeholders were not aware of the DMIA and felt that education and information sharing needed to be improved. Therefore, many stakeholders were not in a position to comment or answer in detail whether the DMIA had been used well. One participant expressed the view that it was often hard to see where results and learnings from DMIA projects were used by networks in new demand management projects or programs.

When it came to unsolicited ideas about future DMIA projects, there was support expressed for trialing rewards based peak pricing tariffs (e.g. peak-time rebates, critical peak pricing but with "carrots" not "sticks"), automated and emerging technology solutions and energy efficiency. When we attempted to elicit further discussion around nine project areas to draw out stakeholder opinion on more specific proposals, we received a limited response.

5.6.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2016/17 is shown below and an estimate of projected costs for 2017/18. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	**2015/16 Actual**	**2016/17 Actual**	**2017/18 Projected**	**Total Projected**
Project development and implementation	$10,581	$37,700	$20,000	$68,281
Total (excl GST)	**$10,581**	**$37,700**	**$20,000**	**$68,281**

5.6.6 Project progress & identifiable benefits

Up until the end of June 2017, phase 1 of the project was substantially complete with a phase 1 project report in progress. When complete, the phase 1 report will be distributed to participants and published on Ausgrid's website at www.ausgrid/dm.

A decision will also be made in 2017/18 whether to proceed to phase 2 activities and the exact scope of these activities should we proceed.

This project is a research engagement project and therefore is not expected to achieve any material peak demand reductions. The project activities do not form part of a deferral of a real network need but are designed to build capability and capacity and explore efficient demand management mechanisms with our stakeholders.

5.7 Solar & battery customer research

5.7.1 Project nature and scope

This project involves approaching a large sample (10,000 to 20,000) of our customers to participate in a survey about solar and battery systems to understand the purchasing motivations and potential future uptake of solar and battery systems. Both residential and non-residential customers will be invited to participate in the survey as well as existing solar and non-solar customers.

5.7.2 Project aims and objectives

The primary objective of this research is to better understand customer motivations for purchasing and installing solar and battery systems that might be used to manage peak demand, provide network support and reduce network investment.

5.7.3 Implementation plan

Phase 1 – Customer survey

The first phase of the project will be to implement an online customer survey of 10,000 to 20,000 customers. Detailed design of the survey questions will be conducted within this project phase including engagement with key customer stakeholder groups.

The primary target group will be customers with existing solar systems including both residential and non-residential customers. The trial will also target customers who have not yet invested in a solar or battery system to understand potential motivations for installing a solar and/or battery system in the future.

A more detailed sampling design will also be developed in this phase of the project.

Phase 2 - Follow up focus groups and qualitative research

The online survey will provide quantitative information about customer's motivations for purchasing and installing a solar or battery storage system. However, it is envisaged that more detailed qualitative information would be useful to better understand some of the purchasing motivations of customers and to inform future demand management trials around batteries.

5.7.4 Results

Phase 1a – Residential customer survey

In November 2016, we sent out around 16,000 letters to residential customers inviting them to participate in an online survey about solar and batteries. Around 10,000 of these were sent to existing solar customers, including customers who had recently submitted a battery connection application. Another 5,000 to 6,000 letters were sent to customers residing in a separate house who had not yet installed a solar power system. The survey was conducted throughout the month of November 2016. We received 1,075 online responses from solar owners (including 86 battery owners) and a further 386 online responses from non-solar customers.

An interim report was released in March 2017 and is available on the Ausgrid website at this link:

https://www.ausgrid.com.au/-/media/Files/Customer-Services/Homes/Solar/Solar-Power-and-Battery-Survey-2016_Final.pdf

A summary of key findings was also published in an online article entitled "What customers told us about solar and batteries" as part of the HelloGrid Energy Exchange hosted by Energy Networks Australia. For further information visit: http://www.hellogrid.com.au/energy-exchange/what-customers-told-us-about-solar-and-batteries/

Phase 1b – Non-residential customer survey

As at June 2017, the non-residential customer survey of phase 1 was still in development. Based on our experience with past DMIA projects involving non-residential customers we decided to take a different approach for this set of customers to encourage good quality survey responses. In past projects and programs we have often had difficulty getting in contact with the right person in an organisation who may be the decision-maker about energy investments for the business. With this in mind, we approached market research providers to provide a Computer Aided Telephone Interview (CATI) survey for our solar and non-solar business customers. Ausgrid has a total of around 180,000 business customers across our network and around 4,500 of these have already installed a solar power system.

The non-residential customer survey will be completed during 2017/18 and final results and report will be published on the Ausgrid website at www.ausgrid/dm when completed.

Phase 2 – Focus groups

One of the key research learnings from the phase 1 residential survey was the response to whether battery owners would consider allowing an electricity utility to operate their battery system on peak days in return for a financial incentive. The survey response was that 59% would not consider this. A further survey question sought to explore the reasons why with customers stating they did not want to give over operation of their battery to anyone else, they didn't think the incentives would be enough or they needed more information to make a decision.

To further explore these issues, we recruited respondents from the residential survey into a focus group (conducted in Newcastle by Newgate Research) where we explored some of these issues in more detail. This focus group had a similar overall response to the survey in that about 60% of participants would not consider allowing an electricity utility to operate their battery system on peak days in return for a financial incentive.

Questions about the concept of using customer battery storage systems for demand management were also asked of early technology adopters in three other focus groups (Singleton, Sydney CBD, Parramatta) as part of Ausgrid's Customers At The Centre research project. Each focus group had around seven to nine participants.

The principle barriers to understanding the approach were found to be a lack of knowledge on how such a battery DM program would work and a lack of trust towards Ausgrid following changes to the solar feed-in tariffs. The lack of details or clarity around how a battery demand management program would work led to uncertainty in their acceptance with the participants having a number of questions that would need to be answered before they could make an informed decision. Some of the questions raised included:

- Would network charges be reduced?
- If a distributor uses a battery and the equipment is damaged, who pays for its repair?
- If a battery isn't full, who gets first priority on its use?
- What is the minimum amount of battery power/ capacity required to participate?
- Do customers receive meter data on how much power is used by the electricity utility, and at what times?

The research also showed that those who opposed a battery demand management program were vocal in their opposition.

5.7.5 Summary of actual and projected costs

A summary of the actual project costs incurred in 2016/17 is shown below. All costs incurred for this project are categorised as opex.

Actual and projected project costs:

Budget Item	2015/16 Actual	2016/17 Actual	2017/18 Projected	Total Projected
Project research and development	$8,513	$134,983	$100,000	$243,496
Total (excl GST)	**$8,513**	**$134,983**	**$100,000**	**$243,496**

5.7.6 Project progress & identifiable benefits

During 2016/17, the phase 1 residential customer survey was conducted and largely completed. Follow up phase 2 focus groups of residential customers was also completed during 2016/17. The phase 1 customer survey of non-residential customer will be completed in 2017/18.

This project is research only; therefore it is not expected to achieve any material peak demand reductions. The project activities do not form part of a deferral of a real network need but are designed to build capability and capacity and explore efficient demand management mechanisms with our customers.