Ausgrid

DMIA Annual Report 2017-18

October 2018

Demand Management Innovation Allowance Submission

October 2018

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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 2017/18 financial year.

2 Governance

2.1 DMIA spending in 2017/18

There was one new project and four (4) ongoing DMIA projects under implementation or development for which Ausgrid incurred costs in 2017/18. Ausgrid's submission identifies claimable costs incurred totaling $455,826. 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	2017/18 Actual Cost (excl GST)	Year initiated
New projects (initiated in 2017/18)		
Battery demand response	$66,871	2017/18
New projects sub-total	**$66,871**	
Existing projects (expenditure in 2017/18 and initiated prior to 2017/18)		
CoolSaver Maitland	$5,926	2014/15
DMIA stakeholder engagement	$9,737	2015/16
Solar and battery customer research	$108,408	2015/16
Demand management for replacement needs	$264,883	2016/17
Existing projects sub-total	**$388,955**	
TOTAL	**$455,826**	

4 New projects

4.1 Battery demand response

4.1.1 Project nature and scope

As residential battery systems have reduced in cost in recent years, customers have increasingly adopted the new technology. And as prices for battery systems are expected to continue to fall, we expect there will be continued steady growth in battery system installations in future years. The customer adoption of this technology offers Ausgrid a possible source of cost effective demand reductions to offer an alternative to network investment.

This project aims to investigate the potential application of demand response for residential batteries for network support services by engaging with customers with an existing battery system. The motivations and drivers for the early adoption of batteries were explored in a residential solar and battery survey which Ausgrid conducted in late 2016 which included responses from over 80 early adopters of residential battery systems. Their responses gave us some early insights into the types of customers and their attitudes and energy consumption behavior (see section 5.4).

Given the uptake of battery systems over the last two years, we now wish to investigate and conduct some early stage pilots and trials with customers to explore demand response from existing battery systems.

4.1.2 Project aims and objectives

The three primary objectives of the project would be to:

- Test whether customer battery systems offer a technically and commercially viable demand management option.
- Test customer take-up of a network support (demand response) offer whereby customer battery systems are dispatched to align with network needs.
- Investigate and trial the integration of battery management platforms or systems within the Distributed Energy Resource (DER) optimisation platform of Ausgrid's Advanced Distribution Management System (ADMS).

Secondary objectives include;

- Better understanding of the types of customer battery systems being installed by early adopters of the technology
- Better understanding of the impacts on maximum demand and energy volume for a customer with a battery system with and without a demand response offer.

4.1.3 Implementation plan

The project is planned to be divided into 3 phases to align with the objectives set for the project:

- Phase 1 – Battery customer market research
- Phase 2 – Customer trial over 2 to 3 summer seasons
- Phase 3 – Distributed Energy Resource integration with the Advanced Distributed Management System (ADMS)

Phase 1 of the trial will include collation and analysis of information of battery systems connected to Ausgrid's network and an exploration of possible offers and contractual arrangements with a range of different market providers (e.g. battery suppliers, aggregators and energy service providers). At the conclusion of Phase 1, Ausgrid would propose formal arrangements with one or more market providers to provide network support services.

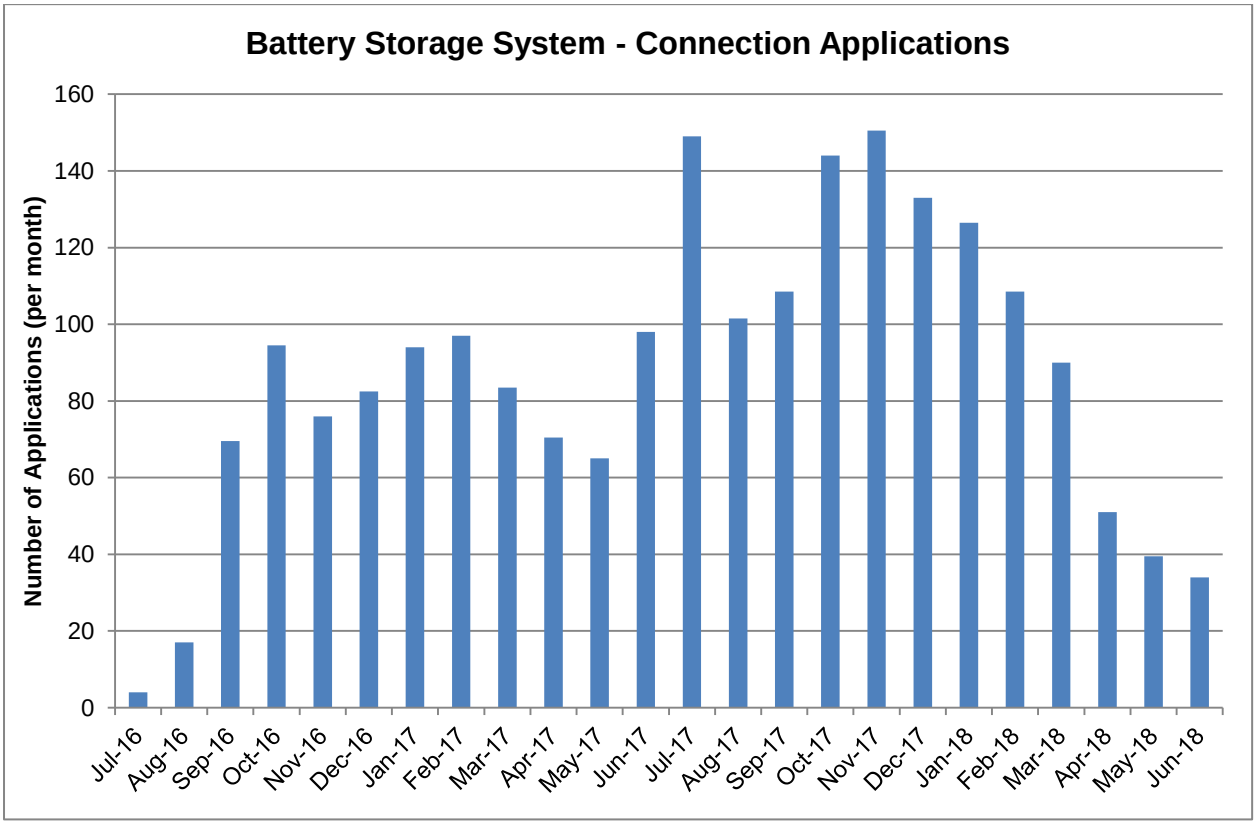
Phase 2 of the project will include customer battery system dispatch and further development of aggregator partnerships.

Phase 3 of the project will focus on the integration of network support dispatch and constraint management into the DER platform of Ausgrid's Advanced Distributed Management System (ADMS).

4.1.4 Results

During the research and development stage in Phase 1 of the trial, Ausgrid has conducted detailed analysis of the battery system connections applications for Ausgrids's network.

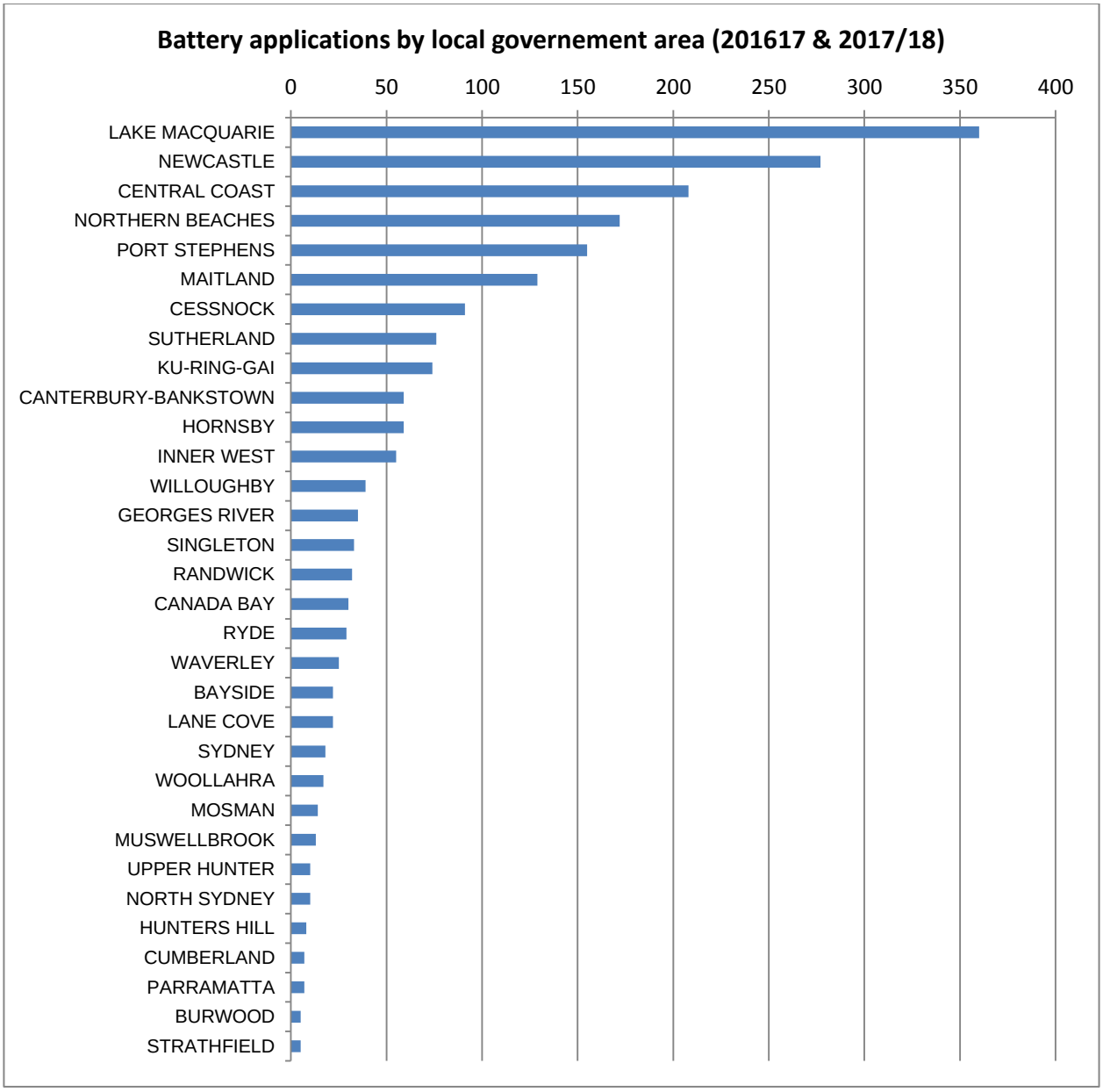
Beginning from the latter half of 2016, the number of residential customers installing battery systems on Ausgrid's network increased from near zero to about 100-150 per month. As at June 2018, there were a total of about 2,100 customers who had submitted a battery connection application. Below is a graph showing the monthly number of battery connection application received by Ausgrid from customers over the 2 year period from July 2016 to June 2018.



Most of the 2100 connection applications received up until June 2018 have been from residential customers with only around 30 business customers submitting a connection application for a battery storage system. The table below summarises the customer types and the network tariffs for customers that have submitted a battery connection application up until June 2018.

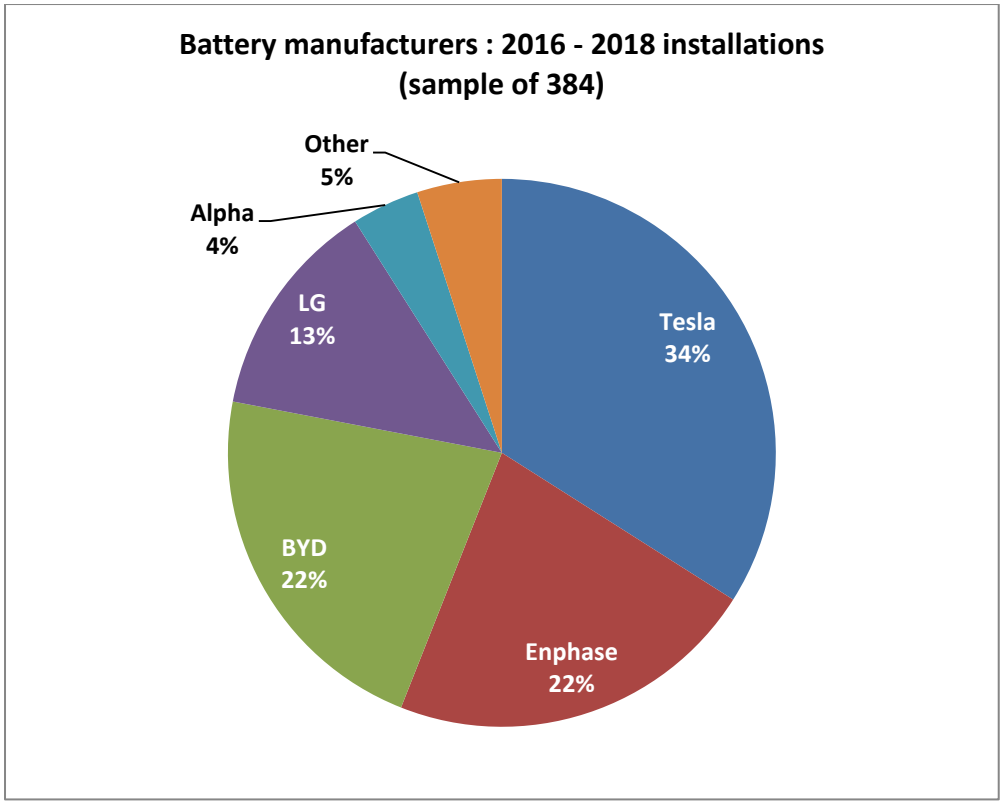
Customer Type	Network Tariff Structure - 2017	Average annual consumption (kWh) - 2017	Battery applications
Residential	Flat	6,992	745
Residential	Time of use	8,111	1339
Small-medium business (<=160MWh pa)	Flat	11,366	8
Small-medium business (<=160MWh pa)	Time of use	28,205	22
Large business (>160MWh pa)	Time of use	656,156	3

The majority of customers that have submitted a battery connection application have been from customers in the Central Coast and Hunter regions (61%) of the Ausgrid network. This is consistent with solar power system take-up as these regions represent about half of the total rooftop solar power systems in Ausgrid's network. The following chart shows the breakdown of the number of battery applications by local council areas in the Ausgrid network area.



Analysis of a sample of 384 of the 2100 battery connection applications submitted during 2016 and 2017 showed that the average battery storage capacity increased from 5.5 kWh from a sample of 65 battery applications submitted in 2016 to 8.8 kWh from a sample of 319 battery applications submitted during 2017. This increase in the average size of batteries is likely due to the larger storage capacity of available products that came onto the market in 2017 at a more cost-effective price.

Analysis of the battery manufacturers of this sample of 384 battery connection applications indicates that 95% of the batteries were from five battery manufacturers with the top 3 comprising 78% of the installations (Tesla, Enphase and BYD).



For a small number of the installed battery systems, a more detailed assessment of the energy and peak impacts was completed. This sample of six systems was for customer premises with existing solar power systems and the installation of large battery systems of about 10 kWh or larger in size.

The customer distributed energy resources (DER) included in the sample analysis were as follows:

Customer No.	Solar PV capacity (kW)	Battery capacity (kWh)
1	6.1	9.8
2	5.0	13.2
3	5.0	13.2
4	5.2	13.2
5	3.8	13.2
6	9.8	13.2

Analysis of the total customer metered electricity use was completed for the summer period of Nov 2016 to Mar 2017 before the installation of the battery and the summer period of Nov 2017 to Mar 2018 after the installation of the battery. At this stage, the analysis did not include verification of the DER information or whether other customer changes might have contributed to the variation in electricity use.

This assessment looked at the total imported and exported electricity over the summer period and the maximum demand over the peak demand period of 2pm to 8pm. The results from the analysis are shown in the table following.

Customer No.	Before battery installation		After battery installation		% Change	
	Total Summer import (kWh)	Maximum Summer demand 2-8pm (kW)	Total Summer import (kWh)	Maximum Summer demand 2-8pm (kW)	Total Summer import (kWh)	Maximum Summer demand 2-8pm (kW)
1	5,085	8.18	2,715	7.69	-47%	-6%
2	2,473	6.33	574	4.36	-77%	-31%
3	8,291	12.81	374	6.46	-95%	-50%
4	3,629	7.47	552	3.71	-85%	-50%
5	3,398	5.88	913	6.30	-73%	7%
6	2,658	7.96	3,633	11.96	37%	50%
Average	**4,256**	**8.11**	**1,460**	**6.75**	**-66%**	**-17%**

These results show that, for these 6 customers, the installation of the battery system reduced imported electricity over the summer period by an average of 2,796 kWh (-66%) and the individual customer half-hourly maximum demand over the summer 2pm to 8pm period reduced by an average of 1.36 kW (-17%). Note also that maximum summer demand increased for two customers (Customers 5 and 6) by 7% and 50% respectively.

Further analysis of the battery system connection applications and customer operation of these systems will be ongoing to ensure that trial activities represent customer use of this new technology. This will include more detailed analysis of meter interval data to explore actual customer operation of the battery systems.

4.1.5 Implementation costs of the project

A summary of the actual project costs for 2017/18 is shown below, with all expenditure being operating expenditure (OPEX).

Actual DMIA project costs:

Budget Item	2017/18 Actual	Total Actual
Project research and development	$66,871	$66,871
Project implementation	$0	$0
Total (excl GST)	**$66,871**	**$66,871**

Projected DMIA project costs:

Total project costs will be largely dependent upon the response to the network support offer from aggregators and customers but might be forecast to be in range of $0.25-0.75m.

4.1.6 Project progress & identifiable benefits

Up until the end of June 2018 the main progress made has been in the research and development stages of the project with results detailed in 4.1.4. In addition, preliminary discussions were conducted with the battery industry (suppliers, manufacturers and aggregators) to scope the potential for a demand response customer trial.

5 Existing projects

5.1 CoolSaver Maitland

5.1.1 Project nature and scope

The fifth and final stage of the Cool*Saver* Program was completed in the 2016/17 summer season (December 2016 - February 2017). This program was developed to explore the potentially cost effective method of controlling residential air conditioners using AS4755 compliant devices and how this solution could form a component of demand management solutions. For results from past implementation phases of the project please refer to previous Ausgrid DMIA Reports on the AER's 2016-17 DMIA webpage here or in interim reports for the Cool*Saver* program on Ausgrid's website here.

For this reporting period, and given that the program had closed, activities relating to the project were principally associated with wrapping up the program such as finalising incentive payments to participants and decommissioning demand response equipment. The majority of these activities were completed in 2016-17 with some minor costs incurred in early 2017-18.

The following information summarises the key objectives and findings of the project for its final phase. A final report for the overall Cool*Saver* project will be published on Ausgrid's DMIA Innovation Research and Trials website page.

5.1.2 Project aims and objectives

The primary project objectives for the Maitland phase of the Cool*Saver* project were:

- 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.
- More acutely test customer perceptions, particularly amongst those who did not receive notifications of the peak event activations, and to further refine the diversified demand reductions data.

The secondary project objectives for the Maitland phase of the Cool*Saver* project were:

- 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.

5.1.3 Implementation plan

As the Cool*Saver* program had closed by the end of FY 2016-17, the primary actions remaining for FY 2017/18 were:

- Collect and analyse data – Demand Response Enabling Device (DRED) data logs, customer meter data and participant surveys to determine demand reduction performance (quantitative), customer acceptance (qualitative) and technology performance
- Report findings and conclusions
- Close down program – collect DREDs, finalise payments to installers and finalise reward payments to program participants.

5.1.4 Results

A fully detailed final report with results across the entire project is scheduled for completion by the end of 2018. When complete, the final project report will be published on Ausgrid's website and publication communicated to Ausgrid's registered demand management stakeholders. Details regarding the customer acquisition strategies and issues, as well as dispatches for past years can be found in past Ausgrid DMIA reports to the AER and in our program interim reports. Some key results from the final phase of the project included the following lessons learned:

Program participation and retention

Satisfaction with the program experience remained at a high level in the Maitland area, where the proportion of customers who rated their experience in the trial as 8 or above, increased from 84% to 100%. Including customers moving home, the resultant retention rates between 2014/15 and 2016/17 over the length of the program were:

- Central Coast trial area, 67%
- Lake Macquarie trial area, 85%
- Maitland area, 93%

The majority of the decline in retention rates for Central Coast and Lake Macquarie trial areas was due principally to program participants moving home during the four year program for these trial areas. The Maitland trial program area was conducted over two years and so the higher retention rate is likely due to the lower number of participants moving home.

Override rates and customer response during peak event dispatches

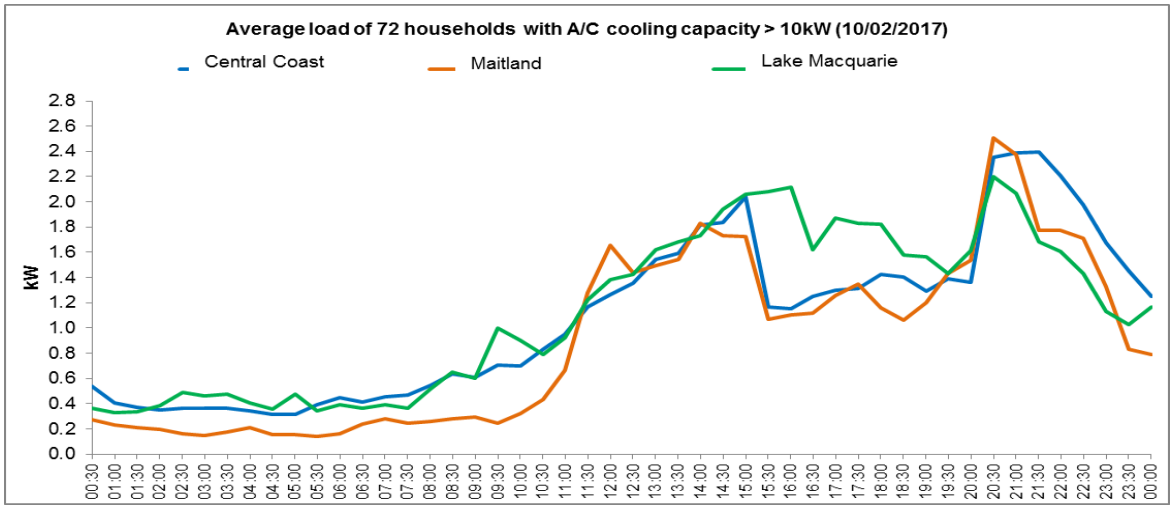
During the 2016/17 summer period from December 2016 to February 2017, there were 7 dispatch events conducted. Of the two areas where participants could override a dispatch event, Maitland participants were more likely to override (9%) compared to Central Coast participants (6%).

Interestingly, Lake Macquarie participants, the only group which were not given the capability to override the dispatch events (and were not notified of the power saving mode activation), were more inclined to state that they did not notice any difference in their cooling experience during the dispatch events.

Diversified Demand Reductions

The chart below shows results from the dispatch event on 10 February 2017 where demand dropped by an average of about 1-1.5 kW per participant. The chart displays the average demand from households with systems above 10kW for 72 participants in the Central Coast, Maitland and Lake Macquarie program areas. The dispatch event period was 4pm to 8pm for Lake Macquarie participants and 3pm to 8pm for Central Coast and Maitland participants.

The 10 Feb 2017 was the maximum peak demand day in 2016/17 for the Ausgrid network at 5,802 MW (the highest system load since 2011). On this day the dispatch event utilised the power saving mode on customer air conditioners which limits electrical input power to 50% of rated capacity.



Post-Program Survey

The main objectives of the final stage of the project was to collect as much data as possible on customer retention, the participation experiences of the customers in terms of override use, levels of comfort and behaviors during the activation periods and continued testing of the performance of the technology. The customer experience information was collected via a series of customer surveys. 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. 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%).

5.1.5 Implementation costs of the project

A summary of the actual project costs for this year and previous years is shown below, with all expenditure being operating expenditure (OPEX).

Actual DMIA project costs:

Budget Item	Previous Years Actual	2017/18 Actual	Total Actual
Project research and development	$6,635	$0	$6,635
Project implementation	$734,891	$5,926	$740,817
Total (excl GST)	**$741,526**	**$5,926**	**$747,452**

Projected DMIA project costs:

This project concluded in 2017/18 and no further costs will be incurred.

5.1.6 Project progress & identifiable benefits

Project progress up to the end of June 2017 can be found in previous Ausgrid DMIA reports for the AER for 2014/15, 2015/16 and 2016/17 on the AER website here. Past project progress is also reported in the most recent Cool*Saver* Interim Report published on Ausgrid's website here. Activities in 2017/18 mainly consisted of remaining project close-out activities.

Results from, and experience of, the program so far suggest that customers have a consistently 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 also 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.

An overview of the results of the Cool*Saver* programs are summarised in section 5.1.4. More details will be released in the final report for all three Cool*Saver* air conditioner demand response projects reported in previous years. When complete, the final report will be published on Ausgrid's website here. Overall lessons learned from the trial will be provided in the upcoming final report.

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 DMIA stakeholder engagement

5.2.1 Project nature and scope

This project involved consultation 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, this project was aimed to canvas the views of a broad range of stakeholders through a formal consultation process. .

5.2.2 Project aims and objectives

The primary objective of this project was 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.

5.2.3 Implementation plan

To ensure that stakeholder views were effectively canvassed, a range of consultation techniques were investigated. Working with our stakeholder engagement team, we identified the most effective approach for this exercise to be an online forum using the Group Quality online platform. It was the first time that such a tool has been used in the business so this was considered as a good opportunity to trial this tool for the business.

A new topic was introduced at the beginning of each week and was facilitated by Ausgrid's Stakeholder Engagement Manager and supported by the Demand Management and Forecasting group to provide responses to participant questions relating to the topics or projects discussed and supporting material. Each participant was sent a personal login and password. Contribution to discussions was initiated by firstly all participants introducing themselves and then following through the topic discussions in the following order:

Topic 1: Introduction of participants and Ausgrid members/observers

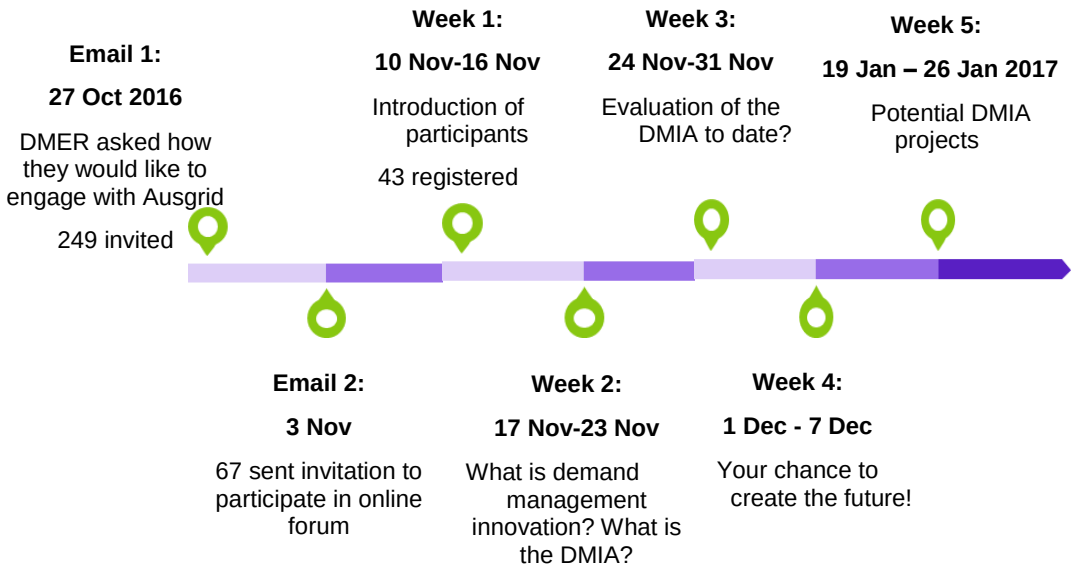
Topic 2: What is demand management, innovation, what is the DMIA

Topic 3: Evaluation of the DMIA to date

Topic 4: Your chance to create the future – ideas about future DMIA

Topic 5: Potential Ausgrid DMIA projects – your opinions on prioritizing 9 possible projects which we proposed to the group

The timeline of the forum is provided below:



5.2.4 Results

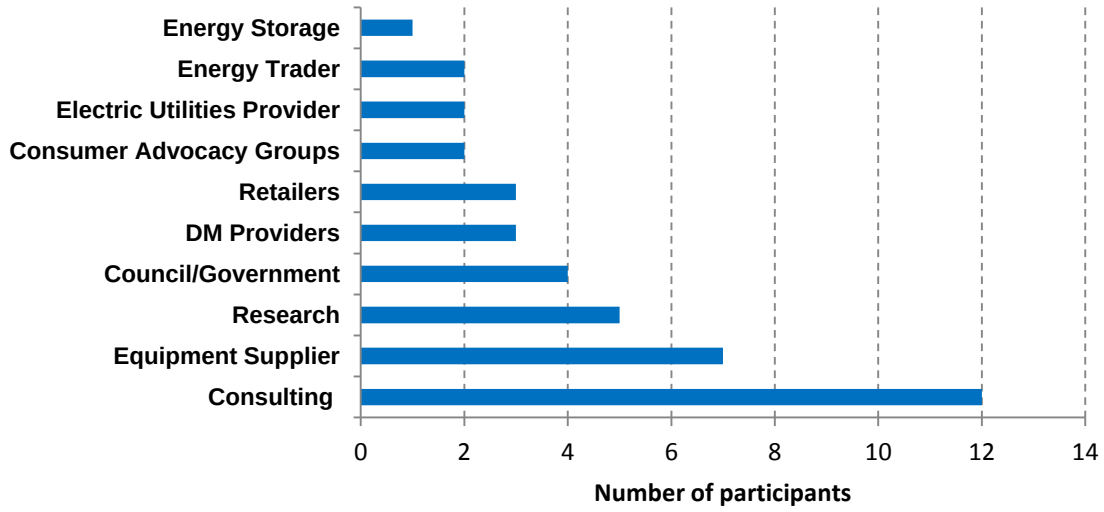
To establish the forum we asked all stakeholders (249) who had registered on Ausgrid's Demand Management Engagement Register (DMER) how they would like to engage with us about demand management where they could decide from the following responses:

- just be kept informed (no contribution of feedback) (33)
- would like to share their views with us (therefore would be eligible for invitation to online forum) (67)
- did not wish to engage with us and be removed from register (12)

About half of the members responded, from which 67 (44%) expressed interest in sharing their views while 33 (22%) stated that they only wanted to be kept informed. For those who wanted to share their views, we extended an invitation to join the online forum and provided a high level summary of the forum topics to help them prepare their views. Of those invited, 43 (64%) stakeholders registered to participate in the forum.

Week 1: Participant introductions and motivations to participate

The chart below shows the industry type for the 43 stakeholders that registered to participate in the forum.



For topic 1, 39 participants contributed to the discussion. There was a relatively diverse range of representation across the group of participants; the majority being consultants, equipment suppliers and researchers. Among the consultants and suppliers, many expressed interest in exploring opportunities to embrace demand reduction initiatives such as ways to minimize kVA demand charges for their clients.

Others were interested in understanding the bigger picture of how demand-side activities integrate within the electricity sector planning, DNSP decision making, regulation and policy.

Those from research backgrounds expressed interest in interacting with industry participants and learning about new tools, techniques and initiatives. They also expressed interest in coming together to learn about what real world applications were available to them for potential demand management projects and trials.

Those representing customer advocacy groups were particularly interested in seeing how demand management and innovation changes in the electricity industry impacted certain groups of customers e.g. from Culturally and Linguistically Diverse (CALD) backgrounds or how different pricing and demand load control trials are being applied in the community. Interest in how various demand management mechanisms/tools impacted security, reliability and costs to consumers also interested this group.

Week 2: What is demand management? What does innovation mean? What is the DMIA?

For topic 2, 14 participants provided their opinions in the online forum. In this section we sought to gauge what demand management meant to different stakeholders and identify the key issues they considered to be important. We wanted to ask them for their opinions on what demand management activities they thought had worked well in the past and what opportunities they thought would be worth investigating going forward. We also wanted to know how important innovation is to DM stakeholders and what their level of understanding was of the DMIA, its purpose and their opinions about Ausgrid's use of DMIA funds.

What demand management means to stakeholders?

There was a range of perspectives about what demand management meant but generally most related it to either demand or supply mechanisms put into place during peak demand periods in order to defer investment on the network. Another saw it as a way to ensure the network is managed in the most cost efficient way possible.

What is the role of regulation with the DMIA?

The topic of price elasticity was raised by some of the participants who felt that it was the regulator's role to enable market forces to drive price signals and incentives towards the right investments, while fully integrating the growth in share of other distributed energy resources such as generation and storage. Peak demand was regarded by some to be the demand for alternative energy sources and that pricing of electricity will be required to be more responsive to market forces when alternative energy sources may come into play.

Week 3: Evaluation of the DMIA to date

Ten participants engaged in conversation on this topic where we asked stakeholders to share their knowledge about their level of understanding about the DMIA and their opinions about how well Ausgrid and other electricity networks have managed their DMIA funds. The feedback gained from stakeholders can help inform how we can improve our communication to stakeholders and the industry about DM activities and enable us to better identify the challenges and issues facing industry participants.

The following insights were gathered from the participants' input:

- Many were not aware of the DMIA, Ausgrid DMIA projects, or the scope of the DMIA. Education and sharing information needs to be improved and made more visible by Ausgrid and other distributors;

> *"Communication is key. It doesn't matter if you've done a great trial project, if nobody knows about it. The storytelling is almost as important as the project itself." (Participant #7)*

- Those who shared their opinion felt that residential trials needed to be incentivised in order to maximise participation rates, but recognised the challenges of delivering residential projects at scale while retaining cost effectiveness;

> *"DM has no inherent appeal for any residential customer unless there is a direct payment for it. The payment has to be small because the benefit from the DM is small to the Distributor, while the cost of installing the necessary control devices is large. Besides, it interferes with the customer amenity. This makes it very difficult to scale." (Participant #11)*

- Industrial and commercial DM has significant capital costs to install controllable equipment and operating costs that requires compensating customers for control over their capacity and use.
- Reference was made to the risks perceived if the energy industry fails to apply innovative demand management approaches.

> *"I think the major lesson learned is not from the DMIA itself, but from where it was NOT used. The South Australian System Black showed that, irrespective of whether you attribute the cause to renewables or the storm, the simple facts are:-*
>
> *- That the underlying system was insufficiently resilient,*
>
> *- That a number of different technologies will be needed to manage the transition and we should not just accept popular concepts such as batteries as the only solution,*
>
> *- That the cost of all the transition to renewables is going to be very high and this is showing in power prices that have seriously affected South Australian Industry already and the likelihood/certainty is that substantial further rises are coming,*
>
> *- Based on our calculations, Demand Management can be extended beyond the traditional load shedding to do a variety of grid stabilisation functions" (Participant #11)*

Week 4: Future DMIA

In this section we engaged with 8 stakeholders who gave their opinions about how the DMIA mechanism could be changed and improved. We wanted to identify the key issues that would impact demand management projects in the future and what future projects Ausgrid might undertake under the DMIA. A summary of their ideas are provided below:

- Residential critical peak pricing tariff trial - using an incentive-driven approach, rather than applying penalties.
- Battery rebate trial - to reduce evening peaks in constrained areas and assess the value of distributed generation for improving grid system security.
- One participant commented on the need for automated solutions.

> *"Automated control solution is certainly the best way to elicit the sorts of responses you want from customers on an aggregated scale". (Participant #30)*

- Another participant suggested that rewards based demand management offers would build customer relationships.

> *"I also think a rewards based approach would directly link the distribution business to the customer, building a relationship and greater understanding of the role and issues faced by the network." (Participant #3)*

- And a participant expressed concern that networks were not integrating lessons learned from DMIA trials into network decision making and demand management programs.

> *"I am still concerned that there is not enough evidence from networks of how they are integrating the results of past DMIA funded projects into new ones (or not); building on past learnings and cooperation with other networks (rather than reinventing the wheel) is often hard to see; not an Ausgrid-specific issue." (Participant #15)*

- Another participant noted a concern about unclear national policy.

> *" …Government policy and clarity around specific goals / targets and also guidance as to where we are going as a country would be of great assistance. We need leadership to work toward specific goals where each of the generators and distributors can work together." (Participant #6)*

Week 5: Potential DMIA projects

The final topic area included presenting 9 potential project concepts which Ausgrid might consider implementing in the future. Stakeholders were asked to review the list and provide their comments on each one and rank the projects according to how they felt each should be prioritised and why. It should be noted that we received few responses at this stage of the engagement with only 3 participants contributing to this topic.

The table following summarises each project concept and the corresponding comments received:

Project Concept	Summary of Participant Responses
1. Residential tariffs Should we look at trialling different pricing structures such as demand tariffs, alternative peak demand periods, critical peak pricing or peak time rebates? What would we trial that is new or different from what has been done before? What involvement should retailers have in trialling new network pricing structures?	Responses suggested that stakeholders think residential tariff trials are prone to unreliable results and dependent upon customers varying levels of knowledge and interest which impacts on the trials' effectiveness. Responses included: • behaviour modification via tariff change was not regarded as reliable and unpredictable in its ability to deliver reductions during extreme weather events. • there was some question on whether network charges realistically reflected cost levels; hence there would be contention about how to change them. • a respondent felt that customers were generally unaware or not very well informed about their tariff levels and details and would therefore not be engaged in any demand management led activity.
2. Residential appliance load control/ demand response Should we keep going and trial more technology solutions, customer offers or alternative customer acquisition models? (In the past, Ausgrid has conducted hot water, pool pump and air-conditioner load control trials).	Responses were neutral (neither strongly for nor against) towards residential appliance load control**.** Responses included: • *"there is no household appliance that meets most of the above criteria. It is only when you use sensors and intelligent control systems that you get real benefit." (Participant #11)*. • Suggestion to target large households such as those that have 3-phase connections.
3. Residential energy efficiency Should we trial a rebate offer scheme for the purchase of air conditioners; for example where high star rated models are offered a rebate on the purchase price? Are there other appliances that might be considered?	Responses were generally favourable towards a residential energy efficiency rebate. Responses included: • *"As regards rebates for efficiency, then yes, if measured at the holistic system level." (Participant #11).* • *"Energy efficient appliance exchange ... I would love to know just how much effect this has on demand. The only hard thing was all the paperwork required..." (Participant #6).* • *"For HVAC units, there is potentially a very high level of efficiency gain I believe" (Participant #6)*
4. Business Tariffs What tariff options might be trialed with business customers? Could we look at trialing different pricing structures such as alternative peak demand periods or critical peak pricing? What involvement should retailers have in trialing new network pricing structures?	Respondents were not in favor of business tariffs for similar reasons to their reluctance to support residential tariffs. Responses included: • behaviour modification via tariff change was not regarded as reliable in result and unpredictable in its ability to deliver reductions during extreme weather events. • similar to the residential tariff concept where behaviour is unpredictable and not always controllable especially during peak events or during extreme weather.

5. Business energy efficiency Do you see value in further energy efficiency efforts to reduce peak demand over and above what is being done already by governments?	Respondents were generally supportive of this concept. Responses included: • *"to promote efficiency for businesses … replacing old electric motors, updating commercial size HVAC etc. are all good places to start" (Participant #6).* • *"I think there would be more immediate and measurable benefit across the entire business / commercial usage if we were to get serious about harmonics and power factor." (Participant #6)* • *"Set some targets around power factor and efficiency for companies to follow and if required, offer rebates for conformance and performance." (Participant #6).*
6. Business demand response	This concept raised some concerns amongst those who responded. Responses included: • *"If I had a major commercial building, I might trim air con on a hot day in return for some savings, but could not afford to jeopardise staff productivity on a really hot day. This is unreliable and unpredictable at best." (Participant #11).*
7. Behavioural demand response Does this sound too good to be true? Do you think Ausgrid should trial a project to test this concept? For example, we might provide a free app and access to real-time monitoring of smart meter data or the load of a network asset that a customer is connected to? Would customers be likely to engage without a direct financial incentive?	Respondents were skeptical about how effective this technique would be: • *"It may work .... [but] I believe the vast majority of us still don't know how to program our DVD player and are too busy … for this to be effective or have real impact in the long term." (Participant #6).* • *"I think this would be unreliable, unpredictable and inherently uncontrollable." (Participant #11).*
8. Customer battery storage Do you think it is worthwhile undertaking a battery demand response trial? Or should battery operation be signaled through cost reflective network pricing rather than a direct load control approach?	Respondents did not think that a customer battery storage trial was worthwhile given the high cost and the high volume of trials already being done: • *"…batteries are still breathtakingly expensive. A large house requires many batteries for power, energy and potential duration of outage." (Participant #11).* • *"…a trial is not really needed. Large scale work being done in Adelaide at present across 1,000 homes where they are offering subsidised batteries. Lots of other work in this space to call on." (Participant #6)*
9. Grid-side battery storage Given the number of grid-battery trials, do you think Ausgrid should conduct a further trial of this technology solution? Or, should we wait and see as the cost and reliability of this solution matures?	Respondents felt that there was not a need to conduct another grid battery trial given that the technology has been proven and established that it is a viable DM tool: • *"My view would be that we already know that it works and we are just waiting for the costs to come down." (Participant #11)*

Key lessons learned – engagement process

Some of the key lessons learned from the engagement process are summarised below:

- Active participants declined significantly after the week 1 introductions (from 39 to 14), and those participants who were more active appeared to dominate the conversation. One potential option would have been to separate the group into smaller groups to encourage reluctant participants to engage in the online discussion more freely.
- Setting of ground rules. While the forum facilitator attempted to encourage participants to share their views, we could have set up our expectations and guidelines in advance by stating what Ausgrid's role and what participants' roles were in the forum, how often they are expected to post and contribute and who will be given access to the conversation threads.
- Another lesson learned was that we could have reached out to reluctant individual participants earlier on in the engagement process and asked them privately if they had any issues/ concerns about the online forum which we could have addressed earlier in the process.
- In order to improve the depth of engagement, we could have included more links/videos and materials to engage and inspire ideas among the participants. For example, we could have provided a scenario of a demand management problem and asked participants to provide suggestions on innovative solutions or provided more maps and diagrams depicting some of the issues or projects that we could have asked participants to provide input on.

Key lessons learned - participant feedback on DMIA

The following insights gained from the forum will help to inform and guide our development of DMIA projects for 2019-24 regulatory period:

- There needs to be better information sharing and transparency across the industry about distributors' DMIA projects, what they have done in the past and more transparent consultation.
- Improve Ausgrid's communication and sharing of past DMIA funded project with stakeholders and other networks to build upon and improve past results and research.
- Look at opportunities that involve reward based approaches such as Peak Time Rebates and other incentives rather than pricing.
- Solutions that consider automated control solutions.
- Aim to deliver incentives in a fair and equitable way so as to not disadvantage the already disadvantaged.
- Explore the option of residential and business energy efficiency projects.
- Look at approaches that encourage price signalling to drive growth in a technology and/or change of customer behaviour.
- Consider stakeholder views regarding the need for regulation to help enable the electricity market to provide the right signals and incentives to drive the right investments.
- Investigate Ausgrid DM projects that integrate the growth of other renewable energy sources such as distributed generation and distributed storage.

5.2.5 Implementation costs of the project

A summary of the actual project costs for this year and previous years is shown below, with all expenditure being operating expenditure (OPEX).

Actual DMIA project costs:

Budget Item	Previous Years Actual	2017/18 Actual	Total Actual
Project development and implementation	$48,281	$9,737	$58,018
Total (excl GST)	**$48,281**	**$9,737**	**$58,018**

Projected DMIA project costs:

This project concluded in 2017/18 and no further costs will be incurred.

5.2.6 Project progress & identifiable benefits

The project was principally completed in 2016/17 and activities in 2017/18 consisted of analyzing participant responses in more detail to assist in DMIA project focus areas for the upcoming 2019-24 regulatory period.

A decision was also made in 2017/18 not to proceed further with this project, but the project gave Ausgrid identifiable benefits in terms of understanding what engagement techniques might be best for future and to help define the focus areas for DMIA projects for the 2019-24 regulatory period.

This project is a research engagement project and therefore did not achieve any 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.

5.3 Solar & battery customer research

5.3.1 Project nature and scope

This project involved surveying a large sample (10,000 to 20,000) of our customers to better understand the purchasing motivations and potential future uptake of solar, energy efficiency and battery systems. Surveys of both residential and non-residential customer segments formed part of the project.

5.3.2 Project aims and objectives

The primary objective of this research was to better understand customer motivations for purchasing and installing solar, energy efficient equipment and battery systems that might be used for demand management programs to reduce network investment.

5.3.3 Implementation plan

Phase 1a – Residential customer survey (online)

This first phase of the project was to implement an online customer survey of 10,000 to 20,000 of residential customers. This involved a letter mail-out to randomly selected solar and non-solar house customers in Ausgrid's network area to invite the customer to participant in the survey.

Phase 1b – Business customer survey (Computer Assisted Telephone Interview)

For the business segment we were primarily interested in customers who had invested in solar PV systems or energy efficiency equipment to better understand their motivation for installing a solar and/or energy efficient equipment in the future. Battery owners were less of a focus due to the very small number of business customers who had invested in this technology so far to date. However, we were interested in customers who were considering or intended to install battery systems.

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 telephone interviews were conducted over an 11 week period from 24 August 2017 to 7 November 2017.

Phase 2 - Follow up focus groups and qualitative research

The online survey provided quantitative information about customer's motivations for purchasing and installing a solar or battery storage system. However, more detailed qualitative information was explored with a focus group of battery owners to better understand some of the purchasing motivations of customers and to inform future demand management trials around batteries.

5.3.4 Results

Phase 1a – Residential customer survey

The results from the phase 1a residential customer survey was completed in previous years and reported on in previous DMIA annual reports. An interim report was released in March 2017 and is available on the Ausgrid website here.

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 see here.

Phase 1b – Non-residential customer survey

The non-residential customer survey was conducted and completed during 2017/18 and final results and final report can be found here. We also presented these results in conjunction with the market research provider, McNair YellowSquares, to interested stakeholders from our Customer Consultative Committee. A brief summary of some of the main insights from the research were:

- Nearly three quarters of all customers who have invested in energy efficiency have observed at least some reduction in energy use and costs.

- Solar customers were twice as likely as non-solar customers to have stated that they observed a large reduction in energy use and costs.
- The average payback periods for investments in energy efficiency ranged between 4 and 6 years, with efficient lighting having the lowest payback period and efficient heating/cooling the longest average payback period.
- The main reasons given for why business customers had not invested in energy efficiency was because they don't know enough about energy efficiency options.
- The main reasons for installing solar is to save money. Secondary reasons given were to reduce business carbon emissions and to take advantage of government rebates (save money).
- The majority of solar customers (63%) are satisfied with their cost savings. Those with larger systems of 30kW+ were the most satisfied system size group (74%)
- More than half of non-solar customers do not intend to install a solar system in the future.
- The main barriers to take up are due to the building they are in (renting or installation limitations) or because of the cost or payback associated with the installation.
- The most popular suggestion that non-solar customers have to help incentivize solar installation are government subsidies.
- Non-solar customers are significantly less likely than solar customers to own their own premises.

Phase 2 – Focus groups

A focus group of residential battery owners was conducted as part of the Ausgrid Customers At The Centre research program and results reported on in the previous 2016/17 DMIA annual report. A summary of the results can be found on the Ausgrid website here.

5.3.5 Implementation costs of the project

A summary of the actual project costs for this year and previous years is shown below, with all expenditure being operating expenditure (OPEX).

Actual DMIA project costs:

Budget Item	Previous Years Actual	2017/18 Actual	Total Actual
Project development and implementation	$143,496	$108,408	$251,904
Total (excl GST)	**$143,496**	**$108,408**	**$251,904**

Projected DMIA project costs:

This project concluded in 2017/18 and no further costs will be incurred.

5.3.6 Project progress & identifiable benefits

The phase 1a residential customer survey and phase 2 focus groups were completed in previous years (see 2016/17 annual reports or other links in section 5.4.4) and the main activity during 2017/18 was to conduct the Phase 1b business customer survey.

This project is research only; therefore it has not achieved any 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.

5.4 Demand management for replacement needs

5.4.1 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 network investment.

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 consists of conducting a request for information from market providers for two independent project components:

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

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).

To inform the solar and energy efficiency activities under Part A of the project, results from the solar and energy efficiency and battery research project (detailed in section 5.3) were also used to inform activities for the project. Lessons learned from past DMIA projects such as the non-residential energy efficiency and dynamic peak rebate projects detailed in previous Ausgrid DMIA reports were also used to assist in defining the scope and activities of the project.

5.4.2 Project aims and objectives

The two primary objectives of the project are to:

Part A. Test the effectiveness of an incentives program in a targeted geographic area or areas that lead to new installations of technologies that offers permanent demand reductions (e.g. 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.

Part 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.

5.4.3 Implementation plan

The project consists of a preliminary 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. Establish service contracts with market providers and project partners.

Phase 2: Initiate and operate trial activities over an 18 to 24 month period.

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

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.

5.4.4 Results

Most activity during 2017/18 was spent on engaging with the market, developing the commercial arrangements required for the project and negotiating with co-funding partners for the Part A incentives program. The results of the activities so far include:

1. Market engagement and market provider selection where we invited submissions/proposals from market providers in October 2017 to respond to a Request for Information (RFI) for the project. 16 submissions were received for Part A. The RFI closed on the 23 November 2017.
2. The submissions were evaluated using criteria defined in the RFI to develop a short-list of four potential market providers.
3. Meetings were held with the representatives of these companies in March 2018 to clarify their proposals and capabilities to meet the project's delivery criteria. Following assessment of the new information these four companies were assessed to meet the required evaluation criteria and negotiations continued up to the end of June 2018.
4. Discussions were also held with a fifth facilitation service market provider who specialises in a single customer segment. This provider was assessed to meet the evaluation criteria for the project and we requested they submit a proposal to facilitate solar installations in the project target areas. Upon review it was confirmed that their proposed facilitation model for this niche customer segment met the project's evaluation criteria.
5. Negotiations with two co-funding partners for the project were initiated in 2017 to develop an incentives funding scale sufficient to assess multiple energy efficiency solutions across multiple customer segment areas. As at June 2018, one partner, the City of Sydney, had agreed in principle to co-fund up to $750,000 of incentives for customer installations in their local council area. Negotiations with a second co-funding partner were ongoing as at June 2018. For further information the media release for the co-funding partnership with the City of Sydney can be found here.

5.4.5 Implementation costs of the project

A summary of the actual project costs for this year and previous years is shown below, with all expenditure being operating expenditure (OPEX).

Actual DMIA project costs:

Budget Item	Previous Years Actual	2017/18 Actual	Total Actual
Project research and development	$5,552		$5,552
Project implementation		$264,883	$264,883
Total (excl GST)	**$5,552**	**$264,883**	**$270,435**

Projected DMIA project costs:

The total approved Ausgrid budget for this project is $2,550,000 with the majority of this expenditure planned to occur in 2018/19 and 2019/20 financial years when the incentives program is initiated.

Of this budget, Ausgrid has allocated $1.75 million for incentives to market providers to offer customers subsidised permanent demand reduction activities.

Additional funding from partners is expected to increase the incentive amount such that the total incentive fund is expected to exceed $3.0 million.

5.4.6 Project progress & identifiable benefits

Up until the end of June 2018 progress has been in the research and development stages of the project and initiation of the implementation stage. Activities have included engaging with the market, selecting market providers, developing the commercial arrangements required for the project and negotiating with potential co-funding partners for the Part A incentives program.

The Part A incentives program is planned to be initiated before the end of 2018 once the total funding amounts are finalized with the project partners and market provider contracts are agreed.

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

The project activities may overlap with an area of the network with an investment need, however, the project is primarily designed to build capability and capacity and explore efficient demand management mechanisms with market providers. This will include measuring the effectiveness and sensitivities of changing incentive levels on encouraging customer demand and gauging how effective they are in achieving permanent demand reductions.