Demand Management Incentive Scheme Report - 2016

UNITED ENERGY

DMIS Report

This report details outcomes of projects supported by the Demand Management Innovation Allowance.

TABLE OF CONTENTS

1 Introduction

During the 2016 calendar year, United Energy (UE) continued two projects under the Demand Management Incentive Scheme (DMIS). These were:

- Virtual Power Plant (VPP) Project; and
- Summer Saver (Demand Response) Trial.

This report and its attachments deliver the annual reporting requirements of the DMIS for work undertaken on these projects during 2016 and documents the outcomes and learnings of each project. Further details of each project are presented below.

1.1 Virtual Power Plant (VPP) Project

In September 2013 UE submitted a request to the AER to seek indicative up-front approval to use part of the 2011-2015 allocation of Demand Management Incentive Scheme (DMIS) funding (part A) to support the development of UE's Virtual Power Plant (VPP) 50kW Residential Pilot Project. With the subsequent success of this pilot during this period, we are now transitioning the pilot to business-as-usual for management of peak demand and economic deferral of traditional network augmentation. We are using part of the 2016-2020 allocation to fund this transition.

With the price of solar photovoltaic (PV) falling dramatically and the price of battery storage forecast to decrease sharply in coming years, UE was eager to explore the use of PV and battery storage technology for addressing immediate capacity shortfalls and deferring traditional network augmentation solutions on the UE network. By utilising the energy stored in batteries, VPP technology can now be used by UE to shave peak load and defer augmentation projects in regions of the network where the future peak demand growth is uncertain and where the cost of adding capacity through traditional solutions is higher than average.

The aim of the original pilot project was to validate or otherwise, the use of a VPP to manage embedded generation and storage in a residential setting for the provision of efficient and prudent non-network augmentation. In 2014 there was significant work completed as part of the pilot. UE successfully installed a total of thirteen VPP units distributed across our network. The installations were completed in July 2014, and significant testing, refinement and learnings have been established through the operations of these units in 2015 and 2016. The pilot project objectives were achieved in early 2016. The innovation involved in establishing the pilot project has been recognised nationally with the project recently announced as winner of the 2016 Clean Energy Council Award in the Innovation category.

Coming into 2017 we are now at a point where we want to transition this technology to business-as-usual and justify VPP on its own economic merits against traditional augmentation. With battery prices falling rapidly, we decided to retest the market for pricing of battery technology. UE commenced a competitive RFI to process in 2016 to identify any new manufacturers that could supply a full turnkey VPP solution for UE (including solar and battery technology, software and integration). The tender process found that the new Tesla Powerwall battery was at a significantly lower price point than any of the other system available on the market. To test the new product, UE set up the Burwood field depot to replicate a standard residential solar and battery installation using the Tesla Solar Storage systems in a test environment to identify the most technically suitable and least cost architecture. With this work now completed, it is planned to undertake field deployments in 2017 at identified capacity constrained sites within the UE distribution network as an alternative to traditional network augmentation.

Refer to Appendix 1 for further details on this project.

1.2 Summer Saver (Demand Response) Trial

Demand response seeks to incentivise the end customer to reduce their demand on a small number of peak demand days through a variety of mechanisms. These mechanisms include voluntary load reduction, utility load control, supply capacity limiting and dynamic peak pricing. Sustained reliable demand response from residential and commercial/industrial customers has been proven to be effective and efficient at managing peak demand, and can be used to defer network augmentation.

The Summer Saver Trial was an investigation of how effective and efficient customer demand response is as a non-network alternative at addressing demand at peak times. The trial investigated various demand management options. The outcomes of this trial have enabled UE to develop a demand management model that describes the best combination of mechanisms that will result in the biggest peak demand reduction at specific locations based on customer demographics and load profiles.

UE launched the trial in February 2014 targeting 6,500 customers on four Bulleen zone substation feeders. Customers were offered $25 if they reduced their load during the UE nominated three-hour event period. UE anticipated calling on average four events per summer with the customer having the opportunity to earn $100 for the summer if they participated in all events.

UE expanded the trial for summer 2014/15 to target 4,000 more customers in areas of the network that were likely to experience an interruption from electrical asset overload. The trial also introduced new demand management options to existing trial members including direct load control of pool pumps, and supply capacity limiting.

The trial was expanded again for summer 2015/16 to target a total of 13,000 customers in areas of the network that are likely to experience an interruption from electrical asset overload. On top of the pool pump load control and supply capacity limiting options, the new option of load control of air-conditioners was added to the service offerings. A Bidgely customer smart phone application was also introduced.

The trial in 2015/16 was so successful it has been recognised as a Technology Pioneer and Best Customer Focused Technology Project by the US Peak Load Management Alliance (PLMA) and Australian Utility Innovators Awards respectively.

The success of the trial has provided UE the confidence to proceed with the Summer Saver Program[1]as a business-as-usual activity to defer traditional network augmentation using demand response. As such, Summer Saver Program will be targeted to 10,000 customers in areas of identified network constraint in summer 2016/17.

The Summer Saver Program 2017 is partially funded via DMIS as it is trialling several new elements for demand management to assist with the transition to business-as-usual and the Smart Energy smart phone application. Summer Saver Program is utilising the capabilities of the Advanced Metering Infrastructure to encourage customer participation and engagement whilst lowering implementation costs.

The majority of the costs incurred in 2016 were for the last summer of the Summer Saver Trial. This includes technology cost to support the Smart Energy app and the registration website. Other costs include marketing, participation incentives and load control technology. The remainder of the cost incurred were for Summer Saver Program 2017, which were costs for technology development and transition to business-as-usual.

Refer to Appendix 2 for further details on this project.

---

[1] http://unitedenergy.com.au/summersaver

2 Regulatory Requirement and Compliance

The AER, in its Demand Management Incentive Scheme applied to UE for the 2016-2020 regulatory period, sets certain criteria and reporting requirements for expenditure from the DMIA. These are detailed below along with a description of how UE complies with each of these requirements for each project.

2.1 VPP Project

"1. Demand management projects or programs are measures undertaken by a DNSP to meet customer demand by shifting or reducing demand for standard control services through non-network alternatives, or the management of demand in some other way, rather than increasing supply through network augmentation."

The VPP project attempts to combine the capabilities of solar PV generation and battery storage to flatten out the demand profile by charging the battery overnight from the network or from PV during the middle of the day when solar PV generation is at its maximum and discharging the battery during the early evening when energy demand requirements on the UE network are at their maximum. Aggregating VPP units will provide a system that can be dispatched to manage network capacity constraints.

"2. Demand management projects or programs may be:

(a) broad-based demand management projects or programs—which aim to reduce demand for standard control services across a DNSP's network, rather than at a specific point on the network. These may be projects targeted at particular network users, such as residential or commercial customers, and may include energy efficiency programs and/or

(b) peak demand management projects or programs—which aim to address specific network constraints by reducing demand on the network at the location and time of the constraint."

The VPP sought to address specific network constraints by reducing demand on the network at the location and time of the constraint. With the VPP concept now proven by the pilot, it is intended to locate such units in areas where there are identified network constraints. In the first instance, this is likely to be in areas where there are significant distribution transformer constraints by clustering the VPP units in localised areas. Ultimately the goal is to alleviate constraints higher up in the network such as at the distribution feeder or zone substation level.

"3. Demand management projects or programs may be innovative, designed to build demand management capability and capacity and explore potentially efficient demand management mechanisms, including but not limited to new or original concepts."

The VPP offers a new solution for a constrained network area, particularly where load growth is low, uncertain or is expected to plateau in future. The ability to provide incremental amounts of capacity through combining renewable generation and storage to meet the demand as it materialises could be economic against a more traditional network solution that provides significant step increases in capacity at higher cost. The innovation involved in establishing the Sunverge pilot project has been recognised nationally with the project recently announced as winner of the 2016 Clean Energy Council Award in the Innovation category.

"4. Recoverable projects and programs may be tariff or non-tariff based."

The VPP project is non-tariff based.

"5. Costs recovered under the DMIS:

(a) must not be recoverable under any other jurisdictional incentive scheme

(b) must not be recoverable under any other Commonwealth or State/Territory Government scheme and

(c) must not be included in forecast capital or operating expenditure approved in the distribution determination for the regulatory control period under which the DMIS applies, or under any other incentive scheme in that determination."

Costs recovered under the DMIS for the VPP project are costs incurred by UE in procuring expert consulting services, equipment and installation services for the trial. These costs have not been recovered from any other scheme. The costs do not include labour for UE employees' time toward this project. This cost is absorbed by the organisation and is regarded as in-kind contribution towards the project.

"6. Expenditure under the DMIA can be in the nature of capital or operating expenditure. The AER considers that capex payments made under the DMIA could be treated as capital contributions under clause 6.21.1 of the NER and therefore not rolled into the regulatory asset base (RAB) at the start of the next regulatory control period. However the AER's decision in that regard will only be made as part of the next distribution determination."

All costs incurred by UE under the DMIS for the VPP project are classified as operating expenditure.

2.2 Summer Saver Trial

"1. Demand management projects or programs are measures undertaken by a DNSP to meet customer demand by shifting or reducing demand for standard control services through non-network alternatives, or the management of demand in some other way, rather than increasing supply through network augmentation."

The Summer Saver Trial sought to incentivise customers to reduce their load during peak times. Voluntary trial customers were rewarded $5 per hour for reducing their load during the UE nominated three hour event period. Customers who reduced for all 3 hours were rewarded $25. Customers on the pool pump load control program were incentivised $40 per event for load reduction and Supply Capacity Limiting customers were incentivised $50 per event for load reduction. Customers on the air conditioner load control trial were incentivised $50 per event for load reduction and $100 as a sign up bonus.

During the period of December 2015 to March 2016, an event was called in each month totalling 4 events. Event results are summarised in Appendix 2.

"2. Demand management projects or programs may be:

(a) broad-based demand management projects or programs—which aim to reduce demand for standard control services across a DNSP's network, rather than at a specific point on the network. These may be projects targeted at particular network users, such as residential or commercial customers, and may include energy efficiency programs and/or

(b) peak demand management projects or programs—which aim to address specific network constraints by reducing demand on the network at the location and time of the constraint."

The Summer Saver Trial sought to address specific network constraints and is therefore targeted at customers directly impacted by those constraints. The trial targeted approximately 13,000 customers in areas of the network which are likely to suffer an interruption during summer or had suffered an interruption in previous summers due to electrical plant overload. Throughout the trial, UE sought to understand if sufficient numbers of customers participate in the trial with the right level of behaviour to reduce sufficient load to prevent an interruption.

"3. Demand management projects or programs may be innovative, designed to build demand management capability and capacity and explore potentially efficient demand management mechanisms, including but not limited to new or original concepts."

Residential demand management as a concept is not new however trialling it in metropolitan Melbourne certainly was. Other DNSPs in Australia and internationally have found success with demand management in regional areas where communities display more social capital. Since UE's network is predominantly metropolitan, demand management such as demonstrated by this trial is a crucial option to be explored. The innovation of the trial has been recognised locally and internationally, winning Australian Innovator Utility Awards 2016's Best Customer Engagement Project, and the US Peak Load Management Alliance's Technology Pioneer Award.

"4. Recoverable projects and programs may be tariff or non-tariff based."

The Summer Saver Trial is non-tariff based.

"5. Costs recovered under the DMIS:

(a) must not be recoverable under any other jurisdictional incentive scheme

(b) must not be recoverable under any other Commonwealth or State/Territory Government scheme and

(c) must not be included in forecast capital or operating expenditure approved in the distribution determination for the regulatory control period under which the DMIS applies, or under any other incentive scheme in that determination."

Costs recovered under the DMIS for the Summer Saver Trial are costs incurred by UE in marketing the trial, creating a registration website, customer participation incentives, and procuring and installing technology. These costs have not been recovered from any other scheme. The costs do not include labour for UE employees' time toward this project. This cost is absorbed by the organisation and is regarded as in-kind contribution towards the project.

"6. Expenditure under the DMIA can be in the nature of capital or operating expenditure. The AER considers that capex payments made under the DMIA could be treated as capital contributions under clause 6.21.1 of the NER and therefore not rolled into the regulatory asset base (RAB) at the start of the next regulatory control period. However the AER's decision in that regard will only be made as part of the next distribution determination."

All costs incurred by UE under the DMIS for the Summer Saver Trial are classified as operating expenditure.

UNITED ENERGY

2.3 DMIS Reporting

The information contained in this report and its attachment appendices is suitable for public publication.

The AER requires that a DNSP's annual report must include the following for each project.

2.3.1 VPP Project

1. The total amount of the DMIA spent in the previous regulatory year, and how this amount has been calculated.

UE had $72,631.54 excl. GST of expenses during the 2016 calendar year on activities associated with the DMIA for VPP projects. The costs were associated with engaging external consultants, hardware procurement, installation and maintenance and ongoing operational expenses associated with the pilot.

These costs can be categorised as follows:

- $ 4.43k excl. GST for the VPP Sunverge pilot project including hardware maintenance costs, retention of operational data, ongoing operational expenses associated with the pilot (such as sim cards to enable remote control and continuous live monitoring of the systems by UE etc.) and software maintenance.
- $ 42.7k excl. GST for the Burwood Tesla pilot including procurement costs for the installation of a new inverter and reconfiguration of the Burwood installation to a dual battery architecture.
- $ 25.5k excl. GST in legal expenses.

Further costs associated with transitions of the VPP pilot project to business-as-usual are likely to be incurred by UE in the 2017 calendar year, drawn from the 2016-2020 DMIA allowance.

2. An explanation of each demand management project or program for which approval is sought, demonstrating compliance against the DMIA criteria in section 3.1.3 with reference to:

(a) the nature and scope of each demand management project or program

A VPP can be defined as a cluster of grid-connected distributed generation and storage plants that are monitored and controlled by an operator for energy trading and grid benefits. When combined, the cluster can then be treated as a single power plant. For UE's VPP project we intend to use solar PV and battery storage technologies which when combined can act to reduce peak electricity demand.

(b) the aims and expectations of each demand management project or program

The aim of the project is to test the VPP concept and its ability to control peak demand through the dispatch of battery storage optimised against solar PV generation.

Traditional network solutions usually result in sunk capital; the resulting augmented asset cannot be easily recovered and used elsewhere if future demand falls. This project's aim is to validate or otherwise, the use of a VPP to manage embedded generation and storage in a residential setting for the provision of efficient and prudent network augmentation. The solution will be validated if it:

- Effectively avoids/defers CAPEX/OPEX requirements in a prudent and efficient manner.
- Is the most economic outcome when actual costs and benefits are known.
- Is a technically appropriate solution with appropriate mitigation of any risks.

The objectives of this project are to validate VPP as a suitable approach for managing augmentation on the UE distribution network with no adverse impacts to network reliability and safety. The VPP project aims are:

- To test the current state of the technology and its ability to scale.

- To identify the risks.
- To test and assess the level of control that can be achieved with commercially available devices currently on the market.
- To develop an understanding of the economics of the solution and validate the solution is a viable load management tool by exploring and then testing the business model(s), taking the generation, retail and distribution aspects into consideration.
- To explore and test the contractual and commercial agreements with 3rd parties and Residential Hosts (customers).

(c) the process by which each project or program was selected, including the business case for the project and consideration of any alternatives

This project proposes VPP as a solution to address peak demand issues in low voltage feeders when augmentation costs using traditional solutions are high. It is anticipated that in the future, distributed generation and storage will have application for the entire network as costs continue to fall.

(d) how each project or program was/is to be implemented

The overall VPP project has been broken into key stages to ensure that appropriate governance over costs, risks and benefits and associated gating and review are applied at each stage, with each stage being subject to independent approval. Stage 1 which is essentially complete consisted of a VPP system comprising thirteen installations at residential sites totalling 50kW. The installation sites were limited to UE employees and VPP project team members' premises within the UE distribution area to manage identified risks. Stage 1 was operated over an extended period to test the economics and commercial models and understand the technology's capabilities, limitations and suitability for larger scale deployment. Stage 2 which involves deployment to capacity constrained sites to defer traditional augmentation is now underway.

(e) the implementation costs of the project or program and

In September 2013 UE submitted a request to the AER to seek indicative up-front approval to use part of the 2011-2014 allocation of Demand Management Incentive Scheme (DMIS) funding (part A) to support the development of UE's Virtual Power Plant (VPP) Project. This was endorsed by the AER on the 2nd October 2013. The overall VPP project stage 1 was estimated to cost $1.75M.

Stage 2 is estimated to cost $0.2M during 2017, being largely the costs to transition the project to business-as-usual.

(f) any identifiable benefits that have arisen from the project or program, including any off peak or peak demand reductions.

We have identified a number of constrained locations around the UE network where deployment of VPP is able to achieve peak demand reductions economically. These sites will be targeted for Stage 2.

3. The costs of each demand management project or 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 or operating expenditure approved in the AER's distribution determination for the regulatory control period under which the DMIS applies, or under any other incentive scheme in that determination.

- Expenditure under the demand management incentive scheme is not eligible for recovery under any other jurisdictional incentive scheme

UNITED ENERGY

- Expenditure under the demand management incentive scheme is not eligible for recovery under any other state or Commonwealth government scheme
- Expenditure under the demand management incentive scheme has not been approved in the AER's distribution determination for the regulatory control period under which the scheme applies, or under any other incentive scheme in that determination.

4. An overview of developments in relation to projects or programs completed in previous years of the regulatory control period, and of any results to date.

Not applicable.

2.3.2 Summer Saver Project

1. The total amount of the DMIA spent in the previous regulatory year, and how this amount has been calculated.

UE had $432,821.89 excl. GST of expenses during the 2016 calendar year on activities associated with the DMIA for the Summer Saver projects comprising of the following:

- Creating a customer registration website, marketing, paying customer participation incentives, procuring and installing technology including the Smart Energy app, technology development and conducting market research.

2. An explanation of each demand management project or program for which approval is sought, demonstrating compliance against the DMIA criteria in section 3.1.3 with reference to:

(a) the nature and scope of each demand management project or program

This Summer Saver Trial 2016 was an investigation of how effective and efficient customer demand response is as a non-network alternative at addressing demand at peak times.

Different mechanisms of demand response can be utilised to motivate and/or incentivise customers to change their energy usage behaviour and reduce load during peak times. These include:

- Voluntary Demand Side Participation (DSP): incentivises customers to reduce/shift their load during peak times with a single-rate reward paid to those who reduce usage by any amount.
- Direct Load Control: gives the utility more certainty in managing load by allowing the utility to manage appliances (RCAC and/or pool pump) during peak times to a known and predictable maximum.
- Critical Peak Pricing: electricity is priced significantly more during peak times to induce customers to reduce load and save money on their bill.
- Supply Capacity Limiting: sets a limit on the customers supply during peak times. This mechanism targets high users by enforcing a reasonable limit on their supply during peak times. Signing up to this option is voluntary and it is envisioned that such customers are genuinely keen to save energy and be more comparable to their neighbours.

Summer Saver Program 2017 is the transitional phase for the Summer Saver Project from a trial basis to a business-as-usual program as a non-network alternative at addressing demand at peak times. The program utilises a variation of Voluntary Demand Side Participation (DSP) similar to that of Summer Saver Trial 2016.

(b) the aims and expectations of each demand management project or program

The key objectives of the Summer Saver Trial 2016 were to investigate and assess the benefit provided to the network through:

- demand management tools:

UNITED ENERGY

  - investigate the take-up and impact of the three demand management mechanisms on customer load at peak times
  - incentivise customers to reduce their load during peak times via one or more demand management tool
- Informing and empowering the consumer:
  - provide consumers with the tools and information they need to take an active role in managing their consumption and to reduce energy costs and environmental impact

To this end, the trial intended to:

- investigate the take up of the different demand management mechanisms and their
  - attractiveness/value to the customers managing/reducing their load
  - attractiveness/value to UE in managing peak load
- investigate the value of the different demand management mechanisms compared with network solutions
- identify risks with the technology in installation and operation
- develop UE knowledge and capability in leveraging Advanced Metering Infrastructure benefits
- develop relationships with UE customers
- explore and test contractual and commercial agreements with 3rd parties (retailers, contractors, suppliers)

The outcomes of this trial has enabled UE to develop a demand management model that describes the best combination of mechanisms that will result in the biggest peak demand reduction at specific locations based on customer demographics and load profiles.

This model is now being incorporated into business-as-usual activities to manage peak demand.

The key objectives of the Summer Saver Program 2017 is the transitioning of a trial demand response program to a business as usual activity to manage peak demand.

This includes a trial of high frequency Advanced Metering Infrastructure data to help inform customers in managing their load.

(c) the process by which each project or program was selected, including the business case for the project and consideration of any alternatives

Approximately 85% of UE's network services residential customers. This trial investigated various demand management options that can be employed by residential customers. The results of this trial has helped UE define which demand management mechanisms have the biggest customer take-up and participation and yield the biggest load reductions at a given incentive value.

(d) how each project or program was/is to be implemented

UE undertook analysis to identify areas that are likely to experience an interruption and could benefit from load reduction through demand management. Customers in these areas were sent addressed letters informing them of the project and inviting them to register via the UE registration website.

UE accepted registrations from customers within the area who have either a mobile phone or email account to receive UE event alerts.

UE sent app notifications, SMS and/or email alerts to customers:

- 48 hours notification of an event day
- 24 hour notice of the event period
- And a reminder on the morning of the event day.

Following the event, UE analysed customer smart meter data to verify load reduction during the three-hour event period. Successful customers were informed via email that they will be rewarded. Rewards were processed and sent at the end of the project.

UE undertook further analysis of customer data to evaluate individual customer and total load reduction achieved for the event.

(e) the implementation costs of the project or program and

In October 2014 UE submitted a request to the AER to seek indicative up-front approval to use part of the 2011-2014 allocation of Demand Management Incentive Scheme (DMIS) funding (part A) to support the development of UE's Summer Saver Trial. This was endorsed by the AER on the 24th November 2014. The overall Summer Saver Trial was estimated to cost $0.59M.

In 2016 the DMIA costs were incurred on marketing activities that included letters mailed to customers and flyers dropped in letter boxes. Funds were also spent on market research of customers within the trial area to understand the best channels to inform customers of the trial and motivations for signing up (or not) to the trial. Research was conducted on trial members to learn about their experience on the trial and find ways of improving the trial. A large body of work was undertaken to create an automated registration website for customers that linked to the Smart Energy app as well as procuring and setting up the Smart Energy app. Funds were incurred on deploying DRED technology at customers' premises over the summer.

With the completion of the trial we now expect to incur further costs of approximately $0.3M during 2017, being largely the costs to transition the project to business-as-usual and for use of the Smart Energy app.

(f) any identifiable benefits that have arisen from the project or program, including any off peak or peak demand reductions.

UE called four event days last summer.

Event data showed that:

- An average of 75% of registered customers participated at any single event. This is confirmed by post summer customer research that shows that a significant portion of customers tried to participate but data shows that they did not manage an energy reduction during the event.
- An average of 37% demand reduction was achieved across all four events
- 100% participation rate by customers on load control trials.
- No rebound peak/shifted peaks were observed during the event days

3. The costs of each demand management project or 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 or operating expenditure approved in the AER's distribution determination for the regulatory control period under which the DMIS applies, or under any other incentive scheme in that determination.

- Expenditure under the demand management incentive scheme is not eligible for recovery under any other jurisdictional incentive scheme
- Expenditure under the demand management incentive scheme is not eligible for recovery under any other state or Commonwealth government scheme

UNITED ENERGY

- Expenditure under the demand management incentive scheme has not been approved in the AER's distribution determination for the regulatory control period under which the scheme applies, or under any other incentive scheme in that determination.

4. An overview of developments in relation to projects or programs completed in previous years of the regulatory control period, and of any results to date.

Not applicable.

3 Attachments

3.1 Appendix 1 – VPP Pilot Project Stage 1 Report

- Background
- Virtual Power Plant Project
- Sunverge Pilot
- Tesla Pilot
- Future Initiatives

Award Links:

http://www.cleanenergysummit.com.au/awards.html

3.2 Appendix 2 - Summer Saver Project Report

- Customer Letter
- Frequently Asked Questions
- Promotional Flyer
- Terms and Conditions
- UE Website Content
- Trial Results

Award Links:

http://www.peakload.org/?page=Award2016

http://www.australian-utility-week.com//Awards