

# **ARENA Demand Response Trial**

## **ARENA Test 4 Knowledge Share**

December 2019



**EnergyAustralia**

LIGHT THE WAY

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# Executive Summary

EnergyAustralia has progressed strongly with the demand response trial in the latter half of 2019, growing our Behavioural Demand Response (BDR) cohort significantly - from less than 10,000 at the beginning of the year, to over 19,000 in December.

We trialled two offers in relation to residential BDR this year: a standard offering, whereby customers are sent text messages on the day of the event and their results a few days later; and a premium experience, whereby customers have access to their near real-time consumption and reduction during an event. A more cost reflective BDR incentive was also trialled under the premium experience. Given the Premium BDR experience has higher operational and system costs, it will need to be assessed against the improved curtailment and engagement benefits at the end of the program, 30 November 2020.

BDR customers were surveyed about the way they use electricity; 55% moderately to significantly change their behaviour at the time of a PowerResponse event, which demonstrates a high level of engagement of active customers.

This is consistent with the level of understanding and confidence of these customers in making the necessary changes to their electricity usage.

The vast majority (3 out of 4) BDR customers would like to receive more information and useful tips on how to reduce energy consumption during a demand response event. This is essential to provide guidance for subsequent PowerResponse events and highlights an opportunity for further education to support understanding and take-up by customers.

Recruitment campaigns and research conducted in relation to campaigns identified the financial rewards are what entices a customer to register for PowerResponse. The community or environmental/grid stability elements are considered a secondary benefit but not the driver for most customers.

- No sign-up bonus vs sign-up bonus: A higher conversion rate was experienced when offering a bonus upon sign-up.
- Customer Motivation: It can be difficult to motivate a customer to join a program that helps solve a problem they don't know about; and has the perception of little to no impact on their day to day life.
  - A significant amount of education is needed before beginning recruitment for customers to understand why a program such as PowerResponse is needed, how it will impact their lives and what their contribution would be.
- Incentive structures: The bill credit reward is the main reason for participating in the program.
- Event Communication: Customers feel the level of communication in relation to calling an Event is about right, however the notification period prior to the event is a key ingredient for an active and meaningful participation of BDR customers during an event. Post-event notifications (communicating results) are also important to maintain strong engagement.

Additionally, we continue to test and learn in relation to Load Control Devices (LCD) and Virtual Power Plants (VPP; which include batteries and other storage devices), having completed several marketing campaigns aimed at increasing customer numbers.

Load Control Devices are a complex product. This complexity extends to the product install and the customer profile. To date it is these two areas which have proven to be the biggest challenges. This adds time and risk to each installation, often resulting in higher than expected costs. Finding a customer who is interested in having a complex device, which they likely do not understand, installed in their switch board and allowing another party to switch off/on circuits is a difficult proposition. This is part of the challenge to resolve moving forward.

Our Virtual Power Plant focus has been on batteries but could include electric vehicles and other energy storage products that may form part of the trial as we progress.

- Compatibility issues of storage devices with inverters in some cases caused complications during an event and had the potential to be offline at the time of need.
- Aggregation platforms – can be expensive when multiple brands underpin the VPP.

The Commercial and Industrial (C&I) segment of the portfolio continues to deliver the largest amount of Megawatts (MW). New customers were brought into the portfolio over the past 6 months. The team has also noticed customers tend to provide increased DR as more events are called and their operational procedures mature.

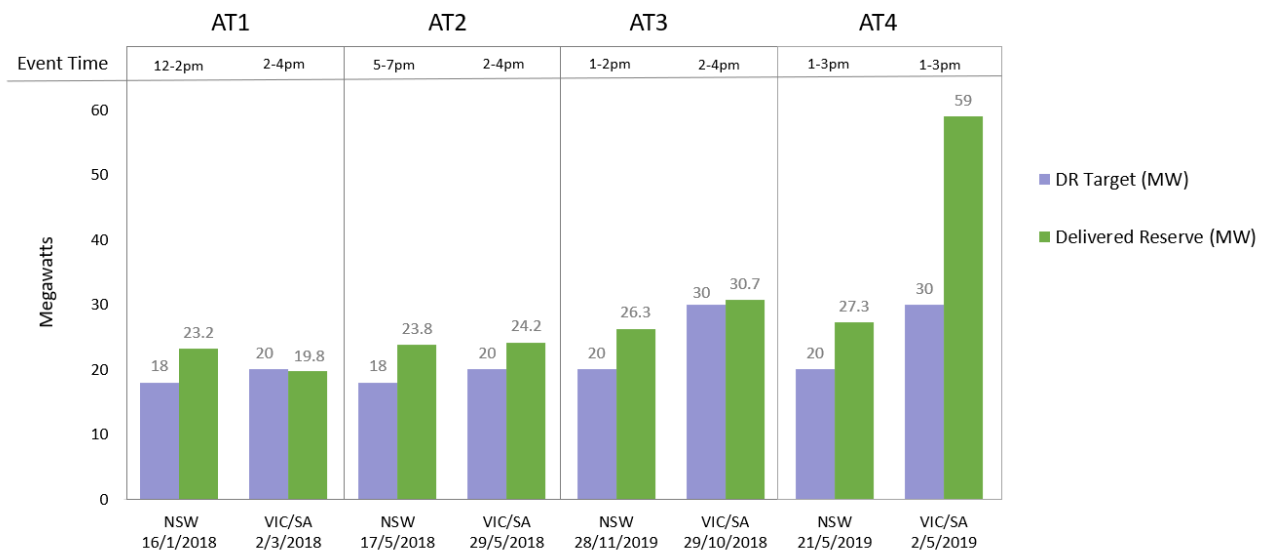
# Introduction

This document is a continuation of knowledge already shared<sup>1</sup> for previous Activation Tests (AT1, AT2 and AT3) and focuses on the subsequent Activation Test 4 (AT4) and other test events held between May and October 2019. It does not include Activation Test 5 (AT5).

This document leverages new learnings and experiences following AT4 and the launch of our residential platform for demand response.

EnergyAustralia’s focus following AT4, combined with our residential demand response solution launch, was to increase customer adoption of the PowerResponse program. Our goal is to continue testing and learning what demand response products and services best meet the needs of customers and provide the best capability to manage demands on the electricity system at peak times. These learnings are then used to increase our Mass Market (MM) Behavioural Demand Response (BDR) cohort, grow the Virtual Power Plant (VPP) capability and deploy more Load Control Devices (LCD).

In the Commercial and Industrial (C&I) segment, there was a focus on creating a more diversified portfolio and further educating customers about DR.



**Figure 1 – Results of all Activation Tests to date**

<sup>1</sup> [Demand Response Project Performance Report](#).

# 1 Activation Test 4 (AT4) – VIC/SA-2 May 2019

## 1.1 Overall

This test incorporated both MM and C&I customers in South Australia (SA) and Victoria (VIC), and all three (3) curtailment types were called upon:

- BDR
- LCD
- VPP

Overall, AT4 delivered 58.6MW. C&I sites provided 58.9MW, offsetting MM customers who consumed 0.3MW more as not all mass market customers participate due to the voluntary nature of BDR.

Additionally, it was very difficult for MM to contribute on a very mild weather day (~18°, patchy rain in Melbourne; ~13° and mild in Adelaide).

DR Type	Delivered Reserve (kW)	DR (% of Total)
MM BDR	-302.0	-0.52%
C&I	58,862.5	100.48%
MM VPP	20.8	0.04%
MM LCD	0.06	0.00%
<b>TOTAL</b>	<b>58,581.25</b>	<b>100%</b>

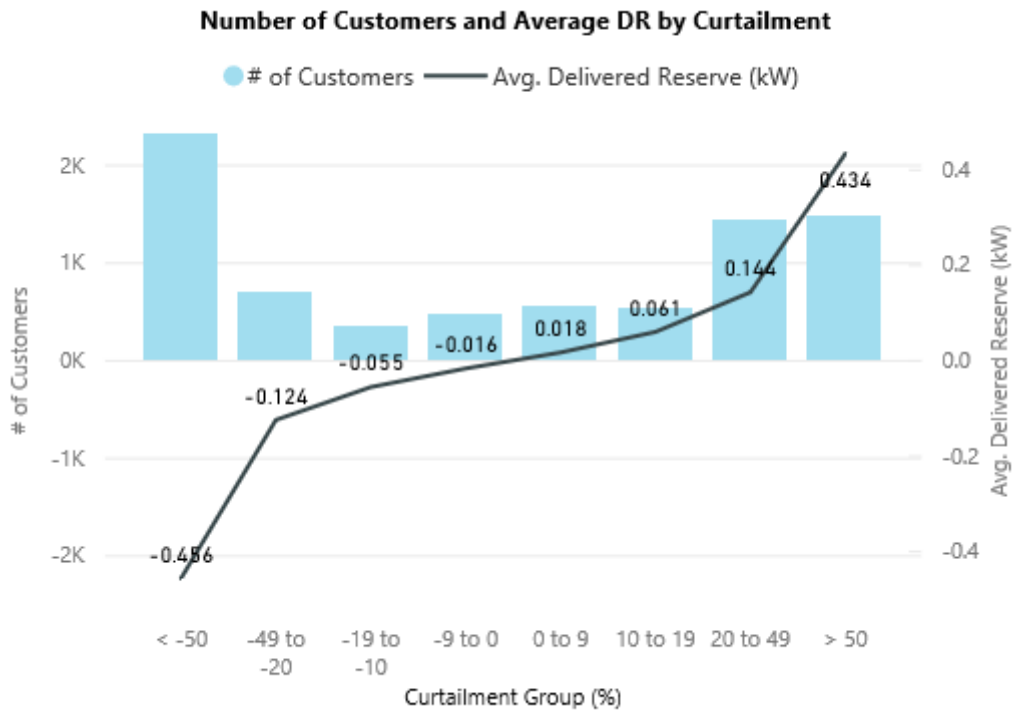
Table 1: Delivered Reserve and percentage of total by cohort

When considering only **performing MM** customers, the total reserve delivered was 59.8 MW, with MM contributing 0.9MW.

DR Type	Delivered Reserve (kW)	DR (% of Total)
MM BDR	868.28	1.46%
C&I	58,862.51	98.5%
MM VPP	25.62	0.04%
MM LCD	2.25	0.00%
<b>TOTAL</b>	<b>59,758.66</b>	<b>100%</b>

Table 2: Delivered Reserve and percentage of total by cohort of performing customers

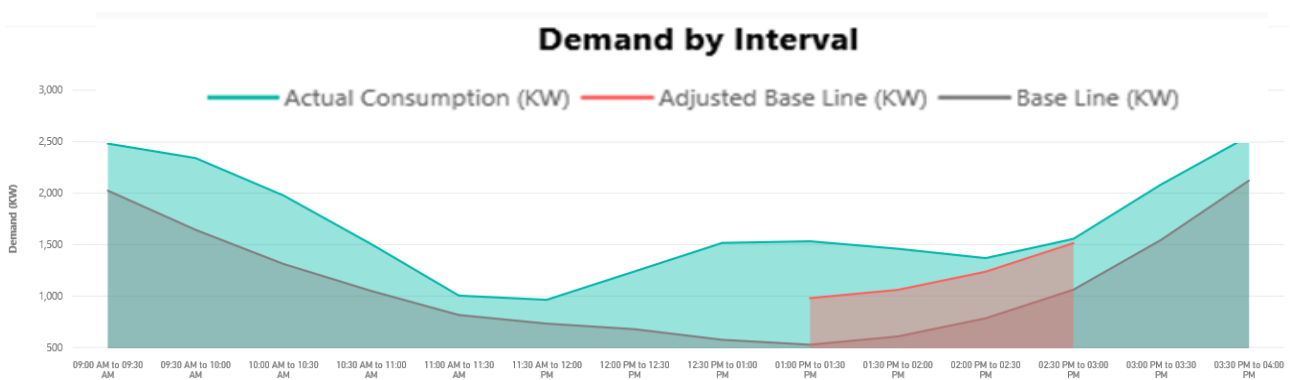
Overall in MM, approximately 39% of customers consumed over 20% more than their adjusted baselines, while approximately 37% of customers reduced their consumption by 20% or over.



**Figure 2: Average delivered reserve by number of customers and percentage**

## 1.2 VIC/SA – Mass Market

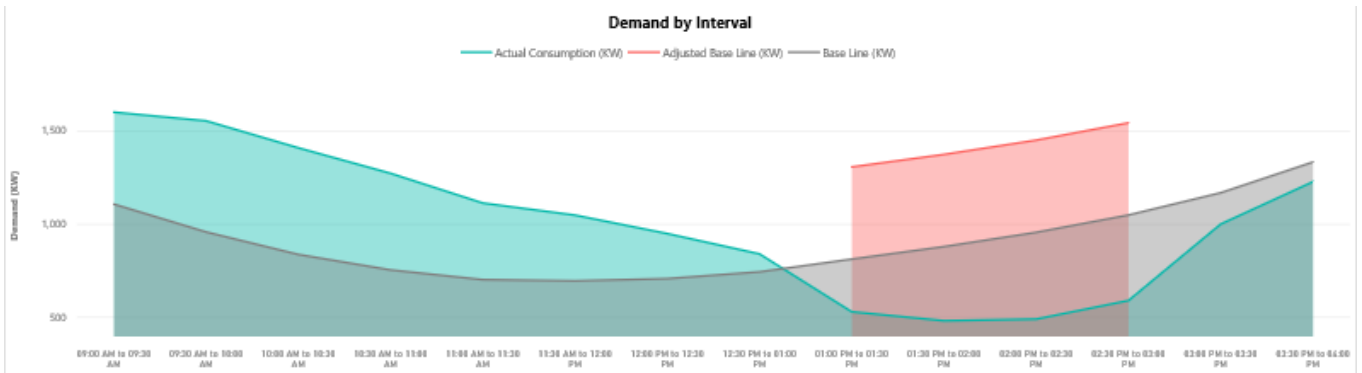
As shown below, the combined usage of MM customers during the test event was more than what they would have otherwise used, across all three curtailment types (BDR, LCD and VPP).



**Figure 3: MM demand during VIC/SA AT4**



When considering only the **performing** customers (i.e. those who curtailed), they reduced their usage to provide a total reserve of 0.9MW (896.2kW), detailed below:

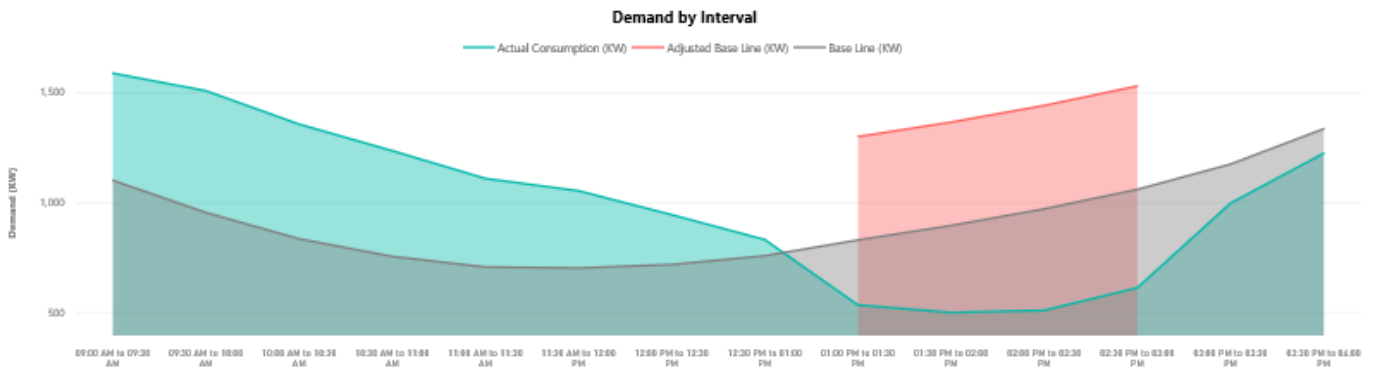


**Figure 4: MM demand during VIC/SA AT4 when considering only performing customers**

### 1.2.1 Behavioural Demand Response (BDR)

BDR is the voluntary reduction or shift of electricity usage by existing customers, which could help to keep a power grid stable by balancing supply and overall demand of electricity. This helps to make electricity systems flexible and more reliable, which is beneficial for the community and for customers.

Most of the MM reserve came from BDR customers (868.3 kW). This was consistent with expectations given the higher number of participants in this cohort. Pre-event communications were sent out on the day of AT4, a few hours prior to the event. The post-event communications were sent out via SMS notifications using a customer engagement platform.



**Figure 5: MM BDR demand during VIC/SA AT4**

### 1.2.2 Load Control Device (LCD)

LCDs were installed exclusively on pool pumps and customers with an LCD performed well during the test, providing 2.3kW of reserve.

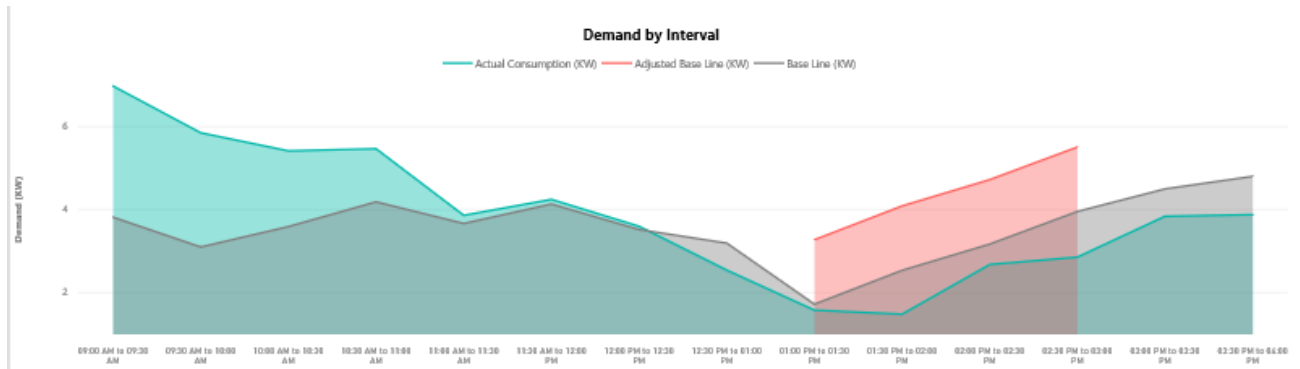


Figure 6: MM LCD demand during VIC/SA AT4

### 1.2.3 Virtual Power Plant (VPP)

EnergyAustralia’s VPP is a collection of energy storage systems managed (being charged and discharged) either individually or simultaneously to support the electricity grid. Our VPP customers were invited to participate in the event and allowed EnergyAustralia to discharge their battery during the event. They provided a total load of 25.6kW.

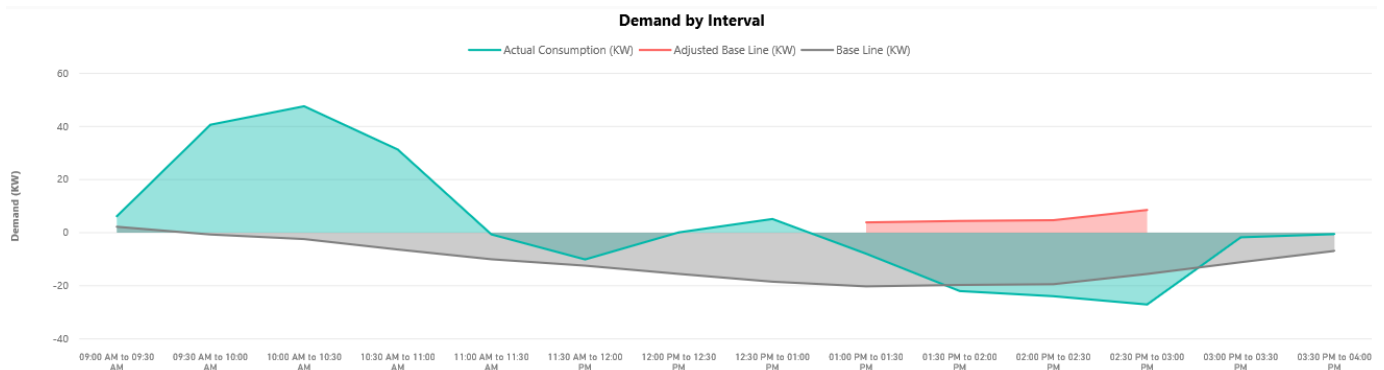


Figure 7: MM VPP demand during VIC/SA AT4

### 1.3 VIC/SA – Commercial & Industrial (C&I)

C&I customers across VIC and SA delivered 58.9MW. Approximately 5% (1.4 MW) of total load was provided from fossil-fuel sources which is well under the target of 20%.

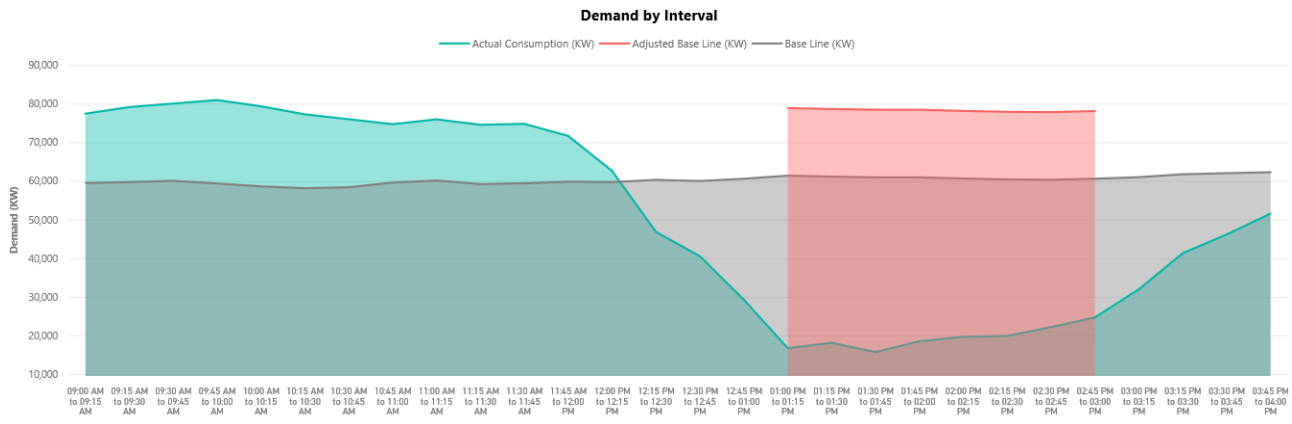


Figure 8: C&I demand during VIC/SA AT4

## 2 Activation Test 4 (AT4) – NSW-21 May 2019

### 2.1 Overall

This test incorporated both MM and C&I customers, and all three MM curtailment types were called upon (BDR, LCD and VPP). Overall, AT4 delivered 27.3 MW, with the majority provided by C&I sites (99.9%) while MM customers did not deliver any reserve as the reserve provided was cancelled out by those who utilised more than their adjusted baseline. Approximately 32% of total MM customers consumed 20% (and over) more than their adjusted baseline, while the same proportion of customers reduced their consumption by 20% and over.

This is the first time 'Premium' customers were invited to an Activation Test and overall delivery was 26.5 kW. Premium is an alternative platform to trial demand response in **NSW only**, whereby customers receive a gift card instead of a bill credit as per our standard offering. Premium customers are also able to access near real-time reporting (5-minute intervals).

The majority of load was supplied by C&I; it was very difficult for MM to contribute on a mild weather day (~26° in Sydney).

DR Type	Delivered Reserve (kW)	DR (% of Total)
BDR MM (Standard)	-12.1	-0.04%
BDR MM (Premium)	26.5	0.10%
C&I	27,282.3	99.9%
VPP MM	12.1	0.04%
<b>TOTAL</b>	<b>27,308.8</b>	<b>100%</b>

Table 3: Delivered Reserve and percentage of total by cohort

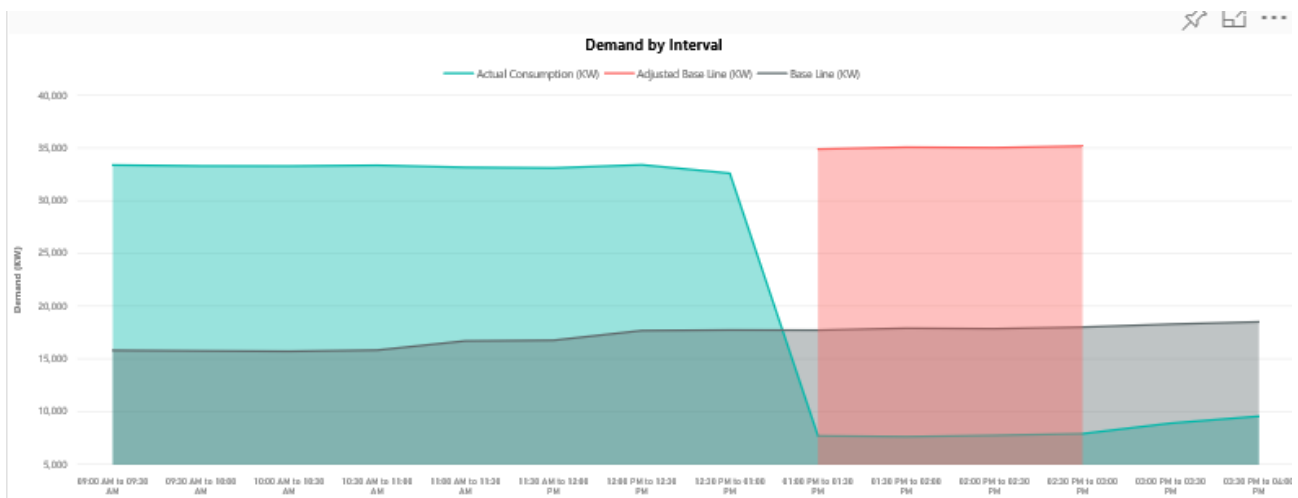
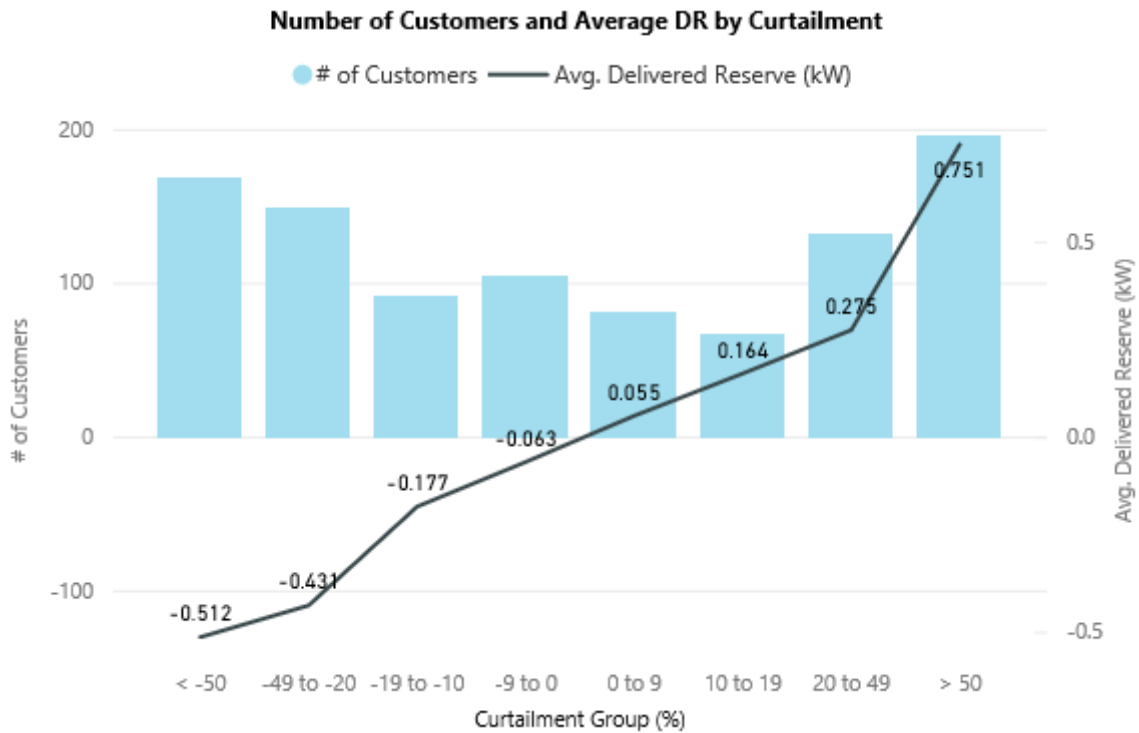


Figure 9: Total portfolio demand during NSW AT4

Overall in MM, approximately 32% of total customers consumed 20% (and over) more than their adjusted baseline while the same proportion of customers reduced their consumption by 20% and over.



**Figure 10: Average delivered reserve by number of customers and percentage**

## 2.2 NSW – Mass Market (MM)

AT4 NSW invited residential BDR customers from two different propositions – Standard and Premium – to reduce their consumption. Their combined delivery was 14.4 kW, based on CAISO-10<sup>2</sup> method.

When considering only performing customers from Mass Market, the BDR delivered reserve was 54.4 kW from customers on the standard offer and 132.4 kW from premium platform customers, giving a total of 186.8kW.

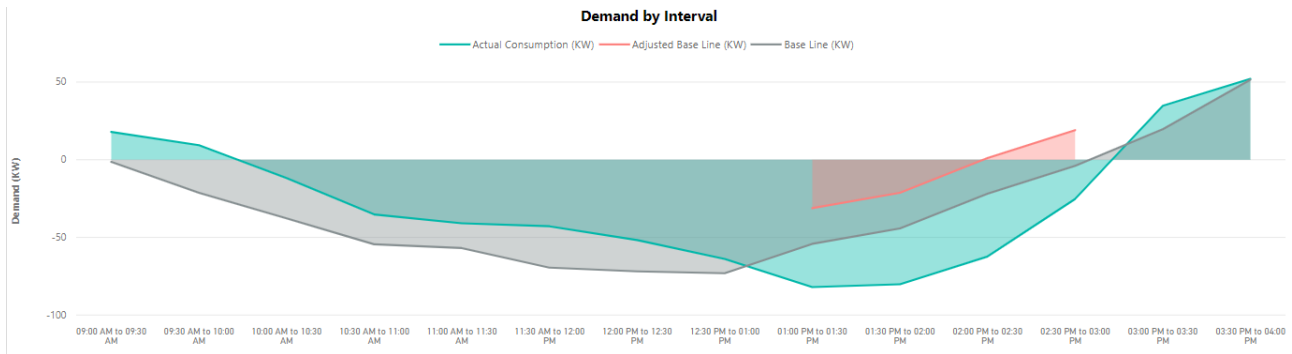
DR Type	Delivered Reserve (kW)	DR (% of Total)
BDR (Standard)	54.4	0.20%
BDR (Premium)	132.4	0.48%
C&I	27,323.7	99.27%
VPP	13.4	0.05%
<b>TOTAL</b>	<b>27,523.9</b>	<b>100%</b>

**Table 4: Delivered Reserve and percentage of total by cohort of performing customers**

<sup>2</sup> [Baselining-arena-aemo-demand-response-rert-trial.pdf](#)

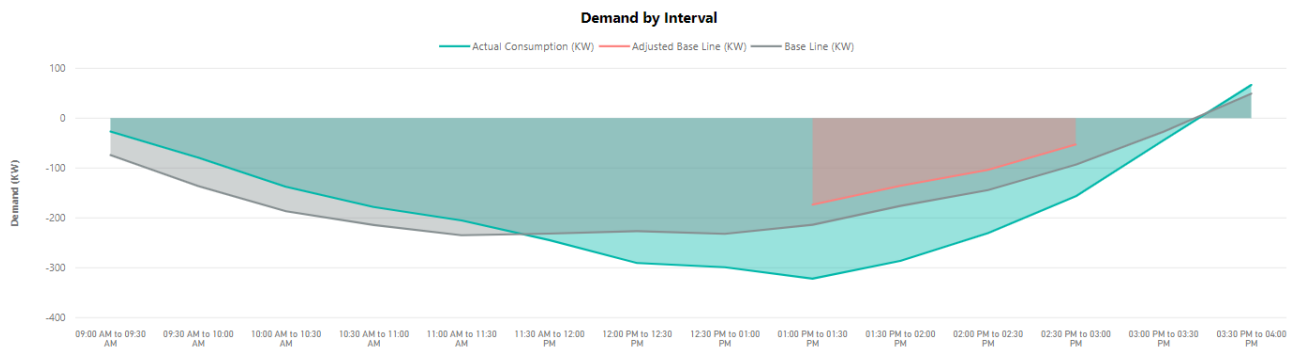
### 2.2.1 Behavioural Demand Response (BDR)

Approximately 27% of the load, 54.4 kW, was from the BDR 'standard' participants which is an average-load-per-customer of 0.31 kW. In comparison, in NSW the other cohort on the 'premium' platform performed better. It is considered that more visibility of their actual usage in real time encouraged curtailment. This is particularly true for selected solar customers who are very much engaged with energy usage. Their average load was 0.44 kW, or +41% higher compared to the Standard BDR cohort.



**Figure 11: MM BDR 'standard' demand during NSW AT4**

Customers on the premium platform reduced their usage to deliver 132.4kW (based on CAISO10 method) which makes the Average-Load-per-customer 0.44 kW.



**Figure 12: MM BDR 'premium' demand during NSW AT4**

### 2.2.2 Load Control Device (LCD)

There were no LCD customers in NSW for AT4.

### 2.2.3 Virtual Power Plant (VPP)

MM VPP customers were invited to participate in the test by allowing EnergyAustralia to control their battery to discharge. This provided a total load of 13.4 kW.

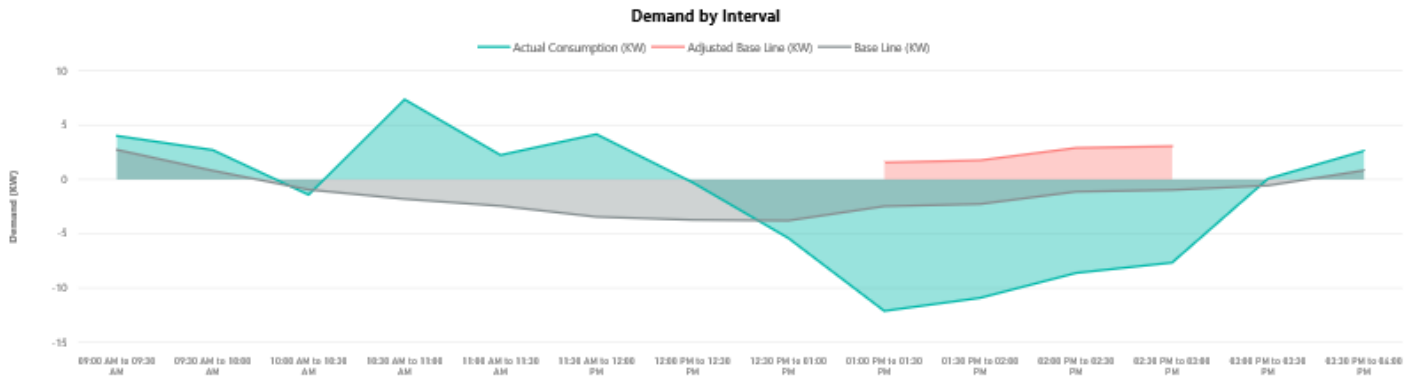


Figure 13: MM VPP demand during NSW AT4

### 2.3 NSW – Commercial & Industrial (C&I)

C&I customers delivered 27.3MW, however some C&I customers consumed more than their adjusted baseline. Overall it was still a strong result across our C&I network and consistent with that expected from this cohort of customers.

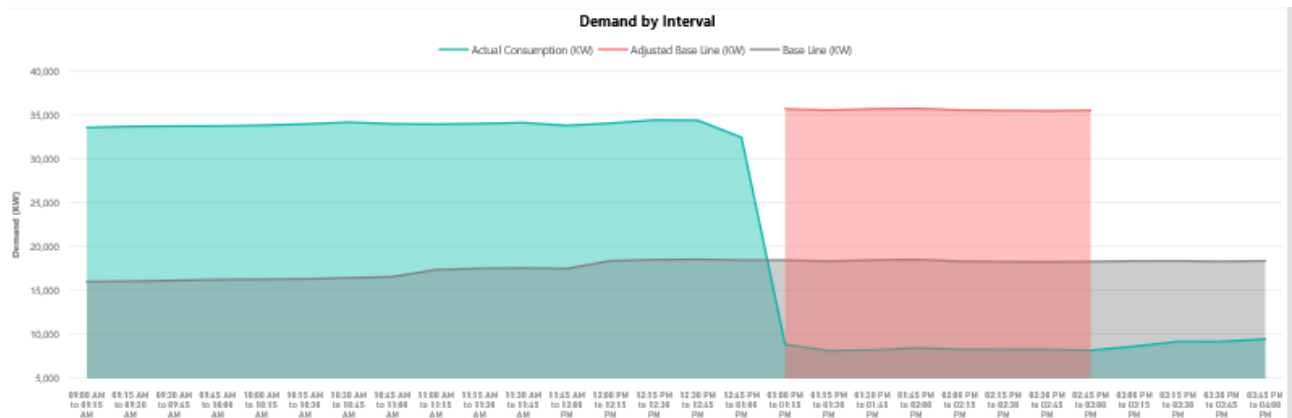


Figure 14: C&I demand during NSW AT4

### 3 Demand Response Platform

We successfully deployed a new in-house mass market platform in May 2019 to enable customers to easily sign up for PowerResponse online. EnergyAustralia ran a small BDR marketing campaign and test event (27 May) to test end to end capability of the platform.

Some of the key learnings from that process were:

- Better management of customers with Life Support equipment through an automated process during PowerResponse registration. This was added to prioritise customer health and ensure regulatory compliance and means customers with Life Support requirements are automatically excluded from PowerResponse registration. A positive secondary outcome is that we are identifying additional Life Support customers which EnergyAustralia may not have otherwise been aware of.
- The new platform presented a few issues in managing subscriptions for customers who were changing retailer to EnergyAustralia. The eligibility criteria for these customers was not always available immediately in EnergyAustralia systems and required some manual intervention for a period.



## 4 BDR Lessons Learned

The “Standard BDR” PowerResponse customers are one of the most active and engaged cohorts. As this base has grown from around 9,000 residential customers (end 2018) to ~19,000 as at November 2019, they have become the cornerstone for DR in the Mass Market space. EnergyAustralia continued to invest in capabilities to scale up this DR model and increase the adoption rate in the different retail channels. To date, new and important findings have been taken from customer surveys and customer feedback post the AT4 test and the October events.

### Customer research findings

When BDR customers were asked about how actively they have changed the way they use electricity, around 55% moderately to significantly did change at the time of the PowerResponse event. Only a minority 16% did not shift their behaviours, which demonstrates the level of engagement of active customers.

This is consistent with the level of understanding and confidence of these customers in making the necessary changes to their electricity usage. Around 59% confirmed that “they were confident and knew what changes they needed to make” and another 34% had a rough understanding of what changes they had to make.

The main behavioural changes implemented by the customers were:

- Shifted the usage of appliances to before or after the event;
- Turned off the air-conditioner/ heater;
- Turned off the lights, computer, TV and/ or other appliances at the socket (only the refrigerator was running during the event– base load.); or
- Simply just left the house.

The vast majority (3 out of 4) BDR customers would like to receive more information and useful tips on how to reduce energy consumption during a demand response event. This is essential to provide guidance for subsequent PowerResponse events.

The business is also looking at other residential products for demand response including a “premium” BDR experience and customer communications with more access to real-time usage data.

### 4.1 Current status

From a “test and learn” approach, EnergyAustralia has now scaled up the DR adoption model via direct marketing campaigns to existing customers, planned communications to increase awareness, and through active calls in the Call Centres. Training and face-to-face discussions has been implemented, involving the majority of sales and inbound agents. This has increased the awareness of the new propositions and conversations around DR.

The website content and a specific PowerResponse landing page were launched to increase the digital presence during Q3 2019.

## 4.2 Marketing insights

In this period, EnergyAustralia conducted a recruitment campaign to attract current eligible customers to join PowerResponse. In line with previous research, the messaging hierarchy gave preference to rewards and incentives over the benefit to the community. A more immediate reward (sign-up bonus) in a recruitment email resulted in double the conversion rate.

### No sign-up bonus vs sign-up bonus

Two types of recruitment emails were sent, one without a sign-up bonus and another with a \$10 sign-up bonus. The email without the sign-up bonus had conversion rate of 2%. Two weeks later, the same email was sent to the customers that didn't register with the additional \$10 sign-up bonus and a 'limited time only' offer, this resulted in a 4.4% conversion rate.

### Target Market

Marketing Research was conducted targeting over 96,000 customers to identify how they differed. High level results found that '400 Hearth and Home Community' represented most demand response customers, most likely because of the credits available to them. These customers are closest to the average Australian, life revolves around the home, embrace conventional family life, home improvers, and their homes as an expression of their status and achievements

### Recruitment difficulties/challenges

How to motivate customers to join a program that helps solve a problem they don't know about; and has the perception of little to no impact on their day to day life.

A significant amount of education is needed before beginning recruitment for customers to understand why a program such as PowerResponse is needed, how it will impact their lives and what their contribution would be.

## 4.3 Event Incentives

Customers could get bill credits when they curtail usage during an energy saving event, up to \$20 plus earning a \$5 reward for completing a survey about their event experience:

- \$10 reward by reducing usage by 20%-49% compared to normal usage.
- \$20 reward by reducing usage by 50% or more compared to normal usage.

From customers' feedback and survey responses, the main reasons for participating in the program are:

- to earn bill credits,
- to do my part for the environment, and
- to do my part to help keep the energy grid stable.

Bill credits earned through the program for events are applied to customer accounts within 15 business days of participation. Customers appreciated the rewards reflected in their accounts as they check their bills in MyAccount.

## 4.4 Event Communication and Customer Feedback

The customers felt that the level of communication (SMS) is “about right”. The pre-event SMS is very important in terms of timing and this becomes a concern when they do not have enough time to prepare for an upcoming event. During the 29 August event, due to operational constraints and increased volumes, the SMS only went out an hour prior to the DR event. This did not resonate well with customers and was reflected in the lower Net Promoter Score (NPS) in surveys post the event. However even with the ‘very short’ lead time, 51% of invited customers responded and reduced usage during that test event.

Notification period prior to the event is a key ingredient for an active and meaningful participation of BDR customers during an event. Post-event notifications (communicating results) is also important to maintain strong engagement.

## 4.5 Market Event Results

### Event 29 August 2019

Due to market conditions on the morning of 29 August, EnergyAustralia triggered a DR event between 6:00pm and 8:00pm AEST, inviting 8,409 Mass Market customers to reduce their usage. 4,308 customers (**51%**) responded to the event by providing reserve of 2.18 MW.

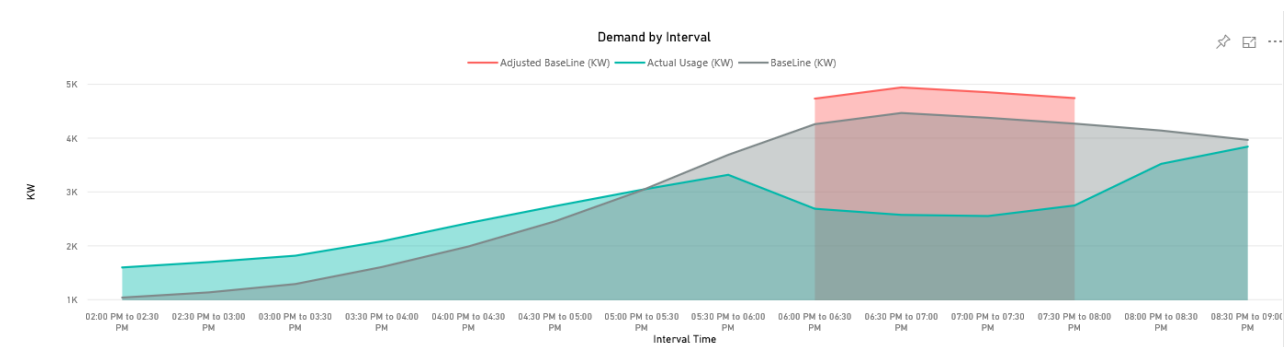


Figure 15: BDR demand during 29<sup>th</sup> of August 2019 Market event

This includes VPP customers whose contribution was 36.67 kW.

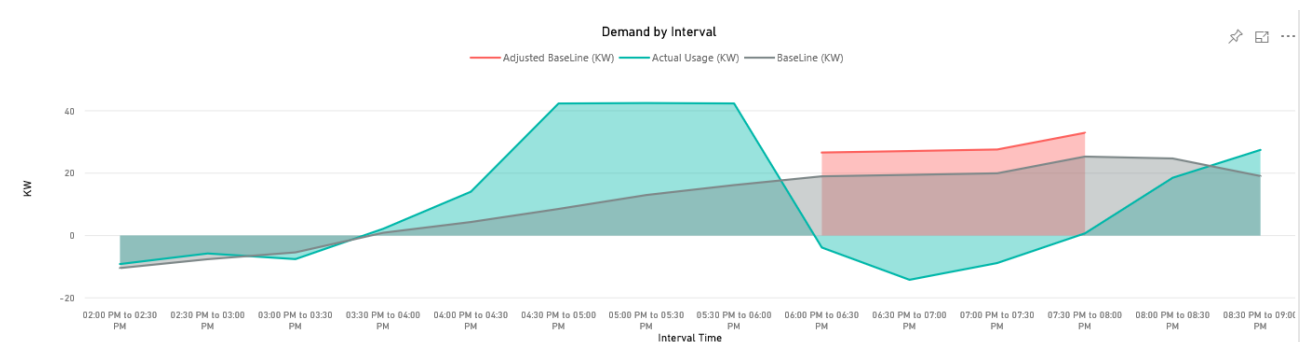


Figure 16: VPP demand during 29<sup>th</sup> of August 2019 Market event

### **Event 23 October 2019**

The event was planned to further test the EnergyAustralia DR platform's ability to handle a larger volume of customers (over 17K). This was the first attempt to run a DR event with such a large volume of customers; the event was planned for 2 hours, from 3:00pm to 5:00pm AEDT, engaging 17K + customers from the standard BDR cohort. Approximately 45% of customers (~8K) responded to the event notification by reducing their consumption and delivered a total reserve of 1.83 MW.

### **4.6 Next Steps**

EnergyAustralia is looking at other DR products adjacent to BDR in order to maximise the customer experience and participation for future test events. Smart home automation, load control devices, and customer facing platforms are being considered with the objective of enhancing, maximising the delivered load reserves during events. EnergyAustralia is anticipating more Mass Market events happening during the dry and hot summer months. Current platform processes are being optimised given the on-going customer volumes and signups.

Other marketing and communications will also expand to target new and existing EnergyAustralia customers in the different digital and below-the-line channels.

## 5 LCD Lessons Learned

Load Control Devices are a complex product. This complexity extends to the product install and the customer profile. To date it is these two areas have proven to be the biggest challenges.

No two consumer switchboards are the same resulting in the installer encountering a different safety, analysis, design and physical challenge each time they install an LCD device. This adds time and risk to each install, often resulting in a higher than expected install cost and occasionally the need for a second site visit to reconfigure the device.

Finding a customer who is interested in having a complex device, which they likely do not understand, installed in their switch board and allowing another party to switch off/on circuits is a difficult proposition. This is part of the challenge to resolve moving forward.

The ability to monitor and compare near real-time energy usage at a circuit level of detail adds an additional benefit and opportunity for the engaged customer to control their energy costs (depending on which tariffs apply) and smooth their usage patterns to meet the demands of the grid.

### 5.1 Current status

Much work and research has gone into developing propositions and products. We currently have one proposition in market and one product:

Proposition	1 - Winter Standard Load Control July 2019
Products	1 - Circuit Level Control Device
Platform	1 - Aggregation and Control & Customer facing
Customers	36

**Table 5: Current status of LCD**

### 5.2 Marketing insights

EnergyAustralia's objectives were to understand and measure customer appeal for an LCD, the effectiveness of draft recruitment email, channel preference and other insights.

Similar to our findings in relation to BDR (refer [4.2](#)), customers indicated:

#### **Increase emphasis on financial motivators to make benefits clearer**

While the overall concept was positively received, the highest performing aspect of the campaign was the secondary heading of "Be Rewarded for Saving Energy". There was some confusion amongst customers that they would have to pay for the device, so clearer communication about the value aspects is required to improve uptake.

## **Make it easier for customers to find more information**

Most customers had additional questions or information needs to build confidence in signing up. These related to how the device operates, installation process, program costs to the consumer, risk mitigation and access/control issues. Future opportunity to include a link for customers to access more information and ensure web pages have a clear FAQ section.

## **Explain the fulfilment journey for customers**

Customers had several questions about how the installation process would work and whether their pool pumps would be compatible with the device. Clear, concise communication will be required on the fulfillment process to address customer concerns prior to sign-up moving forward.

## **Campaign learnings**

EnergyAustralia had a fantastic response to a marketing campaign for our 'Pool Pump Trial' where we targeted existing BDR participants known to have a pool pump. The call to action was to respond with an 'Expression of Interest' given the need to contact the customer to discuss suitability of their switchboard, whether anything other than the pool pump was on the circuit etc. We achieved an 86% open email rate, and zero unsubscribes from EnergyAustralia's marketing material.

Unfortunately, we were unable to process more than 50% of the LCD customers who expressed interest for several reasons, including:

- Pool pump not being on a dedicated circuit
- Inability to identify which circuit connected/controlled what in a customer's switchboard
- Not enough space in the switchboard to fit an LCD

## **Recruitment difficulties/challenges**

The challenge in recruitment arises from the customer eligibility profile required to participate. The combination of having a pool and smart meter limits the opportunity size. Furthermore, these customers need to be interested in the product and proposition when targeted.

It can also be difficult to make contact with engaged customers to recruit them. We need to further assess the best communication approach.

## 5.3 Incentive Structures

### LCD Incentive – Version 1 – Summer 2018

Fixed Amount	Event
\$50.00	Payable when you sign up in accordance with clause 2(b) of this Schedule.
\$10.00	Payable per demand response request issued to you in accordance with clause 4 of this Schedule.
\$20.00	Payable per demand response event where: (a) you have activated the demand response request under clause 4 of this Schedule; and (b) the Actual Metered Consumption during the demand response event is less than the Deemed Baseline Consumption during the demand response event by a margin of 10% or greater. See our explanation below as to how your Actual Metered Consumption and Deemed Baseline Consumption is calculated by us.
\$25.00	Payable where EnergyAustralia has requested that you complete a survey, and such survey has been completed by you and returned to EnergyAustralia as required.

**Table 6: First LCD incentive structure, no longer in market**

### LCD Incentive – Version 2 – June 2019

Feature	Benefit	Value
Free install of WattWatchers device	Install of device at no cost to the customer. This is now available for them to use and control their pool pump outside of Energy Australia events.	\$600*
Sign up bonus Payable when you sign up in accordance with clause 2 of this Schedule.	Earn cash reward	\$25
Participation in event Payable per demand response request issued to you in accordance with clause 4 of this Schedule.	Reduce energy usage to the grid and earn cash reward	\$20
Participation in a survey Payable where EnergyAustralia has requested that you complete a survey, and such survey has been completed by you and returned to EnergyAustralia as required.	Earn cash reward	\$5
Energy management platform	Gives customer visibility, understanding and control of energy usage. Creates potential savings via reduced usage when devices are controlled.	Variable per customer

**Table 7: Current in market LCD incentive structure**

\* Approximate value based on device at \$250-\$350 and installation from \$200-\$700.

**Note:** The above was tested in customer research. However, the participation was \$10 and combined with a \$20 performance reward which has since been removed (as per version 1 above).

## 5.4 Event communication and customer feedback

Event notification is sent via SMS. Three messages are sent: before, during and after each event.

Due to the small number of customers participating, there has been little valuable customer feedback. One customer suggested that they had changed their Pool Pump operating timer to the end of the day just so that they were more likely to benefit financially from event participation. This is not the intended behaviour LCD or BDR propositions were designed to promote, and future propositions may need to be changed to close this 'loophole' for the desired benefits to be achieved.

## 5.5 Operations

Technical constraints with LCD devices make scaling a difficult proposition. For example, after confirming customer eligibility for our pool pump trial with the device (ie. state, pool etc), there were additional manual processes, and a minimum of two customer contacts to further discuss meter box capacity, whether any other appliances are on the same circuit as the pool pump, and then have someone attend the property to install where they may still discover an issue that prevents the device from being installed.

The cost to install a circuit level LCD device is more than initially anticipated at approximately \$700 per installation, and the benefit of controlling these devices during an event relies on load being released back to the grid during an event. Most of these devices are currently attached to a swimming pool pump circuit which may not have been used at the time of the event, therefore providing no benefit to the grid.

From a strong response in customers expressing interest in installing an LCD (56%) from the first campaign, we were able to successfully install 43%. Our second campaign had a good result at 23% registering an expression of interest, and successful installation of 75%. Both these campaigns targeted existing BDR customers, who were therefore already engaged with the DR concept and we had identified they had a pool; hence the positive take-up.

Event operations are run from a third-party platform. 3G connectivity is built into the device and data is sent to the LCD OEM. Data is then uploaded to the third-party portal. Using the Aggregation tool, the portal enables groups of customers to be created and events run by group.

Group management and event setup can be planned very quickly and with little notice enabling a fast (less than half an hour) response to a DR request. Whole group or individual devices can be switched on or off during an event. Each customer can override an event 'switch' at any time, including during an event.



## 5.6 Market Event Results

### Event 21 October 2019

EnergyAustralia ran a small LCD Test event on this date, from 12.00pm – 2.00pm to test the LCD process from end to end, following the implementation of the control portal.

We used a small number of customers as the target was not to reduce load, but to test the connectivity and ability to remotely control the devices. During the event both group and individual customer switching was tested. After the end of the event an audit of all customers was made to ensure switches were returned to the original pre-event state.

The effectiveness of an LCD device as a DR tool often depends on what other devices the consumer has at their home and how they already manage their energy usage. For example, we found that the majority of consumers who also have rooftop solar systems run their pool pumps in the middle of the day when the solar system is often producing the most energy and the home is using the least energy. In these cases, the customers contribute little to a real-life demand response event that typically occurs in the late afternoon / early evening.

## 5.7 Next Steps

Next steps are to further understand:

### The customer

- Recruitment barriers enabling us to onboard more customers interested in participating;
- Motivators to becoming involved; and
- Level of knowledge and education requirements.

### The product

- It appears that the complex installation of devices is a deterrent to customers, and a financial barrier in making a circuit level device scalable and commercially viable.
- The binary nature of the circuit level product (either 'On' or 'Off') limits the range of applications where it can be used without having an undesirable impact on customer comfort or the appliance itself. EnergyAustralia is keen to investigate the availability of devices that can partially and temporarily reduce the load of the unit to which it is connected but keep it running.

### The Proposition

- What motivates the customer as an incentive?
- What is their tolerance for events?

## 6 VPP Lessons Learned

**Compatibility of battery storage with battery inverters** – there were some cases where inverters went offline due to the technology of the inverter not being compatible with certain batteries.

**Aggregation platforms** – control and monitoring platforms that improve visibility of a battery while being able to charge and discharge, can be expensive when multiple batteries and inverters are connected to the VPP.

### 6.1 Current status

- Two energy storage systems are now included in EnergyAustralia's VPP.
- Marketing channels are mature for one of the two energy storage systems.
- Last campaign was successful with multiple new customers signing up online and via EnergyAustralia's customer service number.

### 6.2 Marketing insights

EnergyAustralia's objectives were to understand and measure customer appeal of a battery VPP, the effectiveness of leads from our solar and battery sales teams (both internal and external seller networks) and other insights.

It became apparent that, based on the high cost of a battery, that customers are more likely to be enticed by offering:

- **A Sign-Up Bonus** – this is seen as a good incentive but may need to be weighted with a shorter or no contract time frame and no exit fees providing an overall better benefit to the customer. The customers' preference was to receive this bonus up front, rather than be paid over the year.
- **Event Rewards** – these payments (or bill credits) need to be reasonably substantial to be considered worthwhile. For example, \$20 was seen as negligible, whereas \$50 piqued interest but needed to be balanced with the re-assurance that this reward would be in addition to feed-in tariffs and still leave the customer with enough energy for their own needs.
- **No Lock-in Contracts** - Customers want to be able to trial the offer to make sure it was right for them. Having no lock in contract or exit fees helps alleviate potential barriers to sign up. Customers also appreciate the ability to be able to leave whenever suits them, as well as the option to continue participating in the Virtual Power Plant.
- **FAQs** – were confirmed to be a valuable supplement to help build confidence and encourage customers to sign up.

As a general observation, customers are confused by the term 'Virtual Power Plant'. Common language is around 'batteries', highlighting a key need to ensure any marketing or informational material produced for customers must clearly articulate this concept.

Key themes that surfaced as we investigated our options in promoting VPP were:

- I'm interested, but I still have a lot of questions
- I need to do the calculations
- Tell me the impact on my battery
- Don't leave me in the dark (will I be left without power?)
- Reward me for staying (prefer not to be locked in)
- Manage my expectations (how many events will there be?)
- To switch I need to consider everything (not just PowerResponse, I have to look at rates)

We will now continue to promote VPP to assess the take-up rate as we develop and test material to respond to those customer questions.

### Recruitment difficulties/challenges

There is a lack of accurate and complete data on quantity, location and model of types of energy storage in Australia.

## 6.3 Incentive Structures

A variety of research methods were carried out to help make our data and findings more robust. We created an unbranded proposition to gauge the value of the proposition on its own merits.

Below are the parameters based on the insights from the research:

- Sign Up Bonus - \$250
- Reward per event - \$40
- Reward per survey completed - \$5
- Join for 12 months, leave anytime for free

All payments are in the form of bill credits.

## 6.4 Communication and Customer Feedback

Research was conducted with a goal to receive insights on direction for tone and message hierarchy for marketing assets. Customer feedback gave insights to develop a final proposition:

- **Reassure the customer that they have all the hardware they need** - Customers were concerned that they needed extra hardware, installation or call outs to sign up to this offer.
- **Use low to moderate technical information** - Many customers who have batteries, set their settings and view their usage daily. Their comprehension of the storage and energy flow is moderate, and we can connect to these customers by mirroring this language
- **Talking about the customer's battery** - Terms like "utilising your battery's energy more efficiently" and "extra" state that these rewards are on top of your feed-in tariff.
- **Doesn't affect the plan you're in** - Reassure the customer that this offer is compatible with their current electricity plan

## 6.5 Operations

For AT4, only one type of Solar Hybrid Inverter was used. The portal enables companies to set up groups of customers for the purpose of running demand response event. The group are not mutually exclusive, so a customer can exist in more than one group. All systems used for DR purposes use DC coupled topology.

Planning for the demand response events require EnergyAustralia employees to check:

- Whether the inverter is On-Line
- The state of charge of the battery/ batteries in each system
- The expected charge rate of battery/ batteries
- The local weather conditions for each online inverter location

Remedial action is initiated with the customer or installer to ensure offline units are brought back online, but it's unlikely that a fix will occur given the time between detection and event. Proactive monitoring of battery status would be encouraged from the OEMs.

Where batteries are not in a fully charged state, an EnergyAustralia Operator must determine what actions can be taken to maximise the charge level in a battery prior to an event start. These actions are made on a unit-by-unit basis and may include (but not be limited to):

- Do nothing. It's sunny there and it looks like the solar PV system is producing enough electricity (less current home usage) to fully charge the battery prior to the event start
- Set the battery to charge from the grid. It's cloudy, or there is a smoke haze that's preventing sufficient solar from being produced to charge the battery.
- Set the battery to charge from the grid. The customer is using all of the generated solar energy to power their home.

Event start and finish times can be set for each group by setting a dispatch target in kW, the event date and start and finish times.

Whilst all are near real-time, actual response times of the system to the dispatch command seems to vary depending on the type of battery/ batteries installed.

At the end of the event all systems revert to their pre-event state. Though at times, customer settings (e.g. charging from the grid at night when stored solar-produced energy is used up) can be wiped and not automatically re-instated post event. Manual EnergyAustralia Operator intervention is required.

EnergyAustralia has become more focused on gathering connection agreement information from customers due to Distribution Network Service Provider's (DNSPs) having a range of contrasting policies with battery export limits. Whilst often allowing solar export from the same customer, zero export from the battery system is mandated in a few regions within Victoria, regardless of the topology (DC-coupled or AC-coupled). This excludes customers within these regions from earning revenue (or bill credits) from their battery systems.

## 6.6 Market Event Results

### Event 29 August 2019

On 29 August EnergyAustralia called its own DR event, calling on C&I, MM BDR and VPP customers. From this event we identified some interesting findings, particularly from our VPP cohort.

Victorian and South Australian sites had been grouped in the dispatch portal. As the systems hadn't been run for spot purposes previously, having the states together hadn't posed any problems. Running an event where both regions need to be sent a signal based on real time prices identified that EnergyAustralia needed to have different grouping structures for different event types.

During this event EnergyAustralia trialled sending individual inverter commands rather than a group collective target. In the past, sending a group target without insight into regional weather conditions and individual load usage meant battery charging was not optimised. Managing individual inverter targets to optimise each system's output enabled EnergyAustralia to achieve 81% utilisation from the batteries.

## 6.7 Next Steps

- Customer intelligence – increase functionality on performance monitoring and control portals
- Continue on-boarding customers to VPP from existing integrations
- Consider integration of new Battery Energy Storage Systems (BESS)

## 7 C&I Lessons Learned

Large businesses are primarily concerned with cost and business continuity rather than grid stability, therefore financial benefit remains the key driver for the DR discussion.

“Assisting grid stability” is not a strong or successful selling point for most C&I customers and generally prefer to maintain control of their site and do not want a third party accessing their site to curtail load. Many of the DR sites in the EnergyAustralia portfolio rely on manual curtailment by the customer.

The need for real time metering data is becoming more prevalent with increased awareness and penetration of DR. Adaptation of metering providers is crucial to meet this need.

Energy intensive customers are often the most engaged and therefore most receptive to DR opportunities – this is reflected in our DR portfolio hosting most of our largest energy consumers. There is a correlation between engagement, market knowledge and participation.

Many C&I customers have back up generation assets on site that are not being utilised and/or not operational, and even when they are, generators are often looked at as a ‘doomsday’ scenario; ‘only for when there’s a blackout’.

### 7.1 Current status

The C&I portfolio has continued to grow with customers signed up for demand response providing almost 60MW of capacity.

### 7.2 Recruitment

Recruitment/procurement of C&I Customers continues to be a lengthy and time-consuming process. Long lead times, multiple site visits and tailored solutions were all required as part of the sign-up process, with customers often juggling conflicting commercial interests when considering core business objectives and DR incentives.

Internal stakeholders at most businesses have differing engagement levels, and goals are often not aligned – procurement vs operations for example. What might seem like a logical and potentially viable solution to an energy procurement manager might seem implausible or even potentially unsafe from an operations perspective. Being able to understand the business realities, implications and impact of DR is crucial in the customer discussion and journey.

With respect to smaller size customers there is a reluctance to sign up for anything too complicated or onerous. Simplicity is paramount, and complexity of product, or an obligation to participate, appear to be the largest barriers to entry at present.

## 7.3 Customer types and location

Our C&I portfolio is made up of various industries with most common being:

- Agriculture
- Processing Plants
- Manufacturing
- Distribution and data centres

Customers in SA and VIC seem more engaged, mainly due to expected volatility this summer (VIC) and in the past (SA). Energy awareness is always more prevalent in South Australia but is gaining traction in Victoria with increased media coverage.

## 7.4 Technology

EnergyAustralia's C&I DR portfolio is still dispatched mainly through manual processes, see learnings around third party control and manual curtailment by customers on site at the beginning of this [section](#).

A third-party vendor has been engaged to provide and facilitate a control platform but none of the Customers who took part in the recent tests were controlled by the platform.

EnergyAustralia continues to investigate opportunities to partner with technology vendors to further assist C&I customers with participation.

## 7.5 Next Steps

With an increasingly volatile Wholesale market there are opportunities during peak times for our C&I customers to benefit from reducing their load as well as providing ongoing stability to the grid, and ultimately helping to keep the lights on. EnergyAustralia will continue to engage our large customers as well as exploring opportunities with smaller customers, new products and new technologies.

## 8 Glossary

Term	Definition
AEDT	Australian Eastern Daylight Time
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
ARENA	Australian Renewable Energy Agency
BDR	Behavioural Demand Response
BESS	Battery Energy Storage Systems
CAISO	California Independent System Operator
C&I	Commercial and Industrial
DR	Demand Response
DNSP	Distribution Network Service Provider
EA	EnergyAustralia
kW	Kilowatts
LCD	Load Control Device
MM	Mass Market (residential/small business customers)
MW	Megawatts
NMI	National Meter Identifier
NSW	New South Wales
OEM	Original Equipment Manufacturer
RERT	Reliability and Emergency Reserve Trader
SA	South Australia
SMS	Short Message Service (i.e. text message)
VIC	Victoria
VPP	Virtual Power Plant