Powershop Demand Response Program

Project Report for 1 December 2018 to 31 May 2019
(Year 2)

Contents

This Activity received funding from ARENA as part of ARENA's Advancing Renewables Programme - Demand Response.

Activity Summary

This report (**Project Report**) relates to the demand response program (**Program**) conducted by Powershop Australia Pty Ltd (**Powershop**) during the period December 2018 to May 2019 (**Period**) and provides:

- an update to Australian Renewable Energy Agency (**ARENA**) on the Program;
- a comprehensive summary of the Program's performance during the Period; and
- key insights.

Project Summary

1. Knowledge Sharing Activities

Below is a summary of knowledge sharing activities undertaken by Powershop during the Period.

1.1 Workshops and information sharing

a) Distribution Energy Integration Program

Powershop participated in a panel discussion to discuss its Program in relation to Distributed Energy Resources (**DER**).

b) Demand Response Reliable and Emergence Reserve Trader (**RERT**) Trial: Portfolio Knowledge Sharing Workshop

Powershop attended a workshop with the participants in the joint ARENA and Australian Energy Market Operator (**AEMO**) demand response pilot to discuss the outcomes of their respective demand response programs during the Period. Powershop discussed the operations of the RERT activation process for the two demand response events triggered by AEMO (**Events**) that occurred on 24 and 25 January 2019.

c) Baseline Investigation

Powershop shared its findings on baselining issues with Oakley Greenwood and collaborated to highlight the major concerns when calculating a baseline for residential consumers.

1.2 Research Organisations

Powershop and ARENA partnered with the Behavioural Insights Team (**BIT**) to apply behavioural insights to Curb Your Power (**CYP**) to research the effectiveness of ways to:

- increase the number of customers joining CYP; and
- decrease the amount of energy used by CYP participants during an Event.

2. Behavioural Insights Team

2.1 Background

BIT is an organisation that specialises in applying behavioural insights to improve and enhance the performance of programs relying on behavioural decisions.

Given CYP had a statistically significant sample size, Powershop and ARENA agreed that CYP presented a valuable opportunity to conduct randomised controlled trials (**RCT**) on behavioural demand response (**BDR**).

There were two key behaviours identified that could impact the result of BDR and enhance the overall performance of the Program if targeted correctly, these were (1) the total number of participants; and (2) the amount of reserve provided by each participant. As a result, Powershop and BIT co-designed two RCTs:

1. Trial One – to test which behavioural insights encouraged Powershop customers who were not yet enrolled in CYP to join the Program; and
2. Trial Two – for customers already enrolled in CYP, to test which interventions encouraged them to reduce their energy usage during an Event.

2.2 Trial Setup

BIT and Powershop ran several workshops to scope and design the two RCTs. This included mapping out key behavioural insights relevant to the Powershop CYP audience, developing different treatment groups, determining the right messaging for each group and establishing measurable outcomes.

a) Treatment Groups

Four treatment groups were designed to be measured against a control group receiving the same communications as the previous year's CYP communications (**business as usual**). The purpose of the different treatment groups was to establish if behaviourally informed messages and incentive structure could affect the recruitment of eligible Powershop customers to join CYP and encourage registered participants to use less power during an Event.

Treatment Groups	Hypothesis	Change from BAU
Business as usual (BAU)	Control group	Customers receive a $10 credit for reducing their energy consumption by 10% of their baseline consumption (**Curb Target**) during an Event and receive standard BAU communications.
Prize draw (T1)	We can increase the incentive to participate in CYP by offering a prize draw entry to all customers successfully achieving their Curb Target.	In addition to the BAU $10 credit, customers hitting their Curb Target receive an entry into a $5,000 prize draw to be drawn at the end of summer.
Join the club (T2)	We can make CYP more effective by emphasizing the collective identity of this group, focusing on the intrinsic reward.	Re-framing the CYP recruitment eDM and subsequent communications to evoke a sense of collective identity and community-minded purpose. The $10 credit for successfully hitting their Curb Target remains, but it is reframed as a token of thanks.

Choose your own adventure (T3)	We can make CYP more effective by: a) giving customers some autonomy over their reward; and b) providing a clearer pro-social purpose option.	When registering for CYP, we let individuals choose whether they preferred to take the BAU $10 credit or donate a larger amount of $15 to Powershop's Your Community Energy program each time they hit their Curb Target.
Message by default (T4)	We can make CYP more effective by requiring customers to opt-out of the Program, rather than the current opt-in model. Removing the initial friction to join CYP may increase the number of people who will participate.	This group did not receive the CYP recruitment email. Instead they received text messages and a feedback email by default when the Event occurred, each with an option to opt out of receiving these communications. The text messages did not mention CYP or the $10 credit. Instead, this group received a text message indicating there will be high electricity demand on the grid and asked the customer to reduce electricity usage if possible. They were first communicated with four hours before an Event. This group received the standard BAU $10 credit if they hit their Curb Target but they were only informed of this after the Event.

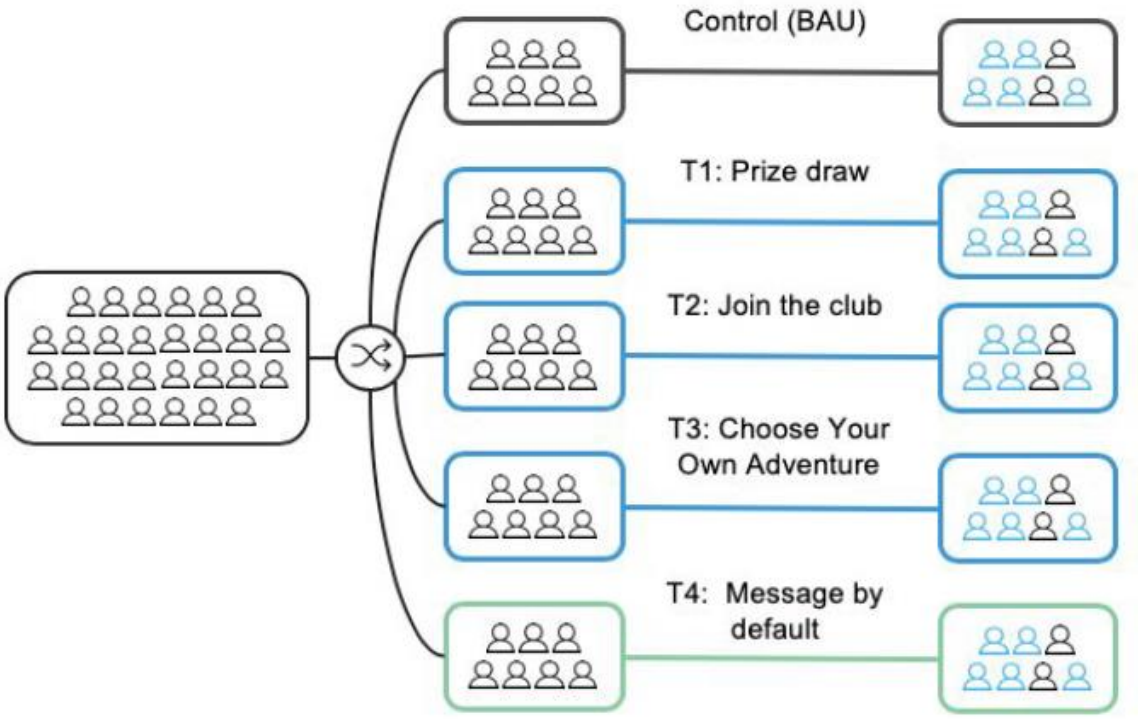


Fig. 1 shows the four treatment groups of Powershop's RTC, where CYP customers were randomly allocated to a group.

b) Messaging

The different treatment groups were sent the different communications simultaneously to ensure that messaging could be measured across the groups for behavioural impact.

As identified in Section 2.2, each treatment group had a distinct hypothesis to be measured against the control BAU group. The characteristics distinguishing each treatment group were reflected in their communications:

- Control BAU: communications were unchanged from the previous CYP season.
- T1 Prize draw: communications leant heavily on a tangible reward incentive.
- T2 Join the club: communications evoked a sense of collective identity and community-minded purpose.
- T3 Choose your own adventure: communications gave customers the sense of choice and charitable giving.
- T4 Message by default: communications commenced at the time of a peak demand Event.

2.3 Trial One – Recruitment

a) Aims

The aim of Trial One was to increase the number of Powershop customers registered to participate in CYP, allowing Powershop to respond to peak demand Events more effectively by increasing the number of customers contacted to respond.

All eligible[1] CYP customers who were not yet enrolled in CYP were evenly and randomly allocated to one of the five groups. Except for the "message by default" group[2], the remaining four groups received a tailored recruitment email inviting them to register to CYP.

If the customer completed the CYP registration, they would then receive text messages at the time of an Event with messaging specific to their treatment group. The "message by default" group received a modified version of the BAU communications that didn't specifically mention CYP or curbing rewards.

b) Outcome Measures

Primary Research Question	Outcome measure
Did the customer register to be part of CYP?	Successful registrations before the first Event
Secondary Research Question	**Outcome measure**
Did this treatment group achieve a higher open rate of the eDM?	Average percentage of open rate for x2 recruitment eDMs

[1] CYP is open to all Victorian Powershop customers with a smart meter but excluding certain customers (e.g. vulnerable customers on life support).
[2] To maintain the validity of this treatment group, it could not be included in the recruitment process.

Did this treatment group achieve a higher click through rate to the registration page from the eDM?	Average percentage of click through rate for x2 recruitment eDMs

c) Trial Outcomes

Trial One aimed to answer the primary and secondary research questions above to establish the most effective behavioural application to BDR recruitment.

The table below sets out the new registrations achieved from this recruitment, total registrations (including customers that had previously registered to CYP in past seasons) ,the average open rate and average click through rate of the two recruitment eDMs sent to each treatment group (excluding the “message by default” group).

Customers previously registered to CYP before the implementation of the recruitment RCT were equally distributed between the control BAU and the treatment groups. They received a reminder eDM with communications specific to their treatment group, reminding them of the upcoming CYP season and their previous registration.

Treatment Group	Average open rate	Click-through rate	Percentage that registered
Control BAU	49%	10%	13%
T1 Prize draw	48%	10%	13%
T2 Join the club	45%	5%	5%
T3 Choose your own adventure	39%	4%	5%
T4 Message by default	NA	NA	NA

From this data, Powershop and BIT identified that the provision of a prosocial option did not increase CYP recruitment. These results were reflected in the click through rates and overall registration, with both the control BAU group and Prize Draw group eDMs soundly outperforming the “join the club” and “choose your own adventure” treatment groups.

This suggests that re-framing CYP communications in certain ways could potentially reduce rates of recruitment. This may be because these conditions added further complexity to CYP, causing customers to disengage.

2.4 Trial Two – Event Performance

a) Aims

The aim of Trial Two was to encourage customers already registered in CYP to effectively reduce their energy usage during Events. This could be impacted by:

1. how many registered households/businesses choose to reduce their energy usage during an Event; and
2. how much these participants reduce their usage by.

By identifying the two areas of impact, Powershop and BIT established key outcome measures.

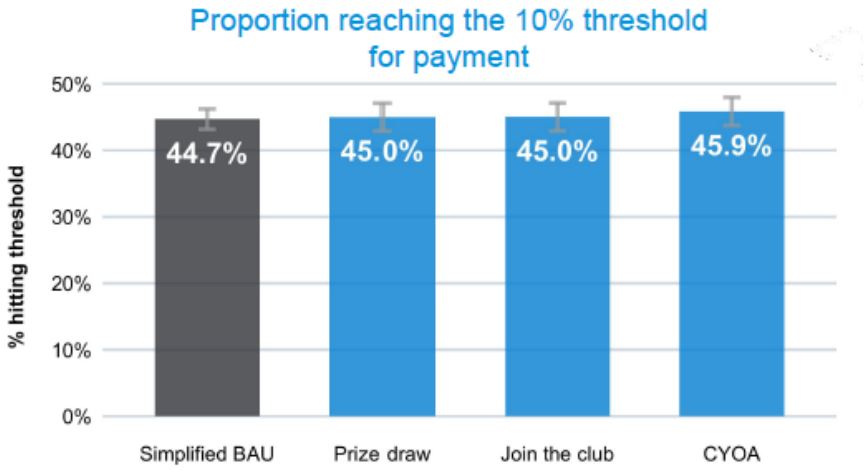
b) Outcome Measures

Primary Research Question	Outcome measure
Did the individual successfully meet the threshold for receiving incentive payment?	10% of baseline usage reduced, using Powershop's baseline calculation.
Did the intervention reduce energy consumption during the peak Event?	Average kWh usage during Event.

Secondary Research Question	Outcome measure
Did the intervention change individuals willingness to take part in the CYP program in the future?	Number of participants withdrawn from the Program before February 2019

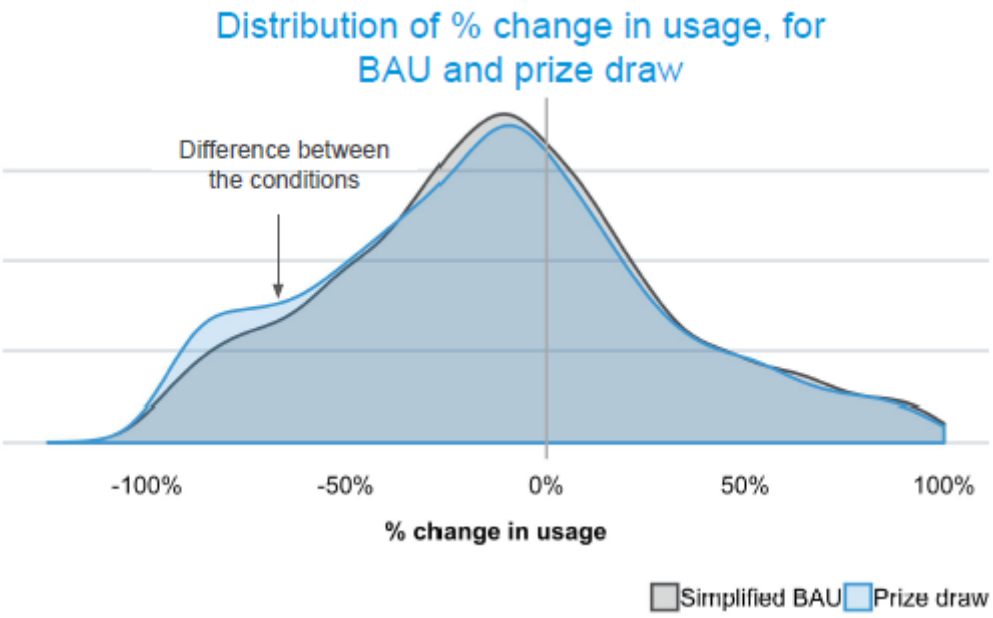
c) Trial Outcomes

Trial Two found that there were no significant differences between the groups that registered in CYP and their average energy usage during a peak demand Event. This demonstrates that the different interventions were not able to significantly encourage more energy savings during an Event. Similarly, there were no statistical difference between these groups in the percentage of participants who met their Curb Target as shown in the graph below.



The most significant finding from Trial Two was that customers who received the peak-demand text messages as part of the “message by default” group used less power than those in the control BAU group. This means that the opt-out method was able to reach a larger group of Powershop customers, while having a greater impact on reducing power usage during the peak-demand Event.

Another interesting finding was that members in the “Prize draw” group reduced their electricity usage more aggressive than those in other groups. A similar number of customers hit their Curb Target across all groups, however, “Prize draw” had a larger proportion reducing energy usage by 50 to 100% as shown in the graph below.



2.5 Conclusion

In summary, the results of both trials suggest the following insights:

1. BDR programs that require customers to opt-in serve as a friction to reducing energy usage during peak-demand Events; and
2. those customers who opt-in to BDR programs are less likely to reduce power usage significantly.

It may be those who join the program are already more conscious of their power usage and are less able to reduce power usage significantly. Reaching those who would not opt-in may be crucial for increasing the impact of demand response and considering an ‘opt-out’ model of BDR, greatly increases the potential pool that can be impacted by the peak-demand event text messages.

Key recommendations from the trials were:

- all households should be made aware of peak-demand Events by default to increase involvement; and
- communications should be kept simple and refined.

3. Overview of Powershop's Demand Response Program

This section provides an outline of the different segments that contribute to Powershop's Program.

3.1 Curb Your Power

CYP is an opt-in BDR program where customers are asked to reduce their electricity usage during times of peak demand. Participation in CYP is entirely voluntary and open to all Victorian customers with a smart meter but excluding certain customers (e.g. vulnerable customers, such as those with life support.

a) CYP overview and operations:

Powershop customers can register to participate in CYP by completing an online registration form on Powershop's website. New customers were notified by email to join the Program.

Powershop used its in-house information management system and data base (Curbomatic) to:

- send Powershop management daily notifications outlining the total number of registered customers (split by residential, commercial and the percentage of registered CYP customers that have solar);
- integrate with an SMS delivery platform to enable Powershop to send bulk SMS's during Events;
- measure the baseline of each individual customer and accordingly the estimated reduction in energy usage following an Event; and
- send CYP customers a tailored email summarising their performance following an Event.

On the day of an Event, Powershop sends CYP customers the following notifications:

- ***SMS 1:*** 1-hour warning before the Event which includes event times.
- ***SMS 2:*** Start Curbing - sent at the time of the Event to ask customers to reduce demand.
- ***SMS 3***: Stop Curbing - sent at the conclusion of the Event to signal to customers to stop demand response activities.

b) Recruitment strategy:

Previously, Powershop's main recruitment avenues for CYP were eDMs, digital ads and banners on customers' monthly account reviews. However, due to the involvement of BIT it was determined that eDMs would be the only method to recruit new CYP customers.

This may have limited recruitment, but it was a necessary measure to ensure the different treatment groups were not contaminated.

c) Pricing structure and incentives

Incentives were influenced by the BIT trials and were unique to each of the treatment groups. See section 2.2 for an overview of the treatment group incentives.

d) Future pricing structure and incentives

Influenced by the result of Trial Two, Powershop has decided to offer a prize draw and a $10 power credit to all CYP customers that hit their Curb Target.

3.2 Reposit Power

a) Reposit GridCredit technology

Powershop is utilising customers' Reposit enabled solar and battery systems to create a virtual power plant (VPP). Using the Reposit web application, Powershop has the ability to:

- create multiple VPP's;
- dispatch any/or all VPP's on command;
- see geographically where each battery is located; and
- at any given time, determine the capacity of each battery (and accordingly the entire VPP's capacity).

b) Grid Impact - program overview

Powershop is offering a Reposit plan (Grid Impact) to customers that have a Reposit enabled solar and battery system. Registrations are completed online and, once verified as a Reposit customer, customers receive a fixed payment every three months. The payment is based on the size of their battery power output. For example, a Victorian customer will receive the following payments:

GridCredit's®	less than 3.5 kW	3.5 kW to 7.5 kW	7.5 kW or more
Victoria (yearly)	$100	$156	$236

c) Recruitment

Recruitment of Victorian Reposit customers has been slower than initially expected. Currently Powershop has 15 customers in Victoria with a Reposit enabled solar and battery system. Powershop is investigating alternate ways to build a VPP to meet the desired capacity of 1 MW.

3.3 Monash Cogeneration Facility

Powershop contracted with Monash University's 1 MW gas cogeneration facility (Cogen) to provide additional 'firm' capacity.

Due to ongoing maintenance, Cogen has been out of action since mid-2018 and was not available for summer Events.

4. Performance and Analysis

4.1 Invitation to Tender

Powershop received an invitation to tender (ITT) from AEMO on 24 and 25 of January 2019 respectively and responded positively to both requests.

a) 24 January 2019

Time (EST)	Event Timeline
13:57	AEMO sent Powershop an ITT requesting 5 MW from 16:30 to 19:00.
14:20	Customer SMS's were scheduled to be sent via Powershop's system. • SMS 1 scheduled for 15:30 • SMS 2 scheduled for 16:30 • SMS 3 scheduled for 19:00 Powershop scheduled a Reposit Fleet dispatch using the Reposit Fleet platform
15:00	Powershop accepted the ITT via AEMO Markets Portal
15:32	AEMO sent Powershop an activation email requesting 5 MW from 16:30 to 19:30. Powershop only received 58 minutes to activate (rather than the 60 minutes contractually required). Consequently, CYP customers received their first SMS less than 1 hour before the Event. Further, the Event period in the ITT did not align with the time block in the RERT activation email. The time block in the RERT activation email was 30 min longer. AEMO gave no reason for this time change.
15:33	Powershop sent its CYP customers SMS 1. Some customers did not receive SMS 1 until 16:00 due to SMS congestion. Due to time pressure, Powershop did not have the ability to change the copy or timing of the SMS release from when originally scheduled. Powershop changed the Reposit Fleet dispatch time to reflect the RERT activation time block i.e. 16:30 to 19:30.
15:33	Powershop contacted AEMO ops to confirm activation and questioned AEMO regarding the change in activation time.
16:30	Powershop activated its reserve. SMS 2 was sent to customers. Due to the SMS queue, some customers did not receive the activation SMS until 17:00.
19:00	Powershop deactivated its reserve. The deactivation time was scheduled based on the ITT time block. Powershop did not have the ability to change the deactivate details in SMS 3 after receiving the RERT activation email hence SMS 3 was sent 30 minutes before the end of the Event.

b) 25 January 2019

Time (EST)	Event Timeline
07:39	AEMO sent Powershop an ITT requesting 4 MW from 11:00 to 15:00.
08:05	Powershop accepted ITT via AEMO Markets Portal
08:30	SMS's were scheduled to be sent via Powershop's system. • SMS 1 scheduled for 10:00 • SMS 2 scheduled for 11:00 • SMS 3 scheduled for 15:00 Powershop scheduled a Reposit Fleet dispatch using the Reposit Fleet platform for 11:00 to 15:00

09:02	AEMO sent Powershop an activation email requesting 4 MW from 10:00 to 14:00. Powershop was given less than 60 minutes to activate its reserve from receipt of the RERT activation email. The time block in the ITT did not match the activation email. AEMO gave no reason for the change in time.
09:03	Powershop reprogrammed its system to be adaptable with SMS timings following the previous days event. Powershop rescheduled SMS times to the following: • SMS 1 scheduled for 09:03 • SMS 2 scheduled for 10:00 • SMS 3 scheduled for 14:00 Powershop changed the Reposit Fleet dispatch time to reflect the RERT activation time block i.e. 10:00 to 14:00.
09:03	Powershop contacted AEMO ops to confirm activation.
10:00	Powershop activated its reserve.
14:00	Powershop deactivated its reserve.

4.2 Performance

The table below shows Powershop's performance during the two January Events, comparing AEMO's baseline calculation against Powershop's optimised baseline calculation.

Event	Time	Baseline	Total	Capacity
24 Jan	3 hrs	AEMO	9.68	3.23
		Powershop	**11.70**	**3.90**
25 Jan	4 hrs	AEMO	17.47	3.88
		Powershop	**18.20**	**4.55**

Due to maintenance, Cogen was not used during the 24 and 25 January 2019 Events. The figures above are based on Powershop customers only.

Powershop has optimised its baseline calculation which shows that AEMO's baseline calculation can undervalue a residential BDR program by 15% to 20%, depending on Event conditions.

4.3 CYP Fleet Specification

The table below shows the specifications of each event

Event	Capacity (MW)	Customer Participation (%)	Curb Target (%)
24 Jan	3.90	52	44
25 Jan	4.55	50	41

The results above are calculated using Powershop's baseline methodology and excludes capacity provided by Cogen.

5. Budget Update

5.1 Financial Year 2017 / 2018

This information is commercially sensitive and confidential.

5.2 Financial Year 2018 / 2019

This information is commercially sensitive and confidential.

6. Learnings

Key learnings to be taken from the 2018 / 2019 summer DR season:

a) **Operational**: It is important to have scheduling capability that can be easily altered to adapt to activation times changes.
b) **Messaging**: Simple communication is vital. Do not over complicate the Program.
c) **Future Development:** Additional incentives seem to have a minimal impact on Event performance and it may be worthwhile incorporating a prize draw. To optimize our portfolio we should only send activation messages to customers that have a high probability of responding positively. Further, we can use push notifications to keep customers engaged during an Event.

7. Other commercial objectives for Powershop's Program

Powershop is currently not using its Program for any use outside the scope of the Funding Agreement entered into between Powershop and ARENA.