



**Project performance
report – Energy Under
Control
May 2020**

Contents

1. Executive Summary.....	1
2. Introduction.....	2
3. Summary of Knowledge Sharing Activities.....	3
4. Response provided.....	4
5. Analysis of performance	5
6. Lessons learnt	8
7. Key contacts.....	14

This Activity received funding from ARENA as part of ARENA's Advancing Renewables Programme - Demand Response. The views expressed herein are not necessarily the views of the Australian Government, and the Australian Government does not accept responsibility for any information or advice contained herein.

1. Executive Summary

The start of the final year of the ARENA DR Trial brought a number of new challenges and an unprecedented global pandemic which upended daily life for both customers and Flow Power.

As per previous program periods there were no live activations during the 6-month window. The market conditions however were markedly different to previous years – early 2020 saw very high temperatures and severe bushfires impact the east coast of Australia. These circumstances led to the Reliability and Emergency Reserve Trader (RERT) being activated in New South Wales for the first time ever.

However Flow Power's ARENA RERT portfolio was not activated to provide assistance at any time during the hot summer. This included one day where the Victorian-New South Wales interconnector was taken offline due to bushfires and two other very hot days in late January. All of these days saw the activation of other RERT contracts in New South Wales.

The other significant event of 2020 was the coronavirus pandemic, which significantly impacted businesses and people's daily habits and freedoms. One of the saving graces of the pandemic's impact on the electricity sector is that the worst of the pandemic was experienced at a mild time of the during autumn and not the height of summer. The pandemic did however severely impact Flow Power staff who are primarily Melbourne-based and we unable to travel to outside of Victoria.

Looking ahead to the end of the ARENA DR trial at the end of 2020 Flow Power's intention is to continue to promote demand response, particularly spot-exposed DR, and to migrate customers over to other RERT portfolios.

Flow Power also continues to promote automation and technology to facilitate demand response. With the impending start of the five minute settlement and the technical requirements of participation in the Wholesale Demand Response Mechanism technology-enable demand response will become increasingly important, if not essential, to participation.

2. Introduction

This is the Project Performance Report for Flow Power’s Energy Under Control project. Part of ARENA’s Demand Response Competitive Round, Flow Power works with commercial and industrial customers to provide strategic reserves in the National Electricity Market via the Reliability and Emergency Reserve Trader (RERT) mechanism.



We’re a licensed electricity retailer focusing on giving Australian businesses access to the wholesale market.

We offer businesses



Transparency



Flexibility



Cost savings

3. Summary of Knowledge Sharing Activities

In the December 2019 to May 2020 period, Knowledge Sharing Activities focused on sharing learnings and building knowledge of the market operations with the broader energy community via digital means.

Flow Power’s staff that manage the ARENA DR Trial are Melbourne-based and the significant extended lockdown and travel bans severely impacted the planned knowledge sharing activities for 2020. The inability to travel outside of Victoria after March prevented the planned ‘DR roadtrip’ to visit customer sites in New South Wales.

From March onwards all live events which involved significant gatherings of people were also halted and large numbers of staff across the country migrated to working from home arrangements.

One initiative that Flow Power took during the lockdown was to produce a series of weekly webinars (‘On the Spot’) which allowed for a deeper dive into topics around the energy market. These included a deep look into some of the significant trends shaping the energy market (historically low demand and prices, and the accelerating duck curve) and the overhaul of energy policies which will shape demand response in the future.

ACTIVITY	KNOWLEDGE CONTENT	AUDIENCE	DOCUMENTATION
Webinars	‘On the Spot’, a weekly webinar series	Prospective participants and current participants	https://www.flowpower.com.au/on-the-spot-energy-policy/ https://www.flowpower.com.au/on-the-spot-summer-lookback/
Material creation	Developed a framework for industrial customer to implement demand response in a consistent and logical way	Industry, prospective and current participants	https://flowpower.com.au/demand-response-framework-webinar/ Physical brochure created and mailed out to customers

4. Response provided

Technology

Proprietary technology, the kWatch® Intelligent Controller, has been installed at each customer site to facilitate ten-minute response to AEMO activation signals.

Purpose built for allowing customers to respond to market signals and automate the curtailment of load, the Controller gives customers:

- Live data feed – weather, market data, other signals as desired
- Alerts
- Automation of connected equipment

If AEMO call an event, Flow Power sends alerts to customers. Customers typically need to accept the activation and opt in before the Controller will then reduce their load; however some customers have elected to operate on an ‘opt out’ basis.

Model

Customers receive two payments:

- Availability – based on the volume of capacity provided during tests or activations
- Activation – based on the volume of load shed during events

Customers pay an annual fee to cover the installation of and access to data from the Controller.

Portfolio

Flow Power’s portfolio is comprised of customers from a diverse set of industries across NSW.

INDUSTRY	INDUSTRY TYPE	RESERVE (MW)	LOCATION
Agri-businesses	Orchards/Irrigators	1.47	NSW and VIC border
Warehouse/Storage	Refrigeration	1.16	Sydney
Councils	Water Management	1.3	Throughout NSW
Food Processing	Packaging/Manufacturing	1.7	Throughout NSW
Forestry	Timber Mill	0.5	North Eastern NSW
Manufacturing	Building Supplies	3.7	Western Sydney region
Manufacturing	Steel Production	20	Newcastle region

5. Analysis of performance

INITIAL TEST – 30/01/2018

TARGET RESERVES	5	MW
Recruited Capacity	7	MW in Maximum demand
Number of Customers	4	
Test Result	1.52	MW
Number of Activations	0	

RE-TEST – 27/03/2018

TARGET RESERVES	5	MW
Recruited Capacity	11.6	MW in Maximum demand
Number of Customers	7	
Test Result	3.51	MW
Number of Activations	0	

TEST TWO – 23/05/2018

TARGET RESERVES	5	MW
Recruited Capacity	39.3	MW in Maximum demand
Number of Customers	6	
Test Result	27.9	MW
Number of Activations	0	

TEST THREE– 24/10/2018

TARGET RESERVES	15	MW
Recruited Capacity	39.57	MW in Maximum demand
Number of Customers	7	
Test Result	21.8	MW
Number of Activations	0	

TEST FOUR– 24/05/2019

TARGET RESERVES	15	MW
Recruited Capacity	39.57	MW in Maximum demand
Number of Customers	7	
Test Result	23.1	MW
Number of Activations	0	

TEST FIVE– 3/12/2019

TARGET RESERVES	20	MW
Recruited Capacity	39.57	MW in Maximum demand
Number of Customers	7	
Test Result	18.54	MW
Number of Activations	0	

6. Lessons learnt

Year 1 – Recruitment and Set up

- Many large customers (Maximum Demand > 1 MW) felt the financial reward was not significant enough to offset their risks of program participation. This forced Flow Power to shift the focus towards smaller businesses. In some cases the Controller was provided at no cost as an additional incentive to program participation.
- In comparison to Flow Power's experience operating and recruiting for RERT portfolios in Victoria and South Australia, NSW customers generally had less knowledge of demand response and the RERT mechanism.
- In some occasions, Flow Power found that within customer organisations there were varying drivers. For example, operation managers had different motivations to the main decision makers signing onto the program, namely operational targets being of greater importance than pure financial decisions. In some cases these different motivations may be encapsulated in operational or revenue-based KPI targets.
- Several customers, specifically those who are not existing Flow Power customers, expressed concerns about integrating new technologies with their existing control systems. This issue is often resolved through improving the customer's understanding of how the kWatch® Intelligent Controller operates and the process followed when sending customer signals.
- The initial recruitment of customers yielded significantly lower demand reductions than anticipated or estimated. For example, the initial contracted portfolio was expected to provide 6 MW, however the first test yielded only 1.5 MW. The second test yielded a 3.6 MW reduction in demand from an expected portfolio of 9 MW. The risk of portfolio underperformance due to weather conditions or altered production conditions can be mitigated by over-subscribing the portfolio.
- The kWatch® Intelligent Controller has had significant updates to its installed firmware. Major development effort was undertaken to improve the reliability and stability of the Controller under all conditions. Flow Power achieved the goal of keeping all the Controllers online most of the time. The Controllers have an in-built watchdog monitoring network failures and device recovery.
- The kWatch® Intelligent Controller has the ability for near-real time information collection from meters and delivery (via portal and app) to enable participants to make educated decisions about energy usage. Continued development also been undertaken to provide notifications of events via various communication channels.

Year 2 – Build and Maintenance Phase

Year two of the project brought increased understanding and learnings across four broad categories: technology, data, customer-specific and the impact of externalities on DR. The discussion below will dive into these categories further, from a general and a customer-specific perspective.

General Perspectives

- Baselines continue to be a significant aspect of demand response, particularly the RERT program. Unlike spot-responsive DR customers, the RERT program relies on a baseline against which to assess performance and determine the value provided. The baseline used (the CAISO 10 of 10 asymmetric adjustment) has been the topic of much discussion throughout the ARENA DR trial and suffice to say that impact has been noticed on Flow Power's portfolio.
- The significance of the baseline to Flow Power's portfolio was observed when the time window for testing the portfolio varied significantly from the time that the portfolio would typically be called upon. One of the tests was conducted in the morning, where typically the requirement for RERT is late afternoon/early evening. The difference in available load, as determined by a baseline, is apparent – particularly in agriculture and cold store customers who have seasonal and/or temperature dependent loads.
- Data access is a continued impediment to the efficient management of demand response. Without real time data it is impossible to monitor the performance at some customer sites. While most industrial customers have their own SCADA systems are able to monitor their own energy consumption, aggregated real time data on the aggregator side would lead to more efficient DR management outcomes.
- As discussed previously, the delay in metering upgrades in NSW has made receiving data feeds more difficult than in states such as Victoria. The Controller is designed to receive customer energy usage and other site-based data via the Modbus standard (available on the EDMI mk10 device but not the mk6, for example). Modifications have been made to the Controller to allow pulsing inputs from older meters, however due to reliability and scalability concerns meter upgrades have been the preferred path forward.

Customer-Specific Perspectives

- As the program matures individual customer performances have been improving. This is a combination of improved understanding of demand response on the customer side, education and resources provided by Flow Power as well as improved operational systems and processes within Flow Power. While the improvement with program maturation is to be expected, it highlights the importance of familiarity and education to implementing successful demand response initiatives.
- Although public awareness of demand response and its benefits to commercial customers has broadly increased, Flow Power has had challenges signing up new customers to the ARENA DR trial in order to diversify the portfolio. Multiple customers were initially very keen on the concept of implementing demand response, but later decided not to participate. In most of these cases this was a commercial decision – the impacts of demand response were determined to be too significant on their business operations.

- This behaviour has been observed in Flow Power’s spot-responsive demand response customers, and typically takes a combination of a strong sales cycle with an in-house champion. Without the in-house champion driving the idea of implementing DR the proposition always falls over. The sale or job of convincing companies that DR is worthwhile is a complex one, and typically requires a long and technical sales cycle. Flow Power is still working on improving the DR pitch and has developed some sales material to help businesses understand the benefits and potential ease of implementing DR.
- This inability to recruit new customers has led to a lack of diversity within the portfolio, which is a significant risk factor in the portfolio
- The lack of spot price volatility and reliability concerns in the New South Wales region haven’t helped with the demand response sales cycle. Memories are short and the reliability concerns of February 2017 in NSW seem long gone. This isn’t helped by a strong media focus on the reliability and price volatility in Victoria and South Australia. In this regard selling DR to businesses is much easier in these regions – if customers see a potential situation where they could choose to reduce load and be rewarded or be forcibly disconnected from the grid during a load shedding event than the choice is an obvious one. This dichotomy doesn’t currently seem to exist in New South Wales.
- There are several technology barriers and concerns still being observed with customers – the first of these are the integration of the kWatch Intelligent Controller with customer sites. Integration of the controller requires three fundamental things – a compatible electricity meter, access to the site for installation (and sometimes temporary interruption to operations) and integration with the on-site control systems. There has been a surprising amount of resistance by customers to site access in order to installation equipment. This is further exacerbated when the integration of on-site control systems is factored in.
- One surprising barrier experienced in upgrading meters has been the cooperation of the Metering Data Providers. From a customer perspective the retailer, and in the case of the ARENA DR trial the aggregator, owns the relationship and manages all aspects of the electricity connection. However, the NMI meter is the exclusive domain of the MDP, and all changes including upgrades or maintenance to this meter must be done by the MDP. This is further exacerbated by the fact that different customers typically have different MDPs, which means new relationships and new negotiations.
- One customer in the portfolio has a high voltage connection with the NMI meter located in the HV switch yard of the distributor away from the customer site location. Access to this HV switchyard has been all but impossible due to the nature of the work required to access a HV site.
- One of the challenges developing an in-house technology solution with a small team has been developing a platform that is flexible enough to handle a range of different customer control systems. The general approach has been to provide a single point of relay control, which a customer’s electrical contractors can then integrate with their specific control systems. However, in some cases Flow Power has worked more closely with customers to integrate and specifically program parameters on the Flow Power platform side.

- Seasonality of customer loads continues to be significant – the agricultural loads are primarily based on irrigation requirements, which are significantly reduced or in some cases non-existent during winter. Cold store loads while constant throughout the year are highly dependent on ambient temperatures. This is an issue for the ARENA DR portfolio which has a static size between the winter and summer periods as well as payments based on a constant rate of MW availability and delivery.

Year 3 – Transition Phase

Summer 2020

Early 2020 brought a number of challenges to the power system with extremely high temperatures and bushfires affecting both Victoria and New South Wales. This was seen in an extreme fashion when a bushfire saw the emergency shutdown of the Upper Tumut substation, which disconnected the interconnector from Victoria and preventing and power exports This prevented Victoria from much needed power into New South Wales, which subsequently saw a severe shortage of availability and ‘Lack of Reserve’ conditions.

Despite these very trying conditions on the grid Flow Power’s ARENA portfolio wasn’t activated by AEMO during this period, despite being available and being a short response-time portfolio.

In fact Flow Power’s ARENA portfolio wasn’t activated by AEMO on the afternoons of January 23 and January 31 when very hot conditions saw the activation of other RERT portfolios, including Flow Power’s non-ARENA portfolio. This was quite a surprise given that the ARENA portfolio is essentially already paid for via the availability payments made over the course of the period and the activation rate during the event is very low.

Given that this summer was the first time ever the RERT was activated in New South Wales it felt like somewhat of a missed opportunity to fully test the ARENA portfolio, outside of the twice-annually scheduled tests.

The portfolio test was also marked by confusion over scheduling – originally planned for late November the test was accidentally scheduled in late December by AEMO operations. This led to the test actually being conducted in early December, within the 6-month rather than prior to its commencement.

Regulatory Changes

As the ARENA DR Trial has been progressing there has been several very significant movements in the DR regulatory space:

- The Wholesale Demand Response Mechanism
- Integration of Distributed Energy Resources into the grid
- Five Minute Settlement

In the last 6 months more details around how these will be implemented, and the impact on the market have been realised.

These regulatory changes will have a significant impact on the operation of the electricity grid and the way customers, especially large commercial and industrial customers, interact with the grid. A few themes are readily apparent:

- The DR trial has encouraged interest in spot price exposure, which more accurately aligns DR to market signals and the design of the electricity market. Flow Power has seen a number of customers begin down a path of participating in emergency demand response programs and later migrate to a retail spot price exposure contract. This is significant because it shows that a) customers typically have a significantly more load flexibility in their operations than initially thought and b) a willingness to utilise DR in order to improve commercial outcomes. The flipside of a migration of commercial DR load from emergency DR programs to spot price

exposure is that it should help mitigate some of the underlying reliability concerns without the requirement to call the RERT trigger.

- The DR trial has shown a desire to integrate controls equipment more significantly with a customer site and improve automation. Automated DR is the gold standard, both from the perspective of the DR portfolio manager (guarantees a higher level of performance and control over the aggregated assets) and from the customer perspective where less resources are required to manage the ongoing DR activities. Many customers are initially hesitant to significantly integrate third party controls into their operations but will do so when the commercial benefits are clear.
- The DR trial and the broad media coverage have provided an ability to utilise and leverage this DR positively to enter new customer verticals. Traditional DR loads (pumping, cooling) have been low hanging fruit targets of many international DR programs, but as the general understanding of demand response increases more opportunities in industries traditionally hesitant to explore DR become possible. This includes highly risk adverse businesses and those with tighter production and delivery timeframes.

Additionally, the work of Energy Security Board has begun to much more broadly consider the role that demand-side resources will play in the future of the grid. While much discussion to date has focussed on *Distributed Energy Resources*, particularly behind-the-meter photovoltaic systems and batteries, demand response still remains a critical part of the energy ecosystem moving forward.

The ARENA DR trial has help demonstrate the depth of the market, both for traditional commercial and industrial loads and in the residential space. It should be seen as no coincidence that early 2020 saw the rise of a retailer focussed on providing wholesale market signals to residential customers, as well as demand response as a physical hedge to this price exposure.

The final stage of the ARENA DR trial portfolio is focussed on transitioning customers out of the trial and into the broader DR ecosystem. For many customers this will mean transitioning into Flow Power's non-ARENA RERT portfolios for summer 2020-21, however the intention is to encourage customers consider spot-price exposure demand response or consider how they could prepare themselves for participation in the Wholesale Demand Response Mechanism in October 2021.

7. Key contacts

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