Backup Boost Knowledge Sharing

Report #1

30 April 2020

enel x

Overview of the trial

We are proud to partner with the South Australian government to provide support to local businesses by changing the way they use energy.

Enel X and the South Australian government are investing $2 million each over three years to unlock the potential for cheaper more reliable electricity, supporting backup generator upgrades across a number of South Australian businesses.

The upgrades will be partially funded by the South Australian government's Demand Management Trials Program, with no requirement to repay, accelerating sites' entry into the market. The remaining costs are recovered from earning revenue under our Demand Response programs.

This project will upgrade existing backup generators in SA and test the ability to:

> Create an aggregated portfolio of fast-responding, dispatchable generation

> Improve liquidity in the contract market

> Show that demand response can bring financial benefits to participating businesses and consumers more broadly.

This is the first of a number of knowledge sharing reports we will publish to share our findings on the effectiveness and challenges of using backup generation in the wholesale market and to sell financial products.

Meeting the objectives of the trial

The purpose of the trial program is:

To show how businesses' existing backup generators can provide dispatchable demand response capacity in the NEM and to assess the viability of selling a cap product in relation to the aggregated generation capacity.

It's still early days in the trial, however we have already had some successes and opportunities to learn.

We have found that there is strong interest from businesses in South Australia to use their backup generators more flexibly and benefit from opportunities to participate in the spot market.

Similarly, we have found that there is an appetite for energy retailers and potentially spot exposed customers to purchase the cap products[1] we are able to sell using the backup generation capacity. Prices for caps were strong over summer due to the expected price volatility. However, we expect prices to continue to be strong in winter.

A key learning is the need to analyse and test the load profile of a site before committing the capacity. One of the generators in our trial did not perform as expected and so we have not been able to rely on its capacity. This experience has led us to change our processes so we can be more confident that the generator will perform as we expect.

[1] A cap is a financial product that allows the buyer to set an upper limit on the price that they will pay for electricity. The most common cap in the electricity market is for $300 per MWh. So when the spot price is higher than $300, the buyer can limit its exposure by calling on its caps and only paying $300 per MWh for the agreed volume of electricity.

Barriers we've encountered

We have had a significant amount of interest in this project from a range of businesses, with many contacting us and keen to be involved. However, not all sites are suitable for participation.

The first barrier to participation we found is the need to already have a backup generator in place. A number of businesses without an existing backup generator were interested in participating. However, the cost of installing the generator itself meant the site would not be commercially viable for this program.

For those with backup generators, their load profile must be suitable. This means having a stable and predictable level of demand. This is important to be able to rely on the customer to provide the anticipated level of demand response. Consequently, peaky or unpredictable load is a barrier to participation.

The next step is to understand the cost of connecting the generator to the network. This is required if the customer wants to earn additional revenue from exporting energy, rather than just displacing their load. We have found that network connections are the most significant barrier to participation for a number of reasons:

> If there are constraints on the network, then the network service provider will not permit any additional generation to connect

> The network service provider also has significant concerns allowing businesses with large backup generator capacity (which exceeds their load requirements) to export to the grid, curtailing the potential revenue of those sites

> Even where connection is technically achievable, the costs of connection can be prohibitive.

Incentivising participation in the trial

Enel X's standard pricing structure is to provide businesses with a steady and ongoing stream of "availability payments" for their available capacity, and then "energy payments" to cover the costs of running the generators, such as fuel. An alternative is to offer no availability payments but higher energy payments during dispatch events, typically when spot prices are forecast to be high.

We have found that the majority of prospective businesses for the program have a stronger preference for firm availability payments over energy-only payments for energy delivered during events. Like most businesses in general, they prefer ongoing and predictable revenue streams year-around as opposed to uncertain but potentially very lucrative energy payments.

Dispatch events so far

We already have two generators up and running. Since these generators went live into the market on 1 November 2019, they have been dispatched on six occasions for a total run-time of 15.5 hours. These dispatch events occurred during period of warm temperatures with forecast high spot prices:

> 18, 19 and 20 December 2019

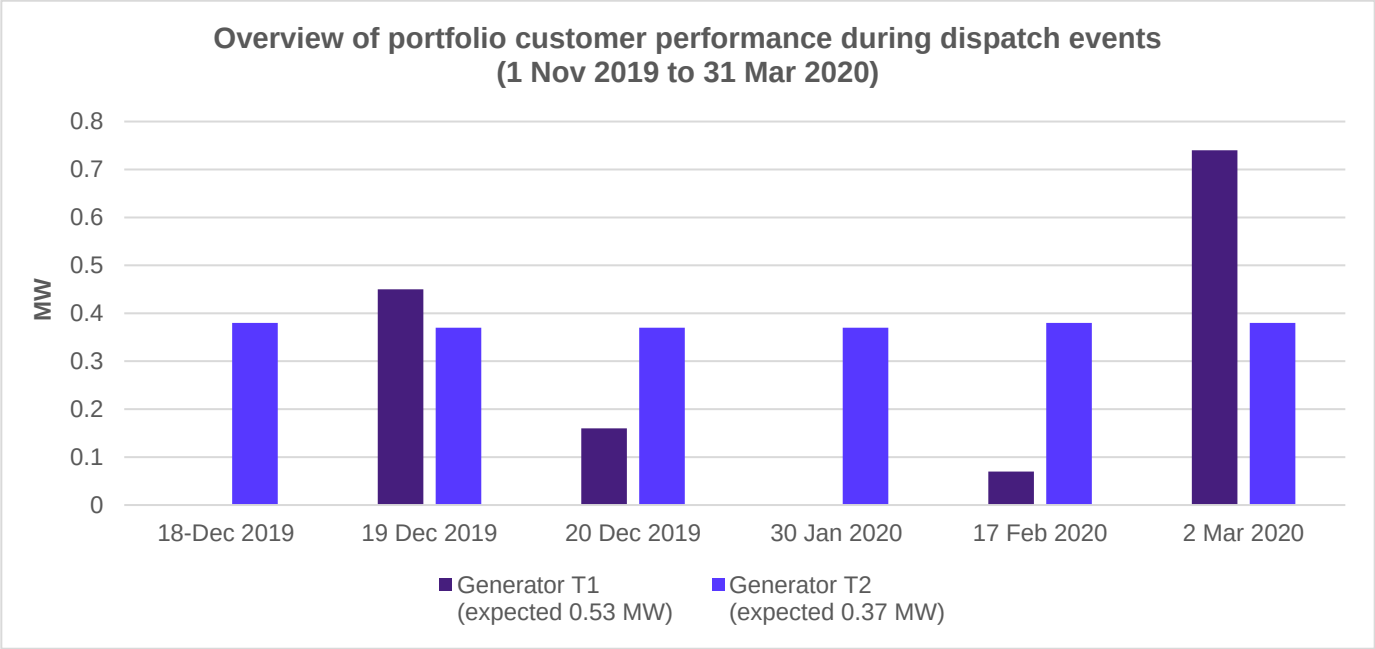
> 30 January 2020

> 17 February 2020

> 2 March 2020.

Technical performance

The two generators, “T1” and “T2”, were contracted for 0.53 MW and 0.37 MW respectively. This is the amount we expected them to deliver during an event. The chart below sets out how they performed.



As can be seen from the chart, generator T2 performed very well. It has consistently provided a firm output of approximately 0.38 MW during all dispatch events. However, the other generator, T1, has not always run as expected. The reasons for this are discussed below.

Ability to rely on the capacity

We were able to sell a cap product against the two enrolled generators to a counter-party for the summer peak period 1 November 2019 to 31 March 2020.

Initial testing just prior to go-live suggested the combined capacity of available generation was approximately 0.9 - 0.95 MW, so Enel X and the counter-party agreed to a firm capacity of 0.9 MW. The agreement stipulated the counter-party would pay Enel X a monthly capacity payment for 'dispatch rights' to the generators, and when required to be dispatched the customers (via Enel X) would receive a fixed amount to cover the cost of running the generators, while the counter-party would receive all remaining spot revenue from dispatch events. Enel X shares these capacity payments with the customers.

Since go-live it has become apparent that the load being supported by generator T1 has been more volatile than expected, with consumption ranging anywhere from 0 MW to 0.75 MW depending on site operations during that time. As the generator only runs as hard as required to support this load, it is not always running at a consistent level when dispatched, therefore making it unsuitable to sell a cap product against. In contrast, the other load (supported by generator T2) appears to be very stable and has consistently provided a firm output of approximately 0.37 MW during all dispatch events.

Financial performance

Enel X has only targeted revenues from capacity payments for the period 1 November 2019 to 31 March 2020 (summer peak period), and the cap price secured for our portfolio with a counter-party was as expected for this period, due to the demand and price volatility as forecast by AEMO.

However, cap revenues earned for the period were lower than initially predicted due to the lower than expected performance from generator T1. This meant that while we had expected to earn cap revenues for 0.9 MW of capacity sold to a counter-party, due to poorer than expected portfolio performances across the six events over summer, we only earned around 55% of what we initially expected.

We did not target market revenues for this period, as our customer preferred stable ongoing cap revenues. However from 1 April 2020 we have enrolled one of the two generators in a Spot-Price share program which aims for dispatching during high spot price events to earn market revenues. So far there have been no spot price events given the mild conditions at this time of year, however we expect there to be several dispatch events over winter.

Hedging against wholesale price volatility

Our current customers all have fairly standard retail contracts with retailers, which do not include exposure to the wholesale spot prices. Therefore while the backup generators on site certainly provide protection against power outages and brownouts/blackouts and allow business continuity, they are not required to provide a hedge against price volatility.

In future we may recruit customers who have some degree of exposure to wholesale spot prices, and will provide an update on whether their backup generators are effective at being used as a hedge against wholesale price volatility.

Outcomes for customers with and without grid export capability

We currently do not have any customers with grid export capability enrolled, so cannot comment on market outcomes for these customers. However as noted above, even in cases where export enablement is technically achievable, the costs to connect to the network for export in some cases have been prohibitive.

Therefore, recruiting customers with grid export capability is likely to be limited as the cost of connections, and therefore the financial viability of export, can vary greatly depending on the geographic location of the site within SAPN's network, and whether generator export is permitted.

Customer experience

Feedback from our customers has been generally positive, including both customers already enrolled and those who are in the process of having their site enabled for go-live. As noted earlier, customers appreciate being able to earn a more predictable and steady stream of revenue via Availability Payments, and still recover their costs when required to run their diesel generators during dispatch events.

However, our customer whose generator has not performed as expected indicated they would have preferred to have known earlier about the impact volatile fluctuating loads would have on dispatch performance, and therefore Availability Payments for the summer period. We have incorporated this feedback into our processes and conducted more comprehensive tests during periods of expected dispatch events (i.e. late afternoon to early evening). This provides a more accurate understanding of site loads during these typical dispatch timeframes and likely generator output for events.

Moving forward, Enel X will also be requesting not only interval data at the gate/parent meter, but also consumption data for individual loads on site, including any customer SCADA data available, for the past 12-36 months, and take load profiles into consideration when assessing sites for suitability.

Patterns in performance and customer experience

As we only have two generators participating in the program so far, we are unable to provide any meaningful patterns in performance or customer experience across sectors, generator sizes or geographical location. As noted above, sites which have a stable and consistent load during high demand periods, in both summer and winter are likely to be better performers in this program. In contrast, sites with highly seasonal or intermittent load profiles are unlikely to perform as well.

However as noted, one of the generators is highly volatile and will be enrolled in Spot-price share program moving forward (with Energy-only payments as opposed to both Availability and Energy Payments). Therefore depending on the site load and generator output during dispatch events this winter (and next summer), their overall performance, payments and therefore customer experience could be better than what we have observed this summer.

Influence of high solar PV generation output

As our customers typically do not have solar PV installed on-site, we cannot provide an indication of their operations during high solar PV generation output.

Our customers' generators are dispatched during periods of forecast high spot prices, and in our experience these events are usually during periods of high forecast demand (due to weather), along with periods of low wind and/or low solar PV generation output. The majority of events that have occurred so far in the program have occurred in the late afternoon to early-mid evening, when there is lower solar PV output compared to during the middle of the day.

However, as mentioned earlier, our customer portfolio performance does not have a direct relationship with the volume of solar PV output into the grid; rather performance is dependent on business operations and therefore site load and generator output during dispatch events.

Impact of cap products on contract market liquidity.

As noted above, we have been able to build and sell a cap product to a counter-party for two generators over this recent summer period 1 November 2019 to 31 March 2020. As our cap product sold was only 0.9 MW (recently adjusted down to 0.38 MW) and only in operation for one summer, it is still too early to advise whether the product has had any impact on contract market liquidity.

However, we believe once we build to a 20 MW portfolio, and have this portfolio sold and in operation for a full 12-month period, we will certainly be able to provide more meaningful observations and analysis about any impact on contract market liquidity, particularly in the SA NEM region.