

Energy Security Board
Level 15, 60 Castlereagh St
Sydney NSW 2000

15 October 2020

Thank you for the opportunity to contribute to the ESB's consultation on the post-2025 market design for the NEM.

Reposit has been successfully operating residential solar and battery systems as market-responsive Distributed Energy Resources (DER) in the NEM since 2015. In that time Reposit has been able to achieve market entry with DER capacity in every service attempted. This has brought Reposit end users hundreds of dollars of new value each year.

DER acceptance into existing services has not been easy but it has been highly successful. And so it is Reposit's opinion that the NEM is DER-friendly for those DER operators that understand the NEM and can support their position. It is also Reposit's opinion that to attempt to divorce DER investors and operators from the requirement to function in the wider NEM will result in wide ranging and substantial negative outcomes in the future.

While Reposit respects that the ESB process is wider than DER integration, the remainder of this submission argues that capacity provided by DER cannot and should not be treated any differently to capacity from any other resource.

DER is already functioning in the NEM – It is Reposit's day job

For several years Reposit has struggled to communicate its successes in the NEM to policy and regulatory bodies in various states and jurisdictions. Some part of this can be attributed to the engineering-and-economics-first culture of the company, and what is considered valuable communication internally. But some of it is simply because it is often stated that DER "is blocked from participating in X or Y NEM service". This is simply not the case, the NEM does not address DER explicitly to include or exclude it from any service.

So to be absolutely clear, Reposit has successfully delivered capacity to non-trial contracts and registrations for the following NEM services:

- Market - Contingency FCAS (outside of AEMO's VPP Trial)
- Market - RERT
- Market - Wholesale Energy
- DNSP - Network capital deferral
- DNSP - Solar curtailment
- DNSP - Voltage control/reactive power provision
- DNSP - Solar ramp rate control
- DNSP - Data provision and site visibility

These contracts and registrations were not simple to attain and are the product of technology and processes that have been built by amazingly talented people at Reposit and our partners over the course of 8 years. They are all based solely on technical capability and hence are very much possible for others to replicate. Reposit are happy to discuss the nature of these contracts with the ESB as permitted by any applicable non-disclosure commitments.

In each contract or registration Reposit has had to engage its partners with reasoning and data to show that DER is able to function to deliver these services correctly. In some cases this has taken several years. This is as it should be. DER is a new technology and Reposit

controlled capacity has the same physical effects on the supply/demand balance at a network location as any other capacity. So, why should it be treated any differently? Why should it not be subject to the same standards as other sources of capacity? Why should it be measured differently? And why should it attract different compensation for the same work done by traditional sources of capacity?

It is Reposit's opinion that running trials that water down the requirements of the NEM for DER have been deeply damaging to the NEM. They have sent, and continue to send the message that DER and VPPs need special treatment to participate in the NEM. They fragment the system, create grey areas and allow special interests to erode the economic, engineering and meritocratic underpinnings of the NEM. Not just for DER, but for all participants.

These trials also breed weak MW which cannot be compared apples-for-apples with the MW of other participants. It should come as no surprise to anybody that weakening the requirements of the NEM in a trial sees weak participants join a trial. Why would somebody able to participate in the open market choose instead to apply their efforts to a trial?

A key part of the formulation of the NEM is its technology neutrality. This should not be confused with vendor-neutrality (the NEM should absolutely be this as well). Segregating DER from the wider market is not technology-neutral by definition, and the NEM should not lose this key property in the future. Even if it means providers of DER must be able justify why their capacity is just as good as that of their non-DER peers, and even if some providers don't make the cut.

All waters eventually meet - often with unpredictable consequences

One of the reasons for technology neutrality, and a single set of overarching rules, is that the boundary between two systems is where all the weird stuff happens. This is true everywhere, but especially in physics, economics and software. Given that the NEM encompasses all three of these disciplines, it will absolutely happen in a fragmented NEM+ (proposed) DER-NEM as well. And it will be near-impossible to manage.

We have already seen it happen with solar FiTs. Various entities started to compensate solar feed-in far beyond the market value of that feed-in. People respond to incentives, and the incentive was/is to pile rooftop solar into the NEM. It isn't the wholesale market's fault, the wholesale market isn't driving the incentive, it is happening in another system. And it would be fine if the two systems didn't interact. But they do, and now we are unexpectedly facing various difficult problems on unexpected timeframes.

The initial designers of the regulated solar FiTs in VIC and SA just wanted to get more solar PV installed on roofs to help people with their power bills. They didn't think that things would get out of hand to the point where the NEMDE would not be able to find secure dispatch solutions in South Australia. All of this in just 10 years, and without the influence of software - PV is a materials science game, things change relatively slowly and predictably.

A similar scenario is likely to play out where an attempt is made to isolate DER from the wider NEM. If the NEM and the DER-NEM share a frequency domain (grid), which they will, the consequences will be completely unpredictable. Especially when the impact of Artificial Intelligence (AI) is considered. Not just today's AI, but 10+-years-into-the-future AI.

AI is a collection of technologies that delivers low-cost predictions by finding correlations in data. In all circumstances an AI operator is seeking a valuable outcome. In simple terms, a large amount of organised data from the problem space is provided to an algorithm, and the algorithm finds correlations in the data. Those correlations are not necessarily causal, they are just correlations. And those correlations can be between data that people wouldn't

suspect were there. So, as an AI operator one gets a lot of data, organizes it nicely, throws it at the algorithm and then sees what the AI finds. Where the correlations are judged to be robust, and there is value in an accurate prediction based on the correlations, the AI operator begins to act according to those predictions.

Because computation is so inexpensive, any nicely organized database (like AEMO's MMS), no matter how large, can be ingested and correlations identified. Doubtless, any DER-NEM will have a similar software-driven MMS-like system which like AEMO's MMS will be able to be ingested by an AI. This AI will quickly find correlations between the two systems, many of them causal, because both markets operate on the same frequency domain (grid).

What happens in the NEM will absolutely be detectable in the DER-NEM. Which means actions in one system will affect the other system, and this creates an opportunity for broad-scale arbitrage between the systems. People (including Reposit) will use technology to find these boundary effects and exploit them to make money without necessarily delivering what the power system needs. Similar technology to this is already employed in the NEM but it is of limited value because the boundaries (transmission constraints, service structure, etc.) are soft and 5-minute changeable. The introduction of a hard and slowly changing market definition boundary, supported by a shared grid will result in it being exploited for profit at the expense of the efficiency of the NEM.

The regulatory system will need to respond to this inefficiency and will do so by having to consider how a rule change in the NEM would affect the DER-NEM. Having a NEM and a DER-NEM now means that there are two degrees of freedom to consider, but because there is only a single grid the rule changes will interact. The net effect will be that regulators will have to consider both systems as a single market, but one with at least twice the complexity of the current NEM, and one with AI-amplified boundary effects. It will favor those participants with the most customer data, and the most sophisticated data science teams.

The incentive will be to exploit the structure of the system instead of to deliver electricity to consumers at the lowest cost. This is the first reason the creation of a DER NEM will be anti-consumer.

One set of rules for us and another for them

The second reason why a DER-NEM is anti-consumer is that it very clearly tells consumers that they are not welcome in the electricity system – not if they want to benefit from it anyway. Doubtless, this will not be the intention of the market designers, but this is how it will be interpreted by consumers.

This message will be primarily heard by early adopters and influencers who invested in market-exposed technology and tariffs, enjoy the benefits, and are excited about the future. This is the more engaged and vocal "prosumer" customer segment. They are often technologists, or have adopted technology strongly later in life. They will ask their representatives to explain why things were changed when they were seeing benefits? They will be naturally suspicious of the change because the electricity system is viewed as untrustworthy by the majority of electricity consumers.

And they will be correct. The NEM as it stands works for those who have made the right DER technology buying decisions. Several thousand engaged prosumers are seeing the benefits that NEM market exposure delivers from Reposit and related offerings. Perhaps the DER-NEM will deliver equal or greater benefits, but in a low trust environment a bird in the hand is worth two in the bush.

This stands apart from the dissatisfaction that any unfavorable value discrepancy between consumers and "the big guys" creates among consumers. When Reposit first delivered a

wholesale market linked \$1/kWh battery FiT in 2017 (GridCredits), it took very little time for previously unengaged people to realise that there was a potential \$13/kWh arbitrage for our partnering retailer. The support lines exploded in outrage. It was not fair, it was their battery energy. Why can't all of that value flow to the end user?

In this case, those people provided a poor satisfaction score and some removed their battery from earning GridCredits – even though they were going to lose their \$1/kWh, as there was no substitute product. What will they do when they are told that their representatives have decided their batteries and cars are completely excluded from the big markets because it is better for them that way? Unless the DER-NEM can be designed to always deliver better or greater returns (and we see what this did with the solar FiT) it will be a constant reminder to Australian electricity consumers that the electricity system is not really there for them. As soon as technology gave them the ability to join in the main game, the goalposts moved. One set of rules for consumers, and a better set of rules for the big guys.

The Australian electricity system is too small to invest in – and this is a good thing for Australia

The NEM currently enjoys an international competitive advantage as a good example of a “perfect competition” energy-only market, dealing reasonably well with very high renewable energy penetration. This is not to be taken for granted – the NEM is special among economic structures underpinning efficient investment and operation of capital. It is not perfect, but it is very good. Reposit has achieved what it has because the NEM is well designed.

This is an unpopular opinion, but people who dislike the NEM confuse execution with intention. Reposit suggests that a lot of the problems in the NEM come from the poor operation of the design – not from poor design. The design of the NEM is renewable-friendly. The design of the NEM is DER-friendly. And it is precisely because the NEM does not specifically address renewables or DER that it is a good design.

The NEM design follows the principle that “Everything should be made as simple as possible, but not simpler”. This is very powerful because it means that technology, business models, operating processes and corporate strategy that are successful in the NEM have some chance of being successful in other, more specific market designs. The NEM design forces participants to focus on the essentials of demand/supply balance, investment signals and efficient operation. And these are fundamental to every electricity system in the world. This means that intellectual property that functions well in the NEM is likely to be a material export revenue earner in the future.

To create a DER-NEM, the new market structure will need to specify more things. Some of those things will be to the taste of some international market designer, and some will not. The more specific the market design, the more “taste” will come into it. But all market designers must deal with the fundamentals of demand/supply balance, investment signals and efficient operation. Participants in the DER-NEM will have to build technology that is very specific to the Australian market, with little hope of most of that technology being implementable internationally. Reposit suggests that Australia doesn't present a large enough market to support that investment proposition.

But more importantly, when treated sensitively, Australia's market design can continue to be the catalyst for investment in intellectual property that underpins the global transition to renewables. Reposit suggests that not only would the DER-NEM fail to attract strong participation due to ROI concerns, but it would also cause Australian and International companies to abandon the Australian market for much larger ones, or those with a more globally applicable (read: less specific) market design. Any potential export revenues will

evaporate, and the excellent young talent that Australia has built up in the NEM will migrate away from Australia to make their fortunes. In short, if the DER-NEM cannot be successfully exported to other countries as a market design for much larger markets it will act as a drag on Australian international competitiveness in energy technology.

Instead, Reposit would like to assist regulators and market designers to address the shortcomings of the NEM with an eye to Australia being the dominant global player in renewable energy technology. As a nation we have all of the necessary ingredients, and we have a substantial head start. We just need to remember that the Australian grid is important, but it is not the final prize.

Continued Engagement

It is clear that the ESB is genuinely interested in improving the NEM. Reposit was founded for the same reason in 2013. Reposit has thought deeply about the energy transition for networks, generators, regulators and consumers. We have made millions of dollars of investment in the process, spoken to countless people, introduced and removed products from the market, and today actively control thousands of DER endpoints.

Reposit would welcome the opportunity to more fully discuss DER in the NEM with the ESB in the future.

Kind Regards,

A handwritten signature in black ink, appearing to read 'D. Spaccavento', with a long horizontal flourish extending to the right.

Dean Spaccavento
CEO
Reposit Power