

1 March 2024

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Potential solutions for peak electricity capacity issues – Vector response to consultation paper

Vector appreciates the opportunity to provide comment on the Electricity Authority's (the Authority) "Potential solutions for peak electricity capacity issues" consultation paper. This submission is not confidential and can be published in full on the Authority's website.

While this consultation is focussed on market solutions to peak capacity issues, there is a need to acknowledge the physical infrastructure that enables the market so that we minimise the potential for unintended, harmful side effects of increased market participation by resources located on distribution networks.

Aggregators of demand response from resources located on the distribution network must be aware of any physical limitations to their participation in wholesale markets. At this stage, because there are lower levels of demand response capability in New Zealand, we are less likely to see distribution constraints act as a barrier to wholesale market participation. This will change as the system and technology evolves. While turning off load does not typically create a concern for distribution networks, the coordinated restoration (or activation) of load will potentially cause power quality or reliability issues for consumers. As a result, we support the proposed inclusion of a 'return time' for dispatchable demand bids as this will allow demand response providers to incorporate any load restoration limits from their host distribution networks when they make bids in the wholesale market. This assumes the Authority continues its work to ensure that all third parties controlling load on distribution networks follow a load management protocol with their host distribution networks.

The Authority is relying on a proposed Code change to mandate distributors' discretionary demand be made available during potential low residual situations¹ as part of the solutions for peak capacity issues. However, increasing the visibility of these resources via mandatory difference bids should be accompanied by additional scrutiny of the behaviour of other market participants by the Authority. The consultation notes that the market has failed to coordinate resources effectively even

¹ <https://www.ea.govt.nz/projects/all/code-amendment-omnibus/consultation/code-amendment-omnibus-december-2023/>

though there is sufficient nameplate capacity to ensure electricity supply meets demand, therefore the Authority should ensure that existing participants' behaviour follows good electricity industry practice for the benefit of all consumers.

We feel that the concept of good electricity industry practice includes an expectation that all participants will do their part to support the electricity system in the case of emergencies. While we support participants pursuing commercial opportunities with their flexible resources, which in aggregate should reduce the likelihood of forced curtailment being required, this should not exempt participants from being directed how to operate those resources during emergencies at both national and local levels, such as making further load reductions when necessary. By way of example, we have noted recent announcements that the Tiwai smelter has entered commercial arrangements to reduce load when doing so would be beneficial to themselves and other market participants. This is positive for the system, and for the further evolution of the demand response market. However, this should not exempt Tiwai from bearing its share of forced curtailment in addition to its commercial arrangements, alongside residential consumers' hot-water assets, as and when the system requires. No party can opt out of a loss of supply if the system were to experience cascade failure.

Plainly, participants can behave in their own commercial interests but must ensure that they are not causing damage, loss of supply, or power quality issues for generation, network, and/or consumer assets.

Finally, we support the Authority's initiative to conduct a survey of flexible demand available in New Zealand and hope that the results can be anonymised and shared at the GXP-level rather than the planned approach of sharing the results aggregated at an island level. Aggregating the information to each GXP would provide significantly more useful insights. For example, the regulatory structure for EDBs in DPP4 plans to create new opportunities for the use of non-network alternatives, where one such alternative is the use of demand flexibility and an awareness of available resources by GXP would provide useful context during distribution planning processes.

Vector's Responses to selected questions posed in the consultation paper

3. Industry is working to better coordinate their resources

Q2: Do you agree with our assessment of the incentives for demand response? If not, what is your view? Are there other criteria that the Authority should consider?

The recent drive for electrification of the economy has seen a sharp increase in peak demand over the last two years. This has been combined with the removal of the RCPD incentive to EDBs within the new transmission pricing methodology.

The Authority notes in the consultation document that, although there is sufficient nameplate capacity to ensure electricity supply meets demand, the market has failed to coordinate the available resources.

Part of the solution proposed by the Authority is to mandate distributors' discretionary demand be made available during potential low residual situations. However, use of these resources should not be seen as a free option to 'bail out' the inability of the market to keep the lights on. Increasing the visibility of these resources via mandatory difference bids should therefore be accompanied by additional scrutiny of the behaviour of other market participants by the Authority, particularly given the acknowledgement that the market has not been effective in managing peak capacity shortfalls.

We agree that there are some existing incentives for the use of demand response to avoid energy costs during peak periods and we are also encouraged to see the modelled impact that demand response can have on wholesale energy prices as noted in clause 3.3 and Table 1 of the consultation document.

Q3: Other than financial incentives, what are the other barriers to entry for demand response participation in the wholesale market that you have identified?

As we have noted in previous submissions, aggregators of demand response connected to wholesale markets through a host distribution network must be aware of the physical limitations of their host distribution network. At this stage, because there are lower levels of demand response capability in New Zealand, we are less likely to see distribution constraints act as a barrier to wholesale market participation. DER have simply not reached sufficient numbers in NZ where we are frequently seeing concentrations of DER on distribution assets, which would increase the probability of constraints due to coordinated or herding behaviour, however we expect that to change as has been seen elsewhere in the world.

Again, as we have noted previously, it is typically not turning off load that creates a risk for distribution networks – it is how these resources are dispatched 'on', whether that is post event or in response to a market signal, that requires planning and coordination to ensure that there are no unintended harmful effects.

4. The Authority considers it best to focus on improved market participation for demand response and BESS in the short-term

Q4: Do you agree that the Authority should focus its resources on identifying and lowering barriers for BESS and demand side flexibility to participate in the wholesale and ancillary services markets? If so, where do you think the Authority should focus first?

We believe the Authority should focus on demand flexibility more generally, rather than looking to enable BESS as a specific technology. The bi-directional offer for BESS contemplated in the consultation is good but risks Code being written in such a way as to limit its use to only BESS systems, and our concern is that taking too narrow an approach might miss future opportunities in this rapidly evolving space. Vehicle-to-grid capability is an example of an opportunity that shows similar promise (and is, fundamentally, the same technology) and so any proposed change should be technology agnostic.

We also agree with the suggestion of including a ‘return time’ in the dispatchable demand regime. While the proposal is focussed on encouraging participation from industrial equipment that is limited in how quickly it can be re-energized, this ‘return time’ would also allow demand response operators or aggregators to respect any load restoration limits communicated to them from their host distribution networks. As noted in our ESIG article², the coordinated restoration (or activation) of load is currently our primary concern on the low voltage network so that there aren’t unnecessary power quality or reliability issues for consumers. Assuming the Authority continues its work to ensure that aggregators and other third parties have load management protocols in place with their host distributor, the inclusion of a ‘return time’ on dispatchable demand bids would allow them to incorporate their host distributor’s load restoration limits into any bids made on the wholesale market in a very efficient way and limit the risks of under-performance due to un-modelled physical constraints on distribution networks. We would be delighted to see this enhancement to market and participant systems.

5. Options to better manage supply risk for winter 2024 and beyond

Q5: Do you agree that any solutions should satisfy these principles? If not, what is your view and why? Are there other principles that the Authority should consider?

Yes, but we recommend an additional principle, between the current c) and d), that clarifies the risk of synchronised resource activity on physical network equipment and electricity power quality for all consumers which are also “unintended harmful side-effects for consumers”. The risks currently identified within principle c) appear to be focussed solely on the financial and market performance risks.

Vector’s recommendation for an additional principle is:

“minimise the risk of unintended harmful side-effects on the quality of supply for all consumers, due to distributed energy resources (DER) participating in the wholesale markets and/or responding to wholesale market signals, such that power quality is impacted (voltage, reactive power, frequency, etc) leading to damage or safety shutoffs of generation, network, and/or consumer assets.”

6. Financial incentives to provide flexibility

Q7: What factors do you think we should consider in the design of such a product?

While the contemplated ‘super peak’ hedge would be a financial product, the Authority should ensure that physical supply to back such a product (to support sale of the product) is open to as many different technologies and providers as possible. It should be technology-agnostic, and specified in such a way that barriers to participation are minimised.

² <https://www.esig.energy/the-forgotten-side-of-load-management/>

8. Interim options to manage residual security of supply risks

Q14: Do you think it would be beneficial to create an out-of-market tender for emergency demand response? If not, what is your view and why?

We think there may be merit in introducing the *framework* for an out-of-market tender now, one that can be activated by the Authority for a time-limited period, as and when required, upon recommendation from the system operator. The risks to supply through the transition period are material, and political concerns are high. Given the risks of knee-jerk political reaction if there were to be a failure of supply, the cost-efficiency trade-off through this period should be weighted more towards ensuring security, even if it means a slight, theoretical reduction in efficiency. A time-limited scheme will be less likely to impact investment efficiency.

Further, this space is genuinely evolving, especially in the case of distributed energy resources operating on distribution networks and activated by distributors. Precedents set on the transmission system may well be mirrored on the distribution network. Genuine “last resort” situations on parts of distribution networks are likely to be an everyday occurrence (due to the greater likelihood of customers’ supply being impacted), compared with perhaps once every couple of years on the grid. Significantly more development work and research is required before a conclusion could be drawn about the efficiency of introducing an equivalent scheme on the distribution network, which is why any such scheme introduced for the grid should be viewed as temporary.

Closing Comments:

We appreciate the opportunity to respond to this consultation and are available to answer any questions regarding our submission.

Kind regards,



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