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Wholesale market arrangements for battery energy storage systems – Code amendment consultation

1. Vector welcomes the opportunity to submit on the Electricity Authority's proposed Code amendments for wholesale market arrangements for battery energy storage systems (BESS). No part of this submission is confidential. We are happy for it to be published in full.
2. Vector broadly supports the Authority's proposals. We support fit-for-purpose market arrangements that enable efficient investment in, and operation of, BESS. BESS will play an increasingly important role in supporting system flexibility, resilience and affordability as the electricity system transitions to a higher share of variable renewable generation and greater electrification.
3. This submission does not respond to each consultation question individually. Instead, we provide a short, high-level response focused on the interaction between the proposed wholesale market reforms and the safe, reliable and efficient operation of distribution networks.
4. Vector supports the overall direction of the proposed Code amendments, however, Vector's support is subject to one important qualification: as more BESS connect to distribution networks, wholesale market participation must be implemented in a way that recognises local distribution constraints, EDB safety obligations and the emerging need for clearer operational coordination between BESS owners, the System Operator and distributors.

Distribution-connected BESS creates a TSO/DSO coordination issue

5. Vector has consistently submitted that, as distributed and flexible resources scale, New Zealand will move further into a hybrid TSO/DSO operating environment. Embedded BESS may be responding to national wholesale market signals, System Operator dispatch instructions, ancillary service opportunities, local network needs, or emergency conditions. These uses can all be valuable, but they must be coordinated.

6. For embedded BESS, “market optimal” operation will not always be the same as “network feasible” operation. A BESS may be capable of charging or discharging from a state-of-charge perspective, but its actual operation may be constrained by local voltage, thermal, outage, protection or power-quality limits. These constraints are not necessarily visible to the System Operator’s tools.
7. It is therefore important that the Code amendments do not create a framework in which wholesale market dispatch is treated as fully resolving BESS dispatch feasibility for embedded resources. State-of-charge constraints are useful, but they do not address all distribution-level feasibility issues.

The Authority has acknowledged the issue, but the workstreams need to progress together

8. Vector welcomes the Authority’s acknowledgement that coordination between distribution network owners, the System Operator and flexible distributed resources will need to improve as the volume of these resources increases.
9. We also note the Authority’s indication that this issue is intended to be addressed through the future system operation workstream, including through possible primacy rules and limits for use of BESS within distribution network constraints.
10. Vector supports that direction. However, we are concerned that the wholesale market reforms are progressing faster than the future system operation arrangements needed to make those reforms workable for embedded BESS. In our view, these workstreams need to be developed in parallel, and at a comparable pace. Otherwise, there is a risk that enhanced wholesale market participation and dispatchability will be implemented before the necessary operational interfaces, responsibilities and safeguards are considered and put in place at the distribution level.
11. This would risk shifting practical operational risk onto EDBs and, ultimately, consumers. EDBs remain responsible for maintaining safe, reliable and power-quality-compliant operation of their networks. They therefore need clear visibility, control interfaces and operational rights where embedded BESS activity could affect local network security.

Key requirements for implementation

12. Vector considers the Authority should ensure the final design and implementation pathway includes the following principles:
 - **Distribution feasibility must be explicit** – Dispatch and trading arrangements for embedded BESS should explicitly recognise that operation must remain physically feasible at the relevant point of connection and within local distribution network limits. This includes voltage, thermal, protection, outage and power-quality constraints.

- **Instruction hierarchy must be clear** – The Authority should clarify how BESS owners are expected to respond where System Operator dispatch instructions interact with EDB load management requirements, outage conditions, emergency instructions or local power-quality limits. This should include a practical compliance pathway or safe harbour where an embedded BESS must deviate from dispatch to comply with distribution network requirements. Local network limits or requirements must take priority (and physics will dictate that they will).
- **EDB/DSO visibility and telemetry must develop alongside market reforms** – Distribution-connected BESS participating in wholesale markets should be subject to appropriate visibility, telemetry and communication requirements. These should support both System Operator needs and EDB requirements for managing local constraints and emergencies.
- **Operational agreements should be encouraged or required** – Where embedded BESS participate in wholesale dispatch, the Authority should consider whether BESS owners or aggregators should be required to maintain operational agreements with their host EDB. These agreements could address local operating limits, outage protocols, emergency response, communications and dispatch coordination.
- **State-of-charge constraints are necessary but not sufficient** – Vector supports the Authority's proposal to develop state-of-charge constraints to improve dispatch feasibility and reduce inefficient conservative trading. However, these constraints should not be treated as resolving all feasibility issues for embedded BESS. Local network constraints may bind regardless of a BESS's state of charge. As noted above, these must take precedence.

Relationship with future system operation

13. Vector encourages the Authority to explicitly link the implementation of these BESS wholesale market reforms with the future system operation workstream. In practice, the workstreams are interdependent. Wholesale reforms that improve BESS dispatchability will increase the need for clear TSO/DSO coordination arrangements, and the future system operation workstream will need to define how these arrangements function in practice.
14. Vector's preference is for a hybrid model of future system operation, where the System Operator retains responsibility for system-wide coordination and security, while EDBs retain clear responsibility and operational primacy for distribution-level safety, constraints and emergencies. The BESS reforms should be designed to support that evolution, rather than pre-empting it.

Conclusion

15. Vector broadly supports the Authority's proposed Code amendments for BESS wholesale market participation. We consider the proposals are a positive step towards more efficient participation by BESS and more technology-neutral wholesale market arrangements.
16. However, the final design should more clearly recognise that embedded BESS create distribution-level operational issues that cannot be resolved solely through wholesale market dispatch tools or state-of-charge constraints. The Authority should ensure that implementation of these reforms is sequenced with, and does not run ahead of, the future system operation arrangements needed to support safe and efficient operation of embedded BESS.

Kind regards

A handwritten signature in black ink, appearing to read 'B van Esch'.

Bas van Esch
Market Regulation