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A regulatory road map for battery energy storage systems

Transpower welcomes the opportunity to provide feedback on the Authority's roadmap for developing regulation for Battery Energy Storage Systems (BESS), published 24 June 2025. This submission is from Transpower in its role as System Operator. The Authority seeks feedback on the roadmap for potential gaps or work it should reprioritise.

We support having a regulatory road map for BESS. BESS are expected to play a critical role in the operation of the power system and market in the future. Our 2025 Annual Security of Supply Assessment (SOSA) highlights the key role BESS is expected to plan in firming power generation to keep the lights on over peak periods in the upcoming winters. The Authority's Future Security and Resilience (FSR) programme has significant coverage of BESS and the opportunities afforded by their capabilities. BESS are already here and there are many regulatory and technical issues to solve.

We recommend the Authority considers a pan-industry working group to harness industry experience with grid/utility BESS to identify the detailed roadmap steps for wider integration of BESS in the power system and wholesale electricity market. We consider from a technology point-of-view the capabilities of grid/utility scale BESS are broadly similar. Therefore, focussing on grid/utility BESS can enable progress without having to solve the additional challenges which distributed BESS bring such as aggregation. Further, we think the Authority's recent pragmatic initiatives to support small-scale BESS such as the peak feed-in tariff will encourage the uptake of small-scale BESS. In the appendix we list a range of issues that will need attention, and a key first step is to decide priorities.

Roadmap needs development with stages towards coherent regulatory settings

The BESS roadmap published by the Authority captures well most of the BESS related activities the Authority already has underway or was already planning to undertake. The most notable omission is several non-Part 8 activities on the FSR roadmap, for example the consideration of new or revised ancillary services (activity 4.2).

We consider further development of the BESS roadmap is needed to show the steps to be taken to reach the end point of new regulatory policy for BESS in the wholesale market and its associated Code. The starting point is the work to date that allows BESS to participate in

the wholesale market. BESS can already participate as a generator and as dispatchable demand, provide instantaneous reserve (IR), and provide frequency keeping when acting as a generator for the whole trading period. We note that while the full capabilities of BESS are not yet able to be harnessed there are several products and services which can be provided 'today'. Promotion of the revenue streams BESS can currently access as well as those requiring Code and or tool changes to access may assist with getting more BESS on the system more quickly.

The BESS roadmap also needs to consider the wider Authority work programme. For example, it would be inefficient to undertake tool changes to enable full BESS participation in the provision of frequency keeping separately to the repurposing of the current multiple frequency keeper (MFK) signalled in the Authority's 2024 Potential solutions for peak electricity capacity issues decision paper. We believe the Authority's work programme should include a system frequency management strategy and a review of the FSR Roadmap. The outcomes of these pieces of work will inform activities on the BESS Roadmap.

Work to reprioritise (and prioritise)

- For system security and stability, immediate focus should be on grid/utility scale BESS. Several grid/utility scale BESS have been connected to the power system, more are being built, and yet more are signalled in the 'generation' pipeline. Changing the Code and market systems to fully utilise the capabilities of grid/utility scale BESS will deliver system benefits without the added complications of having to solve aggregation, compliance, and distribution network management issues which accompany distributed smaller scale BESS.
- Funding for the technical and analytical work underpinning understanding and integration of BESS operation in the power system, particularly for BESS that are closely coupled with generation plant as hybrid plant. This work is not BAU under SOSPA.
- The work scoped under TAS113 to remove the potential for non-physical SPD solutions to arise from traders bids and offers and the current modelling of BESS. Along with the consideration of enabling greater uncertainty close to real-time to enable BESS owners to maximise their utility.

Gaps

- The BESS roadmap steps need to address issues which are being felt now; we provide a list of issues in the appendix.
- Consideration of the cost allocation for frequency keeping including a fair proportion being allocated to intermittent generation (IG). Most of the IG currently being built in Aotearoa New Zealand does not include BESS. IF IG owners faced a fair share of frequency management costs they may be incentivised to include BESS in their projects. Co-located BESS and IG provides greater system benefits than IG alone.
- Similarly, consideration of operational ramp-rates for IG may incentivise installation of BESS with IG. The current unlimited ramping of IG is questionable long term as a greater absolute quantity and proportion of the power system is provided by IG.

- We recommend BESS should have its own classification in the Code to better reflect its unique characteristics. Consequently, better asset owner performance obligations (AOPOs) can be placed on BESS in the Code and their modelling in the market system and tools can also be improved. We note a new classification for BESS has been implemented in Australia.
- Many of the settings needed for BESS are consistent no matter the size of the BESS. However, bespoke consideration of consumer batteries, whether EVs or residential BESS, may be required on some topics. These BESS also come with the broader mass participation issues such as aggregation, compliance, and distribution network management issues.

We are committed to directly supporting the workstreams the FSR programme and market development TAS work. We encourage the Authority to accelerate its market development programme and prioritize its resource to activities that support maintaining system security and supply reliability in a power system with increasing VRE and IBR penetration.

Kind regards

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Appendix – Issues to be considered in roadmap stages

Code/Regulation/Market design:

Ancillary services such as Instantaneous Reserve (IR), Frequency Keeping and Black Start are technology dependent, and their obligations would be better dealt with using the Ancillary Services Procurement Plan and Policy Statement rather than under the Code. The Procurement Plan and Policy Statement as system operation documents are subject to regular review and can take account of evolving industry practice with BESS operation.

Common quality matters associated with BESS operation such as frequency and voltage obligations will likely need to be incorporated into the Code, considering the unique characteristics of BESS. This ensures their capabilities can be fully leveraged to provide essential reliability services for the power system, as well as ancillary services that generate revenue to support their operation.

Security constrained IR dispatch needs to become considered with some urgency. The geographically dispersed nature of grid connected BESS and IG highlights the situation that IG and BESS output when providing IR can be greater than connection capacity during transmission outages. Because IR is procured at the island level neither the Code nor market system cater for the consideration of transmission capacity in the IR scheduling process. Manual processes are in place to mitigate this issue but are not an enduring solution.

Sustained Instantaneous Reserves (SIR): Can and should BESS operate in the SIR market which is currently a 15 minute product with 5 minute dispatch? Future thinking should include revisiting the ancillary services IR products, specifically considering the time-limited characteristics of BESS.

Technical

BESS as Virtual Power Plants (VPP) Solar Zero (SZ) showed that Virtual Power Plant hybrid providers are possible but are likely to be slower to respond to dispatch instructions and system events when compared to grid BESS, and have some significant technology challenges in meeting the existing market requirements. Solar Zero had significant MW capacity in the IR market with a one-way response. The required response was delivered but upon frequency recovery does not return to their previous state. Generation-provided IR and interruptible load (IL) both return to their previous state, either because of a new energy dispatch set-point for generation or via an instruction to restore IL. VPP BESS IR receives no such instruction and is not required to revert to their previous state.

In addition the widely dispersed nature of BESS VPP will challenge the existing safeguards in the Code and Procurement Plan concerning the interaction of AUFLS and IR.