

30 May 2023

Electricity Authority| Te Mana Hiko  
PO Box 10041,  
Wellington 6143

Ref: Submission on Future Security and Resilience - Review of common quality requirements in Part 8 of the Code

Thank you for the opportunity to submit on Future Security and Resilience - Review of common quality requirements in Part 8 of the Code

Power System Group (PSG) have in the past have made submissions on critical issues associated with New Zealand transmission investment and security of supply as below

- Ministerial review of electricity market cites (PSG) submission in Page 26 for recommendation 17 to restructure SOE
- Submissions Electricity Commission, MED; Transmission Upgrades (2006), North Island Reactive Proposal (2010), Electricity Markets (2010).

We feel that part 8 of the code is long over-due and hopefully it will better clarify roles and responsibilities for all the electricity stakeholders to ensure not only continued high reliability but ensure resilience in the context of new security threats, challenges and increased expectations from this important lifeline.



Nirmal Nair (he/him)  
Poukairangi|Associate Dean Postgraduate Research  
Te Herenga Mātai Pūkaha|Faculty of Engineering  
Ahonuku|Associate Professor  
Te Kura Pūhanga Hiko, Rorohiko me te Pūmanawa |Department of Electrical, Computer, and Software Engineering  
Waipapa Taumata Rau | The University of Auckland  
405.643 (Bldg 405, Room 643), 5-7 Grafton Road  
Tāmaki Makaurau | Auckland 1010  
Aotearoa | New Zealand  
Tele: +64 9 923 9523  
Fax: +64 9 373 7461

## Appendix B Format for submissions

Question	Comment
<p>Q1. Do you agree with the description of the first common quality issue and that addressing it should be a high priority? If you disagree, please provide your reasons.</p>	<p>Agree with the first common quality issue. The fact that NZ does not have AGC and instead uses MFK does not blend naturally to having granular frequency keeping market arrangements as in other ISOs. The obligations amongst the current 3 modes of frequency response (Governor-AOPO, MFK and 5-minute energy dispatch) will get more challenged and will potentially under-utilize opportunities for integrating other traceable albeit expensive options to help participate in the frequency keeping. A revisit to see if we have 2 buckets (Synchronous- i.e. Governor and Flexible i.e. MFK+ 5 minute dispatch) needs to be revisited. Keeping this focused around technical rather than market impacts, in the first pass will be advisable. The participatory limit i.e. 30 MW etc. if reduced due to possibility of inverter-based generation will also need to factor some notion of number of inverters participating, availability, traceability, source (e.g. preference to battery storage) and times (day time availability of solar backed resource etc.) will need to be clarified.</p> <p>Another item that will need some clarity is around correlating frequency keeping with the amount of wind-farm being dispatched in real-time.</p>
<p>Q2. Do you agree with the description of the second common quality issue (ie, first voltage-related issue) and that addressing it should be a high priority? If you disagree, please provide your reasons.</p>	<p>We partially disagree with the premise of certainty with regards to inverter causing larger voltage deviations. New Zealand North Island, particularly Auckland based reactive compensation by STATCOM etc. has been constituted based on existing grid configuration and generation mix. So the notion that grid-strength will decrease with reduced synchronous generation and attributing the replacement generation i.e. inverter-based generation as the root-cause of the description of the second common quality merits a more detailed and nuanced analysis. Without that, the question would arise of the existing transmission reactive investments. The basis of this submission is</p>



<p>Q5. Do you agree with the description of the fifth common quality issue and that addressing it should be a high priority? If you disagree, please provide your reasons.</p>	<p>I disagree with the premise of “harmonics” being a big issue from viewpoint of bulk security. The very fact that there is no clarity around managing and responsibility of “power” aka. Voltage quality and how to allocate it even in the current configuration is a testament to this. With inverter-based generation this challenge is likely to increase. So making it more simpler will help the order of the day. This submitter is part of developing new micro-grid standards.</p> <p><a href="https://standards.ieee.org/ieee/2030.12/7398/">https://standards.ieee.org/ieee/2030.12/7398/</a></p> <p>For distributors this needs to be made more simpler else compliance will become a challenge simply because the onus will be on the increasing inverter-based plants (generation and storage) that will proliferate within the networks.</p>
<p>Q6. If you are a distributor, what is your experience of asset owners sharing information with you for network operation purposes?</p>	<p>Not applicable</p>
<p>Q7. Do you agree with the description of the sixth common quality issue and that addressing it should be a high priority? If you disagree, please provide your reasons.</p>	<p>Agree. Network operators should have more information not less. Very similar to market operators and participants.</p>
<p>Q8. Do you agree with the description of the seventh common quality issue and that addressing it should be a high priority? If you disagree, please provide your reasons.</p>	<p>Agree completely. By the time this group gets together and works on it will have to grapple with newer terms like grid-forming, following and supporting modes, AC-DC MV/LV Grids etc.</p>
<p>Q9. Do you consider there to be other high priority common quality issues not identified in this paper that are occurring or that you expect to occur because of:</p> <ul style="list-style-type: none"> <li>a. the uptake of inverter-based resources, and/or</li> <li>b. how the Code enables different technologies?</li> </ul>	<p>Agree. Some of these new modes of emerging operating architectures identified in response to Q8.</p>