

Submission: Addressing more frequency variability in New Zealand’s power system

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Summary

The Authority is understandably concerned about increasing amounts of variable generation impacting the variability of frequency due to decreasing system inertia plus greater variation in generation. Our suggested solution is to create a new market that is akin to governor response. Creating this market creates a technology-neutral playing field where power system participants could decide whether to provide a governor-response type service or not. What we are proposing moves frequency management from using 19th century technology and policy settings, to using 21st century technology and modern policy settings.

SolarZero prefers option 3. But this option does not address the technology-driven paradigmatic shift in frequency management that could occur with the right policy settings. To achieve the most efficient outcome for the long term benefit of consumers the Authority should move away from a performance obligation approach (i.e. options 1&2) and extend option 3 to explore how a market for all aspects of frequency management can be developed including a market for governor response that would include “synthetic” governor response.

Conceptual framework

Conceptually there are three parts to maintaining frequency:

1. Governor-type response to keep the frequency in the required band, which is not dispatched.
2. Frequency keeping which addresses the intra five minute changes in frequency as power stations and demand ramps up/down.
3. Contingent response when something goes wrong.

Governed rotating plant helps with all three parts of maintaining frequency. There is a market for 2&3 (above) but not for 1. In part, providers of contingent response will help with maintaining frequency within the band and frequency keeping (1&2) depending on the deadband settings. Interruptible load cannot provide frequency maintenance (1&2 above) services, but can provide contingent response. We believe that market mechanisms will deliver the best outcomes for consumers to address points 1, 2 and 3 above.

A new frequency management market - “governor response” in the 21st century

We propose that a “governor response” market is created to keep the frequency within the dead band. But first the whole concept of maintaining frequency needs to be reconsidered to reflect the opportunities provided by new technology, i.e. frequency management in the 21st century.

For example, the concept of a dead band is problematic in its own right. Systems that provide reserves have a dead band. When they do respond it is generally because there is an actual frequency event, which occurs rarely, e.g. once or twice a year. In these situations reserve providers must follow a procedure to, for example, provide data to Transpower. Ideally as frequency wobbles around devices that can respond should actually respond – batteries, both residential and large, have the ability to help keep frequency in a band. So a distinction is needed between frequency management and contingent response in terms of the administrative/data aspects.

A new market is needed to keep the frequency in the band. The existing frequency keeping market needs a third element added to it – governance response including “synthetic” response (e.g. provided by batteries).

Q1. Do you agree the Authority should be short listing for further investigation the first frequency related option to help address Issue 1? If you disagree, please explain why?

This option perpetuates a 19th century approach to frequency management. A new approach is needed that creates a market for frequency services/keeping frequency in the band. A market for this new product would result in the most efficient outcomes and deliver the best long term benefits for consumers.

The approach proposed in option 1 imposes costs on participants. Therefore, those providing the service need to be recompensed. A market is thus needed to enable the most efficient outcomes.

Q2 What do you consider to be the main benefits and costs associated with the first frequency-related option?

We are uncertain from the documents provided as to what the benefits of a 5MW threshold are. There are likely to be costs. As stated above, a market needs to be created and the management of frequency needs to be thought about quite differently – a 21st century approach to frequency management is needed.

Q3. What costs are likely to arise for the owners of (single site and virtual) generating stations under the 30MW threshold if the threshold were to be lowered to 5MW or 10MW?

Without understanding more detail of what might be involved with this option we are not in a position to estimate costs. We would be happy to discuss possible costs with staff at the Authority.

Q4. What do you consider to be the pros and cons of aligning the AS/NZS 4777.2 standard with the Code requirement for generating stations to ride through an underfrequency event for six seconds?

AS/NZS4777.2 currently does have some ride through elements. From the consultation document it is not clear what additional changes are being considered. In the absence of this detail SolarZero is not in a position to comment.

We suggest that the Authority engages directly with the committee that is involved in the 4777 process. The way the standards process works is that the Authority would be one party to present a view on aspects of the standard. As we have outlined in previous submissions, the standards process can be fraught and the Authority needs to carefully consider whether the standards process is the right route to follow for this issue.

Q5. Do you consider a permitted maximum dead band should be based on the technology of the generating station? Please give reasons with your answer.

We suggest that the Authority moves away from a technology-based approach and moves towards a market for maintaining frequency within a band. On the one hand the Authority's philosophy is to try to make the Code technology neutral, yet here the Authority appears to be attempting to entrench a technology-specific approach. The Authority's approach appears inconsistent.

Q6. Do you consider the Authority should be short listing the widening of the normal band for frequency as an option to help address the identified frequency-related issue? Please give reasons with your answer.

As outlined in this submission, the Authority should consider an overall market for frequency management. Increasing or even decreasing the normal band for frequency needs to be considered as part of designing this market.

Q7. Do you agree the Authority should be short listing the second frequency-related option to help address Issue 1? If you disagree, please explain why.

This option appears to be a command and control/regulatory approach that is unlikely to deliver efficient outcomes and therefore will impose costs on consumers in the long term. A market for governor response/keeping frequency within the band needs to be created.

Q8. What do you consider to be the main benefits and costs associated with the second frequency-related option?

None. Develop a market for frequency maintenance to ensure least costs to consumers.

Q9. What costs are likely to arise for the owners of generating units if a permitted maximum dead band were to be mandated in the Code that was not less than the inherent dead band in generating units?

Mandating and regulating this area is not the way to go. The approach proposed by the Authority is outdated, will not bring new solutions to the fore and will increase costs for consumers. Instead a market should be created for frequency maintenance.

Q10. What do you consider to be the main benefits and costs associated with the third frequency-related option?

Modern technology can provide a frequency maintenance service without being dispatched – a kind of “synthetic” governor response. We believe that option three should be pursued, but should be considered as part of reframed thinking about frequency management i.e. a review/enhancement of frequency management.

Q11. Do you have any comments on the Authority’s assessment of options to help address Issue 1 identified in our 2023 Issues paper?

The concept of Option 3 comes out as the preferred option, but Option 3 needs further work. What is needed is a rethink of the approach to maintaining frequency. The new approach needs to reflect the capabilities of modern technology. A new market needs to be created rather than requiring and performance mandates.