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Electricity Authority
By email: fsr@ea.govt.nz

Part 8 Common Quality Requirements

Meridian appreciates the opportunity to comment on the Electricity Authority's issues paper on Part 8 common quality requirements.

This submission makes some general observations before turning to more specific comments on the seven common quality issues identified in the paper. All of the potential issues identified warrant careful consideration in light of the changes to the generation mix expected in future.

General observations

In general, Meridian's opinion is that inverter-based technologies should not by default be forced to perform in ways contrary to their design. The costs to consumers of forcing certain capability from inverter-based resources (including any associated disincentive to invest in such technologies) must be considered. Meridian's experiences in Australia have shown us that complying with overly prescriptive fault ride-through and voltage support regulations can result in significant costs and project delays and ultimately disincentivise generation investment. In one example, the modelling and compliance costs were four times the hardware costs. We encourage the Authority to consider the costs and benefits of different approaches and to be cautious of leaping to gold-plated compliance obligations on the owners of inverter-based resources.

As well as considering capability requirements for inverter-based resources, the Authority should consider the relative costs and benefits of designing new and expanded ancillary services to meet increasing system support needs. For example, it may be lower cost to invest in additional capability from existing synchronous generation, rather than impose costs on all inverter-based resources. New and expanded ancillary services could also reward existing system support services like governor response and inertia that are currently provided for free and are only going to become more important, with costs borne by the owners of synchronous generation and incentives created to try to avoid those costs.[1]

The Authority has also been generic in its description of the issues with inverter-based technologies, whereas in our experience there is significant variation and in fact some inverter-based technologies are capable (with the right software settings) of providing system support services. The analysis would benefit from more consideration of the specific issues with different inverter-based technologies.

Issue 1: Inverter-based variable and intermittent resources cause more frequency fluctuations, which are likely to be exacerbated over time by decreasing system inertia

Although inverter-based resources can cause frequency fluctuations, new technologies can also support system stability. We recommend that consideration is given to a wide range of possible options to ensure that system support is available when needed, including designing new and expanded ancillary service to procure system support services to meet system needs at least cost.

Regarding the comments in the issues paper on governor response and frequency dead bands, the Code could be clearer on how to achieve frequency outcomes at least cost and the mechanism to do so, i.e. through market incentives or rules. Meridian generally believes that market based approaches will deliver better outcomes than rules based approaches, hence our suggestion that the Authority should consider expanded ancillary services to reward governor response, which will become increasingly valuable. Decisions would also need to be made about how the costs to pay for the ancillary service are allocated to beneficiaries of frequency keeping through governor response.

[1] Note that MDAG made similar observations about the role of new and expanded ancillary services in its issues discussion paper *Price discovery under 100% renewable electricity supply* discussion paper, paragraphs 7.15 – 7.37. Available here: DRAFT, 6 Nov 20 (ea.govt.nz)

In Meridian's opinion the Code provisions regarding speed governors should also be reconsidered so that operators of inverter-based resources do not have to apply for an equivalence arrangement in the absence of a speed governor.

Issues 2, 3, 4: Inverter-based resources cause more voltage issues

Although it is true that synchronous generation provides the bulk of voltage support, Meridian's view is that the analysis of voltage issues is overly negative towards inverter-based resources. Inverter-based resources can still provide some voltage support.

Meridian's view is that the analysis would benefit from more detailed information about the nature of inverter-based resources, and the likelihood of these issues playing out. It is not clear that there is evidence to support some of the issues (for example, that low quality voltage waveforms can cause more inverter-based resources to disconnect).

Meridian agrees that increasingly less generation will be subject to the Code's fault ride through provisions, due to the increasing amount of smaller generation. It would be possible for the Authority to extend these provisions to smaller generators, as the current 30MW threshold may be too high in a future where high volumes of small generation are expected. We note that in Australia fault ride through provisions apply for generation that is greater than 5 MW.

In Meridian's opinion there is also an opportunity for the Code to clarify:

- What reactive support the system operator will require from participants. Meridian generally prioritises making peak capacity available. However, to the extent there are other expectations those should be made clear.

- AVR droop limits, which appear to be a regulatory gap as it is not clear what level of droop is acceptable and the settings in turn influence how much voltage support is provided.

- Fault ride through requirements. Clause 8.25B could be clarified so that generators recover in a way that is proportionate to the fault. Furthermore, the assumption that simultaneous application of 8,19 and 8.23 is not required could be clarified.

- Requirements in respect of tap changer range. We have found that installing tap changers with large ranges into transformers is expensive and they are known to be a leading cause of equipment failure, but operational experience is that only a small range is ever used.

Issue 5: There is some ambiguity around harmonics standards

Meridian agrees with the articulation of this issue.

Issue 6: Network operators have insufficient information on assets wanting to connect, or which are connected, to the power system

The consultation signals that new information sharing obligations may be required in order to address issues relating to network operators having insufficient information on assets. Information sharing obligations have a significant cost to businesses. It is essential that the benefits of any new requirements exceed the costs.

Regarding the issue of proprietary asset-related information, one potential option could be to consider the Australian model where equipment manufacturers are required to share information directly with the System Operator under a non-disclosure agreement. This could alleviate some concerns about generation owners (the clients using the proprietary information) sharing commercially sensitive information or not having access to all the information to share.

The Authority should also be aware that different generating stations are set up differently (for example, wind is different to hydro in that it is typically set up as one system, compared with hydro which may have multiple units). This should be considered when designing any new information sharing obligations.

Other points

The review of Part 8 is also an opportunity to consider the requirements for routine testing and protection coordination. Minimum requirements for testing and coordinating grid interface protection are set out in the Code (schedule 8.3, Technical Code A, Appendix A). They are ambiguous and in practice there is a range of interpretations across the sector. The period of testing may be uneconomic given modern self-testing technology. We think that these provisions would benefit from review, with the aim being to make them clearer and more economic.

Concluding remarks

This submission can be released in full. Please feel free to contact me if you would like to discuss any aspect of this submission.

Nāku noa, nā

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