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Electricity Authority
PO Box 10041
Wellington 6143

Submitted via email to fsr@ea.govt.nz

Promoting reliable electricity supply: Options to address a harmonics issue

Introduction

1. Orion welcomes the opportunity to provide feedback to the Electricity Authority (Authority) on the Consultation paper - Promoting reliable electricity supply: Options to address a harmonics issue (Consultation Paper).

2. Orion owns and operates the electricity distribution infrastructure in central Canterbury, including Ōtautahi Christchurch City and Selwyn District. The network is both rural and urban and extends over 8,000 square kilometres from the Waimakariri River in the north to the Rakaia River in the south; from the Canterbury coast to Arthur's Pass. Orion delivers electricity to more than 233,000 homes and businesses and is New Zealand's third largest Electricity Distribution Business (EDB).

Submission

1. Orion agrees with the Authority that the regulatory arrangements governing the management of harmonics on New Zealand's power system are no longer fit for purpose. At present there is ambiguity around the applicability of harmonics standards. Furthermore, as the industry evolves to include a wider range of technologies, including modern inverter-based resources, relying on the New Zealand Electrical Code of Practice for Harmonics Levels (NZECP 36:1993) will increase the risk of harmonics issues arising and the costs associated with harmonics mitigation. Given the uptake of these resources is increasing rapidly, it is timely for this issue to be addressed.

2. The Consultation Paper considers three different options for updating the regulatory arrangements by either amending or revoking the outdated NZECP 36:1993. Orion's preference is for the Authority to move forward with considering option one (to revoke NZECP 36:1993 and mandate aspects of the AS/NZS 61000 standard series for transmission-level harmonics and aspects of the Electricity Engineers' Association's (EEA's) Power Quality Guidelines for distribution-level harmonics). Orion sees that this option is preferable to either option two (revoking NZECP 36:1993 and making recommendations to use guidelines) or option three (to amend NZECP 36:1993).

Orion New Zealand Ltd
565 Wairakei Road
PO Box 13896
Christchurch 8141
+64 3 363 9898
oriongroup.co.nz

3. Mandating aspects of the EEA's Power Quality Guidelines for distribution-level harmonics will ensure a level playing field across New Zealand, while still allowing the industry to be agile and accommodate future technological changes. This strikes the necessary balance between certainty and flexibility. For this reason, Orion is largely supportive of Option one as presented in the Consultation Paper. However, Orion sees this option should be extended to include mandating harmonics management requirements. Leaving this up to best practice will not provide the certainty that is needed and may result in further ambiguity (and costs) if parties were to interpret best practice differently. It seems counter-intuitive to the overarching goals of the Consultation Paper; to reduce ambiguity and create consistency. Whilst it may be challenging to codify aspect of harmonics management, Orion does not see this as valid justification to not mandate it. Furthermore, the establishment, monitoring and enforcement of harmonics requirements should be made an enforceable Code requirement. Relying on contractual arrangements would create variation between distributors and their customers, as well as additional costs associated with managing and reviewing bespoke contracts.

4. Orion does not see that the approaches offered in options two and three strike the right balance between certainty and flexibility as they provide too much flexibility and will not create the intended consistency. Mandating the EEA's Power Quality Guidelines is essential to ensuring compliance and consistency across distributors and the issues associated with NZECP 36:1993 are too significant to be dealt with by amendments alone.

5. The Consultation Paper also considers whether to establish a database of harmonic measurements that is accessible to parties who have a legitimate use for the data. A database would require the installation of power quality monitoring devices at additional locations, along with the systems needed to store and manage the resulting data. Depending on the volume and resolution of the data collected, storage and data management costs could be significant. While this would provide some benefit to connecting customers, these benefits can largely be met by the current approach. Providing this information currently is manual however, the work required to provide it is not significant and so requesting parties are able to receive the information they require promptly.

Concluding remarks

6. Orion's preferred approach is option one in the Consultation Paper (with the addition of mandating harmonics management requirements and making the establishment, monitoring and enforcement of harmonics requirements an enforceable Code requirement). This approach will resolve the current ambiguity issues and create consistency across the industry. Options two and three do not provide enough certainty to successfully achieve this.

7. The points raised above are expanded on in Appendix A, where Orion's responses to the specific questions in the Consultation Paper have been provided.

Yours sincerely,

Grace Burtin
Regulatory Lead -Electricity Authority

Appendix A

Questions	Comments
Q1. Do you agree the Authority should be short listing Option 1 for further consideration? If you disagree, please explain why.	Agree.
Q2. Do you agree the Code should not mandate harmonics management requirements, other than harmonics planning levels? If you disagree, please explain why.	Disagree. Harmonic management requirements should be mandated to ensure consistent alignment across transmission, distribution and industry. Mandated requirements will help ensure harmonic management is applied fairly and consistently across all parties. This will ultimately work to reduce the costs of connections. Orion appreciates the Authority's concerns that the management of harmonics is not easily codified. However, Orion sees these concerns are overstated and can be resolved. The example given of Transpower not applying the method for 'voltage droop' harmonics allocation for higher voltage transmission network connection points doesn't appear to be a valid reason for not mandating harmonics management requirements. Issues such as these could be resolved through the issuance of guidance documents, or similar.
Q3. What regulatory instrument (ie, the Code or the Electricity (Safety) Regulations) do you consider should be used to regulate installation standards for harmonics?	Orion sees the Code should be used as the regulatory instrument for the installation standards for harmonics. It is not appropriate for it to be contained in the Electricity (Safety) Regulations (Regulations) as it is not directly related to safety. Orion appreciates the Authority looking to remove ambiguity by amending the Regulations to make it clear that complying with the harmonics standards in the Code would satisfy the obligation in the Regulations. Whilst this would help, Orion suggests the Authority investigate the workability of removing the reference entirely.

Q4. Which, if any, aspects of AS/NZS 61000 do you consider need substituting or adapting in order to accommodate New Zealand conditions?	No comment.
Q5. Do you consider the establishment, monitoring and enforcement of harmonics requirements should be a contractual matter between electricity network owners and their customers, or a Code-enforceable matter? Please give reasons with your answer.	This should be made an enforceable Code requirement. Relying on contractual arrangements would create variation between distributors and their customers, as well as additional costs associated with managing and reviewing bespoke contracts. If the Code enforces these requirements, there is no need to develop separate, bespoke arrangements.
Q6. Do you consider distributors should have a mandated responsibility to investigate and resolve security of supply or reliability issues caused by non-compliance with the harmonic levels specified for distribution networks?	Yes, although further investigation is required to ensure its workability. Some smaller distributors may not have the resources or capability to investigate and monitor harmonic issues effectively. Even if these requirements were enforceable under the Code, identifying the source of a breach, or determining who is responsible, may be difficult. Orion has seen examples on its network where total harmonic distortion changes significantly depending on the configuration of the transmission network.
Q7. What guidance for industry participants do you consider would be necessary under Option 1?	Orion sees that the creation of an industry tool to calculate how to solve or mitigate harmonic issues, that could be standardised and used across all distributors, would be more useful than any guidance documents or industry forums. While this would come at a cost, Orion considers this is worth exploring.
Q8. What do you consider to be the main benefits and costs associated with Option 1?	Orion agrees with the costs and benefits as summarised in the Consultation Paper.

Q9. Do you agree the Authority should be short listing Option 2 for further consideration? If you disagree, please explain why.	No, option one is preferred. Option one would better achieve the Authority's goals of updating the regulatory arrangements and providing consistency across the industry. Option two would not achieve this as well because it does not mandate the EEA Power Quality Guidelines. Mandating this is essential to ensure compliance and consistency across distributors.
Q10. What do you consider to be the main benefits and costs associated with Option 2?	While there will be a benefit from revoking NZECP 36:1993, it will be lessened by not mandating the AS/NZS 61000 standard and the EEA Power Quality Guidelines.
Q11. Do you agree the Authority should be short listing Option 3 for further consideration? If you disagree, please explain why.	No, option one is preferred. Option one would better achieve the Authority's goals of updating the regulatory arrangements and providing consistency across the industry. Option three would not achieve this as effectively. The NZECP 36:1993 is significantly out of date and is not fit for purpose for modern power system technologies and challenges. Given it is a standard based on harmonic limits established in 1967, the issues are too large to be resolved through amendments alone.
Q12. What do you consider to be the main benefits and costs associated with Option 3?	There is a significant cost relating to the continuance of NZECP 36:1993. Orion sees that the proposed amendments do not go far enough in updating the regulatory landscape and so there will be costs relating to harmonics avoidance and differing approaches across the industry.
Q13. What do you consider to be the benefits and costs of the current arrangements for obtaining harmonics data from distributors and from Transpower, as a transmission network owner?	Whilst there is some manual work involved as a distributor in providing this information on request, it is not significant. The benefit of the current approach is that it achieves the goal without creating undue cost.

Q14. What do you consider to be the benefits and costs of a database of harmonics measurements?	A database would allow connecting customers to quickly understand network constraints before progressing with detailed network studies or site investigations. Improved access to good-quality data would also help reduce the cost and effort associated with these studies. However, a database would require the installation of power quality monitoring devices at additional locations, along with the systems needed to store and manage the resulting data. Depending on the volume and resolution of the data collected, storage and data management costs could be significant. While there may be some benefit to customers, Orion sees that much of this benefit can be achieved via the current approach at significantly less cost.
Q15. Would access to raw harmonics measurement data be useful for your organisation? If so, why?	Raw harmonics measurement data would not be useful to Orion.
Q16. Who do you consider should host a database of harmonics measurement data? Please give reasons	Orion does not consider a database of harmonics measurement data is justified at this time.