

30 June 2026

Future Security and Resilience Team
Electricity Authority
By email: fsr@ea.govt.nz

Tēnā koe,

Managing harmonics for power quality in both transmission and distribution

We welcome the opportunity to respond to the Electricity Authority (**Authority**)'s consultation paper on options to address a harmonics issue. New Zealand's electricity system is changing, including with increased large distributed generation (**DG**) connections which can introduce not only the typical harmonics, but also inter-harmonics and supra-harmonics.

The management of these types of distortion is becoming a more important component in maintaining power quality and the standards and guides need to reflect the current operating environment. We agree that New Zealand Electrical Code of Practice for Harmonics Levels (NZECP 36:1993) is outdated and an alternate standard for harmonics is required in regulation.

Our summary observations are:

Targeted use of AS/NZS 61000 is the best option

- The AS/NZS 61000 is a suitable harmonics standard for the current power system and aspects should be mandated for both transmission and distribution.
- Harmonics management needs to be aligned and allocated across the system, not treated separately in transmission and distribution. Further consideration is required of the aspects of AS/NZS 61000 that would be regulated, including other power quality measures such as inter-harmonics and supra-harmonics.
- The Electricity Engineers' Association's (EEA's) Power Quality Guidelines are not written as a standard and would require significant change for regulatory implementation.

Sharing harmonics and other power quality data already occurs where relevant

- Powerco has power quality meters installed which provide significant power quality information including harmonics, inter-harmonics and supra-harmonics,
- There are some customers where harmonics is relevant in their location and for their use, but harmonics planning level and customers' ability to work within that will vary
- Powerco does share power quality data with customers and other relevant parties. However, there would be limited value and some cost in more general sharing of harmonics data. This is not a matter for the Code to regulate.

We respond to the Authority's consultation questions in the attachment.



This submission does not contain any confidential information. We are always keen to meet with the Authority to discuss and develop the ideas in our submissions. In the meantime, if you have any questions or would like to talk further on the points we have raised, please contact Robin Pittwood (Robin.Pittwood@powerco.co.nz).

Nāku noa, nā,

A handwritten signature in black ink that reads "E. Wilson".

Emma Wilson

Head of Policy, Regulation and Markets

POWERCO

Responses to the Authority's questions: Options to address a harmonics issue

Questions	Comments
Q1. Do you agree the Authority should be short listing Option 1 for further consideration? If you disagree, please explain why.	We agree that variations of option 1 should be considered further. Our view is that aspects of AS/NZS 61000 should be mandated for both transmission and distribution. The EEA Guide is not suitable for mandatory requirements for distribution.
Q2. Do you agree the Code should not mandate harmonics management requirements, other than harmonics planning levels? If you disagree, please explain why.	Aspects of harmonics management that are important include: • Allocation policy at grid exit points for harmonics • Inter-harmonics • Supra-harmonics • Flicker • Flexibility (rather than too prescriptive) in harmonics planning level related to local scenarios and optionality • Use of power quality meters. Some of these aspects should be mandated and others be directed through industry good practice. Which aspects are mandated requires further workshopping with industry. We agree that guidance could be provided on application of harmonics standards for devices versus installations, noting that some customer devices assist reducing harmonics contributions. The size of a connection is also relevant.
Q3. What regulatory instrument (ie, the Code or the Electricity (Safety) Regulations) do you consider should be used?	This aspect of power quality could be addressed in the Code. While not directly related to market regulation, it is related to connections which the Code addresses.
Q4. Which, if any, aspects of AS/NZS 61000 do you consider need substituting or adapting in order to accommodate New Zealand conditions?	This is a very broad question because the 61000 set of standards cover a wide range of issues. Workshops will be required to work through the details. Powerco would support starting with harmonics, inter-harmonics and supra-harmonics, because power quality metering is showing that these phenomena are already appearing. While the relevant parts of AS/NZS 61000 are generally suitable for New Zealand conditions, it will be important that there is scope to adapt planning levels for risk management at a local scenario. New Zealand has existing prescriptions in some related areas (eg 4777) around reactive power and voltage which will need to be aligned. Other Authority workstreams on reactive power and voltage coordination are also relevant. Allocation rules need further consideration, for example related to size of DG connection.
Q5. Do you consider the establishment, monitoring and enforcement of harmonics requirements should be a contractual matter between	The management of harmonics is a broad aspect stretching across the whole industry, consumers, generators, network and transmission. Not many customers understand harmonics or the impacts. In our experience, relying on contractual arrangements is not appropriate.

Questions	Comments
electricity network owners and their customers, or a Code-enforceable matter?	
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?	Distributors are inherently focused on addressing customer needs and issues and already take responsibility to coordinate an investigation and potential response to any customer issues raised. Issues may arise through power quality meter information or through a customer identifying an issue. The causes, effects and appropriate responses are often localised, complex and bespoke. Broader general standards and application (through regulation or otherwise) still need to evolve. We do not consider that a mandated responsibility to investigate and resolve issues is required.
Q7. What guidance for industry participants do you consider would be necessary under Option 1?	The EEA Guide is the appropriate "guidance" document for network/grid managers. As the topic evolves the EEA Guide should be reviewed to include developments and learnings. Workshops could be scheduled to help the industry keep up to date, for example at two yearly intervals.
Q8. What do you consider to be the main benefits and costs associated with Option 1?	There are considerable benefits in an AS/NZS 61000 approach rather than relying on ECP36. AS/NZS 61000 provides for management of key aspects of harmonics relevant in current network management such as the role of connected DG in filtering harmonics. There could be considerable cost in translating the EEA guide into an enforceable regulation. It would be more efficient and appropriate to apply AS/NZS 61000 for both transmission and distribution. Mandating AS/NZS 61000 removes uncertainty and need for risk management, but at the potential cost of less effectiveness or cost efficiency, as it may limit distributors' ability to optimise for their network and customer needs. Much equipment in use in New Zealand is produced overseas for countries already using AS/NZS 61000. New Zealand alignment with AS/NZS 61000 should further standardise technical requirements and operation of equipment. While harmonics may be managed effectively now without the cost of prescriptive requirements, the issue is reaching a level of significance to justify a coordinated strategy and standards. It is difficult to assess potential future impact with the evolving power system, and the potentially material costs if harmonics is not more actively managed. Harmonic allocation may not be particularly cost reflective (causer pays). Higher costs could be evident in future due to unnecessarily restrictive compliance levels (eg thresholds), or the opposite (excessive mitigation costs if thresholds are too low). The shared approach also risks costs being borne by the wrong party if costs do rise materially as concentrations of harmonic producers increase (as expected). Hence a less prescriptive approach may be warranted as harmonic allocation evolves.

Questions	Comments
	We support an approach for distributors to use power quality meters at sites where harmonics may be affected. This may involve cost for some distributors or affected customers, but the benefit outweighs the cost.
Q9. Do you agree the Authority should be short listing Option 2 for further consideration? If you disagree, please explain why.	No. We support a regulated approach to harmonics management. The EEA guide is not suitable for this purpose.
Q10. What do you consider to be the main benefits and costs associated with Option 2?	The EEA guide would require significant rework to set standards suitable for both transmission and distribution.
Q11. Do you agree the Authority should be short listing Option 3 for further consideration? If you disagree, please explain why.	No. There is no benefit in amending the outdated ECP 36, particularly as AS/NZS 61000 is available.
Q12. What do you consider to be the main benefits and costs associated with Option 3?	
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?	
Q14. What do you consider to be the benefits and costs of a database of harmonics measurements?	There are some customers where harmonics is relevant in their location and for their use. For example, we have some locations where harmonics planning level is exceeded but the industrial customer understands and works within that.
	There would be limited value, a high level of technical complexity, and some cost in more general sharing of harmonics data.
Q15. Would access to raw harmonics measurement data be useful for your organisation? If so, why?	Powerco has access to harmonic and other power quality data for power quality management. Powerco is sharing relevant subsets of this data with affected customers as required.
Q16. Who do you consider should host a database of harmonics measurement data? Please give reasons	Transpower and distributors should manage their own power quality data.