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Promoting Reliable Supply: Options to address a harmonics issue

Transpower welcomes the opportunity to respond to the Authority's consultation *Promoting Reliable Electricity Supply: Options to address a harmonics issue*, published 19 May 2026. This submission is from Transpower as Grid Owner and has the support of the System Operator.

We agree with the Authority that it is desirable for harmonics requirements to be "*proportionate to the scale and likely harmonics risk of an asset connecting to the network.*" Our existing practice is already consistent and proportionate across our connected parties and aligns best with Option 1 which propose best practice alongside a minimal (but still effective) compliance basis.

Transpower supports Option 1, mandate only planning standard IEC 61000.3.6:2012¹

We fully (and only) support Option 1. Under Option 1, the Code would be amended:

For Transpower

- to mandate (only) transmission harmonics planning levels from IEC 61000.3.6:2012
- to allocate total harmonic distortion based on best practice.

For Distributors

- to include distribution harmonics planning levels from the EEA's Power Quality Guidelines
- to allocate total harmonic distortion based on best practice (e.g., the harmonics allocation methodology in the EEA's Power Quality Guidelines).

¹ Electromagnetic compatibility (EMC) – Part 3.6: *Limits – Assessment of emission limits for the connection of distorting installations to MV, HV and EHV power systems.*

This option would also retain the System Operator's current role in harmonic monitoring, where investigations are undertaken only in response to complaints.²

We consider the risk identified under Option 1, that there may be *"over-reliance on a standard series that may not fully address supra-harmonics or emerging technologies"*, is not unique to this option. The same issue of needing to factor in supra-harmonics or emerging technologies would arise under each of the options proposed. Where an existing standard does not yet address an emerging technical issue, the appropriate response will be to apply relevant industry best practice until the applicable standard is updated.

[We do not support further consideration of Options 2 and 3](#)

Option 2. The proposal is to remove the compliance requirement under the connection code (schedule 12.6) and adopt a guidance-based approach to governing the management of harmonics, using an expanded version of the EEA's Power Quality Guidelines.

We do not support option 2 being considered further because its basis is to remove the existing approach for compliance with a standard i.e. we consider the policy discussion is about what is the appropriate standard given the inadequacies of the existing NZECP 36, not whether standards should be removed.

We disagree with the thinking that the following is beneficial *"Industry participants having the flexibility to tailor harmonics requirements to their assets' characteristics and not be constrained by mandatory Code provisions, thereby reducing the risk of inefficient investments in harmonics mitigation measures."*³ The fact that investment may be required to comply with a harmonics' standard does not mean that the investment is inefficient. Standards are often designed to manage risks that are not fully internalised by the party causing them. In the case of harmonics, a connected party's equipment may impose distortion on the wider network, with potential effects on other connected parties and on overall system performance. The purpose of a planning standard is to manage those wider system effects, not to minimise the compliance costs of an individual participant. For that reason, we would not consider the need for investment, by itself, to indicate inefficiency; otherwise, many obligations to comply with technical standards could be viewed in the same way.

Option 3. The proposal is that the NZECP 36:1993 standard would be retained but amended to address its known technical and structural shortcomings.

In our view this approach is less efficient than applying the international standard [IEC 6100 3-6] with slight modification for the NZ context. We agree with the characterisation of significant cost and time that would be the result of extensive technical review, multi-agency coordination and broad industry engagement.⁴ Having different standards to international peers also imposes additional costs to New Zealand electricity consumers as we don't benefit from economies of scale inherent in "buying off the shelf" when procuring electrical equipment.

² Clause 7.2D

³ Consultation paper para. 5.10 (a)

⁴ Ditto para. 6.5 (a)

A database of harmonics measurements would be inefficient and ineffective

The Authority describes that a variation of each of the three options, *is establishing a database of harmonics measurements that is accessible to parties who have a legitimate use for the data.*⁵

Transpower does not support this proposal. A raw harmonics measurement database would likely create a material risk of inefficient investment, given its limited use for a small number of users and grid connection locations

The grid owner provides harmonics data to prospective connection parties and other legitimate requesters on a case-by-case basis. Harmonics data needs to be combined with network configuration/outage data to be useful. This request-driven approach is both sufficient and efficient in practice: requests are relatively infrequent and can be readily serviced with an appropriate level of curation applied to the underlying measurement data prior to release.

Please contact Micky Cave with any questions about this submission.

Yours sincerely

Joel Cook

Head of Strategy and Regulation

⁵ [Consultation paper](#) paragraph. 7.1

Appendix – Response to questions

Promoting reliable electricity supply: Options to address a harmonics issue

Submitter	Transpower as Grid Owner
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Question	Comment
Q1. Do you agree the Authority should be short listing Option 1 for further consideration? If you disagree, please explain why.	Yes. Option 1 is our preferred approach to managing harmonics. This option is also the preference of the System Operator.
Q2. Do you agree the Code should not mandate harmonics management requirements, other than harmonics planning levels? If you disagree, please explain why.	We agree the Code should only mandate harmonics planning levels under IEC61000.3.6:2012 <i>"Assessment of emission limits for the connection of distorting installations to MV, HV and EHV power systems"</i>
Q3. What regulatory instrument (i.e., the Code or the Electricity (Safety) Regulations) do you consider should be used to regulate installation standards for harmonics?	These regulatory instruments differ in their purpose: the Electricity (Safety) Regulations (ESR) apply to electricians doing installations for the purpose of electrical safety to the public, whereas the Code applies to wholesale market participants for ensuring power quality and system performance. The ESR states that for harmonics interference, compliance with regulation 31 (1) is met via a list of (four) standards. The Authority proposes it would recommend that the ESR <i>"be amended to clearly say that complying with the harmonics standards in the Code would satisfy the obligation in regulation 31(1)"</i>⁶. However, the Code does not apply to electrical workers, so they cannot comply with it directly. The ESR could instead be amended to recognise that the Code standard may also be used to address harmonic interference in installations, while retaining the four existing standards as alternative means of compliance.
Q4. Which, if any, aspects of AS/NZS 61000 do you consider need substituting or adapting in order to accommodate New Zealand conditions?	Assumptions regarding the historically low harmonic diversity in New Zealand networks may warrant reconsideration as the amount of switch-mode power supplies increases, improving the diversity of harmonic emissions.

⁶ In order to preserve the quality of electricity supplied, the use of fittings and appliances must not unduly interfere with the satisfactory supply of electricity to any other person, or impair the safety, or interfere with the operation, of any other fittings or appliances. [New Zealand Electricity Safety Regulations 2010.pdf](#)

Question	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.	We consider it is more efficient to retain the status quo. We consider that as the default transmission agreement is a schedule to the Code, then non-compliance with the dTA would also mean non-compliance with the Code. We consider that via contract, Transpower can require remediation in the first instance. This aligns parties' interests in harmonic issues and means the Authority does not (yet) need to be drawn into non-compliance processes. However, should non-compliance be ongoing, then a Code breach process would be an option.
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?	No comment.
Q7. What guidance for industry participants do you consider would be necessary under Option 1?	Transpower is happy to share its processes and learnings on harmonics management to support industry understanding.
Q8. What do you consider to be the main benefits and costs associated with Option 1?	The benefits are the being able to "buy off the shelf" when procuring electrical equipment, which reduces the cost of procurement rather than requiring equipment that suits a bespoke NZ standard such as NZCEP 36. We also consider that investment required to comply with a harmonics' standard does not mean that the investment is inefficient. The purpose of a planning standard is to manage wider system effects, not to minimise the compliance costs to an individual participant.
Q9. Do you agree the Authority should be short listing Option 2 for further consideration? If you disagree, please explain why.	No. We do not support progressing this option. Amended EEA Power Quality Guidelines would not create the "stick" of enforceable obligations for the Grid Owner to manage harmonics on the grid.
Q10. What do you consider to be the main benefits and costs associated with Option 2?	We consider the costs of all the development necessary to ensure the guidelines would apply to Transpower, would still leave the position that Transpower would not be able to enforce harmonics obligations. Costs would be incurred while creating no additional benefits.
Q11. Do you agree the Authority should be short listing Option 3 for further consideration? If you disagree, please explain why.	No. We consider this option should not be progressed further. In our view this approach is less efficient than applying the international standard [IEC 6100 3-6] that may need some modification to NZ context. We agree with the characterisation of significant cost and time that would be the result of extensive technical review, multi-agency

Question	Comment
	coordination and broad industry engagement. Having different standards to international peers also imposes additional costs to New Zealand electricity consumers as we don't benefit from economies of scale inherent in "buying off the shelf" with procurement of electrical equipment.
Q12. What do you consider to be the main benefits and costs associated with Option 3?	For costs, we agree with the characterisation of significant cost and time that would be the result of extensive technical review, multi-agency coordination and broad industry engagement. There are also additional downstream costs such as higher equipment costs due to unique compliance needs.
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?	We consider the current arrangements to be sufficient (and efficient). Transpower as grid owner provides harmonics data to prospective connection parties and other legitimate requesters on a case-by-case basis. Harmonics data also needs to be combined with network configuration/outage data to be useful. Data is supplied for the relevant areas of the network under consideration, typically to the party and/or its engineering consultant. This request-driven approach is both sufficient and efficient in practice: requests are relatively infrequent and can be readily serviced with an appropriate level of curation applied to the underlying measurement data prior to release.
Q14. What do you consider to be the benefits and costs of a database of harmonics measurements?	We consider this option should not be progressed further. We consider there is a material risk of inefficient investment relative to the use described, to support asset owners / developers to perform their own analysis⁷ (for the few locations they could look to connect). It is likely only a few sophisticated parties could practically use the data which limits the potential benefits of this option. Significant investment would be required across industry before any benefits could be realised to the few. In contrast, the current arrangements deliver information efficiently on a targeted basis. As harmonics data needs to be used in conjunction with other information such as Grid asset topology, Transpower will remain involved in any potential use of raw harmonics data. A database is likely to result in duplication as both the party using the raw data and Transpower will have to make the same data query.

⁷ Section 7.7

Question	Comment
Q15. Would access to raw harmonics measurement data be useful for your organisation? If so, why?	We consider this option should not be progressed further.
Q16. Who do you consider should host a database of harmonics measurement data? Please give reasons	We consider this option should not be progressed further.