

Submission form

Promoting reliable electricity supply: Options to address a harmonics issue

Submitter	Harmony Energy NZ Operations Ltd (HENZ)
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Questions	Comments
Q1. Do you agree the Authority should be short listing Option 1 for further consideration? If you disagree, please explain why.	Yes, HENZ agree.
Q2. Do you agree the Code should not mandate harmonics management requirements, other than harmonics planning levels? If you disagree, please explain why.	Yes, HENZ agree.
Q3. What regulatory instrument (ie, the Code or the Electricity (Safety) Regulations) do you consider should be used to regulate installation standards for harmonics?	The Code
Q4. Which, if any, aspects of AS/NZS 61000 do you consider need substituting or adapting in order to accommodate New Zealand conditions?	We do not consider it necessary to substitute or adapt this specification in any way.
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 the establishment, monitoring, and enforcement of harmonic requirements to be a contractual matter between electricity network owners and their customers, rather than a Code-enforceable requirement. The primary reason for this position is that harmonic performance is highly dependent on the characteristics of both the connected asset and the network at the point of connection. Harmonic behaviour is complex and can be difficult to model and predict with certainty, particularly as electricity networks evolve over time. It would therefore be unreasonable and costly to make this a Code-enforceable matter. The harmonic assessment, design, and implementation of harmonic mitigation measures should be undertaken as a collaborative process between the asset owner and the network operator. Network owners have detailed knowledge of their system characteristics, including network impedance, existing harmonic levels, and future development plans, all of which influence the effectiveness of harmonic mitigation solutions. For example, installing harmonic filter banks or other mitigation equipment without appropriate consultation and coordination with the network owner may result in unintended consequences, such as resonance, increased harmonic distortion, or adverse impacts on other network users. A coordinated approach enables the most appropriate technical solution to be identified for each connection point while maintaining overall network performance. For these reasons, we believe that harmonic compliance should continue to be managed through connection agreements and contractual

	arrangements, supported by ongoing collaboration between the network owner and the connecting customer, rather than through prescriptive Code enforcement.
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, HENZ agree.
Q7. What guidance for industry participants do you consider would be necessary under Option 1?	We consider that a comprehensive harmonic guidance document would be beneficial under Option 1 to promote a consistent approach across the electricity industry. The guidance should provide practical information on harmonic assessment methodologies, modelling requirements, measurement techniques, monitoring expectations, and compliance assessment. It should also include guidance on the allocation of responsibilities between network owners and connecting customers, the application of harmonic planning levels and emission limits, and the process for assessing and managing cumulative harmonic impacts from multiple connections. Given the increasing penetration of inverter-based resources, such as solar farms, battery energy storage systems, and wind generation, the guidance should also address emerging harmonic issues, including interharmonics, supraharmonics, and the interaction of multiple converter-based resources connected to the same network. In addition, the guidance should include worked examples and case studies to assist participants in applying the requirements consistently. This would improve understanding, reduce uncertainty during the connection process, and support more efficient collaboration between network owners and customers when developing appropriate harmonic mitigation measures. A well-developed industry guidance document would promote consistency in harmonic assessments, improve compliance outcomes, and reduce the risk of differing interpretations of the requirements across New Zealand electricity networks.
Q8. What do you consider to be the main benefits and costs associated with Option 1?	1. Better alignment of New Zealand's harmonics arrangements with modern international standards and global best practice. This supports consistency of treatment of harmonics across all voltage levels and asset types. It also promotes competition amongst original equipment manufacturers, by enabling equipment designed to comply with internationally accepted standards to be supplied, rather than limiting the equipment manufacturer pool to providers of equipment designed to bespoke local specifications.

	2. More appropriate requirements around harmonics planning levels. This should reduce the need for asset owners and developers to invest in harmonics mitigation measures (eg, harmonic filters). 3. Flexibility to use different harmonics allocation methodologies where justified. This will allow Transpower and distributors to adopt best practice approaches suited to their network characteristics. The aim should be for total harmonic distortion to be allocated in a manner that minimises overall harmonic mitigation costs faced by industry participants.
Q9. Do you agree the Authority should be short listing Option 2 for further consideration? If you disagree, please explain why.	Yes.
Q10. What do you consider to be the main benefits and costs associated with Option 2?	Main benefits: 1. 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. 2. A smaller regulatory compliance burden, reducing operational costs for industry participants. 3. EEA's guidelines can be revised more easily than the Code, adapting to technology change quicker. Drawbacks: 1. Additional burden on an already constraint SO. 2. The potential for inconsistent harmonics requirements across the electricity industry, which may lead to inconsistent outcomes for connecting parties, particularly asset owners / developers operating across multiple networks. It might also limit competition amongst original equipment manufacturers to providers of equipment designed to bespoke local specifications. 3. The potential for insufficient certainty for new connections / investment planning, which may lead to higher assessment costs for new connections and/or a higher risk of unexpected harmonics mitigation measures being required (eg, harmonic filters).
Q11. Do you agree the Authority should be short listing Option 3 for further consideration? If you disagree, please explain why.	No. We do not support shortlisting Option 3 for further consideration. The current NZECP 36 is outdated and does not adequately address the characteristics of today's electricity system, which is experiencing rapid growth in inverter-based resources such as solar farms, battery energy storage systems, and wind generation.

	In contrast, the AS/NZS 61000 series of standards represents current international best practice and has been successfully adopted in Australia. The standard has been applied successfully across Australia for many years and has proven to provide a consistent, risk-based approach for connecting new customers and generation while maintaining acceptable network power quality. Retaining or relying on NZECP 36 would duplicate existing standards, increase complexity, and risk inconsistencies in the assessment and management of harmonics. Rather than investing further effort in an outdated code of practice, we believe the Authority should focus on adopting and supporting the implementation of the AS/NZS 61000 framework, supplemented by New Zealand-specific guidance where necessary.
Q12. What do you consider to be the main benefits and costs associated with Option 3?	We do not support this option.
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?	Based on our experience, we do not consider the current arrangements for obtaining harmonic data from Transpower to present any significant issues. The existing approach is generally focused on providing the information required for a specific point of connection, allowing connection applicants to undertake the necessary harmonic assessments without requiring Transpower to maintain or distribute unnecessary network-wide data. This targeted approach enables Transpower to focus on providing the information that is relevant to each connection in a timely and cost-effective manner. From our perspective, this process has supported efficient connection studies while ensuring that the information provided is appropriate for the proposed development. Expanding the scope of information routinely provided could increase the administrative burden and costs for network owners without delivering a corresponding benefit to connection applicants.
Q14. What do you consider to be the benefits and costs of a database of harmonics measurements?	HENZ generally supports the establishment of a harmonics measurement database, as it would improve the accessibility, consistency, and long-term availability of harmonics data across the industry. A centralised or well-structured database would provide clear benefits by enabling more efficient harmonic assessments, improving transparency for connection applicants, and supporting better-informed engineering studies. Over time, this could reduce duplication of effort and improve the quality and consistency of harmonic modelling and planning across different network locations. We also consider that the cost of implementing and maintaining such a database is likely to be relatively modest compared to the benefits it would deliver, particularly if it builds on existing data collection and reporting practices already undertaken by network owners and Transpower.

Q15. Would access to raw harmonics measurement data be useful for your organisation? If so, why?	No, not at this stage.
Q16. Who do you consider should host a database of harmonics measurement data? Please give reasons	It may be best placed with the Authority, given that all the network owners need to provide data and not just Transpower.