

To: Electricity Authority (the Authority)
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From: Electricity Engineers' Association of NZ

Date: 14 November 2024

Subject: EEA Submission – Consultation Paper – Part 8 Code amendment proposal – Part 1

OVERVIEW

The Electricity Engineers Association (EEA) of NZ welcomes the opportunity to provide feedback on the Electricity Authority's (the Authority) consultation paper on "*Part 8 Code amendment proposal – Part 1*".

The EEA represents over 70 Corporate Members (companies) and 600 Individual Members across Aotearoa New Zealand from all engineering disciplines and sectors of the electricity supply industry (see Appendix A).

Collectively, we are the power industry's largest collaborative forum in Aotearoa New Zealand, provide clarity on complex engineering and technical issues, practical support and solutions, and market intelligence to support our members and other industry stakeholders to deliver.

We recognize the critical nature of this consultation, which addresses two key issues from the recent review of the Part 8 common quality requirements:

- The need for network owners and operators to have sufficient information on assets connecting to or connected with the power system to ensure the safe, reliable, and economically efficient planning and operation of the power system.
- The necessity of refining Code terminology to support new and emerging technologies while eliminating terms that are no longer fit for purpose.

Our response reflects input from industry experts and considers potential impacts on engineering practices, operational standards, and alignment with broader regulatory goals. We support efforts to streamline and clarify the Code, and we offer insights to strengthen its application across the industry.

We look forward to continued collaboration with the Electricity Authority to ensure the Code supports effective network operations and contributes to a resilient energy future for New Zealand.

Response to Questions

Q1.1 (page 15): Do you support the Authority's proposal to apply the periodic testing requirements in Appendix B of Technical Code A of Schedule 8.3 to wind generation? If you disagree, please give reasons and provide alternatives that address the identified problem with wind generation being excluded from the periodic testing requirements.

The EEA supports the Authority's proposal to apply the periodic testing requirements in Appendix B of Technical Code A of Schedule 8.3 to wind generation. Incorporating wind generation into these requirements aligns with the broader goal of ensuring the reliability and stability of the electricity system across all generation types. Periodic testing is essential for identifying potential performance or compliance issues that could impact the reliability of the grid, especially as New Zealand increasingly relies on renewable sources like wind.

Extending these requirements to wind generation addresses the gap in existing technical codes, which historically may not have accounted for the growing role of wind in the generation mix. Including wind generation in periodic testing will enhance our ability to assess the reliability and stability of renewable assets, offering greater operational certainty across all types of generation, and ensuring that any issues are proactively managed.

Q1.2 (page 15) Do you see any unintended consequences in making such an amendment?

One potential unintended consequence of this amendment could be the additional operational and compliance burden on wind generation operators. Unlike other forms of generation, wind is subject to natural variability and intermittency, which may complicate regular testing. There is a risk that the strict application of testing protocols could lead to downtime that is either inefficient or costly, impacting overall generation capacity during testing periods.

To mitigate these impacts, we recommend that the Authority consider a tailored approach to periodic testing for wind generation that accounts for the operational characteristics of wind assets. For instance, testing protocols could be aligned with periods of expected low output or conducted in a staggered manner to minimize the impact on overall generation. Alternatively, simulation-based assessments could be explored to reduce the need for physical testing, thus maintaining compliance without disrupting generation.

Q1.3 (page 17) Do you agree the proposed Code amendment is preferable to the other option identified? If you disagree, please explain why and give your preferred option in terms consistent with the Authority's main statutory objective in section 15 of the Electricity Industry Act 2010.

The EEA agrees that the proposed Code amendment is preferable to the other option identified. By amending the Code to include wind generation in the periodic testing requirements, the Authority can ensure a consistent, enforceable approach across all generation types, which supports the security and reliability of the electricity system. This approach aligns well with the Authority's statutory objective under section 15 of the Electricity Industry Act 2010, which prioritizes the long-term benefits of consumers by promoting reliable and efficient electricity markets.

The alternative option, which suggests voluntary testing or limited testing requirements, would likely introduce variability in compliance and performance standards, potentially leading to gaps in system reliability and placing an uneven burden on other generation types. In contrast, the proposed amendment ensures a high, uniform standard of accountability, which is necessary as the system incorporates higher proportions of renewable generation. By including wind generation in the testing requirements, we can proactively manage risks associated with renewables and support the transition to a more resilient grid.

Q1.4 (page 17) Do you agree with the analysis presented in this Regulatory Statement? If not, why not?

The EEA largely agrees with the analysis presented in the Regulatory Statement, which effectively outlines the benefits of implementing periodic testing requirements for wind generation and assesses the implications for system reliability and security. The analysis correctly highlights the increasing importance of wind as a component of New Zealand's energy mix and the need to address potential risks associated with its integration into the grid.

However, we believe the analysis could more explicitly consider the operational challenges specific to wind generation. Acknowledging the variability of wind resources and the practicalities of conducting tests under these conditions would provide a more comprehensive view. Including an assessment of the cost impact on wind generation operators, especially smaller entities, would also strengthen the analysis. These additional considerations would support the development of implementation guidance that is both effective and practical, ensuring the amendment is applied in a way that benefits the electricity market while recognizing the unique characteristics of renewable generation.

Q2.1. (page 20) Do you support the Authority's proposal to amend the Code to clarify that:

- a) embedded generators must provide asset capability statement information to the system operator in the form from time to time published by the system operator, and
- b) the requirement to provide an asset capability statement to the system operator applies only to generators with a generating unit with rated net maximum capacity equal to or greater than 1MW?.

The EEA supports the Authority's proposal to amend the Code to clarify that:

- Embedded generators must provide asset capability statement information to the system operator in the form periodically published by the system operator. This clarity will help ensure that the system operator has the necessary data for operational planning and reliability assessments, enhancing the system's stability and resilience.
- The requirement to provide an asset capability statement applies only to generators with a rated net maximum capacity equal to or greater than 1MW. Focusing on larger-scale generating units is practical and aligns with regulatory and operational efficiencies, reducing administrative burdens on small-scale generators while maintaining robust system insights.

However, it should be noted that currently there is a significant area of uncertainty relating to how aggregated distributed energy resources should be treated under these requirements. Aggregators are not currently recognised as Participants in the Code and have no obligations to act in accordance with Good Electricity Industry Practice. We strongly recommend the Authority consider either including aggregators as Code participants or establishing clear obligations for aggregators to provide asset capability statements to both System Operators and distributors, as their actions can significantly impact network operations.

Q2.2 (page 20) Do you see any unintended consequences in making such an amendment?

The EEA sees some potential unintended consequences from this amendment. Smaller generators, especially those close to the 1MW threshold, may opt to configure their systems below this capacity to avoid reporting obligations, potentially resulting in an underestimation of available generation capacity. This could lead to gaps in data, impacting the system operator's ability to accurately model and forecast. Furthermore, while reducing compliance burdens for smaller generators is beneficial, a monitoring mechanism should be considered to assess whether any significant data gaps arise from this threshold-based approach, particularly as distributed generation grows.

As noted in our response to Q2.1, the proposed code amendment may further widen the existing regulatory gap concerning aggregators. Aggregators could play a significant role in managing

distributed energy resources (DER) that, while individually below the 1MW threshold, collectively have a potentially material impact on the system.

Q2.3 (page 21) Do you agree with the proposed Code amendment? If you disagree, please explain why and give your preferred option in terms consistent with the Authority's main statutory objective in section 15 of the Electricity Industry Act 2010.

The EEA agrees with the proposed Code amendment. The amendment aligns with the Authority's statutory objective in section 15 of the Electricity Industry Act 2010 by promoting an efficient, competitive, and reliable electricity industry. Clarifying the requirement for asset capability statements from embedded generators ensures that the system operator has the necessary data to maintain system stability and operational efficiency, especially as distributed generation increases. By setting the threshold at 1MW, the amendment also strikes a balance between comprehensive data collection and reasonable compliance burdens for smaller generators, ultimately contributing to a more reliable and cost-effective electricity supply.

Q2.4 (page 21) Do you agree with the analysis presented in this Regulatory Statement? If not, why not?

The EEA broadly agrees with the analysis presented in the Regulatory Statement. The statement effectively highlights the benefits of the amendment in supporting system operator visibility and the rationale for a 1MW threshold. However, the EEA suggests a minor addition to the analysis to address potential data gaps from generators close to the 1MW threshold, which may adjust their capacity to avoid reporting requirements. Acknowledging this potential outcome in the Regulatory Statement would strengthen the analysis by anticipating minor compliance adjustments and planning for effective monitoring of aggregate data availability.

Q3.1 (page 27) Do you support the Authority's proposal to amend the definition of 'causer' in clause 1.1 of the Code so that it refers to the action that results in a UFE, including an increase in electricity demand (load), and the consequential amendments to clauses 8.60 to 8.66, including proposed new clause 8.64A?

The EEA recognizes the Authority's intent to enhance fairness by including distributors as potential 'causers' of unaccounted for energy (UFE) within the Code. However, we have several concerns regarding the proposed amendment that should be addressed to ensure a balanced approach and avoid unintended consequences.

A fundamental issue is the omission of aggregators in the Code, despite their potential impact on UFEs. Although the likelihood of aggregators causing a large, isolated UFE—such as a 150-200 MW load drop within a single distribution network—is low, the aggregated actions across multiple networks could

pose a risk in the near future. This underscores the need for a framework to attribute responsibility when aggregator actions contribute to a UFE.

Additionally, there is a risk that Traders, through shared load control, may inadvertently trigger a UFE within a distribution network. For instance, simultaneous load reductions across multiple Traders in response to a price spike could lead to a UFE, making it challenging to pinpoint a single culpable Trader. While a Load Management Protocol would help manage this risk, it remains essential for the Authority to recognize that UFEs originating from distribution networks may not always be the distributor's responsibility.

Clarification is also needed regarding the treatment of distributed generation (DG), particularly in cases where UFEs are caused by embedded DG. For example, sudden solar output drops due to cloud cover could trigger a UFE independently of any distributor action. In such cases, there is a risk that distributors could be prematurely designated as responsible parties. In networks with multiple significant embedded DG installations, identifying the specific DG installation responsible—and assessing whether other installations exacerbated the issue—could be complex and burdensome.

Given the Authority's statement in paragraph 5.11 that future UFEs are likely to be caused by generators or the HVDC owner, we question whether the proposed amendment is necessary, particularly as distributors are neither required to contribute to availability costs nor eligible for rebates on event costs. We recommend that, before proceeding with these amendments, the Authority provides historical examples of UFEs caused by participants not currently identified as 'causers' in the Code. This would establish a clearer rationale for the proposed changes.

Finally, we note that distributors currently provide an Automatic Under-Frequency Load Shedding (AUFLS) response to the System Operator in response to UFEs, as obligated by the Code. Although the Authority has indicated in paragraph 5.10 that distributors will not contribute to availability costs or receive rebates on event costs, it is important to recognize that distributors are currently uncompensated for providing the AUFLS service. Should the Authority reconsider this stance in the future, due consideration should be given to fair compensation for the AUFLS service that distributors provide.

Q3.2 (page 27) Do you see any unintended consequences in making such an amendment?

In light of the complexities discussed, there are potential unintended consequences associated with the proposed amendment. Expanding the definition of 'causer' could create challenges in accurately attributing responsibility for UFEs, particularly in cases involving aggregators, Traders, or distributed generation where multiple factors may contribute to a UFE.

To mitigate these risks, we recommend a phased or trial-based implementation of the amendment, combined with regular reviews to assess its practical impact across the sector. This approach would allow for adjustments based on observed outcomes and stakeholder feedback, helping to ensure the amendment achieves its intended purpose without creating undue administrative or financial burdens for any single participant group.

Q3.3 (page 28) Do you agree the proposed Code amendment is preferable to the other options identified? If you disagree, please explain why and give your preferred option in terms consistent with the Authority's main statutory objective in section 15 of the Electricity Industry Act 2010.

The EEA acknowledges the Authority's intent in proposing this Code amendment as a means to more accurately and equitably allocate unaccounted for energy (UFE) costs, which aligns with the objective of promoting efficient operation and development of New Zealand's electricity industry as per section 15 of the Electricity Industry Act 2010. However, we do not fully agree that the proposed amendment is necessarily the best approach among the options presented.

While the proposed amendment offers a straightforward extension to include distributors as 'causers' of UFE, as stated previously we believe it does not sufficiently account for the emerging roles of aggregators, Traders, and distributed generation (DG) in contributing to UFEs. In light of these growing complexities, our preferred option would be to develop a more comprehensive UFE allocation framework that explicitly includes guidelines for managing contributions from aggregators, Traders, and DG. This approach would ensure a more nuanced allocation of responsibility that better reflects the evolving dynamics of the electricity market.

A more robust framework could prevent potential misattribution of UFE responsibility, particularly in cases where aggregators or distributed generation may inadvertently trigger UFEs without direct actions by distributors. Such a framework could also facilitate greater accountability across all participants, promoting efficiency and fairness in alignment with the Authority's statutory objectives. Furthermore, by clarifying attribution protocols, this approach could reduce the risk of unintended financial and operational impacts on distributors, who may otherwise bear undue responsibility under the current proposal.

Q3.4 (page 28) Do you agree with the analysis presented in this Regulatory Statement? If not, why not?

The EEA appreciates the analysis provided in the Regulatory Statement and the Authority's effort to evaluate the potential impacts of the proposed Code amendment. However, we have some reservations about aspects of the analysis and believe additional considerations should be addressed as outlined in previous answers.

Therefore, while we recognise the intent behind the proposed amendment, we believe that a broader framework and more robust analysis would better serve the evolving needs of the electricity sector and more effectively align with the Authority's main statutory objective.

Q4.1 (page 31) Do you support the Authority's proposal to amend clause 1.1 of Part 1 of the Code, and clauses 3, 4 and 5 of Appendix B of Technical Code A of Schedule 8.3, to broaden them to apply to inverter-based generation technologies?

The EEA supports the Authority's proposal to amend clause 1.1 of Part 1 of the Code, as well as clauses 3, 4, and 5 of Appendix B of Technical Code A of Schedule 8.3, to broaden their application to inverter-based generation technologies. This amendment is timely, given the increasing adoption of inverter-based technologies, such as solar PV and battery storage systems, which play a critical role in New Zealand's evolving energy landscape. By formally recognising these technologies within the Code, the amendment can enhance integration and alignment with the broader technical requirements for grid stability, ensuring that inverter-based systems meet consistent performance standards. This alignment will benefit system operators, network providers, and consumers alike, supporting a more resilient, reliable, and adaptable electricity system.

Q4.2 (page 31) Do you see any unintended consequences in making such an amendment?

One potential unintended consequence of this amendment could be the additional compliance costs for small-scale inverter-based generation owners. The amendment may introduce more stringent requirements that could inadvertently discourage or burden small-scale operators or residential customers who wish to install or upgrade inverter-based systems. Another risk could be an inconsistency in how standards are enforced across varying scales and types of inverter-based systems, potentially leading to ambiguities in compliance obligations. It may be helpful for the Authority to consider guidance materials or transitional arrangements to mitigate these potential impacts, ensuring a smooth adaptation process across the industry.

Q4.3 (page 32) Do you agree the proposed Code amendment is preferable to the other option identified? If you disagree, please explain why and give your preferred option in terms consistent with the Authority's main statutory objective in section 15 of the Electricity Industry Act 2010.

Yes, the EEA agrees that the proposed Code amendment is preferable to the other option identified. The amendment directly addresses the need to incorporate inverter-based generation technologies within the existing Code framework, ensuring these technologies meet established performance and safety standards. This approach aligns with the Authority's statutory objective under section 15 of the Electricity Industry Act 2010, which emphasises the long-term benefit of consumers by promoting efficient, reliable, and fair outcomes in the electricity market. By broadening the application of the

Code, the amendment better supports grid stability and resilience, which are crucial as the penetration of inverter-based systems grows. Additionally, the proposed amendment is less complex and more straightforward to implement than creating entirely new regulatory requirements, which could lead to additional industry costs and implementation delays.

Q4.4 (page 32) Do you agree with the analysis presented in this Regulatory Statement? If not, why not?

The EEA agrees with the analysis presented in the Regulatory Statement. The statement provides a balanced assessment of the growing role of inverter-based generation and the need for regulatory alignment to ensure reliability and safety in the electricity system.

Q5.1 (page 35) Do you support the Authority's proposal to amend the Code to replace the requirement for an excitation system with a requirement for a voltage control system, to encompass all generating technologies?

The Electricity Engineers' Association (EEA) supports the Authority's proposal to amend the Code to replace the requirement for an excitation system with a requirement for a voltage control system that encompasses all generating technologies. This approach reflects the ongoing evolution of generation technology, particularly with the integration of renewable energy sources that rely on power electronics rather than traditional synchronous machines. By shifting to a more flexible requirement for voltage control, the industry can adapt to a broader range of technologies and meet grid stability needs more effectively, enhancing the reliability and resilience of New Zealand's power system.

Q5.2 (page 35) Do you see any unintended consequences in making such an amendment?

While EEA supports the intent behind this proposal, we recognise that unintended consequences could arise. A key concern is the potential for varying responses from different voltage control technologies, which may lead to stability issues under certain grid conditions. Integrating diverse voltage control systems, especially in a grid with increasing inverter-based resources, could require additional technical standards or performance specifications to maintain consistency and reliability.

EEA suggests that clear guidelines and possibly transitional provisions accompany this amendment, allowing system operators and network owners to adapt to new voltage control standards without compromising grid stability.

Q5.3 (page 36) Do you agree the proposed Code amendment is preferable to the other option identified? If you disagree, please explain why and give your preferred option in terms consistent with the Authority's main statutory objective in section 15 of the Electricity Industry Act 2010.

Yes, the EEA agrees that the proposed Code amendment is preferable to the alternative identified. By focusing on a general voltage control system requirement instead of a specific excitation system, this

amendment offers flexibility that aligns with the Authority’s statutory objective in section 15 of the Electricity Industry Act 2010—to promote competition, reliable supply, and the efficient operation of the electricity industry.

The proposed approach enables a more inclusive standard that supports various generating technologies, allowing for innovation and cost-efficiency as new technologies emerge. This adaptability is essential for fostering competition within the sector, as it lowers barriers for diverse generation types, including renewable and inverter-based resources. Furthermore, the broader requirement supports reliable system operations across all types of generation assets, enabling better overall grid stability and operational resilience as the generation mix evolves.

Q5.4 (page 36) Do you agree with the analysis presented in this Regulatory Statement? If not, why not?

The EEA broadly agrees with the analysis presented in the Regulatory Statement, as it highlights the necessity for a flexible regulatory framework that can adapt to changing generation technologies. The assessment correctly addresses the limitations of the existing requirements, which are rooted in traditional synchronous generation. Moving to a voltage control system standard is a forward-looking approach that recognizes the evolving nature of the generation fleet, particularly with the rise of renewable and inverter-based generation sources.

However, the EEA would suggest further consideration of the potential complexities associated with integrating different types of voltage control technologies, particularly regarding system coordination and stability under varying conditions. Additional guidance on technical specifications and implementation procedures may enhance the robustness of the analysis, ensuring that the transition to a voltage control system standard achieves the intended benefits without compromising reliability.

Q6.1 (page 40) Do you support the Authority’s proposal to amend the Code to require all dynamic reactive power compensation devices to undergo periodic testing?

Yes, the EEA supports the Authority’s proposal to amend the Code to require periodic testing for all dynamic reactive power compensation devices. Ensuring the functionality and reliability of these devices is essential to maintaining grid stability and operational efficiency. Periodic testing would help verify device performance over time, especially as network conditions and equipment characteristics evolve. This practice will enhance transparency and support the integrity of the grid, contributing to greater resilience and reliability in our electricity system.

Q6.2 (page 40) Do you see any unintended consequences in making such an amendment?

Yes, there are potential unintended consequences to consider. The Code currently imposes power factor limits on distributors at Grid Exit Points (GXPs), where power factor correction is typically

managed within the distributor's network. Requiring all dynamic reactive power compensation devices to undergo periodic testing could create complexities in how these power factor corrections are managed across networks. For instance, distributors may face increased operational costs or logistical challenges in meeting both the testing requirements and the existing power factor obligations at GXP's. Additionally, smaller operators might experience a disproportionate compliance burden, impacting their resources and potentially straining technical service availability.

Further, the need to de-energize or isolate parts of the network for testing could temporarily disrupt power quality and stability. Therefore, a phased implementation approach, support for resource-limited entities, and flexibility in testing protocols could help minimise these impacts while still achieving the desired outcomes of reliability and system integrity.

Q6.3 (page 41) Do you agree the proposed Code amendment is preferable to the other option identified? If you disagree, please explain why and give your preferred option in terms consistent with the Authority's main statutory objective in section 15 of the Electricity Industry Act 2010.

The EEA agrees that the proposed Code amendment is preferable to the other option identified. This amendment aligns well with the Authority's statutory objective of promoting competition, reliability, and efficient operation in the electricity industry for the long-term benefit of consumers. Requiring periodic testing for dynamic reactive power compensation devices offers a structured approach to maintain grid stability and ensure reliability. By setting a consistent standard, the amendment supports transparency and accountability across the industry, which is critical as more intermittent generation sources are connected to the grid.

Alternative options, such as voluntary compliance, may lack the uniformity needed to manage reactive power compensation effectively across different networks, leading to potential disparities in reliability and efficiency. A mandatory testing requirement better addresses the need for comprehensive oversight, ensuring all network operators are aligned in supporting grid resilience.

Q6.4 (page 41) Do you agree with the analysis presented in this Regulatory Statement? If not, why not?

The EEA agrees with the analysis presented in the Regulatory Statement, as it provides a thorough assessment of the benefits and potential challenges associated with the proposed amendment.

However, the Authority could undertake further consideration of the challenges that smaller operators may face in meeting these requirements, as well as the potential impact on power factor management at GXP's. Additional analysis of these factors would strengthen the case for targeted support measures or phased implementation to ensure the amendment's effectiveness across the industry.

Q7.1 (page 45) Do you support the Authority’s proposal to amend the Code to treat ESSs as generation for the purposes of Part 8?

The EEA generally supports the aim of better integrating Energy Storage Systems (ESSs) within the electricity system; however, we have concerns about the proposed amendment being positioned as an "interim" measure. We recommend a full and urgent evaluation of the role of ESSs under Part 8 to ensure they can be optimally leveraged for the sector’s efficient operation. The rapid deployment of ESSs nationwide, alongside their increasing role in system operations, underscores the need for a more comprehensive and forward-looking approach rather than temporary solutions.

A key issue raised by the proposal is the application of the 30MW threshold for ESSs. It is unclear whether this threshold applies only to single-site installations or if it also encompasses aggregated smaller batteries operating as a virtual power plant (VPP). Given that the current Code does not address aggregators, this creates ambiguity around the treatment of aggregated ESSs. For instance, would a fleet of smaller-scale batteries, collectively exceeding 30MW — potentially at the distribution, regional, or national levels — be subject to the same requirements as larger, single-site ESSs?

Without addressing these points, the amendment risks unintended regulatory complexities that could hinder ESSs' effective deployment and management within our grid.

Q7.2 (page 45) Do you see any unintended consequences in making such an amendment?

There are a number of potential unintended consequences associated with this interim approach:

- **Uncertainty for Aggregated Resources:** The lack of clarity regarding the treatment of aggregated ESSs, particularly those functioning as VPPs, creates regulatory ambiguity. The growing impact of aggregated residential batteries is already challenging EDBs ability to meet their AUFLS obligations. This presents a persistent operational issue that requires urgent resolution to maintain system stability and reliability.
- **Challenges for Load-Related Services:** ESSs are valuable for both load-related services (such as demand response and reserve capacity) and generation roles. Classifying them strictly as generation may limit their versatility, thus impacting the sector’s ability to fully utilize ESSs for flexibility and network resilience.
- **Implications for Network and Cost Allocation:** Reclassifying ESSs as generation may complicate network planning and cost allocation processes, particularly within distribution networks where ESSs interact differently compared to traditional generation assets.

In light of these points, we recommend that the Authority consider a comprehensive amendment, rather than an interim solution, that addresses the full scope of ESSs’ role within Part 8. Clarifying the

30MW threshold and providing guidance on how aggregated battery fleets are to be treated is essential to ensure ESSs contribute effectively to New Zealand's electricity system.

Q7.3 (page 47) Do you agree the proposed Code amendment is preferable to the other options identified? If you disagree, please explain why and give your preferred option in terms consistent with the Authority's main statutory objective in section 15 of the Electricity Industry Act 2010

While we understand the Authority's desire for a quick solution to address the evolving role of ESSs, we believe a comprehensive review of ESS obligations under the Code would be more effective and better aligned with the Authority's main objective: ensuring a reliable supply and the efficient operation of the electricity industry. The rapid evolution of storage technologies and business models indicates that an in-depth review now would be more efficient and future-proof than implementing an interim measure likely to require significant revision.

Rather than a temporary adjustment, we recommend a more comprehensive, long-term regulatory approach. This approach would establish clearer and more consistent guidelines for ESSs across different operational contexts, especially as they increasingly interact with system services and participate as aggregated fleets or virtual power plants. This proactive measure would not only reduce the potential for regulatory ambiguity but also support continued innovation and investment in storage technologies that enhance system reliability and consumer benefit.

In line with section 15 of the Electricity Industry Act, we believe a thorough review of ESS roles and obligations would ultimately lead to a more robust, flexible, and reliable electricity system—one that can efficiently meet both current demands and future industry needs.

Q7.4 (page 47) Do you agree with the analysis presented in this Regulatory Statement? If not, why not?

While the EEA appreciates the Authority's work on this Regulatory Statement, we believe the analysis would benefit from a more detailed examination of how aggregated storage systems impact system operation and security. The current assessment does not fully address the complexities introduced by aggregated ESS fleets, particularly in terms of their effects on system stability, frequency control, and overall grid resilience. Given the rapid growth of aggregated storage as a resource, understanding these impacts is essential for maintaining secure and reliable operations.

Additionally, the Regulatory Statement could improve by considering the potential costs associated with implementing an interim measure only to be followed by a more comprehensive solution. A phased approach may lead to additional regulatory adjustments and compliance costs for industry stakeholders, whereas waiting for a complete review of ESS obligations could lead to a more cost-effective and stable long-term solution. Balancing these factors is essential to avoid unnecessary

expense and regulatory churn while ensuring that ESSs can be effectively integrated into the system for the long-term benefit of consumers.

A more comprehensive analysis of these aspects would support a well-informed decision that aligns with the Authority's objectives of promoting reliability, efficiency, and cost-effectiveness in New Zealand's electricity sector.

Q8.1 (page 49) Do you support the Authority's proposal to amend the definition of generating unit in clause 1.1 of the Code so that it refers to a generating unit having a frequency and/or voltage control system?

In principle, the EEA supports the Authority's proposal to amend the definition of a generating unit in clause 1.1 of the Code, as it provides greater clarity and ensures that all generating units contributing to grid stability are recognized and compliant with relevant standards. Updating this definition to include frequency and/or voltage control systems aligns with best practices and modernises the regulatory framework to account for newer generating units, such as distributed energy resources, which play an important role in grid reliability and resilience.

However, while we appreciate the Authority's effort to clarify the definition of a generating unit, further clarification around the term "smallest set" is necessary, especially considering that the entire power system operates as a cohesive entity. A precise understanding of what constitutes the "smallest set" will help ensure consistent application across various generating technologies and configurations.

Additionally, we question whether this proposed definition aligns with the one recently adopted in the Omnibus 3 Decision Paper and the resultant Code amendment. Consistency across areas of the Code is essential for effective implementation and helps reduce the risk of regulatory ambiguity.

We also seek clarification on whether all consumer-grade solar PV installations, inverters, batteries, and vehicle-to-grid (V2G) interfaces currently being installed across New Zealand meet the criteria of having both frequency and voltage control systems. It would be valuable for the Authority to specify if such basic control functions are adequate or if more sophisticated control systems are required. This clarification will ensure the new definition is both practical and implementable across the market.

Q8.2 (page 49) Do you see any unintended consequences in making such an amendment?

While we support the proposal, EEA suggests a careful assessment of potential impacts on smaller generating units, particularly distributed energy resources that may not have sophisticated control systems. The amendment could inadvertently impose compliance burdens on smaller units, which might not have been originally designed to meet these standards. Additionally, the proposed definition could create a risk that the "smallest set" criterion may be interpreted differently by various parties,

potentially leading to inconsistent application of Code obligations. EEA recommends that the Authority consider a tiered or phased approach, ensuring that compliance expectations are realistic and attainable for all generating units while safeguarding system stability.

Q8.3 (page 50) Do you agree the proposed Code amendment is preferable to the other option identified? If you disagree, please explain why and give your preferred option in terms consistent with the Authority's main statutory objective in section 15 of the Electricity Industry Act 2010.

EEA agrees that the proposed Code amendment is preferable to the other option identified. By explicitly including frequency and/or voltage control systems in the definition of a generating unit, the amendment ensures greater clarity and consistency in interpreting obligations for all generating resources, including newer technologies such as distributed energy resources. This approach aligns well with the Authority's main statutory objective to promote competition, reliable supply, and efficient operation of the electricity industry for the long-term benefit of consumers.

However, the proposed amendment could be further improved by including specific guidance on how it applies to different scenarios. This additional guidance would help to ensure consistent application across various types and scales of generating units, minimising the risk of varied interpretations and supporting effective and equitable implementation. EEA recommends that the Authority consider these refinements to provide further clarity for industry stakeholders and support practical application of the Code amendments.

Q8.4 (page 50) Do you agree with the analysis presented in this Regulatory Statement? If not, why not?

EEA generally agrees with the analysis presented in the Regulatory Statement and acknowledges the Authority's efforts to clarify Code definitions. However, we would appreciate additional detail regarding how smaller-scale consumer resources, particularly those with basic inverter settings, are expected to comply under the proposed amendment.

Q9.1 (page 53) Do you support the Authority's proposal to amend the Code to allow a machinebased synchronous generating unit to be deemed compliant with the Code's FRT requirements if full compliance is not possible due to the generating unit's inherent stability characteristics and the generator has taken all reasonable measures to support grid stability taking into account the generating unit's inherent stability characteristics?

The EEA supports the Authority's proposal to amend the Code to allow a machine-based synchronous generating unit to be deemed compliant with the Code's Fault Ride-Through (FRT) requirements if full compliance is not achievable due to the generating unit's inherent stability characteristics. This approach recognises the physical limitations of certain machine-based synchronous generating units and the fact that full FRT compliance may not always be feasible. However, we agree that, in such cases,

generators should take all reasonable measures to support grid stability. This flexibility allows for a more realistic approach while maintaining the broader goal of system stability, ensuring that generators with inherent limitations can still contribute value within those constraints.

Q9.2 (page 53) Do you see any unintended consequences in making such an amendment?

While this amendment would enable more inclusive participation in grid stability efforts, we do see potential unintended consequences. One risk is that some generators might rely on this flexibility without fully exploring all technical options to enhance FRT capabilities, potentially leading to suboptimal support for grid stability. To mitigate this, clear criteria should be established for assessing "reasonable measures" to ensure that generators make diligent efforts to maximise their contribution to FRT compliance. Additionally, guidance on acceptable stability characteristics would help align expectations and minimise any disparity in interpretations, thereby promoting consistent practices across the sector.

Q9.3 (page 54) Do you agree the proposed Code amendment is preferable to the other option identified? If you disagree, please explain why and give your preferred option in terms consistent with the Authority's main statutory objective in section 15 of the Electricity Industry Act 2010

Yes, the EEA agrees that the proposed Code amendment is preferable to the other identified option, as it allows machine-based synchronous generating units to support grid stability within the bounds of their inherent stability characteristics. However, we believe that separate FRT curves need to be developed for all types of generation, as different generation types have unique stability profiles that can impact overall grid stability. Developing tailored FRT curves would ensure that each generation type contributes optimally to stability while respecting its technical limitations. Addressing this distinction is crucial to maintain a stable and resilient electricity grid, and we recommend that this consideration be incorporated into future regulatory approaches. This enhancement would align well with the Authority's statutory objective in section 15 of the Electricity Industry Act 2010, promoting a balanced, efficient, and reliable operation of the electricity system for the long-term benefit of consumers.

Q9.4 (page 54) Do you agree with the analysis presented in this Regulatory Statement? If not, why not?

The EEA generally agrees with the analysis presented in the Regulatory Statement. The analysis appropriately considers the limitations of certain synchronous generating units and the potential impact on grid stability. However, we suggest a closer examination of the specific criteria for assessing "reasonable measures" to ensure that all generators are making consistent and diligent efforts to optimise their support for grid stability. This additional layer of analysis would provide further assurance that the flexibility offered by the amendment does not inadvertently lead to reduced grid support across the sector.

Contact

The EEA's contact person for this submission is Dr Stuart Johnston, Lead Advisor Engineering & Technical

Appendix A

Introducing EEA

Founded in 1927 the EEA is the national organisation for engineering, technical and health and safety matters within the New Zealand Electricity Supply Industry (ESI).

Our members include over 70 Corporate Members (companies) and 600 Individual Members from all engineering disciplines and sectors of the electricity supply industry including generation, electricity networks (transmission and distribution), contractors (operation/maintenance), engineering consultancies and equipment suppliers.

The EEA works collaboratively with industry, government, and other stakeholders to provide expertise, advice, and holds or contributes to significant bodies of knowledge on engineering/ technical and safety issues relating to the electricity supply industry in New Zealand. All EEA guides and publications are publicly available.

A key focus of our work is enabling engineering and technology understanding and solutions to support decarbonisation and ensure the safe, reliable, and secure delivery of electricity to our communities.

Our functions include:

- Production and ongoing stewardship of 'bodies of knowledge' including engineering, technical, asset management and safety publications (e.g., guides, Standards, industry reports, and links to relevant legislation and international information).
- Representing the New Zealand electricity supply industry in national and international Standard development and facilitation of benchmarking in safety, technology, and asset management (e.g., IEC, AS/NZS, NZS Standards).
- Providing and supporting engineering and technical professional development and competency for our engineers/technical staff.
- Providing a web-based knowledge hub on safety, engineering, asset management, emerging technology and professional development including information services, notifications, newsletters, guidelines and support documents, events, and infrastructure engineering careers information.

The EEA is currently a partner with EECA and industry in the delivery of the FlexTalk programme which aims to maximise participation in flexibility services through the adoption of a common communication protocol. It also has membership on the Electricity Authorities Common Quality Technical Group (CQTG) and has observer status on the Authority's Network Connection Technical Group (NCTG).