Electricity Engineers' Association

Level 6, 138 The Terrace
PO Box 5324
Wellington, New Zealand
Telephone: (04) 473 8600
Web: www.eea.co.nz

To: The Electricity Authority
decentralisation@ea.govt.nz

From: Electricity Engineers' Association of NZ

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Subject: EEA Submission – Green Paper – *Working together to ensure our electricity system meets the future needs of all New Zealanders*

OVERVIEW

The Electricity Engineers' Association (EEA) appreciates the opportunity to provide a submission in response to the Electricity Authority's Green Paper: *Working together to ensure our electricity system meets the future needs of all New Zealanders.*

The EEA represents engineers, technical specialists, and industry professionals from across the electricity supply chain. Our members span the generation, transmission, distribution, and supply sectors, including consultants, equipment suppliers, and service providers. We work collectively to promote excellence in engineering and asset management, support system reliability and safety, and enable innovation in the face of decarbonisation and electrification.

This submission reflects the collective expertise and practical experience of our membership in managing electricity networks, integrating new technologies, and delivering consumer outcomes. It draws on technical, regulatory, and operational perspectives to provide constructive input into the Authority's strategic discussion on decentralisation.

We broadly support the Green Paper's recognition that decentralisation, driven by the growing uptake of distributed energy resources (DER), new market participants, and active consumer engagement—will reshape the electricity system. However, we emphasise the importance of framing decentralisation as a coordinated evolution of the electricity system, rather than as a standalone outcome. Decentralisation should be seen as complementary to centralised generation and must be integrated with system-wide planning, regulatory reform, and investment to ensure enduring benefits.

In our responses, we highlight the following themes:

- Systems integration and whole-of-system coordination: Decentralisation should be pursued as part of a broader transformation that connects transmission, distribution, and behind-the-meter assets in a coordinated and efficient manner.

- **Distribution System Operator (DSO) enablement:** Establishing clear roles and responsibilities, particularly at the distribution level, will be critical for realising value from DER and unlocking new service models.
- **Consumer participation and equity:** Ensuring that all consumers—active and passive—can benefit from decentralisation is essential. This includes addressing digital and financial barriers and protecting vulnerable consumers.
- **Interoperability and technical standards:** Fit-for-purpose standards, data visibility, and interoperable platforms are foundational to supporting decentralised services at scale.
- **Workforce capability and safety:** A more decentralised system will require new skills, tools, and operating practices. Investment in workforce development must be part of the transition.

We also call for greater focus on the development of flexibility markets, planning frameworks that reflect the locational and temporal value of DER, and governance models that ensure trust, neutrality, and consumer protection.

The EEA looks forward to continuing to work with the Authority and the wider sector to shape a decentralised electricity system that is secure, affordable, inclusive, and capable of supporting New Zealand's climate goals.

Discussion Questions

Q1. Do you agree with the description of decentralisation? If not, why not?

The EEA broadly supports the Electricity Authority's description of decentralisation in the Green Paper. It correctly highlights the increasing uptake of distributed energy resources (DER) and the expanding role of consumers and third parties in managing electricity supply and demand.

However, we recommend a broader framing that better captures the full system implications of decentralisation. In particular:

1. **System Evolution, Not Just Asset Proliferation:** While the focus on DER uptake is important, decentralisation should be seen as an evolution of the electricity system that incorporates active consumer participation, the emergence of distributed energy markets, and increased coordination between transmission, distribution, and behind-the-meter assets. This systems view is essential to understanding the operational and regulatory shifts underway.
2. **Complementary Role to Centralised Generation:** We emphasise that decentralisation should complement, not replace, centralised generation. Both will play critical and interdependent roles in supporting New Zealand's decarbonisation pathway and in delivering a secure, resilient, and affordable electricity supply. The future system will require a mix of large-scale,

dispatchable generation alongside flexible, distributed resources that can be orchestrated to meet demand and manage variability.

3. Changing Role of Distribution Networks: Decentralisation is fundamentally reshaping the role of distribution networks. As more resources connect at the grid edge, distribution businesses are being called on to provide greater visibility, coordination, and flexibility. This shift points to the need for new operating models (e.g. Distribution System Operator functions) and supporting investment in digital capability, planning, and regulatory frameworks.
4. Interoperability and Integration: The integration of diverse DER technologies requires common data standards, interoperability frameworks, and the ability to coordinate system operations across organisational and technical boundaries. These elements are currently underdeveloped and should be seen as critical enablers of successful decentralisation.
5. Equity and Inclusion: Decentralisation creates new opportunities but also poses risks of uneven access and benefit. The transition must ensure that all consumers, regardless of location or income, can participate in and benefit from emerging technologies and services. This includes recognising and addressing the potential for new forms of energy hardship or digital exclusion.
6. Dynamic Consumer Roles: Consumers are evolving from passive users to active participants in energy markets, as prosumers, aggregators, and service providers. The Green Paper would benefit from recognising the full spectrum of these roles and the system and regulatory enablers required to support them safely and effectively.

In summary, while the EEA agrees with the general direction of the decentralisation description, we recommend that it be expanded to reflect its role as a complementary, integrated part of a broader system transformation. Decentralisation is not just about more DER, it's about creating a more responsive, inclusive, and coordinated electricity system that supports New Zealand's climate, consumer, and resilience goals.

Q2 – Do you agree with the articulation of the potential outcomes and benefits from decentralisation for consumers? If not, why not?

The EEA supports the potential consumer benefits outlined in the Green Paper, such as improved resilience, affordability, and consumer empowerment, as key outcomes of a well-managed decentralisation pathway.

However, we emphasise the importance of critically examining the system-level feasibility and implications of emerging concepts such as peer-to-peer trading, community batteries, and local energy markets. These innovations offer promise but must be assessed through the lens of long-term system integrity, cost-effectiveness, and fairness.

In our view, realising these benefits will require:

- Fit-for-purpose technical standards that ensure the safe and interoperable integration of devices, platforms, and systems.
- Clear roles and responsibilities across networks, aggregators, consumers, and markets, to support coordination and avoid fragmentation.
- Recognition of regional variation, particularly in low-density or capacity-constrained areas, where decentralised models may present unique challenges and opportunities.
- A focus on equity, ensuring that access to new technologies and market opportunities is not limited to those with capital, digital literacy, or property ownership.

The benefits of decentralisation will only be realised where it enhances, not fragments, system coordination, and supports secure, cost-effective, and fair delivery of electricity services.

Q3 – Do you agree with the articulated challenges to unlocking the benefits of decentralisation? If not, why not?

The EEA broadly agrees with the challenges identified by the Electricity Authority in relation to decentralisation, particularly the need to adapt legacy systems, clarify roles and responsibilities, and ensure regulatory frameworks remain fit-for-purpose in a more dynamic, distributed energy environment.

However, we suggest that some of these challenges could be reframed or expanded to better reflect the full scope of what's required to unlock decentralisation's potential benefits for New Zealand consumers and the wider electricity system. In particular:

1. Coordination and integration at the edge of the grid: Greater emphasis should be placed on the need for coordination between distribution networks, aggregators, retailers, and consumers to enable decentralised resources to support system-wide outcomes such as reliability, affordability, and decarbonisation. Challenges here include data access, interoperability standards, and clarity over operational responsibilities at different levels of the system.
2. Market access and value recognition: A key barrier to unlocking decentralised flexibility is the absence of clear and consistent market mechanisms that recognise and reward the value DER can provide across multiple value streams (e.g. capacity support, resilience, emissions reduction). This includes consideration of how to support participation by consumers, both directly and via intermediaries, while managing transaction costs and complexity.
3. Investment signals and planning frameworks: Traditional investment and planning approaches are often not well-suited to recognising the locational and temporal value of DER. There is a

need to evolve regulatory settings to ensure distribution-level planning incorporates decentralised solutions on a level playing field with traditional network investment.

4. Workforce capability and safety: Unlocking decentralisation also requires upskilling across the electricity workforce, including in areas such as digital systems, cyber security, and control technologies. As decentralised resources become more prevalent, ensuring safety and reliability across a more complex, bi-directional system will also become increasingly important.
5. Consumer trust and engagement: While technology readiness is growing, realising the benefits of decentralisation depends on consumer willingness to participate. This will require clear value propositions, simple and equitable participation models, and robust consumer protections.

In summary, while we agree with the core challenges outlined by the Authority, the EEA recommends a broader framing that also highlights the operational, regulatory, workforce, and customer dimensions of enabling decentralisation. These issues should be tackled collectively through a system-wide approach that reflects the interconnected nature of the electricity sector's transformation.

Q4: Do you agree with the articulated opportunity statement for a more decentralised electricity system? If not, why not?

Yes, but with the caveat that decentralisation should be seen as one tool in the broader energy transition, not an end in itself. A desirable electricity system must be:

- Optimised: drawing on both centralised and decentralised solutions, selected based on system need, efficiency, and whole-of-system value.
- Integrated: with DER operating as part of a coordinated, dynamic system rather than in isolation or in ways that fragment system operation.
- Consumer-centric: enabling active participation where desired, while safeguarding affordability and service quality for passive or vulnerable consumers.

The EEA sees a strong opportunity to align this vision with the development of a Distribution System Operator (DSO) framework, capable of actively managing DER and enabling local energy markets. Advancing this opportunity will also require fit-for-purpose flexibility markets, supported by open technical standards, interoperable platforms, and trusted governance arrangements that provide clarity on roles and responsibilities across all system actors.

In our view, the opportunity statement would be strengthened by placing greater emphasis on integration, equity, and long-term system coordination, ensuring that decentralisation supports a secure, affordable, and decarbonised electricity future for all New Zealanders.

Q5 - What other feedback would you like to provide to input into the discussion on, for example:

a) what a more decentralised electricity system might look like,

b) how this might benefit consumers, and

c) what might be needed to unlock these benefits.

The EEA welcomes the Authority's exploration of a more decentralised electricity system and offers the following perspectives from an engineering, technical, and system-wide viewpoint:

a) What a more decentralised electricity system might look like

A more decentralised system will be characterised by:

- Greater active participation by consumers through distributed energy resources (DER), including solar PV, batteries, smart appliances, and EVs.
- Local energy optimisation, supported by behind-the-meter intelligence, community-scale resources (e.g. neighbourhood batteries), and locationally responsive markets.
- Real-time coordination across transmission, distribution, and consumer resources, enabled by data sharing, standardised communications, and interoperable platforms.
- Flexible service models, where consumers and aggregators can offer demand response, frequency control, or voltage support, effectively turning demand into a controllable resource.
- Distribution System Operator (DSO) like functions emerging within distribution businesses to optimise DER at scale, ensure local network security, and interface with national markets.

b) How this might benefit consumers

When well-designed, a decentralised system can offer:

- More choice and control, empowering consumers to optimise their energy use and access new services.
- Lower bills, particularly when consumers shift or reduce load, export generation, or participate in flexibility markets.
- Increased resilience, as distributed resources can be coordinated to support local reliability and reduce reliance on centralised infrastructure.
- Environmental benefits, supporting faster decarbonisation and more efficient use of renewable energy at all scales.
- Tailored solutions for different contexts, especially in regional and remote areas where decentralised options may outperform traditional approaches.

However, these benefits are not automatic—they depend on coordinated planning, equitable access, and the removal of structural and regulatory barriers.

c) *What might be needed to unlock these benefits*

To enable a more decentralised future that delivers value, we believe the following enablers are critical:

- A national DSO roadmap that sets out clear functions, accountabilities, and coordination frameworks across transmission, distribution, and flexibility market roles.
- Open standards and interoperability requirements, to ensure devices and platforms can interact securely and reliably.
- Fit-for-purpose regulatory frameworks that recognise new business models, reward flexibility, and allow networks to procure non-wires alternatives.
- Investment in data visibility and hosting capacity transparency, including dynamic hosting capacity maps and real-time network data access.
- Scalable and trusted governance, especially for new markets or system coordination functions, to maintain security, neutrality, and consumer confidence.
- Consumer protections and equitable participation, ensuring vulnerable and passive consumers are not disadvantaged and can share in the system's benefits.
- Workforce capability development, particularly in digital, control systems, and system integration domains.

The EEA and its members are actively progressing workstreams that align with these needs, including connection guideline reform, demand flexibility pilots, and development of asset management practices to accommodate greater system variability. We look forward to partnering with the Authority to turn this shared vision into operational reality.

Contact

The EEA's contact person for this submission is Dr Stuart Johnston, Lead Advisor Engineering & Technical (stuart@eea.co.nz or 021 11986535).