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From: Electricity Engineers' Association of NZ

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Subject: EEA Submission – Green Paper – *Unlocking the Potential of Demand Flexibility – A Residential Product Perspective*

OVERVIEW

The Electricity Engineers' Association (EEA) welcomes the opportunity to provide feedback on EECA's Green Paper *Unlocking the Potential of Demand Flexibility – A Residential Product Perspective*.

The EEA strongly supports EECA's initiative to build a smarter, more flexible, and consumer-centred electricity system capable of meeting Aotearoa's future energy needs. Demand flexibility will be essential to integrating distributed energy resources (DER), electrifying transport and heat, and ensuring affordability for households. The Green Paper's "product-level" lens complements work led by the Electricity Authority (EA), MBIE, the Commerce Commission, and industry through programmes such as FlexTalk, and the National Technical Connection Guidelines.

Residential customers and their smart products are increasingly going to interface individually and collectively with networks and the wider power system. This interaction has significant implications for the operation and future design of local networks, the grid and the future power system. EEA's members — including distribution businesses, Transpower, technology suppliers, and service companies — are responsible for delivering safe, reliable, and efficient electricity services across Aotearoa. This submission reflects their technical expertise and our shared commitment to practical, coordinated solutions that enable flexibility while protecting consumers and system integrity.

Residential product-level flexibility has significant potential to reduce peak demand, enhance renewable utilisation, and lower consumer costs. It is also a critical tool for managing emerging low-voltage (LV) network capacity constraints, reducing the need for reinforcement, and maintaining affordability. Targeted flexibility can help distribution businesses manage demand growth efficiently while supporting New Zealand's decarbonisation goals.

Achieving this at scale, however, depends on delivering safe transitional change through interoperability, open standards, data visibility, and consumer trust. Without consistent technical frameworks, use of international standards, and alignment across agencies, the result could be

disaggregated distributed energy resources using fragmented systems, duplication of costs, and diminished consumer value and confidence.

EECA's Green Paper provides an opportunity to align consumer-level standards with the technical and regulatory architecture emerging through the EEA's Streamlining Connections and FlexTalk programmes.

Summary of Key Points

The following key themes summarise the EEA's response to EECA's Green Paper and highlight the priorities our members see as critical to unlocking residential demand flexibility in a safe, equitable, and technically consistent manner.

- **Consumer trust and value first** – Demand flexibility participation must be voluntary, transparent, and deliver clear value to consumers. 'Common' technical product and installation standards, data-use arrangements, and privacy protections must be transparent, easily understood, consistently applied and regularly monitored and updated. Simplicity and affordability will be essential to ensuring participation across all consumer groups, including those in energy hardship.
- **Interoperability before incentives** – Open, internationally recognised standards (IEEE 2030.5, OpenADR, OCPP, IEC, ISO and ITU) should form the foundation of product design, communication and control. Using such standards will enable interoperability, competition, innovation, and long-term system value. However, premature or inconsistent standardisation may risk fragmentation or deter early market innovators.
- **Alignment with existing technical frameworks** – EECA's product-level work should integrate with New Zealand's activities in international standards, the EEA National Technical Connection Guidelines, and the wider EA-ENA-EEA Streamlining Connections programme, ensuring alignment between product capability, customer electricity-market engagement, and safe network operation.
- **Whole-of-system efficiency** – Flexibility should improve both consumer and system outcomes. EECA's evaluation metrics should measure energy efficiency, emissions, and network utilisation together, rather than in isolation.
- **Visibility and value** – Unlocking flexibility potential depends on improved LV network visibility and mechanisms that value flexible services where they deliver the greatest system and consumer benefit.
- **Co-governance and coordination** – A joint industry/government agency governance framework should align data, regulatory, and consumer-protection initiatives to avoid duplication and

ensure consistency across policy tools. Market and governance enablers must develop alongside product-level specifications to ensure coherent national implementation.

- **Capability and workforce** – Successful implementation requires a skilled workforce able to install, commission, and maintain smart devices safely and integrate them seamlessly into LV networks. EECA should work collaboratively with EEA and Waihanga Ara Rau to embed current and future technical competencies into national training pathways.

Collectively, these principles outline the conditions necessary to unlock flexibility at scale while maintaining consumer confidence and network safety.

Key Considerations

1. Alignment Across Programmes

The EEA strongly supports EECA's direction and agrees that a product-level specification and standards can complement wider regulatory and market reforms. However, several interconnected workstreams — EEA's Streamlining Connections programme, the FlexForums Flexibility Plan, and MBIE's Smart Appliance and Data Access initiatives — are already underway. Close coordination is essential to prevent duplication and ensure coherence across agencies.

The EEA's forthcoming Low-Voltage Connection Guidelines define the technical settings and standards for devices such as inverters, EV chargers, and smart hot-water systems. These guidelines provide the interoperability layer between product safety, capability and performance, and network safety and should be directly and consistently referenced in EECA's (and other government agencies) frameworks.

Access to accurate smart-meter and LV network data is also fundamental to effective flexibility. EECA's framework should align with the EA and ENA's joint work on LV visibility and data access to ensure flexibility resources are targeted to the areas of greatest value and system need.

EECA's specifications should evolve alongside clear market signals and governance mechanisms to ensure demand flexibility is embedded as a trusted and valuable service.

2. Consumer Protection and Data Privacy

Flexibility relies on consumer trust. Product control and data-sharing arrangements must maintain consumer autonomy, ensure informed consent, and protect privacy. EECA's specifications should explicitly reference compliance with the Privacy Act 2020 and adopt a privacy-by-design approach consistent with NZISM principles.

Evidence from FlexTalk 2.0 shows that clear communication about data use and opt-in control significantly increases participation and willingness to engage. Embedding consistent consumer messaging across agencies will be vital to building public confidence in flexibility solutions.

A significant portion of New Zealand households experience energy hardship. Flexibility frameworks must ensure products and programmes remain accessible, safe, and beneficial for low-income and hard-to-reach consumers.

3. Interoperability and Testing

The EEA agrees with EECA's identification of three core product components — communication protocol, product response, and operational information — and recommends adding cybersecurity and fail-safe operation as a fourth pillar. EECA should endorse open, non-proprietary international standards and establish an independent test and certification process to verify interoperability. Interoperable systems must preserve consumer autonomy, including the ability to manually override external control where appropriate.

While early standardisation may accelerate adoption, any framework must remain responsive, principles-based and technology-neutral. Minimum specifications should focus on functional capabilities — not fixed protocols — to avoid constraining innovation or future market evolution. Prematurely setting mandates could penalise early movers and limit consumer choice.

4. Efficiency Trade-offs and System Impact

Flexibility events can temporarily reduce device efficiency (e.g. lower heat-pump COPs or water-heater losses). EECA should evaluate these impacts using whole-of-system metrics that balance energy efficiency, peak reduction, and emissions outcomes. Integrating these insights with network planning and EA market data will enable evidence-based policy and consumer incentives that reflect total system benefits.

5. Governance and Roadmap

The EEA supports EECA's proposal to develop a clear implementation roadmap. This should be co-developed with the EA and MBIE to coordinate pilots, standards, and consumer programmes, and to provide a pathway from voluntary to regulatory frameworks where appropriate.

The roadmap should clarify respective agency roles in standardisation, consumer engagement, and market design to ensure coordinated delivery from pilots to regulation.

Responses to Consultation Questions

Q1. The main use cases for demand flexibility presented in this paper are: managing peak demand, optimising renewable energy use, and optimising home energy use. Do you think these are the main use cases? What other use cases are there?

The EEA agrees that these are the principal use cases and align with New Zealand's key electricity system objectives of reliability, affordability, and decarbonisation. However, the potential applications of demand flexibility extend further than routine peak management and energy optimisation.

- **Resilience and emergency management:** Flexibility can play an important role in improving community and system resilience. Controlled load reduction, temporary curtailment, or strategic pre-charging and pre-heating can all be used to maintain essential services and reduce stress on the network during emergency or contingency events. In extreme weather events or civil emergencies, coordinated flexibility can help preserve supply to lifeline utilities, critical communications, or evacuation centres. Distributed flexible devices — such as batteries, EVs, and smart water heating — can also support black-start and restoration activities after outages, improving recovery times and reducing reliance on diesel generation.
- **Planned outage coordination:** Demand flexibility can also provide significant operational value during planned network outages or maintenance works. By temporarily shifting or reducing load in affected areas, flexibility can minimise the duration of planned interruptions, reduce the need for expensive mobile generation, and improve safety for field crews by maintaining stable local voltage and load conditions. Where advanced network visibility exists, EDBs can pre-signal flexibility events to aggregators or directly controlled devices, enabling households and businesses to actively support outage management.

Together, these applications broaden the value proposition for flexibility beyond household energy cost savings, making it an essential capability for both resilience planning and efficient network operation. Flexibility can also support network efficiency and improve utilisation of existing assets, helping defer capital expenditure and optimise future network investment.

Q2. In the residential sector, the following products have been identified as key end-use products for demand flexibility: EV chargers, heat pumps, electric hot-water systems which use a storage tank, fridges/freezers, clothes washers, dishwashers, clothes dryers, inverters for solar and battery systems, and HEMS. Do you think these are the key demand-flexible end-use products in the residential sector? If not, what are the key products and why?

The EEA supports EECA's list and recommends explicitly including:

- **Battery energy storage systems (BESS) and vehicle-to-grid/home (V2G/V2H) technologies**, which provide bi-directional flexibility.
- **Pool and spa heating systems**, which are large controllable loads well suited to flexible operation.
- **Smart hot-water diverters and solar PV systems** with dynamic export control capability.

EEA emphasises that flexibility frameworks should focus on device attributes — controllability, load magnitude, responsiveness, and communication capability — rather than the appliance type. This ensures technology neutrality and adaptability as new flexible devices emerge, such as hydrogen-ready appliances, thermal storage systems, and advanced micro-inverters.

Q3. Do you think a standardised end-use product/application-based approach is relevant for the commercial sector, or is a bespoke/customised approach needed?

A hybrid approach is recommended. Common commercial loads such as HVAC, refrigeration, lighting, and EV fleet charging lend themselves to standardised frameworks, while process-specific operations (e.g., cold storage, data centres) will require tailored solutions.

The EEA suggests extending FlexTalk 2.0 into the small-commercial and community sectors to pilot interoperability standards, aggregator models, and flexible control arrangements. This would help develop evidence on commercial feasibility while supporting scalable solutions for future regulation.

Such frameworks should remain evidence-based and proportional, recognising that commercial operations vary widely in scale, criticality, and control capability.

Q4. What do you think the key end-use products/applications are in the commercial sector?

The most immediate opportunities are:

- **HVAC systems**, which provide large controllable loads and thermal inertia.
- **Refrigeration and cold storage**, which can offer short-duration flexibility through pre-cooling and duty-cycle management.
- **EV fleet charging**, where shifting or throttling charging load offers measurable benefits to networks and consumers.

- **On-site BESS and PV**, especially when integrated through building-management systems.

The EEA notes that many commercial buildings already use digital control and automation systems. Leveraging these existing platforms provides a low-cost, scalable pathway to deliver flexibility without duplicating technology or requiring complex retrofits.

Q5. Do you think a standardised approach is relevant for the industrial sector, or is a bespoke/customised approach needed?

Industrial flexibility must be customised and contract-based, given the diversity of industrial processes and their specific quality, safety, and productivity constraints. The EEA supports EECA's proposed industrial pilots and recommends coordination with Transpower's Demand Response Programme to ensure consistency across system levels.

The EEA also agrees that EECA's role should emphasise sharing best-practice examples, standard templates, and cost-benefit analyses rather than developing prescriptive technical standards. This approach encourages uptake while respecting site-specific requirements and operational risk management.

Q6. What are the key end-use products/applications in the industrial sector?

Priority technologies include:

- **Electrode boilers**, particularly when combined with thermal storage to shift demand.
- **Compressed-air systems**, which can be pre-charged or sequenced to reduce coincident peaks.
- **Thermal energy storage** for process or space heating.
- **Industrial battery systems** used to manage short-term load fluctuations or provide grid-support services.

EEA recommends that EECA focus on developing replicable design frameworks and data-sharing models to support scaling rather than prescribing specific control systems.

Q7. What are the barriers to the uptake of demand-flexible technology?

The key barriers include:

- **Fragmented standards and interoperability gaps** between devices, aggregators, and networks.
- **Consumer trust and privacy concerns** relating to data use and remote control.
- **Split incentives** between retailers, aggregators, and distribution networks.

- **Insufficient workforce capability**, particularly for installers and commissioning technicians.

A significant additional barrier is the absence of clear incentives and valuation mechanisms for flexibility. Without visibility of LV network conditions or transparent price signals, it is difficult to identify where flexibility delivers the most value or justify investment in enabling systems.

The EEA recommends that EECA work with the EA, ENA, and Commerce Commission to clarify how flexibility benefits can be recognised in regulatory frameworks, tariffs, and network-planning processes. Targeted workforce training and certification, developed with EEA and Waihanga Ara Rau, should also be a near-term focus.

EEA also notes that affordability, digital literacy, and consumer awareness remain significant barriers. Many households facing energy hardship may lack the means or confidence to invest in smart technologies even where incentives exist. Addressing these equity factors will be essential to achieving broad participation.

Q8. Do you agree that the main end-use product components are communication protocol, product response, and operational information? What other components or considerations are important?

The EEA agrees with these components and recommends adding cybersecurity and privacy as a fourth. Products should default to safe operation if communication is lost, and data exchange must adhere to privacy-by-design principles consistent with NZISM principles.

Products should default to a safe mode if communication is lost and provide users with the ability to manually override external control when appropriate. This ensures consumer trust, autonomy, and safety remain central to flexibility implementation.

Definitions should remain functional rather than prescriptive. EECA's framework should define the outcomes devices must achieve (e.g., response time, data format, resilience) instead of mandating specific communication technologies. This will future-proof the framework while enabling innovation.

Q9. Do you think there is a need for a minimum level of standardisation at an end-use product level?

Yes. A voluntary minimum specification would provide certainty for manufacturers, aggregators, and networks while ensuring safe and interoperable integration.

The EEA recommends that such a specification:

- Define minimum functional performance criteria and interoperability requirements.
- Reference internationally recognised standards to streamline compliance for global suppliers.

- Align with the EEA–ENA National Technical Connection Guidelines to ensure network safety and reliability.

Early adoption of voluntary standards can accelerate market maturity, provided the framework remains principles-based and technology-neutral. However, care must be taken to avoid premature mandates that could penalise early movers already providing value or reduce consumer choice by limiting the technologies permitted.

Q10. Would you support EECA creating a voluntary approved list of residential demand-flexible products, similar to the EV Smart Charger List?

The EEA supports this initiative on the following conditions:

- The criteria and testing processes are transparent and updated regularly.
- Testing and verification are independent.
- The list is aligned with existing network connection guidelines to avoid duplication or conflicting requirements.

A nationally recognised list will give consumers, retailers, and EDBs confidence that products meet minimum safety, interoperability, and cybersecurity standards.

Q11. Would you participate in working groups on the key end-use products to develop voluntary demand flexibility requirements? If so, which would you like to be part of?

The EEA would welcome active participation — and where appropriate, co-chairing — of working groups focused on:

- EV and V2G charging systems.
- Space and water heating systems, and
- HEMS interoperability and data frameworks.

These groups should be structured around cross-cutting themes such as data standards, cybersecurity, interoperability testing, and consumer experience, ensuring coherent outcomes across all product types and sectors.

Q12. If you are an end-use product supplier, would you manufacture/import/supply products that meet the voluntary specification?

While the EEA is not a product supplier, it will actively support EECA by:

- Promoting adoption of compliant products and standards among its members and partners.
- Facilitating engagement between networks, aggregators, and manufacturers to support coordinated deployment.
- Feeding supplier and consumer insights back into network-planning and policy-development processes.

EEA, SEANZ, ENA, and EECA can together ensure that market feedback and real-world performance data are continuously incorporated into the evolving flexibility framework, enabling benefits to be realised efficiently and equitably..

Contact

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