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### ***Unlocking the potential of demand flexibility – a residential product perspective***

1. This is Vector's feedback on the green paper, *Unlocking the potential of demand flexibility – a residential product perspective*<sup>1</sup>, shared by the Energy Efficiency and Conservation Authority (EECA) in Aotearoa, New Zealand.
2. No part of this submission is confidential, and we are happy for it to be published.
3. Vector owns and operates the electricity distribution network within the wider Auckland region. This consists of more than 19,000 km of electricity lines and over 22,500 distribution transformers, delivering power to over 624,000 homes and businesses.
4. Vector's Symphony strategy for our electricity distribution business is to orchestrate distributed energy resources, such as manageable electric vehicle (EV) charging and hot water effectively, to reduce the need for additional spend on infrastructure.
5. Vector encourages EECA to focus this green paper on residential products and to consider the role that EECA also plays in educating residential consumers about efficient energy use.
6. In our view, the products that are likely to yield the most initial success as valuable flexibility resources for the wider electricity sector without adding too much complexity to consumers' lives are smart hot water, EV charging (including V2G), and smart inverters for solar and battery systems. Given New Zealand is a small market for global manufacturers, we must align our efforts with international standards wherever possible and cooperate with Australia to have mutually beneficial appliance standards for our shared markets.

### **Responding to specific questions**

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<sup>1</sup> <https://www.eeca.govt.nz/about/news-and-corporate/consultations/unlocking-the-potential-of-demand-flexibility-in-homes/>

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

Yes, these are the main use cases and align with Vector's Symphony strategy to orchestrate DER to minimise whole-system cost and defer traditional reinforcement where practicable. Flexible devices can also help align consumers' demand with their own renewable generation and supports consumer affordability by automating efficient behaviours.

An additional use case not identified above is the use of flexibility to support emergency management and resilience, for example via the load management protocol.

**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/freezer, 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?**

We broadly agree, but Vector would prioritize products with fixed installations over those that are plugged into the wall and products where there is a reduced impact on consumer experience for EECA's initial standardization efforts:

- EV wall chargers: Vector supports EECA's work towards smart charging standards that support off-peak charging, open protocols, and voltage compliance. These should include vehicle-to-home and vehicle-to-grid chargers which are currently becoming more affordable and available. We note, however, that smart charging for an increasing number of EVs on the market can be managed remotely via the car, as opposed to a dedicated charging unit.
- Electric hot water: With a very high penetration of products, and a proven consumer experience from decades of ripple control, hot water has several options for flexible control including modern smart meter-based controls, add-on devices, and smart hot water cylinders.
- Battery/solar inverters: Communications enabled inverters, like those prescribed in the CSIP-AUS standard, provide a mechanism for flexible connection arrangements that allow for faster connections, fairer use of networks, and an enhanced ability to support system and network emergencies.
- Pool pumps: There are fewer residential pool pumps, and there are potentially communications challenges based on their location at residential properties, however NZ could adopt the AS/NZS standard around communications and management capabilities.
- Heat pumps: Although there is a relatively high penetration and strong winter-peak influence, the orchestration of heat pumps must take into account occupant comfort otherwise we risk consumer dissatisfaction with demand flexibility and potentially lose out on the less obstructive devices. EECA could follow the lead of how air conditioning loads are being managed overseas, especially in Australia.

In our opinion, white-goods (such as fridges/freezers, dishwashers, clothes washers and clothes dryers) will tend to have a more marginal contribution relative to the above devices, and potentially are much more complex to enable. The increase in cost, both to purchase and enable 'smartness' for those devices, might not merit action at this point. Vector conducted a survey with customers on our network about their behaviour on the previous day during peak time of use periods. Roughly one of every five customers reported that they shifted their laundry or dishwasher use outside of peak TOU. Customers reported shifting laundry and dishwashing at higher rates than cooking, space heating, or hot water (baths and showers).

We support EECA publishing a minimum viable specification (MVS) for residential flex devices that includes interoperability guidelines, fail-safe/override functions, cyber-security, communications and power data requirements, and an industry standard for randomized restoration behaviour following power outages.

**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?**

We encourage EECA to keep its focus on residential products at this time. We believe a hybrid approach is needed in the commercial sector where standardised interfaces and data exchanges (e.g. signals or communications protocols, metering/sub-metering quality, safety/cyber-security) would lower integration costs and enable aggregation. Commercial buildings will need bespoke control strategies to reflect their individual commercial operations and products (e.g., refrigeration duty cycles vs. office HVAC). We are starting to see meaningful uptake of distributed generation at commercial sites, and we recommend adopting similar 2-way communication capabilities in commercial settings to enable flexible connection arrangements and the ability to respond during system emergencies.

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

For the small commercial sector, there may be several devices that are similar to residential products, however even these are often manufactured by separate companies and to different performance standards. Larger commercial entities will have more distinct products from standard residential products. We recommend that EECA focus on residential products in this green paper.

**Q5. Do you think a standardised end-use product/application-based approach is relevant for the industrial sector, or is a bespoke/customised approach needed?  
Q6. What do you think the key end-use products/applications are in the industrial sector?**

We encourage EECA to keep the focus on residential products. EECA has already done significant work towards identifying the products and approaches for industrial customers through the Regional Energy Transition Accelerator programme<sup>2</sup>. This type of commercial and

<sup>2</sup> <https://www.eeca.govt.nz/co-funding-and-support/products/about-reta/>

industrial programme approach has been shown to work internationally, with bespoke engineering audits to identify specific options for the site, because industrial processes can often vary at different facilities within the same company making a product-based approach unsuccessful.

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

As members of the FlexForum, we have supported the efforts in identifying a series of barriers to the uptake of demand flexible technology that have been reflected in the Flexibility Plan<sup>3</sup>. FlexForum has identified 4 main stages in the journey towards flexibility Discover, Assess, Enable, and Operate. The Discover stage has many barriers related to education and awareness for homes and businesses and EECA has a valuable role to play in that regard. In order to assess whether to participate in flexibility there must be some form of offer or proposition for consumers, and they will need to understand the underlying trade-offs, costs, and benefits associated with making the decision to enable demand flexibility. This includes the design of their facility, products and appliances, connection arrangements, and retail electricity plans and service offerings.

- There is little data in New Zealand regarding the adoption rates, performance, connectivity and locations of devices that are capable of demand flexibility.
- With several communications standards that could be used to coordinate demand flexibility, industry players have concerns about fragmentation and committing to a single standard. We should acknowledge our global position as a follower and taker of technology and standards, and look especially to our closest neighbour, Australia.
- Data access issues continue for EDBs, consumers, and consumers' agents regarding energy data to make effective decisions. EDBs are beginning to gain access to information at the edges of their network, including information about consumer devices installed behind-the-meter. This enhanced information will help EDBs develop the value propositions and offers for the use of demand flexibility within network emergency management, planning and operations.
- There is reduced consumer trust with electricity industry participants. This trust is needed before homes and businesses will cede the management of flexibility to a third party, and consumers also face increased complexity for the installation and integration of these products.

EECA has a critical role to play in providing the supporting resources for both consumers and installers / integrators of these products.

**Q8. The paper describes the three main end-use product components for demand flexible capability as: communication protocol, product response, and operational information.**

- **Do you agree that these are the main components for demand flexible end-use products?**

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<sup>3</sup> <https://flexforum.nz/flexibility-plan/>

<p><b>• What other components or considerations are important for end-use products?</b></p> <p>We broadly agree with these components and suggest that cyber-security and device-level metering could be considered as well. Product response information must include fail-safe operation modes during communications failures and restoration protocols to prevent secondary rebound peaks.</p> <p>Consumer trust, engagement, ongoing support and resources, and education are key components beyond the technical standards and capabilities which will be necessary for an enduring use of demand flexibility from end-use products.</p>
<p><b>Q9. Do you think to support the development and uptake of demand flexibility there is a need to create a minimum level of standardisation at an end-use product level (covering communication protocol, product response, and operational information)?</b></p> <p>Yes, minimum viable standards provide a clear set of requirements for interoperability, security, and performance verification. New Zealand's standards should align with international settings where possible to facilitate a simpler entry into the New Zealand market by both aggregators and device manufacturers.</p>
<p><b>Q10. Would you support EECA creating a voluntary approved list of residential demand flexible end-use products, similar to EV Smart Charger Approved List</b></p> <p>Yes. Presuming that EECA has evidence that the EV Smart Charger Approved List has proven to be useful, other approved product lists would provide clarity to consumers and accelerate uptake. Approvals for devices at a central level are very helpful for entities like EDBs to rely on, as compliance enforcement can be challenging. Any additional information that could be collected and shared about the sale / adoption of devices that do and do not meet the voluntary standards will support insights on the scale of demand flexibility available in markets around New Zealand. EDBs would welcome this additional information to support planning and flexibility procurement decisions.</p>
<p><b>Q11. Would you participate in working groups on the key end-use products to develop voluntary demand flexibility requirements (covering communication protocol, product response, and operational information)?</b></p> <p><b>• If so, what product based working groups would you like to be part of?</b></p> <p>Vector's key areas of interest are smart EV charging including V2G, smart communicating inverters for solar and battery storage systems, and smart hot water systems. We are keen to support EECA in developing these voluntary requirements and encourage EECA to continue working with existing industry bodies like ENA, EEA, and FlexForum.</p>
<p><b>Q12. If you are an end-use product supplier, would you manufacture/import/supply end-use products that meet the voluntary specification?</b></p> <p>N/A</p>

7. We are happy to arrange additional conversations with our staff if we can assist with any further questions or clarifications about our feedback. Please contact Matt Smith (Policy Advisor) at [Matt.Smith@vector.co.nz](mailto:Matt.Smith@vector.co.nz) in the first instance.

Kind regards



**Matt Smith**

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