

Rewiring submission on the Green Paper: Unlocking the potential of demand flexibility - a residential product perspective

About Rewiring Aotearoa

Rewiring Aotearoa is an independent non-partisan non-profit, funded by New Zealand philanthropy. It is a registered charity working on energy, climate, and electrification research, advocacy, and supporting communities through the energy transition. The team consists of New Zealand energy, policy, and community outreach experts who have demonstrated experience both locally and internationally. We're always fighting for the New Zealanders who use the energy system, and our goal is to help build a low cost, low emissions, high resilience electrified economy for Aotearoa NZ.

Key points

Rewiring Aotearoa supports the work EECA is doing to explore suitable functionality for residential end-use products to unlock benefits to customers from consumer energy resources. However there is a risk of focussing too narrowly on technology functionality that could create unnecessary cost or become redundant. It is important that this work:

- Focuses on how to deliver benefits to customer by reducing delivered energy costs for all customers, and not simply focus on lowering system costs.
- Considers the potential for direct pricing and export tariffs to unlock customer flexibility to maximise benefits to all customers.
- Includes understanding of the electricity system use cases for customer flexibility, especially temporal and locational requirements.
- Considers risks and costs associated with mandating or advising customers on technology investment, including where functionality could become redundant, adds unnecessary cost or where technology providers business models limit customer choice.

Start by understanding customer perspectives and focus on reducing delivered energy costs for all customers

The customer perspective needs to be the starting point for decision making and thinking about functionality of consumer energy resources that can provide demand response and flexibility.

Focus should consistently be on customer and community needs, maximising benefits to customers including how to enable an energy system with the lowest delivered cost of energy for all customers - we must emphasise this means the cost that ends up on customers bills, should always be the focus.

Lowering centralised electricity system costs through unlocking customer flexibility is helpful, but we can no longer solely focus on affordability by measuring and reducing electricity system costs.

More options are now available for customers to meet their electricity needs like solar, batteries, smart EV chargers, and smart devices. These technologies in homes and businesses help reduce purchases of grid electricity supply and allow customers to take advantage of TOU prices and buy electricity from the grid when the cost is lower (eg: during off-peak periods or when there is excess supply, when the cost of supply is lowest). The focus should be on supporting all customers to reduce their delivered cost of the energy they use in their home. The lowest cost daytime electricity for many homes is rooftop solar, which means access to the lowest delivered energy costs for all customers should be a key criteria for assessing energy affordability and equity in the energy system.

Customers who are making the decisions about investing in consumer energy resources (smart devices, batteries and rooftop solar) and how the flexibility from this CER is utilised will consider the value they can access from their own investments to reduce energy costs, monetise their flexible resources, manage their reliability/resilience, and reduce emissions. These decisions can also help lower system costs for all customers. For example, customer batteries can help to offset growth in local network peak demand and increase network utilisation - lowering the cost for all consumers by reducing network upgrade costs.

We should not assume real time communication between third parties and CER is consistently needed for customers to maximise value from CER.

Providing demand flexibility services to the electricity system in response to signals (e.g.: monetising their flexible resources), may be a low priority for customers even if offerings are available that provide customers with the full value of the flexibility service. For example customers may benefit more from operating CER to maximise their own use of roof top solar and responding to annually set electricity prices, than offering third party control of their CER.

There is a significant role for direct customer pricing and export tariffs to facilitate flexibility and maximise benefits to customers.

As we note above, it is important not to jump to the conclusion that there must consistently be third party control of CER flexibility response for it to be of value,

without understanding the reality of how consumers will behave with other methods to automate CER operation.

Direct customer pricing (e.g. time of use (TOU) pricing and export tariffs) will play a key role to signal efficient investment and provision of customer shape-based flexibility (eg: 'demand response'). Customers will gain more benefits by being paid directly for their flexibility services (eg: through time of use prices or export tariffs) using automated smarts in their devices, business flex platforms (eg: Farmlands FLEX) or a home energy management system (HEMS) to respond. This could be as simple as using CER settings to schedule device operation in response to time of use retail tariffs. It could also be more sophisticated with some CER apps already including functionality, to respond to weather forecasts and dynamic tariffs (such as Sigenergy's AI mode).

This avoids third-party business models taking a significant cut of the value to the system from a customer's flexibility at minimal or perhaps negative value to customers. Currently this approach is part of a trial in Australian homes.¹ TOU prices and export tariffs can help to shape future demand, offsetting local network investment over the short and long term. While virtual power plants (VPPs), flexibility aggregators or retailers controlling customer devices can help to allocate customer flexibility to its highest value and can be important in some use cases (eg: providing short term localised responses), we need to scrutinise whether this is routinely needed to gain the majority of value from customer flexibility. If this focus is weighted in the wrong direction it is likely to lead to a more expensive energy system for consumers.

Over time this kind of shape-based flexibility will result in a predictable national demand profile that is lower cost to serve, allows greater utilisation of network infrastructure and significantly reduces system costs, whilst ensuring the value provided for flexibility goes direct to customers.

Customers can choose the retail tariff that best suits their needs: this could be simple and just provide day and night rates and a flat export tariff, or include stronger price signals that vary daily and seasonally and have a higher export tariff (payment for export) at peak times.

Below we have quoted directly from an Australian book recently published which briefly covers the topic of VPPs. For context it is a discussion between Dr Saul Griffith, an energy expert, with Dan Adams, the CEO of Amber, an Australian electricity retailer.

¹<https://arena.gov.au/projects/electrify-2515-brighte-research-testbed-of-community-electrification-at-scale/>

Page 181-182 - Plug In! The Electrification Handbook by Dr Saul Griffith
“When Dan worked at Tesla, he developed their virtual power plant (VPP). A VPP is a program whereby people sign up to have someone else manage their battery for a fee. Dan learned that customers don’t really want the VPP model. We are a little way into this experiment, and 86% of households with a home battery in Australia are opting out of VPP programs. Dan explains that the reason is simple, people want two things: to maximise the value of their battery and solar, and to stay in control of these assets. Unsurprisingly, people hate giving up control to their utility company.

Instead, customers want a model that will help them to unlock the full value of their batteries and EVs and give them control. This is what Amber has tried to provide, Dan explains. “Our whole model at Amber, and the reason we’ve done things the way we have, is so that an individual customer can get paid the same price as a big coal or gas generator when they’re exporting their battery into the grid, and they can buy power at the same price as big retail when there’s lots of cheap renewables flooding the grid,” says Dan. “We basically empower the individual household to be able to compete with the big end of town.”

Dan has about 38,000 customers so far. Most of them come to Amber, he explains, after buying a home battery system and talking to their tradie about it. Increasingly their tradie tells them they have three options:

One: they can just use their battery for self consumption.

Two: they could sign up to a VPP, which might pay them \$300-400 per year for the electricity they sell back to the grid, but they’ll lose control of their asset.

Three: they can sign up to a company like Amber, get direct access to the market, get paid the same price as a big coal or gas generator, unlock about \$1000 per year of additional value and stay in full control.”

One of the questions that comes up is whether technology like home batteries, smart devices or home and business energy management systems can be relied on by the customer to respond to price signals. The functionality required for these devices to respond to price signals and provide most of the value from customer flexibility, whilst minimising customer bills can be fairly simple. Large technology companies are well placed to ensure their products deliver the best outcomes for their customers.

Trials including those underway in New Zealand and Australia to demonstrate home energy monitoring systems (HEMS) capability and level of integration with

smart appliances, as well as the degree of control (self-managed vs aggregator or VPP controlled) are very important. We need to be exploring investing in testing self managed options to deliver customer flexibility alongside flexibility aggregator and VPP controlled options.

Understand the use cases for flexibility can inform functionality for end-use products

It is important to understand the use case of flexibility for both customers to reduce delivered energy bills and for the power system to lower system cost when identifying the functionality of end-use products.

As we note above, shaped-flexibility in response to retail price tariff and annually set export tariff can provide a lot of the value.

Whilst we think much of the value of customer flexibility can be gained via price signals that predictably shape demand and exports, there will likely be a role for VPPs/aggregators (or retailers) to facilitate the provision of the remainder of the value from customers flex and compete based on value provided through price and export tariff signals. To deliver this third party control devices would need to have the appropriate communication functionality.

When defining the use cases for flexibility it is important to determine the temporal and locational nature of the response needed - for example some of the uses for flexibility will need to be provided rapidly and needed at specific locations within the network. In these cases communication between external parties and the end-use product providing flexibility is needed, and two way communication for example including information about the end-use product (eg: battery state of charge), can be beneficial to maximise value from demand flexibility.

External parties such as flexibility aggregators or retailers could be important to co-ordinating fast response time flexibility that isn't signalled via retail prices or export tariffs set well ahead of time and allocating flexibility in critical situations. These parties can play a key role, under current market arrangements, to provide reserve services using customer flexibility. For example, Simply Energy already has significant amounts of flexible capacity contracted with businesses, that is purely used for the reserve market. Whilst reserves are used infrequently when they are needed they must be triggered fast and the communication network to do this is critical. Further work by the regulator to explore direct access to reserves for batteries including small batteries in homes and businesses would be beneficial.

Flexibility aggregators or retailers can see price signals in times of scarcity - spiking wholesale prices, and network congestion, so there is a role for override control through a third party during critical periods in the near term.

Decision making needs to be aware of the potential for technical change and avoid redundant technology lock in

Any functionality requirements for devices in homes should consider how technology is changing to avoid encouraging or requiring unnecessary functionality and potentially imposing additional cost on consumers.

For example, the UK policy was implemented in 2022, mandating smart EV chargers via the Electric Vehicles (Smart Charge Points) Regulations 2021. However the majority of all EVs sold into the UK market include onboard smart EV charging capability. Therefore, requiring a smart charger in addition to this is unnecessary. Retailers such as Octopus Energy in the UK offer managed EV charging tariffs² and for a large number of EV vehicle types, communication via the onboard smart EV charger in the vehicle. Communicating with an onboard smart EV charger to manage charging has the added benefit of providing more information about the battery state of charge (SOC) which helps the retailer better manage the charging without making assumptions about the battery SOC. Many smart EV chargers do not communicate with the car and cannot provide information about the battery SOC to third parties.

Future engagement

Rewiring Aotearoa would welcome the opportunity to participate in working groups on the key end-use products to develop voluntary demand flexibility requirements (covering communication protocol, product response, and operational information).

However before we get to this stage, as noted above **it is important to identify the use cases for customer flexibility including demand response³ and demand flexibility, with a focus on maximising benefits to customers through lower delivered energy for all consumers.** This will help inform the functionality that is needed from various consumer devices to benefit all customers.

² <https://octopus.energy/smart/intelligent-octopus-go/>

³ Including customers automating devices to operate to minimise bills based on TOU retail tariffs and peak export tariffs.