



Pricing and physical orchestration signals deep dive: notes for workshop 1

When 4 June 2026 0900-1200

Where Virtual

Who 46 people joined the workshop.

FlexForum Members: Anthill Technologies, ANU, Ara Ake, Bluecurrent, ClimateNavigator, Ecotricity, Electra, Evisi, Evnex, Flex-Able, Heatr, Intellihub, Ivory Egg, Mercury, Meridian, Nexbe, Powerco, PowerHub Group, RBP, Revolve Energy, Transpower, Vector, Wellington Electricity, and private individuals.

Observers: Commerce Commission, EECA, Electricity Authority, ERGANZ and Utilities Disputes.

These are workshop notes. Not minutes or a transcript. The purpose is to record the insights emerging from the workshop.

These notes cover:

- Welcome and reminders
- Context
- Workshop approach
- Workshop part 1 – customer propositions for the mass market
- Workshop part 2 – customer propositions for financially vulnerable and low-income customers

Welcome

The welcome outlined the workshop structure and purpose and reminded attendees of their obligations under the Commerce Act 1986.

Context

FlexForum is beginning a programme of work to identify the signals necessary for a smart, flexible power system. This workshop is the first in a series to take a deep dive into pricing and physical orchestration signals.



Objective

The purpose of the deep dive is to identify the pricing and physical orchestration mechanisms which are needed for Aotearoa New Zealand to achieve a smart, flexible power system to provide

- a broader and shared understanding of the issues, opportunities and practicalities, thereby reducing the incidence of people talking past each other or not talking at all.
- a plausible future state to guide and prioritise policy, regulatory, and learning-by-doing efforts and the enabling investments of the electricity supply chain and by people.

Scope

The pricing and physical mechanisms currently produced or needed from the wholesale market, transmission and distribution operators to practically activate flexibility, and the practical translation of these into flexible customer propositions

Approach

This first workshop considers what people experience – the customer proposition – and then subsequent workshops will consider the mechanisms which are or could be used across the supply chain:

- Wholesale price and physical signals
- Transmission price and physical signals
- Distribution price and physical signals
- Connectivity and messaging
- Signal design, price signal interaction, price and physical signal interaction.

A Member suggested the pathway loop back to the customer proposition and customer, with the customer encompassing households, businesses and communities.

Outputs

The deep dive sessions will result in:

- A FlexForum Insights setting out a plausible whole-of-system view of the suite of pricing and physical mechanisms which are needed for Aotearoa New Zealand to achieve a smart, flexible power system
- a catalogue of 'research' questions to be explored through learning-by-doing (or already being explored).
- potentially, guidance about immediate and subsequent actions required to develop the suite of mechanisms.

Workshop approach

Two members set the scene by talking about their experience developing flex customer propositions.

Workshop attendees were then divided into four groups and separated into breakout rooms with a group moderator. Each group discussed three of six areas:

- Target customers

- Flexible resources
- Coordination and control mechanisms
- Partners/delivery models
- Benefits (to customers)
- Benefits (to retailers/flex coordinators)

Each group captured its discussion on digital sticky notes on a digital whiteboard.

The groups then came back together and the group moderators summarised the discussion.

The material below is drawn from the scene setting, the sticky notes and the discussion. Text from the notes is included in the appendices.

Workshop part 1 – customer propositions for the mass market

Target customers

Prompt questions:

- Can everyone say yes to flex?
- How do location, dwelling type, income level, home ownership, equipment installed affect a customer's ability to provide flexibility?
- Which customer characteristics matter more?
- Which characteristics matter less?

The ideal customer for flex programme participation depends on the needs of flex users. Everyone can theoretically “say yes to flex”, but they may not have a lot to provide, and what they have is not always useful. It is more important to understand whether we can match the need for flex and the ability to provide it.

For a network seeking to avoid or delay capital investment in a congested part of the network, customer location is key – flexibility from customers in other parts of the network cannot address the issue. A programme that casts a wide net can sign up a larger quantity of flexible resources, but unless signals can result in a locational response, the wider geographic spread will dilute the usefulness of the response. Locational needs change over time. A congested area where the value of flexibility is high could have a new network asset commissioned, reducing or removing the congestion, with the result that flexibility is no longer needed.

For a retailer seeking to use flexibility to respond to wholesale spot prices, the ideal customer is one who has a lot of load at peak times, and the ability to adjust this use. The effort required to engage a customer is roughly the same, regardless of how much flexibility they provide. One industrial customer could shift the same quantity of energy as 30,000 residential customers. At the residential level, this means:

- Large households, who have a higher total usage
- Affluent households, who can afford the up-front capital cost of installing flexible equipment
- Households with modern, smart, manageable appliances

- Owner occupied households, who have the security of tenure needed to be confident of getting long term benefits from their equipment.

Barriers to engaging the ideal customers:

- The changing nature of flexibility needs means the ideal customer group can change over time
- The uncertain duration of the flex need makes it difficult to balance costs and benefits
- Participation is maximised in broad programmes, but value comes from targeted response
- Billing arrangements for high-density and shared housing may require all residents to opt in, making it harder to engage potentially useful sites.
- New Zealand's housing shortage means that vendors and landlords don't need to differentiate (for example by offering solar, storage, or smart appliances) to attract buyers or renters.
- Industrial and commercial businesses vary greatly, and each is slightly different. This makes developing a proposition that works for a large number of customers difficult. Programmes may need to be targeted to specific types of business, reducing the scale available.

Partners delivery/model

Prompt questions:

- Who are the key participants required for a successful flex-y proposition?
- What other partners are required?
- What are their roles and responsibilities?
- What are the barriers to involvement for each party?

Workshop participants identified six key categories of participant that could be involved in a customer proposition:

- Customers/flex suppliers (required): These are the ones who have potential to adjust usage to help the power system. Their equipment or behaviour can respond to system needs if they get some sort of signal and have incentive to respond.
- Flexibility users (required): These are the parties who benefit from using flexibility. They can save money, make money, or achieve some other benefit if they can access flexibility. This includes retailers, distributors, the system operator, and the transmission grid owner.
- Flexibility platform provider/aggregator/intermediary: Flexibility users do not always provide good information about the value of temporal and locational flexibility response. Similarly, if flex users don't know what resources are available, in both short and long term, it is harder to plan for their use. At the same time, most customers do not want to micromanage their activity, and need someone to guide them on options, translate the needs of the flexibility users, and potentially manage their flexibility resources on their behalf. A third party could help bridge this gap, matching flexibility suppliers and users, and providing services to each.
- Retailers: Retailers are extremely well placed to capture the value of flexibility. They provide energy and associated services to customers, purchase electricity from the spot market or on contract, and pay lines companies for connection, distribution and transmission services. Pricing signals all flow through the retailer. They mediate between what the industry sees and what the customer sees.

- **Equipment manufacturers:** Equipment manufacturers influence customer propositions by restricting or enabling what can be done with their equipment. If an appliance isn't designed to allow flexibility, it will be more difficult to get flexibility from it. This is wider than just technical considerations. For example, electric vehicle manufacturer warranties will affect whether and how EVs can be used as mobile batteries. Their decisions will be driven by what affects vehicle sales rather than whether V2G is good for the grid or not.
- **Community groups:** many customers lack trust in the electricity sector, and participants in it, but they do trust their friends, neighbours, and community groups. Flexibility programmes delivered by, with, or through non-electricity organisations have potential to overcome this challenge. These groups can help customers understand their options, without feeling like they have a predetermined outcome. For example:

When people can talk to their neighbours and colleagues about real-life everyday experience of flex, awareness rises, they are more comfortable making decisions, and participation increases. This has been the case in In Queenstown and Central Otago.

Kainga Ora's Share the Sunshine programme allowed Using community housing or denser developments to create a neighbourhood effect is an opportunity

Barriers identified through the breakout discussions:

- **Energy literacy.** If customers don't understand how they use their energy, what their appliances are capable of, or what the electricity sector values and is prepared to pay for, they will not provide flex.
- **Readily available signals.** If flexibility users are unable (or unwilling) to put a price on the value that flex provides to them at a particular time and a particular location, then it will be impossible to engage customers. For example, there is no commonly accepted method to value the potential flexibility that could be provided by an embedded battery at a particular location. Flex uptake will not accelerate unless key flex signals, payments, and charges are visible to customers. Customers can then choose to respond as they see fit, be it manually, through their own home automation systems, or through direct control by an aggregator or retailer.
- **Enduring value.** If a service is only needed for a short time (such as one or two years), it is harder to build a customer proposition to deliver it, as the time and cost involved in doing so cannot be spread over a long period, increasing the likelihood that it is cost prohibitive.

Flexible resources

Prompt questions:

- Does the type of flex resources a customer has matter?
- Does the capability of the flex resources a customer has matter?
- Are there technological limitations that make it hard to access the flexibility provided by some or all resources?

As long as customers can respond to signals, the type of resources that a customer has does not matter to flex users, only their capability. Nevertheless, some resources have greater capability than

others. Some resources may be capable of faster response; others may be available for longer periods.

Resources that are well suited to providing flexibility are those with high total demand, high peak demand, predictable usage patterns, and for which customers are unlikely to notice shifts in usage. Today, resources with widespread uptake that meet these characteristics are:

- Water heating, where the electricity usage is spread over time, and can be at different times than the water usage. Flexibility from water heating has been used in New Zealand for decades.
- Space heating or cooling, where energy can be used to heat or cool a space before it is needed, or temporarily turned off. Flexibility is already being sourced from coolstores in New Zealand, but flexibility from heat pumps is uncommon, despite their widespread adoption, including being present in upwards of 90% of new builds.

In some parts of the country, pool pumps also meet the criteria. For these resources, a short (approx. one hour), infrequent (a few times per year) break in supply does not significantly affect customer experience.

In future, other resources will grow in penetration, so that this category will also include;

- Batteries, for which the upfront cost is large, but the only pain point, and the timing of energy use can be adjusted without changing day-to-day operations at all.
- Electric vehicles. A parked EV contains more storage than most household batteries.

Barriers:

- Drafty houses. Much of New Zealand's housing stock does not hold heat well, so there is limited "storage duration" available to shift energy from heating or cooling.
- Warranties. Many electric vehicle manufacturers do not warrant the battery for vehicle to grid operations, even if the control software allows it.
- Technical setup. Making the customer responsible for any setup activity, increases the friction of getting them into and keeping them in a programme.

Coordination and control mechanisms

Prompt questions:

- What coordination and control mechanisms can be used to deliver flex propositions?
- What circumstances are best suited to different messaging approaches?
- What barriers exist to implementing and using potential mechanisms?

There are two broad approaches to coordination and control of flex resources:

- Customer activation: In this model, the customer controls the behaviour of his or her flexible resources. It does not require special equipment or communications infrastructure, so it is low cost, and potentially large in scope. However, it requires high effort to deliver a useful response, and the value delivered is low as response is less certain. This model works for simple, large-scale easy to schedule goals like "move energy use away from peak times", and can be implemented using broad brush approaches like generic time of use pricing, or energy conservation campaigns.

The signal is provided well ahead of time, and the response is blunter, without the ability to quickly and clearly provide a guaranteed response to short notice time- and location-specific value signals.

- Retailer/flex trader activation: In this model, someone other than the customer controls the customer's flexible resources, either by direct control, or by autonomous response to published price signals. It requires more equipment, dedicated communications channels, and more sophisticated automation. This model is high cost (due to the extra equipment and effort involved) and limited in scope (because fewer people are able and willing to participate), but getting a useful response from participating sites is low effort (because of the automation), and high value (because the response is reliable, quantifiable, and specific to time and location).

Under either model, the incentive for the customer should be simple, and the programme should be designed so that the customer can't lose – i.e. the value they currently get from their equipment is not diminished. Their water is always hot, their produce remains fresh, their electric vehicle always has enough charge for their next day's driving. As a sector, we tend to think about appliance function rather than the outcomes they provide. We need to make sure that customers can achieve satisfactory outcomes, which will always involve allowing some degree of opt out. Today's technology can do this.

The coordination mechanism may be decided by the flex devices to be used. If a device can only be accessed or controlled with human intervention – for example reducing throughput on an industrial process, or delaying operation of a clothes dryer – it can only provide value if the customer is prepared to be responsible for that intervention.

Barriers:

- Understanding device capability. Not all installations are suitable for retailer activation. For example, customers may find that a lack of WIFI coverage at the battery location means its choice of battery aggregation programmes is limited.
- Emerging complexity. Coordination is straightforward when there is one user and one service being provided. Complexity emerges when attempting to stack value (provide services to multiple flex users from the same set of assets) or to orchestrate across multiple providers. Evolution of flex coordination will require standardisation and a reduction in the number of contractual relationships.
- Incentives are more important than technology. If incentives for participation are well designed, the specific messaging approaches should not matter. Messaging and control approaches can be pop up organically to meet incentives
- Human psychology. The same financial incentive can produce different results with different framing. For example, time of use pricing with higher prices in peak period could be presented as flat rate pricing with cashback rewards for reaching set proportions of energy consumed in off peak periods. If the incentive is poorly framed, uptake will be affected.

Benefits to customers

Prompt questions:

- Why would a customer sign up to provide flex?

- What are the potential financial benefits for the customer?
- What are the potential non-financial benefits for the customer?
- Is the benefit pool big enough to allow a large enough customer share to justify their participation?

Customers don't want flex in and of itself. Their appliances exist to do a job, and the compensation required to do that appliance differently, or to allow someone else to control how the appliance does its job requires benefits greater than the potential hassle. Customers don't say "yes to flex". They don't care about flex, but they might decide to say "yes to savings".

Financial benefits are the main mechanism used to engage customers. These can come in multiple forms. Lower energy prices, annual payment, event payments, prize schemes, etc. There is no consensus on the best approach yet. But the potential value from an individual customer is currently small. If a flex user can build an always-available, fully controllable grid-scale battery for \$200 to \$250/kW/year, it doesn't make sense to pay more than \$80-\$100 per year for the flexibility in an individual residential hot water cylinder. After the costs of establishing and running a programme, the benefits pool in which customers providing flex from their water heating – the largest demand from a single appliance in most homes – is less than \$1 per customer per day.

FlexForum member experience is that in New Zealand to date, the justification for installing solar, batteries and other flex-capable equipment is seldom solely a financial one. Many customers cite environmental concerns ("I want to reduce my carbon footprint"), resilience concerns ("I want to have power when there's a network outage") or a desire not to contribute to electricity sector profits ("I'd rather pay the bank than the power company"). As technology costs continue to fall, the proportion of customers installing flex-capable equipment for financial reasons will increase, but at present, the pool of potential providers may not be driven by financial benefits.

Some customers make decisions not based on numerical calculations but based on social cues "my neighbour said he'd saved heaps". If their neighbours and peers are participating in flex programmes, they will be more likely to do so, regardless of the other perceived benefits.

Barriers:

- Bill complexity. The more targeted the incentive structure, the more complexity customers need to see to understand the value they get from participation. Flexibility has different values at different times of day, and while putting all the detail on every bill may be overkill, the data must be accessible in some way.
- Principal/agent problem. The person who decides to make a site flex-capable is not always the person who will get the ongoing benefit of that capability. For example, when planning a new medium density housing project, the developer may consider district heating, shared EV charging infrastructure, or a community battery. They will sell the units to others who will actually use those assets. While the developer can model the benefits, they may be skeptical that this significant upfront investment will result in higher sale prices, reflecting the value to the ultimate owners
- Industry software. Many current customer billing systems were designed and built before consumer participation was contemplated. Incorporating new approaches to customer pricing is difficult and time consuming.

- Perceived fairness. Programmes and incentives will face resistance if they are not seen as “fair”. Strong price signals may reflect actual value to the system, but could be seen as favouring some customers over others who are just as worthy.
- Trust. Customers need to have confidence that what they are choosing to participate in will truly benefit them. If they do not trust those who offer programmes, they will not sign up.

Benefits to retailers/flex coordinators

Prompt questions:

- Why would a retailer or flex coordinator want to offer a flex proposition to customers?
- What are the potential financial benefits?
- What are the potential non-financial benefits?
- Is the benefit pool big enough to justify designing and offering a proposition?
- How can customer ‘responses’ to these propositions be accounted for as part of investment and operational decisions?

Flex programmes have costs. Just as customers invest in flex resources, retailers and flex coordinators have to invest in software, sales, service, and equipment. For a programme to be worthwhile, the benefits must outweigh these costs in the long run.

Flexibility is not an end in itself. It's an enabler for something broader: reducing the total cost of energy, which is an essential service for all of New Zealand. We as a sector have an obligation to get it right as best we can. Economic benefits can then flow to multiple other aspects of our nation – increasing wellbeing, increasing productivity, and increasing GDP.

For retailers and flex coordinators, the value of flexibility is largely derived from avoiding building a new generation, transmission, or distribution asset. If we build the same assets with or without a flexibility programme, then the programme has not saved us (as a nation) any money – it has just moved it around.

As for consumers, while financial benefits are important, retailers see non-financial benefits as important too. Even if all the financial benefit goes to the customer, the retailer benefits by offering (ahead of its competitors) better value for customers, more innovative services, and a bigger bundle of services, all of which contribute to winning a larger market share.

Barriers:

- Confidence of flex users in paying for flex. Using flex as an alternative to network investment requires network planners to be able to rely on the response. Without real-world data to show that a flex service will be effective, planners willingness to pay will reflect their uncertainty, particularly if the service uses customer activation rather than centralised control.
- Participation by networks. Requiring a benefit at the scale of avoided investment in new generation is a high bar to clear, and will remain so as costs continue to reduce at both grid and distributed scale. Without participation from networks, where the value of avoided investment can be higher (60% of the asset base is at transformer and low voltage level), the total benefit pool may not be sufficient to support flex at scale.

Workshop part 2 – consumer propositions for financially vulnerable customers

Workshop participants explored the same proposition characteristics to identify barriers and opportunities for flex programmes for these customers in New Zealand.

Members were concerned that the characteristics and needs of this customer group should not be assumed based on stereotypes, and noted that research would be required to assess the best way forward.

Barriers:

- Low-income customers have less ability to fund the upfront costs of flex capable equipment, and less ability to deal with repair and maintenance costs, whether expected or not.
- Most customers in this group do not own their homes, so the person making capital investments in the home is different from the one who would see the ongoing benefits.
- If assets are owned by a third party (i.e. not the property owner and not the householder), the asset owner will likely need a long-term contract in place, resulting in potential complications if the house is sold or re-tenanted
- Like the population at large, customers need to have confidence that what they are being offered will actually benefit them. If they do not trust companies offering programmes, they will not participate. Engaging via existing trusted community groups is likely to be more fruitful than engaging directly.

Opportunities:

- Hot water is the most universal low-income flexibility resource, and it is present in every home. Programmes targeting hot water may still require investment in equipment, but smaller, cheaper technology options can enable participation with significantly less up-front cost than solar or storage.
- Retirees are a significant subset of the customer group, are more likely to own their home, and be able to weigh up asset value with ongoing benefits.
- Social and community housing organisations already provide services to large aggregations of low-income customers, and are an obvious partner for programme design and rollout, and potentially also to fund assets.
- Customer activation programmes work best with those who are motivated and able to reduce costs.
- If the ratepayer assistance scheme¹ goes ahead, low-income homeowners, landlords, and developers will have access to a funding mechanism that is explicitly intended to fund (among other things) household electricity assets like rooftop solar.

¹ <https://www.lgnz.co.nz/policy-advocacy/ratepayer-assistance-scheme/>

- Many lines companies are owned by community trusts, which could potentially reinvest earnings into capital investment in local distributed assets.
- The Winter Energy payment is an existing support mechanism paid to around 20% of households, at a cost of \$500-600 million each year. While a similar level of investment in flex resources would not reach as many households initially, it would have more enduring impact, and could provide bigger benefits over time.

Appendix: Sticky notes – part 1

Target customers

- What is it for and why is it for - impacts on which customers we can get it for. Location is key. May be industrial, or may be residential. Need varies spatially and temporally.
- Does location of where you need it shift over time? Will constrained areas for network change over time? Yes. Progressive growth. When invest in physical assets, flex is no longer valuable.
- Barrier: targeting customers based on changing needs.
- General programmes dilute the value in specific areas. How can we offer something that gives engagement, but also provides and gives value to both parties.
- For spot response, comes down to load at peak times. Customers who use more hot water at peak times. For same effort, shift more kWhs. One industrial customer could be worth 30k residential customers.
- e.g. Simply have targeted cool stores - know that the response for 30 minutes doesn't affect customer experience too much, and seldom.
- 95-100% heat pumps in new builds.
- Now: Hot water, space heating. Emerging: EVs, batteries. Other: pools. Larger households. People with a lot of load.
- High upfront investment cost
- We're chasing demand. Big industrials. Houses with more smart manageable appliances. Today tends to be large affluent households.
- EVs seem to be at the right place at the right time generally. Yes, it's a game changer but has barriers. EV to grid still at early stage. Requires expensive equipment (cost barrier) only two manufacturers will continue the battery warranty if used for discharge.
- EV warranty when discharging (contractual barrier)
- 95% of consumers don't care. Has to be simple, has to be \$ benefit. We have to do it for the customer – we do all the work, you get a benefit that you don't have to think about.
- What's the \$ value that would move a customer to join a flex programme?
- How to target low income customers
- Higher income -> more likely to have flexible appliances (batteries, EVs)
- Can everyone say yes? It is difficult to say yes to flex when there is not yet wide understanding of what it is. Without that, there are big trust challenges
- Yes, everyone can say yes but value isn't well captured
- Customers being engaged with the energy sector will be the characteristic that probably matters most at this stage.
- Dwelling type shouldn't intrinsically impact ability to provide flex - with the exception of appliance availability i.e. solar, batteries
- No discussion between adoption of customer 'lifestyle preferences' versus automation
- Customer understanding is critical to accessing the benefits
- EDBs and retailers unwilling to offer a price for the 'value'
- No options for me to join flex from my retailer or the EDB

- Everyone can say yes but not all the time. ability is influenced by free cashflow (for required investment) flexibility in lifestyle (e.g. shift worker vs 9-5). Agree understanding and trust are important
- being a renter is a big barrier to adopting flex - especially with insecurity of tenure being a feature of our private rental market. This is particularly true for kit like solar. DLC fares better
- Everyone can probably say yes to flex. However, flex is not always needed, so perhaps its more important to understand if the need for and ability to offer flex can be matched.
- Clearly, customers with more devices than can provide flex will have more ability to make use of flex markets. So there will be a demographic influence on the ability to offer flex.
- Depending on the billing arrangements, some high density housing or shared housing may find it hard to individually opt in to flex without the rest of their residents
- Customer characteristics: the neighbourhood effect has been a big positive for adoption of flex in Queenstown and Central Otago. Using community housing or denser developments to create a neighbourhood effect is an opportunity
- To the network, the type and capability of flex resource a customer has should not matter. Flex signals and financial incentives need to be simple enough to ensure this is the case.
- Physically fitting appliances within smaller houses

Partners delivery/model

- Retailer - feels all the signals.
- Customer - has the assets that can flex.
- Someone to provide really good value signals for temporal and locational response.
- How to build a product for a short lifetime. e.g. if service needed for a year, harder to build a programme around.
- Do flex buyers see a centralised flex market as a useful tool to provide longer term signals of what's available and what's needed?
- From network point of view, looking for shift/avoidance at peak. Hard to create something everyone can play with, while that wide participation reduces the value.
- Currently no method to value the potential of a battery/appliance at a particular location.
- Vehicle manufacturers set rules for using vehicle as mobile battery. They will be motivated by impact on vehicle sales.
- OEMs. If appliance isn't designed to do it, it won't happen. NZ is a follower.
- Local place based models instead of individualised
- Currently retailer has the simplest path to offer flex - EDB potentially has the most to gain

Flexible resources

- Less invasive the better, for example heat pumps, temperature often a personal preference, not a good path to customer trust
- Static batteries, hot water, EV less intrusive, customers don't notice
- Some resources are better than others - high peak / volume. Example: hot water if off for one hour no one notices.
- Hot water low hanging fruit, consumers won't notice, measure how much storage, typical use patterns, cheaper than a battery

- Investing in a battery, customers more engaged, wholesale arbitrage opportunity not really there for residential
- Select resources: operations more or less not affected
- Energy literacy - lack of understanding, even if providing price signals and technology
- Customers can choose what level of charge/min for your EV - most commutes are short
- Lack of trust, does this make it easier for new players to offer services? Such as Amber in Australia that has been quite popular
- Aussie example profit share 50/50 and customers left the VPP. Customers want to capture as much value as possible having invested in the asset
- Barrier: customers don't realise batteries need WIFI connection to be coordinated in some programmes
- Yes. Discretionary and non-discretionary loads. Batteries vs stove
- EVs move and may or may not be parked at home – HWC or home batteries are always there
- Yes. Size of load. Turning up/down a heat pump offers up a small power saving vs a HWC with high storage and high loads
- We have found that hot water is a higher load than EV (4 person home survey 1 of 1)
- high proportion of homes have HWC (existing assets) - including renters/low income homes - they will not have batteries or EVs for a while yet
- Retailers get no value from operating customers batteries for them, NZ Inc make it net neutral. Greater than 40MW might have more value
- a big barrier for mass market propositions is the sector is still asking customers to do stuff without having built full trust in the propositions first. It is tech led, not people led.
- the proposition is still not 'proven' - it works for some in specific circumstances but there is distrust that the benefits will remain when it goes to scale
- Appliances must be smart
- If retailers want trust they need to stop announcing record profits the week before raising prices.
- When someone shares "I made \$500 in one night" it makes people think that is the norm, when in reality the value comes from years of small savings / earnings
- understanding the technology and the reliability of the technology to provide a payback are a big limitation
- Flex value can be very different in different locations so some may not be able to access enough benefit to be worthwhile
- Answering yes is contingent on the extent to which flex can be accommodated by the customer's routine.
- Some resources are more amenable to providing flex value without negative effects on energy use (e.g. hot water, EV charging can largely be flexed but not your oven / stovetop!)
- The only mass market option is HW - not well served at present
- Everyone is still 'pilot' minded - no-one leading the mass market discussion
- Characteristics that matter less are the flex provider - it is how the customer facing aspect works that is more key for mass market. However, as noted, there are retailer trust concerns
- Yes capability of flex resources matters. It has to make it easy for customers and leverage tech in their everyday lives.
- How have previous flex options delivered value for low-income over the past 25 years?

- If value is only provided to directly managed hardware then it becomes harder for everyone to participate. I think we need to see value offered even if the customer manages to self-flex
- No common signalling or protocol agreement
- From a network perspective, location is important. There is little benefit from flex in areas where there is no network constraint. (This is different the further up the supply chain you move.
- certain technologies are more proven - payback and ease of use are more certain
- Applying flex for network planning requires quite a shift in thinking, particularly if relying on customer incentives (rather than hard control signals). The types of flex devices available can complicate this more - what level of reliance can typically be placed on flex offerings?
- Some potential flex devices can only be accessed manually, so will only be useful if customers are prepared to take action themselves.
- Certain appliances have a long life so won't require replacement to a flex equivalent for a long time
- Different types of devices would influence the type of flex offering. Some devices may be more capable of immediate response; others may be available for short periods only.

Coordination and control mechanisms

- Energy literacy -- lack of understanding, even if providing price signals and technology
- Coordination is technically straightforward, complexity emerges when stacking value, or working with multiple providers
- Make it normal for customers
- Communication protocols - enable control of flex devices
- Tech exists to make it normal and minimise downsides for customers when you use their devices
- Customer messaging: make it as simple as possible for 90% of consumers
- Addressing the split incentives problem
- Co-ordination and control should be democratised and decentralised. Key flex signals and charges should be provided by the system, and customers can respond to them as they see fit (manually, through their own home automation systems, or through an aggregator or retailer).
- Main barriers to implementing mechanisms? Incentives aren't working. It would be much more effective and simple to charge extra for demand during congestion/peak periods than it is to try to measure and reward 'lack of demand'.
- What circumstances are best suited to different messaging approaches? Messaging approaches shouldn't matter if we get the incentives right. Messaging and control approaches should pop up organically to meet incentives.

Benefits to customers

- Benefits - There is a drive for environmental considerations (customer and companies)
- Cost/benefit analysis - Small gains on a residential scale, maybe larger for C&I or combined (so easier to see benefit for industry than an individual consumer). Need to 'sell' non-financial benefits

- Benefits non-financial - because it feels good to help the system/community with keeping electricity affordable
- Energy literacy and trust in companies are barriers
- Because I want to share with my family member/friend/community member who is struggling with bills - barrier is that sharing is not fully possible at present - exception models like Toast
- for mass market - fear that you'll create negative impacts on those who don't want to flex
- Bring down their total system costs i.e. knowing what your ROI is at the outset of purchase. Barrier is that this is hard to see/judge upfront
- because my neighbour/relative did and they made heaps of money. barrier is that it's currently hard to judge if my electricity situation is comparable to my neighbour
- Transparency barrier - what level of complication can we deal with on bills. Should the info be on the bill or in the data in the background on request when switching
- We want this to be seamless for a consumer and yet there needs to be an awareness that electricity has a different value at different times of day if we want a fully optimised system. The premise of the above was the idea of a consumer saying "yes to flex" if they're just saying "yes to savings" then this point doesn't matter
- Barrier is the split incentive where a property/project developer of new build medium density, doesn't see the benefit to them of delivering a flexibility asset to their buyer (and the eventual consumers). Think central HP HW, or shared EV charging infrastructure. Benefits can be modelled but generally there is more upfront cost that most developers are sceptical of delivering them a return.
- old billing systems within industry not built to create new pricing features (trying to squeeze a square peg into a round hole)
- Literacy - Solutions need to be seen as 'fair' - Sometimes technical fairness is different to public fairness - EG strong price signals might be seen as not fair by consumers, but winter energy payment may be seen as fair by the public, but not by the industry. Need to be able to 'market' solutions, which is hard when trust is so low.
- I like the idea about knowing how you have helped. e.g. the example around saving 2 polar bears. calling out the behaviour customers are doing/changing/flexing and the tangible impact its having. (likely not saving 2 polar bears but helping x families over winter etc)
- people don't understand what Flex means (it's a nebulous concept) even within / across the industry
- different people have different motivations (\$, prestige, environmentalism comfort, community) Tracking all of those things is hard
- Lack of visibility of environmental benefits to participating in Flex. Solution - research to establish, then promotion of the results
- if there's not a significant individual benefit, lowering the difficulty to enable flex is necessary (why do I trust you that there's a system benefit)
- Is there an opportunity to use a similar model to tax credits with donations in a similar vein with gifting electricity. A tax benefit to the giver, and a donation to the householder. Benefits all
- there have been programmes elsewhere (and I think in NZ as a trial with Ara Ake) where people could donate their excess solar credits to those in need rather than getting the bill credit

Benefits to retailers/flex coordinators

- cost / challenge of integration with systems (hard enough to set up WIFI at home let alone configuring or automating devices)
- commercial buildings / businesses are sort of like snowflakes everyone is slightly different - within business types you might be able to develop a consistent offering
- batteries are a game changer for electricity system - the upfront cost is pretty much the only pain point, the ability to flex the timing of energy use causes no ongoing pain to the site and mostly doesn't change day-to-day operations
- prevalence of renters in NZ / if you don't own your home you don't have the ability to make big changes and shortage of housing means differentiation is not needed to get buyers/renters
- in order to shift energy use, you sort of need to 'store' heat/cool effectively and NZ homes and businesses are drafty
- Lack of flex plans means no motivation to reveal or recruit flex. Lack of visible flex means no motivation to offer flex plans. Possible solution is providing funding to get past this barrier.
- hard to show people that what they did had a meaningful impact after the fact
- If a Genter needs to see a benefit at the scale of avoided investment in new generation - this is a high bar. Are there other potential actors who can step in and get better value for flex on a smaller scale if given market access?

Appendix: sticky notes part 2

Target customer groups

- Targeting financially vulnerable customers
- 60% of reserve asset base is at transformer and low voltage level. More assets and higher impact in terms of cost.
- Community Housing providers could install flex capable appliances
- Target streets not suburbs, but bigger change in cost at zone substation. Or new line.
- If a proposition allows people to change their outcomes. Are we creating a new outcome for a specific group. Difficult to separate an energy proposition from the outcome.
- 36% of households in this category, so it's a big group.
- Future value is the avoidance of additional investment. Cost of generating power is going down. Less relevant in the long term. Should be focused on infrastructure.
- Renter vs landlord. Structure should allow it to propagate through.
- Identifying the barriers for these customer groups. Pilot level activity to share findings.
- Social housing space is already doing work in NZ.
- Older fixed income group. Asset rich but cash poor. Have capital access.
- Winter energy payment is blunt, and could be used more smartly.
- What makes them unique as a group. Not own home, so equipment can't install. Access to capital.
- More motivated to take action - propositions that speak to customer-led activity.
- a reliable way to identify those in Energy hardship / Financial Hardship seems to be a barrier
- more distrusting
- no time to think about it
- atypical working hours
- often renters and not owners of housing
- not able to borrow money at reasonable rates to pay off with savings

Partners/delivery model

- Limitation on ability to flex, customers have different starting points
- Set and forget, bigger loads offer more opportunity
- Regardless of delivery model - trust is low for this cohort
- Costs more to deliver on an individual basis than cohorts
- Hierarchy of what provides greatest flex, not everyone has that, hot water might be most universal opportunity
- Amber model popular but for more affluent customers
- Requiring consumers to become experts
- Winter energy payment ~\$500m as part of that perhaps some flex participation is required
- Community coordination challenges
- Ratepayers Assistance Scheme is an interesting model to open up rented properties.
- Even installers may lack understanding
- Community specific solutions - coordinated by someone they already trust rather than bringing in an unknown utility provider

- Social and community housing provider investing in DG and BESS to provide value to their tenants.
- MTR to support shared assets on community and social housing roofs, with benefits distributed across all tenants. (Kainga Ora / OCHT as examples)
- Microgrids between marae and Papakainga housing
- Local optimisation within C&I clusters, housing developments, townships, etc. Needs pricing for lateral flows (reflecting value) and local orchestration and market facilitation - governed by and for local consumers. (Inc. opt out mechanism).
- Try to set up the system so that we're not 'picking winners' with regards to coordination/control and partners/delivery. The perfect solution would allow all the value of flex to be captured by customers that carry out/respond to signals themselves. The only need for middle-person would be to set up/maintain controls for customers that don't want to do it themselves.

Flexible resources

- Hierarchy of devices.
 - hot water
 - Batteries
 - EVs
 - Washing machines non issue.
 - Heat pumps. Personal preference for temperature - opt for devices that are invisible to customers.
- At this stage of trust building journey, want to let them live a normal life, flex runs in background. Can get around drawbacks - set a minimum of 50% charged e.g.
- looking for bigger loads. Wealthier customers.
- customers have different starting points, there are myths about what low-income interested are or are not interested in.
- Is this segment willing to go to greater effort. Can we target non-communicating appliances and customer control?

Asset owners

- People may say they want the assets, but with that comes paying when things break. However, long-term contracts for companies to recoup costs also cause significant problems. Govt assistance through Kianga Ora is good.
- High up-front costs make flex products inaccessible to financially vulnerable, or even the 'squeezed middle'.
- shared housing / Kainga ora housing would be able to invest
- Solar for renters - rewiring's approach = renter gets benefit of solar then some goes back to paying landlord finance. Octopus scheme (i think this requires the renter and landlord to be same retailer)
- Other ideas I've heard - EDB buys and puts on RAB and EDB as collection agent for a 3rd party financier (i.e. recovered via a line item addition to lines charge - but outside regulated service)
- non-profit entities that could offer ability to "finance" by offering donations as a tax benefit for wealthy

- offer microloan-like programme (e.g. a revolving fund that is replenished as people pay back the loans before realising the savings)
- ComCom has said they don't view singling out electricity lines services to those in energy hardship as being something they wanted to see proven with INTSA (Not sure where else an EDB would find money to try something new)
- Pila (a startup) style batteries are an interesting recent development alongside appliances with built in batteries (less of a fan of these)
- Batteries provide a buffer for delivery of electricity and have different types of benefits all along the system from transmission to appliance levels
- Shared EV/mobility programme?
- have heard about programmes where single installer/mfr chosen, and do a mass install down a street which brings down costs because minimise labour costs lost due to experience & less travel time
- Benefits to retailers - Embracing their social responsibility that comes with being a energy provider. There are a lot of initiatives and this continues that path.
- <https://www.blocpower.io/> has an interesting approach
- We focus on solar/batteries. But smaller, cheaper options should also be considered (e.g. timed switches). Also home improvements, e.g. insulation. While home improvements may not be 'flex' it's important to understand everything interconnected. The outcomes of moving peak usage and just using less power both have desired effects.
- potentially health or other issues that prevent 'common' flex types
- EDB well placed to offer zero/low interest loans (but lots of q's about being exposed to financial regs)
- what about the community Trusts?
- Community battery - requires rules to change to enable energy sharing and LUOS charges - if the community is to get the full benefit
- Are there classifications of commercial entities that serve financially vulnerable people?

Coordination and control mechanisms

- Low-income households are less likely to have smart appliances and EVs. Co-ordination and control 'mechanisms' (signals) need to be free and easy to access - including through simple text alerts to support manual response
- Coordination and control by whom? Retailer, EDB? Could be different
- Don't stereotype low-income with life complexity
- Simple, well-constructed price signals (TOU + occasional network congestion/wholesale price spike charges?) plus some education pieces by the retailer should be the primary coordination and control mechanism. We should stay technology-agnostic.
- A centralised independent aggregation platform, accessible for control signalling by EDBs and retailers might be a good idea. (Otherwise we'll end up with 20-30 alternatives)
- providing access to appliances that may be controlled by another rather than requiring the occupant to monitor signals
- Communal assets that are accessible through subscription schemes?
- Perhaps start with a simple in-home device that could indicate low or high energy price times. (Assuming a simple time-of-use tariff scheme is available.

- Cheaper, plug-in systems
- Capacity Band pricing mechanisms - per Laura Sandys concept from years ago, which was the basis / inspiration for Orion's Resi-Flex commercial mechanism.
- Flexible resources: Don't focus on individual appliance types - focus on incentives/pricing and let the resources show up to meet these
- Joint asset ownership with apartment dwellers??

Benefits to customers

- Cannot access benefits due to trust barrier / literacy
- Benefit: consumers do buy in to sharing benefits locally (e.g. Kainga Ora 'share the sun' MTR programme)
- Do customers benefit (for free) from other customers providing flexibility? Therefore providers of flexibility are not able to be rewarded for providing a service.
- This cohort is not interested in flex benefits unless super easy, normalised but still may not be keen even when it is FREE (trust issues again)
- Missing out on benefits
- MYTH: Spend higher % on energy, would they be more open to flex? Because prices is a driver. Busy families, don't have lifestyle "flex" to opt in, so must be set and forget, live their lives, bill predictability, and spread the costs
- Greater options or more bespoke, suite of options
- What is the community approach/ delivery model that can help aggregate benefits - should this be EDB led?
- Value stack can be quite high. retail arbitrage, EDB de congestion, Transformer monitoring added up could offer high money payments to home owners. I don't know how to capture it yet though
- Enable local agents to intermediate on behalf of consumers!