Rewiring Aotearoa

Submission: Working together to ensure our electricity system meets future electricity needs: Green paper.

Rewiring Aotearoa is a non-partisan organisation with charitable status that has shown electrification has major economic and environmental benefits. Our mission is to rapidly reduce New Zealand's emissions, improve affordability, and increase our resilience by electrifying the millions of small fossil fuel machines in our homes, communities, small businesses and on our farms.

Key messages

Rewiring Aotearoa is extremely supportive of the focus the Electricity Authority is putting into exploring opportunities and seeking views on a more 'decentralised' electricity system. It's great to see the release of the Green Paper seeking views from New Zealanders on the role they can play in the future electricity system and how a more decentralised electricity system should evolve. As the Green Paper explains New Zealanders will benefit from a more decentralised, community-centric energy system through lower energy bills, greater energy resilience, fuel security and lower emissions.

However there are some assumptions and emphasis in the Green Paper that we think needs to change. This includes three key areas:

1. 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, that should always be the focus. Lowering centralised electricity system costs through unlocking customer flexibility is helpful, but is not the primary focus. The Authority should have the modelling and clear internal understanding of the impacts of their decisions on customer bills, and the ramifications on customer bills of how the energy system is built out over the following decades. We can say with clear confidence, the Authority does not have this capability today. Decisions made without this crucial context are likely to lead to a more expensive energy system.

2. Direct customer pricing (e.g. Time of use (TOU) pricing and export tariffs) should be the primary mechanism to signal efficient investment and provision of customer flexibility. 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 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), aggregators or retailers controlling customer devices can help to allocate customer flexibility to its highest value and can be important in some occasional instances (eg: providing short term localised responses), this is not routinely needed to gain the majority of value from customer flexibility, and if this focus is weighted in the wrong direction it is likely to lead to a more expensive energy system for consumers.

3. A successful and equitable energy system necessitates all households having access to DER via access to low interest, long term loans and trusted advice and guidance to make decisions about their energy use that are best for their households. The Green paper highlights the role of community renewable generation projects and peer-to-peer sharing of local renewable generation as a pathway to equity and affordability. Rewiring Aotearoa agrees these are beneficial and can help provide lower cost delivered energy for all customers. However more is needed to ensure the benefits of electrification and local generation reach all customers. Low income homes who most need the cost savings from electrifying their space and water heating and cars, and from having a solar panel on their roof - should have access to low interest long term loans to purchase this technology. A mechanism should be in place to support access for renters as well as home owners. Put another way, our regulator(s) remove risk by guaranteeing the return on investment of networks building infrastructure that is then passed onto customer bills, yet if a low income parent wants to invest in rooftop solar and a battery which will lower their bills, they have to take on all the risk. This means the system creates a bias against localised energy, and against the lower bills for homes it can create.

1. Focus on customer benefits and lowering delivered cost of energy

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). This means we can no longer focus on affordability by measuring and reducing electricity system costs. 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. Accessing rooftop solar is about making purchasing, financing, and paying back energy capital expenditure decisions easy, something that historically has only been enabled for the supply side of the energy system.

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

Reducing delivered energy costs includes all options at both the community and individual customer level. For communities this includes projects to lower local network investment costs, increase utilisation, share local generation, and opportunities for local investment to support energy and resilience needs (eg: community charging hubs, community solar and batteries), at the individual customer level this includes self generation from financed rooftop solar, electrification of vehicles and appliances and lower energy bills accessed through demand flexibility or battery exports.

Analysis tells us that the lowest cost source of delivered electricity is currently from solar panels on rooftops. Alongside this electrification provides a big opportunity to reduce customers' energy bills.[2] And nationally the savings stack up - electrification could lead to combined savings of $29 million per day or $10.7 billion per year by 2040 and also avoid millions of tonnes of carbon emissions per year by removing the need for expensive and mostly imported fossil fuels in exchange for more electricity generated in New Zealand.[3]

2. Time of use pricing and export tariffs benefit customers and communities

The Electricity Authority should include more emphasis on the role of TOU prices and export tariffs to shape demand and encourage exports at peak times. There is a strong linkage between the work the Energy Competition Taskforce is undertaking on requirements for time varying retail pricing for consumption and supply and distribution export tariffs. Rooftop solar and behind the meter battery installations present a fast, financially advantageous, and energy security strengthening method to expand New Zealand's energy system. Locally there is potential for significant savings for all customers through offsetting costly network investment. The Code requirements that will come out of the Energy Competition Taskforce workstream 2A, 2B and 2C will have a meaningful impact on how many installs of batteries happen, and whether the installs will be specified to predominantly benefit those who install them, or will be sized in such a way that they are able to benefit all consumers in the energy system (by deferring investment, and providing additional capacity). Likewise it can also impact investment in emerging vehicle-to-grid technology, which also has significant potential to benefit energy customers.

Time of use prices and export tariffs can deliver most of the value from customer flexibility from their DER and provide payments directly to the customers or communities that own them. On the other hand relying on VPPs or aggregator third-party business models likely means they will take a significant cut of the value to the electricity system, from a customer's flexibility. This can dilute investment signals to the customers or communities making the investment and reduces customers benefits. There is no technical reason these signals cannot go directly to customers. The problem of not being able to adequately price flexibility comes from the regulators lack of ability to keep pace with technological progress on the demand side. Creating another supply side owned middleman market is unlikely to create a solution that is of long term benefit to customers. Australia is well ahead of New Zealand with VPPs and managing distribution networks with high amounts of consumer resources.

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[2] https://www.rewiring.nz/electric-homes-report
[3] https://www.rewiring.nz/tomorrow

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.

> 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.*
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> *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."*
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> *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:*
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> *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."*

It must be noted that for this to be possible, the pricing must be in the market and accessible to customer tariffs. This for example requires distribution companies (EDBs) to signal the value of battery export so that the retailer (in the case above Amber) has value to pass onto the customer without needing to sign a VPP contract with the network. Many Australian networks already have this reverse injection pricing available - unlike New Zealand.

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.

Most of the value of customer flexibility can be gained via price signals and help to shape demand and exports over the short and long term, changing the local load profile (over the

whole distribution network) to offset network investment now and into the future. Utilising flexibility in the current network peaks or during localised periods of congestion, reduces existing peaks. However once these peaks are gone, the next highest periods of demand become the new peaks, and local congestion is likely to expand to more and more parts of distribution networks over time. Prices and export tariffs can address peaks and increasing local network congestion over the long term.

Whilst we think much of the value of customer flexibility can be gained via price signals that shape demand and exports, we agree with the Green Paper there still may 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.

VPPs 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. VPPs 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.

VPPs 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. It's crucial however, that in the defence of the long term interest of customers, the maximum amount of value that can be delivered through direct pricing is applied. Otherwise expensive and unfair outcomes are likely to come from entities taking advantage of consumer assets to boost their own profit margins rather than help customers; this has already been seen in New Zealand with solar export prices, and thankfully the recent Electricity Authority Competition Taskforce looks likely to correct this clearly unfair situation.

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 is fairly simple. Large technology companies are well placed to ensure their products deliver the best outcomes for their customers. Trials are underway in 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). Currently New Zealand is focusing on aggregator and VPP controlled options - but should also be looking at overseas trials and investing in testing self managed options to deliver customer flexibility.

Trials could unlock challenges and solutions and test the role of pricing and export tariffs to deliver value from customer flexibility. For example staggering off-peak EV charging through built in mechanisms within the smart EV chargers could avoid “herding” on networks (eg: when large up swings in demand as soon as retail prices swap from peak to off-peak rates create new local peaks).

An open source not-for-profit VPP that passes the full value of flexibility back to customers (minus any operating costs) could be another opportunity regulators could explore. This could be a useful way to layer value streams for community batteries and unlock value from aggregated batteries in homes and businesses for reserve markets. VPPs are not overly technical to deliver and therefore do not need commercial tech companies to deliver them. Government funded trials for example working with a partner like Transpower to deliver a not-for-profit VPP could be a good way to add competition to commercial VPPs. This could increase options for customers and result in commercial VPPs competing with not only direct pricing and export tariffs but also a not-for-profit VPP to provide customers the most value from their flexibility.

An equitable energy system means all households can access DER

Direct access to DER should be included as part of the definition of a successful more decentralised energy system. Access to invest in DER should be available to all New Zealanders through accessible low interest finance. This includes solar and batteries, smart appliances including electric hot water heating, heat pumps, EV smart charges and EVs themselves. Alongside this it is key that households have access to trusted advice and guidance, provided in a way that is understandable, to make decisions about their energy use that are best for their households and communities. Action should be taken to unlock access to solar for renters too. In practices this will include finance for landlords, and mechanisms to share benefits and communicate the benefits of electrified homes.

Alternatives to electrification finance exist, such as energy-as-a-service. This is where electric appliances, owned by a third party, are put into homes or businesses, and bills for the energy service from the machine (for example, the heat from the heat pump) are paid over time. Rent-to-own schemes are another variation of this and are also available for rooftop solar. While we think these schemes can add consumer choice, they may not always be the most affordable option for customers, because a profit margin must be made on this business model. On the other hand, affordable electrification finance can be designed to maximise benefits for the purchaser with low borrowing rates, and provide competition for these alternatives, putting downward pressure on the costs of such services. We are increasingly seeing concerning examples where savings offered to customers are minimal or non-existent. For example a solar firm installing solar on customers rooftops and selling any solar the customer uses at a 10% (minimum) discount from the standard retailer prices. Whilst this does provide a slight saving to the household compared to a standard current retail tariff, it provides a fraction of the lower cost of electricity provided by solar and locks the consumer into ongoing price rises. It also provides lower savings than simply shopping

around for a better electricity plan. The average household saves around $500 a year by shopping around for a new electricity retailer, which is a 15 to 20% saving.[4] [5]

Response to Questions

In this section we provide examples of where the Green Paper could shift focus to maximising customer and community benefits.

Question 1 Do you agree with the description of decentralisation? If not, why not?

Rewiring Aotearoa agrees with many aspects of the description of decentralisation set out by the Authority, however the key messages set out above should be better reflected in the description of what successful decentralisation entails. Specific examples are set out below.

Feedback on the Executive Summary

On page 2 the Green Paper notes that decentralisation will be enabled by: "*Developing local energy markets, pricing and services. These will reward consumers and communities for generating and trading energy locally, and for being flexible with their demand for energy.*"

While we agree with this statement we think it is important to emphasise the primary role of prices and export tariffs to signal the value of export and flexible demand to customers investing in DER. We also think that non-commercial options for energy sharing could be useful. Ultimately it is important to ensure that consumers can engage and gain value from their energy generation and flexible demand without reliance on third party business models where a profit margin must be made at the customers expense.

Also on page 2, the Green Paper notes that decentralisation will be enabled by: "*Unlocking new sources of capital into our energy system through increased local ownership of local energy resources. This includes consumer investment in distributed energy resources (DERs) and community ownership.*" Again while we agree with this statement we think it is important to emphasise equitable outcomes from a more decentralised electricity system, that includes all households having access to finance to invest in the DER that can reduce their energy bills.[6] This means unlocked access to electrification finance for not just home owners, but also renters and those in community and state housing. One of the arguments we often hear against unlocking benefits from DER for households is that it is only for the well off households. The description of increased decentralisation should be very clear that this is not the case, and instead of ignoring benefits for households from DER for all households - focus and action to ensure all households, especially those who struggle to pay energy bills have access and education need to benefit from DER ownership, or access provided in rentals, state and community households.

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[4] https://www.powerswitch.org.nz/

[5] https://www.rnz.co.nz/news/business/559324/is-your-power-bill-average

[6] Swapping fossil fuel bills for finance by electrifying vehicles and appliances can save households money over the lifetime. The cost of delivered energy from solar panels financed at 5.5% is around 13c/kWh compared to around 30c/kWh for variable supply from a retailer.

Feedback on 2 - What is electricity system decentralisation

The key messages set out above should be better reflected in the description of electricity system decentralisation. Specific examples are set out below.

Figure 1 on page 6 shows the global trends (democratised decision making, distributed energy resources and digitalisation of smart systems) and the critical success factors (consumer and stakeholder engagement and trust).

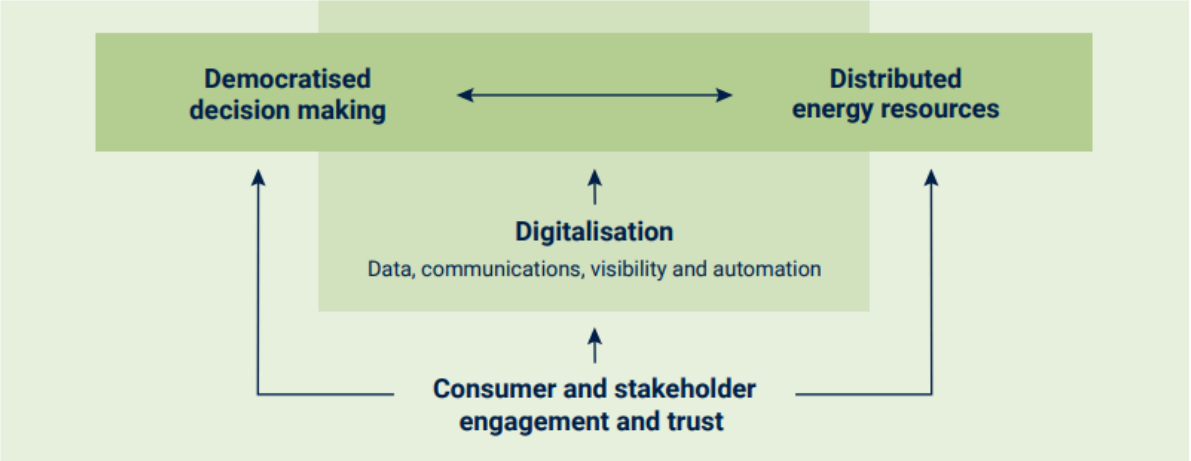

Figure 1: Defining decentralisation

The description of Digitalisation of 'smart' systems includes paragraph 2.12: *'Technologies like building and home energy management systems (HEMS) and VPPs are emerging. These technologies allow DERs to be digitally integrated. This digital connectivity creates value and efficient energy management for consumers, communities, retailers, generators, lines companies, and Transpower — our national grid owner and electricity system operator.'*

We think it is important to also note that smart technology providers (eg: home batteries, smart appliances) are increasingly building in functionality that allows households to minimise their own bills and maximise the value of consumer flexibility or battery exports in response to TOU retail pricing and export tariff. Like HEMS, this provides households with an opportunity to shape demand or export during peaks. Rewiring Aotearoa's view is that enabling customers to use automated functionality in their DER or HEMS to directly respond to price signals and export tariffs is a key part of digitalisation, and should be described here.

It will be important as communication and integration evolves, that it is thought about in terms of how to provide maximum benefits to consumers. There are risks that technology and business models evolve to capture control and most of the value from consumer and community DER whilst providing small financial rewards for customers. The Electricity Authority should focus early on mapping and considering mechanisms and processes to access and reward customers and ensure that options such as direct pricing and export tariffs where customers devices can be automated to respond to prices and maximise value for consumers are given priority, with alternatives that introduce additional intermediate businesses - such as VPP co-ordination - utilised only where and when they are needed to

provide reactive quick response or localised flexibility services. Smart EV chargers are another area that should be considered in this way. Currently some smart EV chargers are installed with contracts where the rights to flexible EV charging is allocated to the EV charger provider and can only be accessed via electricity system participants via paying the EV charger provider through proprietary flex control systems. It is going to be very important that the Electricity Authority consider not only technical open access and common communication and visibility but also contractual access - that ensures customers owning DER can utilise flexibility and gain value from it in a way that benefits them the most.

As the Green paper notes in paragraph 2.14, "*Consumer-owned DERs can offer great value to the energy industry." and "Consumers will need to trust that industry third parties will manage their DERs in a way that reflects their preferences, before giving those parties access to control their energy resources*." We suggest reframing this. Consumers should not "need" to trust VPPs. Regulators need to enforce that third parties behave in a way that can be trusted. This means that customers should be getting a fair deal for providing flexibility, and are not being misled by third parties into contracts that they later discover are not benefiting them as much as alternatives could.

The cost savings matter to customers investing in DER. Seeing the real value their flexibility can provide can have a material impact on whether investments in DER are made. While we note most of the savings from DER come from avoided grid electricity use or avoided petrol bills, these extra value streams can help tip the decision to invest, and can help bring forward efficient investment in DER more quickly.

Engagement as described in the Green paper in paragraph 2.15 states "*To develop new energy infrastructure quickly and at the scale needed, the industry must actively engage with local communities and highlight the benefits these projects could bring to the area and its people and businesses.*" This implies that industry should lead the engagement and convince communities of benefits of projects. Instead the discussion needs to start with what the community needs - What risks do they face to extreme weather? How can electricity infrastructure support economic growth and meet the needs of local people? What is the least cost of delivered energy solutions to meet these needs? Where and when is public EV charging needed and how can this be provided at least cost (noting public EV charging delivered by the market can be quite expensive, so are there community models for EV charging that would better suit the community?) Having industry participants with profit maximising incentives lead these discussions may not work for communities. The Electricity Authority should consider how to support communities to engage in local energy planning and solutions that start with local community, iwi, hapu and customer needs.

Planning needs to start with the people and local community and not just with how to provide a lower cost national electricity system and extract value from flexibility from consumers. To date this process of industry led engagement has led to a more expensive, more biased, and less resilient energy system. If anything, how infrastructure engagement is done should be deeply revisited to ensure it is done with the best interests of consumers in mind, not the best interests of energy incumbents.

Question 2 - Do you agree with the articulation of the potential outcomes and benefits from decentralisation for consumers? If not, why not?

The Section on “Enhanced energy affordability and equity” should also reference the savings on energy bills households can make from investing in their own solar generation and electrification through low interest finance. As we note above, equitable outcomes from a more decentralised electricity system require all households to have access to finance to invest in DER that can reduce their energy bills. The Electricity Authority should highlight that action is needed to ensure all households, especially those who struggle to pay energy bills have access and education need to benefit from DER ownership, or access to it in rentals, state and community households as well as through shared community projects. Action to rapidly get DER installed for low income homes or communities should be prioritised.

Under the heading on page 10 *“*Enhanced security of electricity supply” an additional point should be added that highlights the role of time of use pricing and export tariffs to reward customers for demand flexibility in a way that lowers delivered cost of energy for all consumers.

Question 3 - Do you agree with the articulation of the possible challenges to unlocking the benefits of decentralisation? If not, why not?

Rewiring Aotearoa agrees with many aspects of the description of possible challenges to unlocking the benefits of decentralisation set out by the Authority, however the key messages set out above should be better reflected in the description. Specific examples are set out below.

As set out in paragraph 4.10 Rewiring Aotearoa agrees there is a risk with decentralisation of lower-income households and renters miss out on the benefits of DERs. We agree that community battery models and shared benefits from local generation are helpful, but only provide part of the solution to provide equitable access to benefits.

As noted above, addressing equitable access to benefits should be a priority for a successful future energy system and include unlocking access to DER for all households via access to low interest, long term finance and trusted advice. All community and Government housing should have solar and batteries. Mechanisms should be developed to unlock DER for renters, for example insurance plans that remove risks from landlords investment in solar, independent platforms to facilitate shared benefits of solar and better information on property energy costs provided for homes so customers can factor in the value from DER and electric appliances installed in properties into decision making. Subsidies could also be part of the solution to getting solar and other forms of DER for homes who can't afford energy bills.

The section on “*Capability development*” on page 14 should highlight the need to build capability for trusted advisors who can educate communities and customers to engage and make energy choices, including purchases of DER.

Question 4 - Do you agree with the articulated opportunity statement for a more decentralised electricity system? If not, why not?

Paragraph 5.6 notes that unlocking benefits from distributed energy solutions and a more decentralised system will be enabled by "*Making full use of our existing electricity system. This includes our: Electricity grid, Existing largely renewable electricity generation assets, Locational electricity market, and Highly localised electricity distribution businesses*."

It will be beneficial to maximise utilisation of existing electricity networks assets and markets in a way that provides the greatest benefits to consumers. However, maximising benefits delivered to consumers over time requires us to be open to change to market structures and how we utilise existing generation assets.

Question 5 - What other feedback would you like to provide to input into the discussion?

Please see our Key messages section at the start of this submission for other feedback.