Vector submission
accelerating renewable energy and energy efficiency

Ensuring our energy systems can deliver the best outcomes for NZ Inc now – and in the future – requires bold, urgent change

Meeting our climate change mitigation and adaptation goals requires us to transform the role and shape of our energy systems – fast. As we transition transport and process heat to low emissions sources of power; find clever ways to use less; and empower communities to generate more, our energy system is changing from the ground up. Digitalisation, decentralisation, and data are driving forces of our new energy future – and community-owned local electricity distribution businesses (EDBs) have a key role to play coordinating energy systems that deliver for customers – and for New Zealand's wider decarbonisation goals and innovation economy.

Decarbonisation is creating new interdependencies – such as the convergence of the transport and electricity sectors – and, it increases the future impact of choices that we make today. It requires us to change the way we make decisions – as customers, industry participants, regulators, and policy makers. We need to invest for the future, now; optimise the energy system as a whole - rather than as separate market segments; and change the way we understand risk to reflect the new challenges and opportunities that come with climate change. We need to carefully re-balance old theoretical risks to competition against the future cost of inhibiting new technology uptake. Whilst risk is inherent to innovation, we perceive the risk of not innovating to be far greater in the context of climate change.

It would be unusual if policy and regulatory institutional arrangements which were designed decades ago, were able to deliver for a future characterised by change. As highlighted by research undertaken by the University of Exeter's Energy Policy Group "we do need to reset our energy governance for coordination; to expand and reveal value…from new energy and system resources created or enabled by digitalisation and new technologies, and, to speed up GHG reduction". This review argues for one new energy governance institution.[1] We note that there are a large number of different policy and regulatory institutions in New Zealand which now have a shared role in enabling the transition of our energy systems – including the Ministry of Transport (MOT) which has been leading the Green Freight Project to explore ways to reduce emissions from New Zealand's road freight; the Energy Efficiency and Conservation Authority (EECA) – which funds a large number of small demonstration trials related to the electrification of transport; the Ministry of Business Innovation and Employment (MBIE) – which is leading the Government's Renewable Energy Strategy work programme; the Ministry for the Environment, which is leading much of the implementation of the Zero Carbon Act; the Commerce Commission; the Electricity Authority; the Climate Change Commission; and, the new Infrastructure Commission. We consider that there is an opportunity to align policy and regulatory frameworks and to streamline resource in support of shared future energy goals. This would also make it easier for industry (and other Government agencies) to engage and support the goal to transition to a low emissions energy future. As is described further, we support regulation to ensure the uptake of EV smart chargers. However, we have not been able to identify the agency which has the mandate to implement these regulatory changes. Given the recommendation of the ICCC to prioritise the electrification of transport in order to reduce New Zealand's emissions from the energy sector, we consider this to be a concern for our future ability to implement the recommendations of the ICCC under current institutional arrangements.

The development and uptake of new technologies is a significant opportunity for New Zealand's energy transformation – allowing greater system efficiencies and investment in renewable generation. We see innovation as an area where New Zealand can punch above its weight in global efforts to mitigate climate change, strengthening our innovation ecosystem and national economy. New Zealand's emissions profile is unique in that a relatively low portion of our emissions come from electricity generation (around 5 percent), relative to transport (20 percent). This makes transport New Zealand's second single greatest driver of emissions – after agriculture. This increases the imperative to find new system efficiencies which enables affordable electrification – including smart EV charging,

1. What reform is required of the current energy system/governance? Professor Catherine Mitchell, Energy Policy Group, University of Exeter, Engineering and Physical Sciences Research Council. 2019. Exeter presentation. October 2019.

distributed renewable generation (batteries and solar panels), energy efficiency, as well as a competitive wholesale market which allows the entrance of new renewable generators. This is an opportunity for New Zealand to lead the way in integrating new energy solutions, using community owned networks as a platform to meet these challenges.

Energy efficiency in particular is an area where there is an opportunity for New Zealand to strengthen its investment to deliver greater long-term affordability, sustainability, and stronger wellbeing outcomes. We consider this to be an area where New Zealand is lagging behind the rest of the world currently.

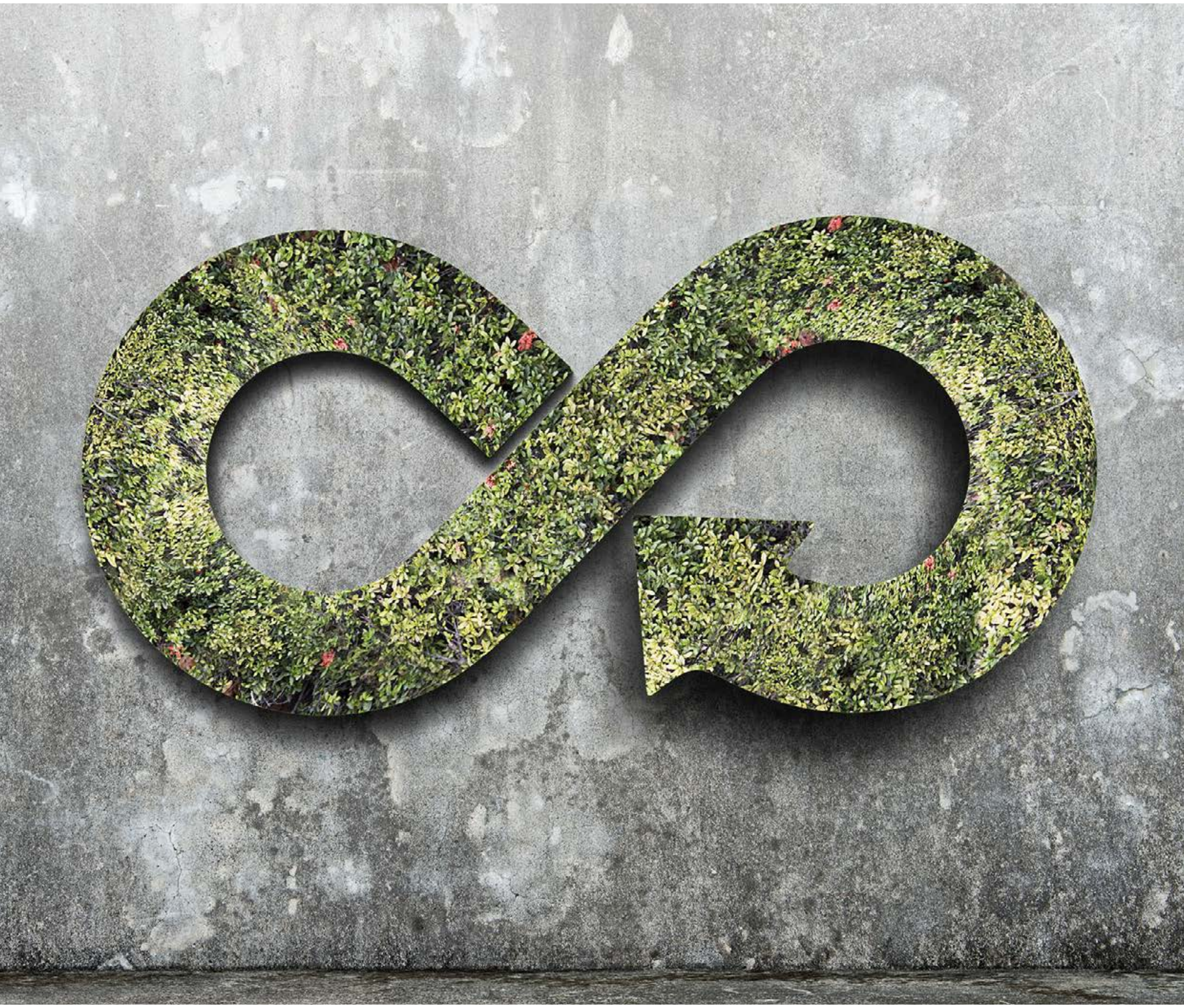
introduction

Transforming our energy systems for customers requires a whole-systems approach. Increasing low emissions electricity generation and implementing demand side mitigations have key roles to play in reducing energy-related emissions and we support the Government's goals. Enabling this holistic approach requires strong coordination across industry and Government.

- Transforming our energy systems to be environmentally and socially sustainable requires a holistic approach which accounts for the different drivers of emissions across energy supply chains, and which considers social and environmental impacts. We believe that long term affordability for customers needs to be a key consideration as we transform our energy systems.
- We support the findings of the Interim Climate Change Commission (ICCC), who in their report, Accelerated Electrification, recommended that the electrification of transport and process heat be prioritised to reduce emissions from the energy sector.
- Having an adequate supply of low emissions electricity is required to ensure that the electrification of our transport system and of industrial processes results in the intended emissions reductions, affordably. This is supported by an increase in renewable electricity generation, as well as managing consumption through energy efficiency and demand response.
- We consequently support the Government's goal to accelerate renewable generation and energy efficiency, and to reduce emissions from process heat, as enablers of our transition to a low emissions energy future.
- We note however that renewable generation is not the same as low carbon generation. Whilst we appreciate that having a high reliance on renewable sources contributes to relatively low emissions from electricity generation we believe that Government and industry should ensure a clear focus on the overall goal of reducing emissions from our energy system.
- In particular we support the focus on demand management and energy efficiency as key enablers of a low emissions energy system. We agree with MBIE that "energy efficiency will be critical to meeting our climate goals and transitioning to a low emissions economy" and we note that the Intergovernmental Panel on Climate Change (IPCC) identified greater mitigation efforts on the demand side as a key characteristic of pathways to reduce global temperature increases in line with the Paris Agreement – as well as transitioning from fossil fuels to electricity in end use sectors. Vector's commitment to this whole-systems approach is exemplified by our New Energy Futures paper on batteries and the circular economy, which is a first step in addressing the social and environmental impacts of lithium ion batteries across the supply chain, using a circular economy approach. This analysis sits alongside the cross-industry Battery Industry Group (BIG) which was convened by Vector to support responsible end of life management of large batteries.
- The BIG recognises the role for cross-industry collaboration and coordination to support the transformation of our energy systems. Similarly, there is an opportunity to support this future through strong coordination across Government which aligns the different drivers of a low emissions future - including transport, energy and resources, the development and absorption of new technologies and innovation, and infrastructure resilience.
- We appreciate the passage of the Zero Carbon Bill in addressing decarbonisation and resilience challenges at a legislative level, and the subsequent establishment of our own Climate Change Commission. However, we believe that a joined-up policy response is crucial to lead the implementation of the Commission's recommendations.
- We also believe that this focus on climate change mitigation and adaptation needs to be clearly reflected in electricity regulation. Regulation should seek to enable the uptake of new technology and innovation which

supports affordable electrification. Electricity Distribution Businesses (EDBs) have a key role to play as enablers of affordable electrification.

- We believe a Ministry for Energy could help to ensure that regulatory settings are well placed and better aligned to support some of New Zealand's most urgent policy goals, and we see a Ministry for Energy as being consistent with the ongoing work of the State Services Commission (SSC) to de-silo and mobilise the public sector around difficult issues.
- We see this is crucial to our wider climate change response – including mitigation and adaptation, and note, for example, that the first draft National Climate Change Risk Assessment Report identified policy misalignment in governance as having an 'extreme' consequence for New Zealand's climate change adaptation.[2]



2. "risk that inadequate institutional arrangements, including lack of central guidance, poor policy alignment and fragmented practice, will continue to exacerbate the impacts of climate change across all domains and create inequitable outcomes".

Our vision for a new energy future starts with the customer, not the power plant, enabling greater customer participation by integrating new energy solutions and technology platforms. We support the Government's focus on demand-side interventions like energy efficiency, demand response and distributed renewables, as key drivers of this future. These technologies deliver the most benefit to customers when they work together.

- We note that the creation of an 'inclusive and consumer focused energy system' is the first key focus of the Renewable Strategy work programme, with providing opportunities for customers to engage with their energy system as a key pillar.
- We support this focus as expressed in our Symphony Strategy – which is to leverage new energy solutions to meet current and future customer needs affordably. In doing so Symphony seeks to transform our energy systems to start with the customer not the power-plant.
- Understanding and responding effectively to demand; as well as enabling customers to generate and store their own renewable electricity through decentralised energy communities, are key elements of an energy future which has the customer at the centre. Critically, these elements need to work together to have the most benefit for customers. As recognised by the discussion document "distributed energy resources, like solar, household batteries and EVs, will be able to make a greater contribution to our renewable electricity supply if a robust DR market exists to remunerate or monetise demand shifting or reduction, and support investment".

Enabling the different drivers of a new energy future – such as demand response, EVs, and renewable DER – to coordinate seamlessly around customers enables a system which is greater than the sum of its parts, delivering greater return on investment

- This requires investment in a digital distributed energy resource management system, such as Vector's DERMs, which can coordinate and integrate distributed energy resources (DERs) – such as solar panels, batteries, and smart EV chargers. We are developing our understanding of how EV smart charging can meet customer needs, and the impact of managed charging on the network, through a trial of 120 EV smart chargers. The EV chargers have been integrated into Vector's DERMs, demonstrating how EDBs can act as enablers of a low emissions energy system.
- This responsive system is further optimised through the use of EVs as distributed storage, enabled by two-way flows of power. For example, Vector is trialling vehicle to home (V2H) technology at Piha, which enables customers to use power from an EV in an outage. This trial shows the value of DER technology to strengthen community resilience by reducing customers' reliance on the centralised network and is a step towards realising the potential of EVs to help manage demand (even whilst EV charging has the potential to add significant load to the network).
- By enabling greater demand elasticity, a coordinated system which responds to customers' needs can gain efficiency through efficient utilisation of network infrastructure, as well as by responding to times of peak demand reducing wholesale price spikes.

proposals to support demand-side participation and demand response

This section responds to Option 8.2 which proposes to encourage greater demand side participation and develop the demand response market.

We support the development of demand response in New Zealand and believe that demand response platforms should be built around the needs of customers and communities – including small residential customers. We believe that this is best supported through a localised, rather than centralised, system operation model.

We support the focus on developing the demand response market in New Zealand as a key opportunity to support electricity asset optimisation, customer-centric services and efficiency, as well as supporting our transition to a low emissions energy future. Demand response markets can help to shape our energy systems around the customer, delivering greater customer efficiency.

The opportunities to utilise sources of demand response currently are limited depending on a number of factors including market conditions and the size of a participant. For example, whilst networks can sell hot water load control into the reserve market, this platform would not be directly accessible to smaller users or customers. To enable greater demand response requires the right platforms, coordination, and focus on how to monetise demand response.

The discussion document mentions virtual power plants (VPPs) - an internet based 'distributed power plant' that aggregates the capacities of users' DER, to trade or sell power on the electricity market. We support the integration of smart digital platforms to optimise our energy systems.

VPPs can support efficient demand response markets, and can play a role in strengthening resilience and reliability outcomes. This is exemplified by the VPP in South Australia. Late last year, the VPP injected power from residential batteries to help the system return to normal after a coal fired unit in Queensland tripped offline, reducing system supply by 748MW. The VPP is connected to 50,000 homes and only needed to draw on hundreds to stabilise the system.

We note that a VPP could be implemented via a localised, or a centralised, model. The impact of a demand response market, and the type of model that should be used, depends on a number of different variables. We do not believe, for instance, that there needs to be a single, centralised, demand response market.

We recommend that different models and existing market conditions are assessed to inform the development of a demand response market model. As highlighted by Hydro Quebec's analysis in "Best Practices in Utility Demand Response Programs" 'demand response is not a homogenous resource; it is provided by a highly diverse set of actors in numerous different ways, and with varying capabilities. This diversity precludes any simple characterisation of demand response types, and also contributes to the flexibility of demand response to meet multiple system needs".

We do not support the suggestion in the discussion document to scale up Transpower's demand response pilot programme to provide a national market mechanism. We note that participants in this scheme are in fact running backup diesel generators to provide demand response to Transpower.

While this is a financial opportunity for the large electricity users who subscribe to the programme to temporarily offset demand, we don't see this model as being accessible to smaller participants – or as being aligned with the wider goal of reducing emissions.

We note that demand side management offers different values to different participants in the market. We believe that it is critical that any demand response market is developed around the needs of the customer – including residential customers or communities – not just the needs of large industry incumbents or large electricity users.

We note the suggestion to create a single, centralised DSO. As noted above, demand response technology has the potential to deliver the greatest benefit to customers when it is acting in conjunction with DER. This can create decentralised energy communities built around customer needs, supported by customer integration with the low voltage network.

We believe that imposing a centralised Distribution System Operator (DSO) to work with Transpower and other DR market participants, as is contemplated in the discussion document, is inconsistent with the drive towards a decentralised energy system which enables efficient community renewable generation, and greater resilience.

Distribution systems are increasingly complex, involving two way flows of power and local dynamics which differ significantly from the dynamics managed on the national transmission grid. Local dynamics are exponentially more complex than behind grid exit points (GXPs), and we do not believe that Transpower is best placed to stabilise this complex local system and dynamics.

As is highlighted by the report ReDesigning Regulation: Powering from the future[3] - decentralisation is 'transformative' for our energy systems. This is about bringing markets closer to, and built around, customers – and is best delivered through a local, community owned, network. Research has also found that imposing a national DSO results in inefficiencies for precisely the same reasons which support DER and demand response in the first place – the difficulty in aligning the actual needs of customers at a local level with that of a single, centralised system (in the case of a centralised DSO this is expressed in a lack of coincidence between local and national peak demand).

Rather than centralising the operation of our network around a national DSO, we advocate for managing it around the real needs of customers and communities by coordinating smart energy technologies at a local level. Local EDBs are well placed to enable this coordination.

Whichever system operations model is used, we believe that cyber security is a key priority. Investing in the right cyber security system has a crucial role to play in strengthening New Zealand's overall infrastructure resilience. We were concerned by the Commerce Commission's failure to recognise the importance of cyber security in their recent DPP3 decision. Vector's cyber Security Operations Centre (SOC) creates a new platform which can strengthen the security of network businesses across New Zealand as digital technologies, like DERMs, play an increasing role in electricity distribution. Our concern relates to the preparedness of many other infrastructure players given that an interconnected system like the energy system is only as strong as its weakest link. Vector is ready to offer this SOC as a service to other EDBs throughout New Zealand. As the EPR highlighted, increased collaboration will be vital

3. Sandys, Laura; Dr Jeff Hardy, Dr Aidan Rhodes and Professor Richard Green. "Redesigning Regulation: Powering from the Future". Challenging Ideas, Imperial College of London, Imperial College Business School, Energy Futures Lab, Imperial College. 2018. http://www.challenging-ideas.com/wp-content/uploads/2018/

The value of a local distribution system operator to enable local energy markets

This future is best enabled by the coordination of a local, rather than national, Distribution System Operator (DSO), with local DSO's resulting in approximately double the cumulative cost savings when compared to central TSO-led market frameworks. Research has found that using a centralised distribution system operator to serve a national demand response market, does not deliver the same value as DERs increase. An independent review undertaken in the independent UK centre of excellence, Catapult Energy Systems *(Assessing the potential value from DSOs)* to compare centralised and localised market frameworks for managing flexible resources, found that the lack of coincidence between local and national electricity demand peaks can lead to inefficient system solutions, increasing costs over time. This review found that local flexibility resources provide higher system value if they are prioritised for use at the local level.

A key benefit of allowing DER management by local DSOs is that DERs provide one of the only economic alternatives to infrastructure upgrades when managing constraints that arise near the edges of the low voltage network. Whereas on a national scale, decentralised resources are just one of many possible solutions to manage network constraints.

initiatives to support demand response

To accelerate the penetration of customer devices in the demand response markets, some jurisdictions have adopted automated demand response standards. For example, California has adopted the OpenADR standards. Under this scheme, customers are provided an incentive to choose any device that meets the open standard and to connect to the EDBs' demand response platform to participate in the local demand response market.

Like the option consulted on in this policy paper, we also envisage the penetration of internet-of-things enabled assets such as smart EV chargers, or smart home appliances – which remotely or automatically are managed to optimise asset use and save customers money.

We note that the discussion document contemplates 'mandatory requirements for some entities...such as EV chargers...to enable internet connectivity and participate in the DR market'. We support this recommendation and note the value in standardising connections early.

We believe that there is an opportunity for regulation to help lead this future through requirements for all new charge-points installed to have smart charging capability, and to be registered with a local Electricity Distribution Business (EDB). As is described further, having visibility of the network is important for networks to deliver efficiency in the context of uncertainty.

Smart EV charging will be key to the affordable electrification of transport

Smart EV chargers, managed by the local network operator, stagger the times that EVs are charged to avoid concentrating the load on the network, reducing the impact on peak demand. Smart EV charging can deliver the greatest value for customers when it is coordinated through a smart digital platform – such as DERMs.

Vector's analysis has found that network capacity would be exceeded with just 20 percent EV penetration in Auckland in the absence of smart EV charging – and this is with 7kw, or 'slow', chargers, which add the equivalent average load of around three houses to the network.

The uptake of fast chargers would increase this network impact further, with one 22kw charger adding the equivalent average load of around nine houses to the network. Managing this demand is key to keeping distribution prices low, as investing in the network to facilitate demand peaks is a key driver of cost for EDBs – accounting for up to 50 percent of networks' costs in some cases.

As reported in EECA's recent report Electric Vehicle Charging Technology, a managed EV charging future could save customers $6.1 billion by 2050 as compared with a passive charging future – with EV linked peak demand being six times greater under a passive, as compared with a managed EV charging scenario.

We note that the UK is currently progressing regulatory change to ensure that all electric vehicle charge points sold or installed in the UK have smart charging functionality included. This is alongside a generous subsidy for the cost of installing EV charge-points at domestic properties.

We support these regulatory steps which help to ensure long-term affordability for customers and note that the proactive installation of smart EV charging capability in the UK results in about half the cost of retrofit installations.

EDBs have a critical role to play driving affordable electrification

We also believe that policies and regulation should encourage network businesses to invest in technology which enables affordable electrification, including EV smart charging infrastructure. This recognises the unique position of EDBs to align infrastructure requirements with the needs of their communities.

The role of EDBs in creating an enabling platform for EVs, for instance, is recognised by the recent New York Department of Public Service (NYDPS) whitepaper *Vehicle supply equipment and infrastructure deployment* which recommends a number of actions to "leverage the utilities' expertise and unique position to promote zero-emission vehicle adoption".

The report released earlier this year includes the recommendation for the Public Service Commission to direct the state's largest distributor-retailers to build the infrastructure needed for the installation of publicly accessible EV charging stations, and to provide funding for up to 90 percent of the associated infrastructure costs. The report also proposes that networks be required to incorporate EV charging scenarios into the annual capital planning processes to encourage 'thoughtful siting' of charging infrastructure. 'Thoughtful siting' recognises the importance of charging station location for equitable community outcomes, and seeks to ensure that new EV infrastructure benefits all customers – including those in low-income communities - which are disproportionately impacted by air pollution.

Proactively ensuring that there is adequate EV charging infrastructure is critical to the uptake of EVs, by helping to overcome customers' range anxiety. Vector is leading this development in New Zealand, having already installed 29 EV chargers around Auckland and having developed the EV charging station app for customers to identify the location of EV chargers.

As well as providing these customer-facing solutions, Vector has a line of sight across the network and the infrastructure requirements associated with the electrification of transport. Vector has announced a Memorandum of Understanding (MOU) with Auckland Transport to assess the network impact of bus electrification, supporting Auckland Transport's commitment to have a fully electrified bus fleet by 2040.

Driving the uptake of technologies which enable affordable electrification – including demand response – requires coordination across the electricity market

The discussion document highlights the ripple hot water control system in New Zealand as a pioneering example of demand response technology. We agree that the ripple relay system has significant potential to deliver benefit for customers – and discuss it further in this submission as an example of how a small, simple, price signal can support wider system efficiency when implemented alongside demand response technology.

It is therefore a shame that the ripple relay system is not used to its full potential or as intended with the number of customers opting into the controlled plans declining. When the system was first installed New Zealand had integrated retailer/distributors with strong incentives to manage demand peaks and direct relationships with customers.

Market segmentation, however, has promoted a siloed understanding of the market which seeks to achieve optimal outcomes for each vertical segment, rather than understanding the supply chain as a whole. This is inconsistent with the whole-of-systems approach needed for our transition to a low emissions future and the cost is coordination failure. This potential coordination failure is most evident in relation to the uptake of new technology which tends to cut across the boundaries of artificial market segments. Networks have a clear and unique incentive in the market to promote this technology, given its value in flattening demand peaks.

Given the potential impact of smart EV charging (and demand response, and DERs more widely) to support affordable electrification and the greater generation of renewable electricity, we consider the cost of this coordination failure to be significant in the context of climate change – and that it must not be repeated. We note changes further to the Electricity Price Review (EPR) which will transfer aspects of Part 3 of the Electricity Industry Act which concern EDB engagement with contestable services, to the Code. The associated Regulatory Impact Assessment (RIA) identified demand response specifically as a 'gap' in existing regulation which the changes are seeking to address. As these powers are implemented, we support a regulatory approach which appropriately considers the cost of coordination failure for our transition to a low emissions energy future. Inhibiting the uptake of cross-cutting energy technologies, such as demand response technology, would be of significant detriment to the policy goals of decarbonisation, and affordable electrification for customers.

proposals to increase electricity industry investment in energy efficiency and renewable generation

This section responds to Option 8.3 which proposes to deploy energy efficiency resources via retailer/distributor obligations, as well as Option 8.6 which proposes to phase down baseload thermal generation and place in strategic reserve.

We support proactive initiatives to increase electricity industry investment in energy efficiency. Achieving the greatest system efficiency requires the integration of new technology, and an investment approach which is focused on the future. This enables energy infrastructure to respond to uncertainty and changes in future demand patterns. We believe that aligning existing regulatory settings to these objectives is a key opportunity to catalyse greater distributor-led energy efficiency, and support incentives based energy efficiency measures.

We support the Government's focus on increasing investment in energy efficiency in the electricity industry. Energy efficiency reduces the need to invest in new generation, optimises the energy asset base, and reduces a customer's energy bill. As highlighted by MBIE's domestic electricity price monitoring, the average annual residential expenditure on electricity has reduced by 4 percent since 2014 – alongside a three percent decline in consumption over the same period.[4]

Network businesses have a key role to play supporting system efficiency. When efficiency gains are made on the network, all customers benefit - not just those who can afford the upfront cost of energy efficient technologies. This is important because Vector's data has found that higher income households have reduced their energy consumption at a rate that is four times greater than low income households. As described above, it is in distributors' clear interests to reduce and manage consumption to defer costly infrastructure upgrades which would be required to meet peak demand. We believe there is an opportunity to catalyse greater EDB investment in energy efficiency by aligning regulatory settings to these objectives, and favour incentives based interventions, rather than obligations, to encourage this further.

Cashflow supports investment in long-term efficiency

As noted by the discussion document energy efficiency investment sometimes does not occur even when it makes sense from a system efficiency point of view due to lack of access to capital. This is true for EDBs, whose capital and operational expenditure allowance is determined by the Commerce Commission's five-yearly Default Price Pathways, as part of price quality regulation.

As we have noted to the Commerce Commission, the expenditure allowances in the latest Default Price Pathway (DPP3) do not fully fund the capital and operating plans we described in last year's Asset Management Plan (AMP 2019). Making an additional large up-front investment for future energy efficiency (such as wrapping all of our lines in insulation, to use the example suggested by the discussion document) is difficult to contemplate when spending within the allowances now requires compromise within our existing expenditure plans – which were driven by quality, consumer growth, Auckland Growth, technological, and resilience needs.

EDBs need the cashflow to make the right level of investment at the right time to support more efficient customer outcomes in the long-term. Approaches to set the regulatory weighted average cost of capital (WACC) and forecasting inflation, significantly compromises the cashflow available for EDBs to invest in the future. We see these regulatory settings as being fundamentally misaligned with the Government's higher-level policy goals – including to accelerate energy efficiency, and to make greater capital investment in infrastructure to support future growth.

We agree with comments of the Prime Minister, Rt. Hon Jacinda Ardern, in her recent State of

4. https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/energy-prices/electricity-cost-and-price-monitoring/

the Nation speech, that 'now is the time' to be investing in infrastructure. We support the focus on infrastructure investment including the initiative to establish the recent Infrastructure Commission. We also note the findings from the Productivity Commission's inquiry into Local Government Funding and Financing which highlighted the need for long term thinking in how investments are made. We agree that greater EDB investment in long term efficiency is an opportunity for customers – and one that needs to be supported by regulation which enables this investment to occur.

Investment optionality allows the network to respond to uncertainty, efficiently

The discussion document also identified the accelerated replacement of inefficient customer products – in line with the Minimum Energy Performance Standards (MEPS) – as an objective to defer EDB investment in distribution assets.

We support this goal and customer-driven energy efficiency more widely as a driver of network optimisation and a means of saving customers money. We note that the benefits of targeted interventions to increase customer energy efficiency will be greatest if accompanied by a network asset management approach which allows the network to mould to changes in demand patterns – including those which may stem from energy efficiency interventions. This requires investment optionality, flexibility, and modularity of the network - underpinned by sophisticated probabilistic, rather than high-cost deterministic, planning. This smart asset management and investment approach leverages new energy solutions and digital assets rather than just investing in traditional poles and wires solutions to allow the network to respond to uncertainty. This reduces the risk of 'stranded assets' – which is particularly important in the context of high future uncertainty driven by the development and adoption of new technology, the impact of global and domestic policies and climate impacts, as well as unquantifiable unknown, unknowns. An example of this asset management approach is Vector's installation of the Asia Pacific's first grid-connected Tesla Powerpack at Glen Innes substation in 2017, responding to population growth in East Auckland. Traditionally, responding to this growth would have required an upgrade to the existing substation.

Using storage to manage demand allowed Vector to delay this costly upgrade and, the battery is able to be moved in response to further changes in population distribution.

The role of data in managing uncertainty

- Better access to data is critical to this smart asset management approach which designs the network around customer needs.
- Smart meter data supports more targeted network investment and customer centric operational management. By looking at past outage events, Vector has learned how to combine half hourly (HHR) and network level data to identify which customers are affected by an outage, allowing direct customer communication about the event and a more coordinated outage response.
- Better data also allows better forecasting and modelling and more efficient decision making for new housing connections. This results in greater efficiencies for developers and customers, supporting Auckland's continued growth.
- HHR consumption data from smart meters can also enable networks to understand the impact of demand management, by seeing how households respond to pricing plans, messaging, and rewards around peak demand times.
- We agree with the discussion document that customers need to have better access to their own data and support the recommendation in the EPR for the EA to expedite work to make it easier for customers and distributors to have better access to data. We look forward to this work progressing as a matter of priority.
- As has been mentioned, Vector supports regulation which would require EV owners to register a new EV charger with their local EDB. This gives networks better visibility of changing demand. As is mentioned further, having visibility of network changes which occur with our transition to a low emissions future, is key for efficient infrastructure investment. Vector is also seeking more data related to EV registrations to inform better forecasting of EV uptake.

The integration of new network solutions defers the need to make costly network upgrades, saving customers money

The potential for reducing infrastructure costs by incorporating new energy solutions into distribution (and transmission) planning is substantial, as seen in research done in Texas by Demand Side Analytics. Utilising DERs to defer growth-related infrastructure expansion resulted in savings worth 8.5 percent of the total transmission and distribution infrastructure costs in Texas. This equated to an estimated $300m in savings per year.

In addition to infrastructure deferral savings, adding 500MW of DER (targeting a 0.7% reduction in peak demand) results in an estimated $1.69 billion in savings on wholesale energy costs over the course of 10 years.[5] We consequently support regulation which encourages network businesses to integrate new energy solutions into the network – including DER – to both increase renewable generation, and to support greater system efficiency.

Maximising the benefits of electrification

We support the six principles for maximising the benefits of electrification, identified by the US based think tank the Regulatory Assistance Project (RAP), in their report *Beneficial Electrification: ensuring electrification in the public interest*. This report is focused on accelerating the transition to a clean, reliable, and efficient energy future.

These principles are:

- Put Efficiency First
- Recognise the value of flexible load for grid operations
- Understand the emissions effects of changes in load
- Use emissions efficiency to measure the impacts of beneficial electrification
- Account for the lifetime and turnover rates of investments
- Design rates to encourage beneficial electrification

5. The Value of Integrating Distributed Energy Resources In Texas. Demand Side Analytics for Texas Advanced Energy Business Alliance. 2019. https://www.texasadvancedenergy.org. 11.13.19.pdf

Supporting this smart asset management approach requires the right incentives to overcome the short-term risk associated with the integration of new energy solutions

Encouraging this approach requires the right incentives to overcome the immediate short-term risk associated with the integration of a new energy solutions. For example, when engineers specify a traditional poles and wires solution on the network, they know what it's going to cost and how it's going to perform. Before adopting DER solutions (including energy efficiency, demand response, solar, or batteries) on the system and guaranteeing the same level of grid reliability as a traditional solution, EDBs need to be able to undertake trials to understand different DER performance profiles.

Currently, EECA's Technology Demonstration Fund supports small scale demonstrations of new or under-utilised energy efficiency technologies with a primary focus on direct customer outcomes. EDBs need to understand the direct customer impact of new technologies, as well as the operational costs and benefits for the network which result from the integration of these technologies. We therefore support the Southern California Edison Preferred Resources Pilot (PRP) which was designed to determine if and how the use of DERs – including energy efficiency, demand response, distributed renewable energy and energy storage – could offset up to 300MW of increasing customer demand for electricity in Southern California. The second phase of this pilot was approved in 2018 with "support for the concept of the PRP as a way to meet local needs and as a laboratory for innovation regarding preferred resources".

The report *Utility Investments for Market Transformation: How utilities can help achieve energy policy goals,* published by Massachusetts think tank "Synapse Energy Economics" also supports the value of 'learning by doing' for leveraging the most value from new energy technologies, holding that "a measured pace of adoption of the new technology will allow for a process of learning, adjustment, and restructuring by utilities, regulators, vendors and consumers".

Supporting the integration of new energy solutions requires an enabling regulatory approach

We believe that enabling a low emissions energy future requires bold change led by clear policy direction which is focused on the future – rather than carrying forward a regulatory approach designed for the past.

New energy solutions and smart digital assets are fundamentally different to traditional poles and wires solutions – and encouraging networks to invest in these new assets for the greatest future efficiency requires a new regulatory approach. We note changes further to the EPR to transfer aspects of Part 3 of the Electricity Industry Act, to the Code. As noted earlier, we appreciate the perceived need for regulatory agility to respond to a rapidly changing environment (including to respond to technological change). However, we believe that this consideration needs to be carefully balanced against the need for regulatory transparency and certainty to support investment in new energy solutions. As highlighted by Dr Richard Meade in the report *Issues presented by Emerging Technologies for New Zealand Electricity Sector Regulation: High-level overview* (commissioned by Vector) regulation "should clearly signal in advance the rules for how regulation will change in the future, if not precisely what future regulation will be". Taking such provisions out of primary legislation reduces this certainty.

As we submitted to the EPR Panel, the arrangements in Part 3 of the Electricity Industry Act were "imposed via legislation following an extensive and transparent policy process that assessed the benefits and detriments associated with structural separation of the supply chain. It was appropriate that that was done via primary legislation given the significant interference in commercial freedom, the implications for existing investments, and the risks to competition and innovation".

We note the comment in the proactively released Cabinet paper that changing technologies are 'testing primary legislation'.

Our view is that both changing technologies, and decarbonisation, are together testing our wider institutional framework and that taking such provisions out of primary legislation and delegating additional power to the regulator, signals that the current and future needs of the sector are out-growing our existing institutional framework. The regulatory implications of our rapidly changing future is highlighted by the analysis of Dr Meade, holding "...the very premise of price-quality regulation for distributors... needs to be revisited. So too do other legacy regulations that will likewise serve to accelerate or impede the uptake of new technology".

As we noted above, we support the action of MBIE to undertake a review of policy and regulatory institutions further to the EPR – we see this as a positive step and an opportunity to re-evaluate perceived risks which underpin our current regulations to ensure alignment with policy goals. As we have noted above, we believe that decarbonisation requires us to carefully re consider perceived risks to competition against the cost of inhibiting the uptake of new technologies – and the critical role of network businesses in this.

The RIA notes that these changes were advanced in response to concerns expressed by other industry stakeholders regarding EDB involvement in DER – with batteries and solar panels referred to specifically. As noted above, these technologies have a key role to play supporting better customer outcomes, network optimisation, affordable electrification and increasing renewable generation. We support competition in so far as it leads to greater customer efficiency and the uptake of new technologies, and believe that in the new context of decarbonisation, the protection of competition through traditional regulatory levers needs to be considered carefully against the perverse outcome of inhibiting the uptake of this technology.

We acknowledge the EA's inclusion of decarbonisation as one of the emerging outcomes themes for its Strategy Reset 2020. We support this focus and look forward to continuing to engage with the EA on this important work. We also acknowledge that the EA has undertaken a number of steps further to the EPR to help ensure that electricity market is delivering better outcomes for customers – including imposing mandatory market making, and advancing the decision to ban saves and win backs.

As highlighted by the UK Think Tank, Challenging Ideas, in the report, ReDesigning Regulation, the regulator faces the choice of "whether to try to squeeze the transformed system into the architecture of the past or to embark on a 'managed' revolution to embrace the new structure of the future of electricity"[6].

Reducing our reliance on thermal baseload affordably requires a whole-systems approach. This should include a focus on catalysing new investment in renewable generation – as well as the role of Tiwai.

We note the proposed option to phase down thermal baseload generation and place in strategic reserve. We agree that thermal asset owners currently have little incentive to reduce generation and retire baseload before its end of technical life and we also appreciate that low emissions renewable energy could replace much of New Zealand's existing thermal baseload electricity generation today.

As highlighted by the Harvard Law & Policy Review in the 2013 article *Fast, Clean, & Cheap: Cutting Global Warming's Gordian Knot* "because consumers perceive energy as a homogenous commodity, there is little to no product differentiation for newer, cleaner, and more technologically advanced energy sources like wind and solar. Whereas pharmaceutical and high-tech companies have an incentive to invest heavily in research and development to invent new products that consumer might switch to or pay more for (such as new cell phones and personal computers), the energy sector will sell the same product—electrons—in 2100 that it sold in 1900. While there has been some very modest success selling "green power" to consumers, no serious expert believes that demand for green power will be anything more than negligible in determining future energy sources."

6. Sandys et al. ReDesigning Regulation. Challenging Ideas. 2018.

The opportunity for competitive differentiation in the market is the most limited at the generation end of the supply chain. Whereas innovative business models and technologies can change the role and experience of the electricity customer at the demand side (such as through peer-to-peer trading and demand response technology), there is a lesser competitive market driver for a generator to transition fossil fuel generation assets to renewable sources.

We support Government intervention to catalyse generators' investment in renewable generation to reduce reliance on (and to eventually to phase out) thermal baseload. Whilst we note the role of the New Zealand Emissions Trading Scheme (ETS) is tilting market incentives in favour of low emissions investment, we believe that policy intervention is required alongside the ETS. However, we hold that intervention should focus on driving new investment in renewable generation as a priority – rather than phasing out thermal baseloads before end of life. As noted by the discussion document thermal baseload assets currently contribute to security of supply - particularly when hydro dams are low. Retiring these assets without adequate alternative renewable generation, and storage technology, could have the perverse outcome of increasing prices for customers.

We also note that Tiwai is currently a barrier to reducing New Zealand's use of thermal baseload to meet supply needs as Tiwai accounts for around 13 percent of New Zealand's overall electricity consumption. Tiwai also receives a significant subsidy for its electricity. The EPR Panel found that residential customers pay 15.5c per Kilowatt hour (KWh) for generation and retail – whereas Tiwai has been reported as paying just 5.5c per KWh for the same. We believe that this artificial pricing distorts the market, further compromising our transition to greater renewable generation. We believe that a review of the benefits of Tiwai for New Zealand Inc – which considers the environmental, social and economic, costs including the distributional impact of their operations, be undertaken. In the instance that the smelter does continue operations in New Zealand we believe that there needs to be full transparency on price and an in-depth review of contracts. We also believe that transparency on water values is important to catalyse greater renewable generation. Transparency could be easily provided by ensuring all generation is bought and sold via the wholesale market.

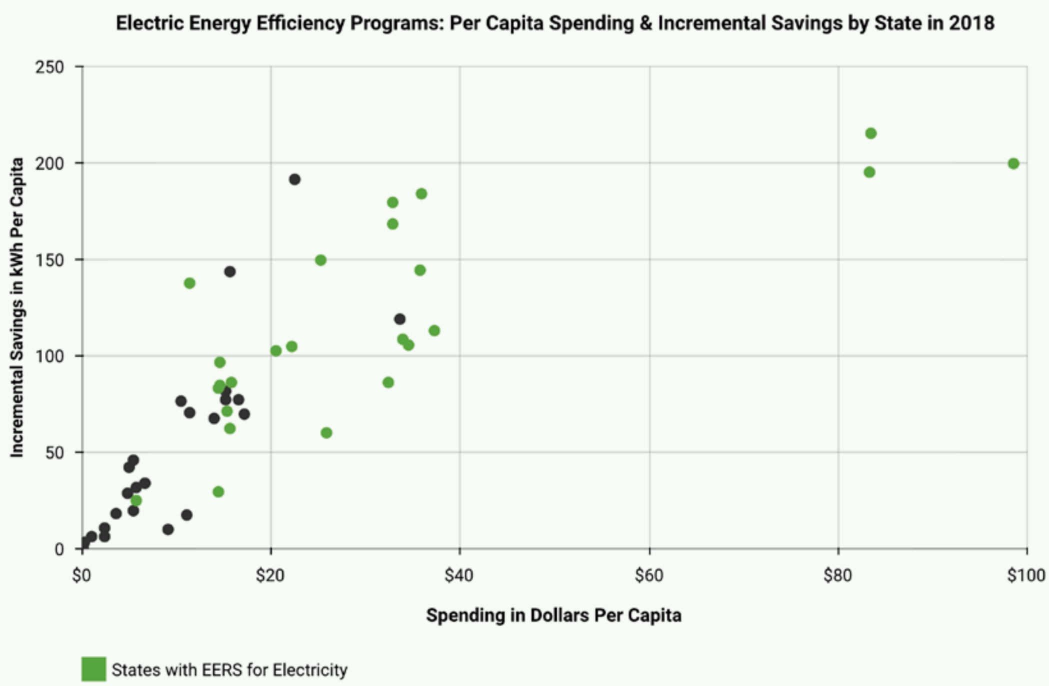
Initiatives to increase electricity industry investment in energy efficiency and renewable generation

The value of energy efficiency investments are clear. As noted by the *Energy Efficiency Impact Report*[7], one of the most comprehensive studies of the impact of energy efficiency programs in the US, energy consumption and emissions would have been 60% higher, without the energy efficiency investments made since 1980. In the absence of these investments, customers would be paying nearly $800 billion more per year in energy costs. The benefits of energy efficiency go beyond energy and cost savings, including a cleaner environment and improved public health and wellbeing.

7. https://energyefficiencyimpact.org/

Incentivising utility investment in energy efficiency results in clear savings for customers. While different states have different efficiency opportunities depending on their climate, geography, and economy, there is a clear trend that states that incentivise utility investment in energy efficiency (such as through Energy Efficiency Resource Standards, for example) typically realise the greatest benefits from ratepayer-funded energy efficiency programs.

States that invest in utility efficiency programs save more for customers



Source: ACEEE (2019), *The State Energy Efficiency Scorecard*

We support the Warmer Kiwi Homes Grant, and the Auckland Council 'Retrofit Your Home' programme, as interventions which directly fund energy efficiency measures for customers. The Warmer Kiwi Homes Grant covers up to two thirds of the cost of energy efficient heating options, and the Retrofit your Home initiative offers up to $5000 for eligible ratepayers to invest in energy efficiency home improvements. These interventions deliver long-term energy efficiency savings, targeting a cause of high electricity costs. An evaluation of the Retrofit Your Home scheme found that the programme returned $3.10 in social, environmental and economic benefits for every dollar invested, with key outcomes for people living in retrofitted homes to include: an increased feeling of satisfaction with their living situation, improved quality of life and life expectancy for those who suffered from an illness related to cold and damp housing, financial savings from reduced electricity consumption, improved educational achievement (for occupiers of homes who are students), and improved efficiency when working from home (from those in employment).[8] In contrast, the Winter Energy Payment does not invest in long term savings and we favour interventions which invest in energy efficiency instead. Such interventions could be simple, including, for instance, LED lightbulbs in customers' homes.

The Brattle Group's report Incentive Mechanisms in Regulation of Electricity Distribution: Innovation and Evolving Business Models (attached as Appendix 2) includes a number of examples of regulatory mechanisms designed to boost investment in energy efficiency and renewable energy:

- Illinois established the Future Energy Jobs Act (FEJA) with a focus on improving resilience, creating jobs, and making energy more affordable. The legislature and utility regulators set ambitious targets for

8. Auckland Council Retrofit Your Home Financial Support Programme: A Social Return on Investment (SROI) Evaluation. Technical Report 2014/020.

delivering energy efficiency to customers, while also enabling utilities to recover the investments made in energy efficiency through the regulated asset base. This made energy efficiency investments as financially important to utilities in Illinois as traditional grid investments. Additionally, FEJA created incentives for new renewable generation by awarding owners or developers the right to sell Renewable Energy Credits for the energy they generate to reach a renewable energy target.

- In New York, Consolidated Edison (ConEd) was considering $1.2 billion USD of grid upgrades, including a new substation, in order to mitigate a capacity constraint. Instead, ConEd pursued a mix of traditional grid upgrades and distributed solutions that cost one-fifth of the traditional "wires" solution, with the Brooklyn Queens Demand Management pilot. The solution included a portfolio of DER such as distributed generation, energy efficiency, demand response, and battery storage. This solution was facilitated through a cost-plus performance incentive mechanism where the EDB is allowed to recover the costs of the project plus receive a performance based incentive as a share of the overall benefits delivered.

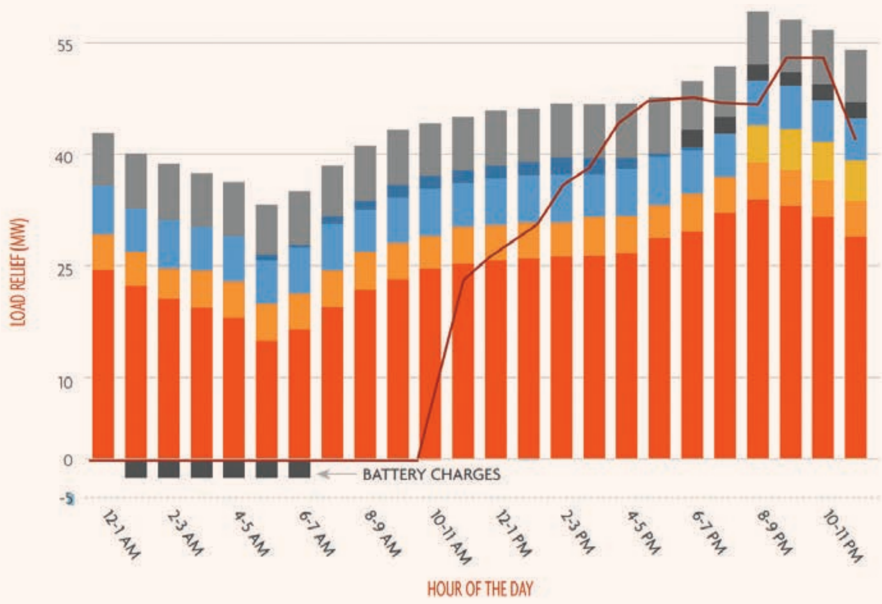


FIGURE 4. BQDM SOLUTION PORTFOLIOS

The Brooklyn Queens Demand Management Program used a portfolio of a variety of DER to provide significant needed load relief and avoid $1.2 billion in grid upgrades.

Image courtesy of SEIA

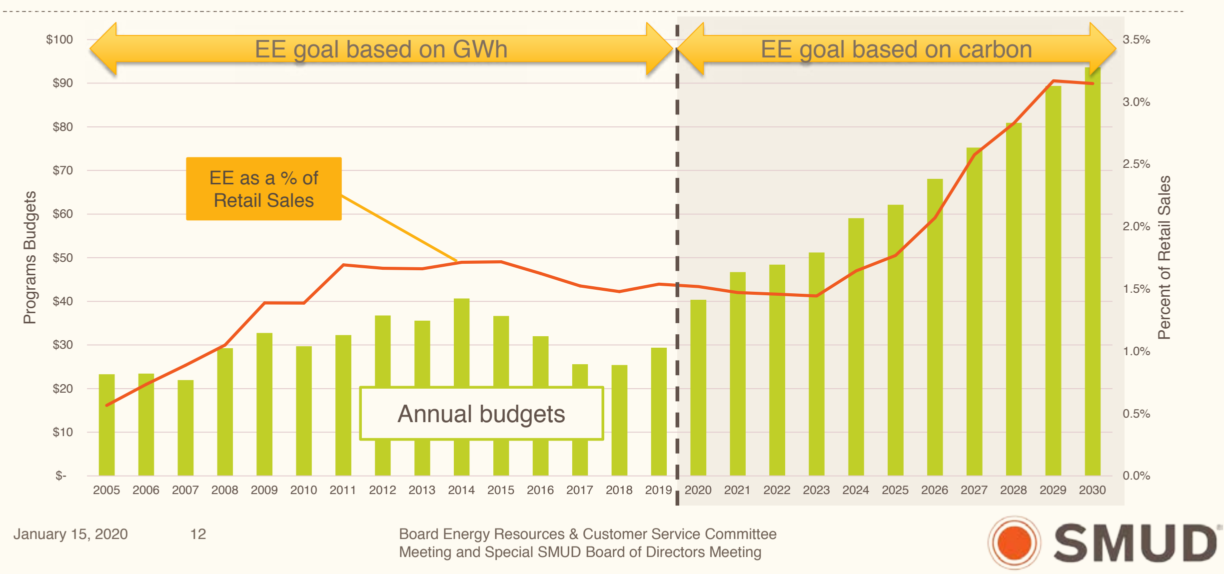
Additional research by the Brattle Group, Energy Efficiency Administrator Models: Relative Strengths and Impact on Energy Efficiency Program Success (attached as Appendix 3) which evaluates different administrative models for energy efficiency, supports the importance of performance incentive mechanisms to successful efficiency programs. This also suggests that government support for consistent funding and strong energy efficiency targets also have significant impacts on success; "regardless of the energy efficiency administrator model, key factors for success are state-level energy efficiency goals, dedicated energy efficiency funding, the availability of full decoupling, and performance incentive mechanisms."

As an example, the energy efficiency programs in the state of Vermont have returned significant savings to consumers. "Since 2000, Efficiency Vermont has generated $2.5 billion in electric energy savings, leveraged through programs supported by just $600 million in ratepayer funds. Because Vermont's utility-scale efficiency programs are cost-effective on their own terms, they deliver greenhouse gas reductions as an added benefit, essentially for free."[9]

9. The Regulatory Assistance Project, 2019.

Rather than targeting KWh usage as a metric for energy efficiency the Sacramento Municipal Utility District (SMUD) is using avoided carbon emissions as a performance metric, linking energy efficiency to wider decarbonisation goals. Rather than having a separate target for decarbonisation and energy efficiency, this gives the customer owned utility the discretion to pursue the most efficient investments in avoided carbon emissions. The programs offer the flexibility to implement fuel switching (renewable gas/hydrogen), electrification, and load shifting technologies alongside traditional energy efficiency measures. With better alignment, SMUD expects to double overall carbon savings achieved by their efficiency programs.[10] This aligns with a whole-of-systems approach to decarbonisation which we support.

Building Energy Efficiency Outcomes and Investments



We note the proposal to impose energy efficiency obligations for retailers, and raise a note of caution to these proposals. As described by the Brattle Group report referred above, a key element of demand side management programs is decoupling revenue from energy sales. We note that any reduction in energy sales from energy efficiency obligations would directly impact revenues for retailers and generators.

The same research found that state-level energy efficiency goals were another significant indicator of successful programs. Managing the goals and evaluating performance of a fixed number of geographically regulated EDBs is more practical than overseeing energy efficiency obligations for a dynamic, competitive retail market, with market entrants and exits every year.

10. Board Energy Resources & Customer Services Committee Meeting and Special SMUD Board of Directors Meeting, 15Jan 2020, https://www.smud.org/-/Jan-15-2020.ashx

proposals to support community solar

This section responds to Options 9.1-9.3, to facilitate local and community engagement in renewable energy and energy efficiency.

We support local and community engagement in renewable energy and energy efficiency as a way to increase renewable energy generation, strengthen community resilience, as well as to empower customers.

We agree that facilitating local and community engagement in renewable energy and energy efficiency has positive social, environmental, economic and network and security of supply benefits. We believe that there is an opportunity for New Zealand to do more to be encouraging greater development of community energy projects.

A key benefit of increasing community renewable generation is strengthening community resilience by reducing customers' reliance on the centralised network. This is supportive of our climate change adaptation efforts. We also believe that encouraging community engagement in renewable energy and energy efficiency can increase the social license of our transition to a low emissions future by putting customers and communities at the centre, and empowering them to be active participants in their energy systems. Supporting community participation in their energy system can also strengthen customers' energy literacy. We agree that facilitating local and community engagement in renewable energy and energy efficiency will increase renewable generation by encouraging "participation of a wider variety of new entrants in the electricity market" which could "increase competition and may lead to lower overall wholesale prices in the electricity market". This includes enabling new standalone generators to enter the market.

This requires the right wholesale market conditions. We support the action of the EA to urgently impose mandatory market making conditions as a positive step to increase confidence and competition in the wholesale market. We agree with the analysis of the EPR - that 'an efficient contract market is particularly important for stand-alone retailers and generators, which are a key source of innovation and competitive pressure', and that a solution is needed for the wholesale market as it is 'not working effectively'. We note that last year saw price spreads in the wholesale market ten times greater than the desired 5 percent - which was attributed to uncertainty caused by low rainfall / gas shortages.

Managing the risk of disruption to the market caused by supply shortages is even more important as we transition to more intermittent sources of renewable generation. As we noted in our EPR submission, we believe there is a need for transparency of sales between generation and retail to support a competitive market in which a variety of generators and retailers can participate.

We support the option for the Government to support a small number of community energy pilot projects to better understand the business models, market design, and regulation required for replication and scale to enable this future.

We note the trial of the Local Energy Market (LEM) at Cornwall, UK, which will design and build a local marketplace platform to enable flexible demand generation and storage to optimise capacity on the local grid. This project is seeking to overcome network constraints which result from Cornwall's highly abundant renewable generation. Rather than investing in expensive and time-consuming network upgrades to support the export of this electricity across the network the LEM will create a local energy market to optimise the generation of distributed renewable energy assets.

We also support the proposal to develop a clear and consistent Government position on community energy issues, aligned across different policies and work programmes and agree that the coordination of policy across Government is currently a barrier to the uptake of distributed renewable energy communities. We note the regulatory work being led by the EA which relates to the issues currently associated with community energy projects and we support work to develop the regulatory system in favour of DER.

Initiatives to support the uptake of community renewable generation

The European Union (EU) revised its renewable energy directive in 2018 with a focus on individual and community participation in renewable projects. This change contains new definitions for "renewable energy communities", identifying them as stakeholders in the energy

system and requiring government support to simplify administration and procedures for community based projects. A growing number of EU countries are also addressing the financing challenges faced by energy communities. Increasingly, they are putting in place revolving funds that communities can access in order to finance upfront project development costs like feasibility studies and permits. These funds often come in the form of grant-to-loan schemes in order to limit investment risks for communities.

The Commonwealth of Massachusetts has launched the $40 million grant program the Community Clean Energy Resiliency Initiative. This is administered by the state to target the provision of clean energy technologies, including microgrids, to increase resilience. This is part of the state's climate change mitigation and adaptation efforts. The EU revised its renewable energy directive in 2018 with a focus on individual and community participation in renewable projects. This change contains new definitions for "renewable energy communities", identifying them as stakeholders in the energy system and requiring government support to simplify administration and procedures for community based projects. A growing number of EU countries are also addressing the financing challenges faced by energy communities. Increasingly, they are putting in place revolving funds that communities can access in order to finance upfront project development costs like feasibility studies and permits. These funds often come in the form of grant-to-loan schemes in order to limit investment risks for communities.

'Virtual net-metering' has been implemented in Greece to target energy poverty and to catalyse greater community renewable generation. Where over 50% of people live in apartment blocks and 4 out of 10 households experience energy hardship, Greenpeace Greece is proposing a 10-year social solar programme based on existing Greek energy laws on virtual net-metering. This would buy households a small PV system to be installed on their rooves or in a nearby PV park. This would enable these households to become self-sufficient, reducing reliance on electricity consumption subsidies. Consumers benefiting from this programme could reduce their energy bills by €280-315 annually. At only half the cost of the current social tariff programme, social solar is a win-win for the climate, for efficient government spending, and reducing energy poverty.[11]

The largest EDB in Illinois, ComEd, has led the Bronzeville Microgrid Project which integrates both customer and utility owned DERs. After funding the project through a series of innovation grants and regulatory approvals, ComEd, has committed to collecting data to cover more than four dozen metrics ranging from its operational efficacy to its societal impact. Starting in 2020, ComEd will be releasing this data on an annual basis for 10 years. This research will provide valuable data illustrating the impacts of microgrids on local emissions as well as reliability and resilience improvements.

11. https://www.foeeurope.org/sites/default/files/climate_justice/2019/community_energy_booklet_v5-pages-300.pdf

proposals to support local network connections and trading relationships

This section responds to Section 11 on local network connections and trading arrangements.

We believe there is a high degree of interdependency between *facilitating community engagement with renewable generation and energy efficiency*, and *local network connections and trading relationships*. Both of these respective sections are concerned with creating conditions to support the uptake of DER, and supporting a more decentralised network. This is because the goal of facilitating community and renewable energy will not be realised without the right network dynamics (supported by the right regulatory and industry settings) which enable new connections and trading to occur over the network.

In this way, EDBs will play a key enabling role in providing a platform to support new connections, and are in a unique position to create an energy system around their communities. As highlighted in this section, the EPR recommended that regulatory barriers to off-grid renewable generation and the electrification of process heat be identified and addressed. The EPR also recommended that the Government "encourage more innovation in the energy sector, particularly new technologies and alternative business models that support a low carbon future, by implementing the Commerce Commission's price-quality regulations in a way that encourages innovation among distributors."[12]

Whilst the discussion document holds that the Commerce Commission's recent default price-quality path (DPP3) decision includes a number of features which support decarbonisation by way of innovation (directly referencing the Commerce Commission's allowance for innovation projects), the Commerce Commission's innovation allowance was a mere 0.1 percent of allowable revenue.

There was also a notable absence of consideration for decarbonisation in the Commerce Commission's decision as this was not consulted on at all. We do not agree that the existing regulatory framework provides a platform for better coordination between investors (and to a certain extent consumers generally), distributors and other interested parties to connect new generation, electrify and/or participate in the electricity market.

We do agree however, that this coordination is required to ensure that networks are efficient, agile and adaptable to future technological and societal change. This is a key goal of Vector's Symphony Strategy, which, as noted above, is focused on leveraging new innovation and technology to achieve this agility in response to uncertainty - delivering greater efficiency for customers long term. Just as this coordination is required at a network level to support the transformation of our energy systems, so too is it required at a governance level. We therefore support a Ministry of Energy to strengthen this coordination.

12. MBIE Cabinet paper responding to the EPR.

pricing for DER and community renewable energy markets

This responds to aspects of Section 9 on facilitating local and community engagement in renewable energy and energy efficiency, and aspects of Section 11 on local network connections and trading relationships.

We agree that sending the right price signals to customers has a role to play to support the uptake of DER, engagement with demand response, and overall system efficiency. Vector is working with Mercury on the Power Down Trial to test the impact of financial incentives to reduce electricity consumption during peak times. Whilst the findings are still early stage, this study will be a first step in understanding the role of incentive based price levers to manage demand. We welcome the recent commitment of gentailers to pass through any distribution savings to customers.

We continue to engage with the EA as they progress efforts to make network charges more cost reflective but believe that consideration for overall system efficiency needs to be carefully balanced with consideration for equity implications and customer experience. Pricing is only an effective lever to manage demand when customers can respond to the signal. We therefore believe that pricing needs to work alongside technological solutions which support demand elasticity and simplicity for customers. We also note that relying on price as a signal can simply move, or create a new, peak. Smart demand response technology, like smart EV chargers however, are, in contrast coordinated and flatten peaks.

Our customer engagement has found that customers value simplicity when it comes to pricing, and this is supported by the past success of the Hot Water Load Control (HWLC) system, or ripple relay system. Whilst the system is not used to its full potential, the scheme showed how a small price signal which is simple to administer, can work effectively alongside demand response technology to deliver greater system efficiency. Whilst the price incentive offered by the scheme was small, customers signed up to the scheme and stayed there because it was simple.

Similarly, we perceive that a balance needs to be struck between dynamic and static pricing to achieve optimal system efficiency. Whilst dynamic pricing can play a role flattening peak demand, deferring costly upgrades, dampening demand where there aren't capacity constraints could also increase the risk of stranded assets. As will be highlighted further, this is why an asset management and investment approach which enables the network to adapt to changes in future demand is important to ensure long term efficiency in the context of change and uncertainty. Ensuring that there is an adequate incentive for the uptake of DER and solar needs to be balanced with any equity implications of cross-subsidisation. For example, a customer using DER may pay less in distribution prices overall as they draw less power across the network. However, they may still contribute to capital costs – for example by using the network during peak times (as solar panels generally do not generate a lot of power during winter peaks). This could effectively result in the cross-subsidisation of these costs by other customers.

We note the recommendation of the EPR for a distribution pricing Government Policy Statement. We support this option and believe that the complex matter of pricing in the context of developing DER requires higher level policy guidance. The TPM review is an example of the risk of leaving this matter up to regulatory decision-making. Such a lengthy and complex process only reduces certainty and we agree with the discussion document that there needs to be certainty and consistency across networks for industry to support investment in DER. The uptake of DER supports overall system efficiency and reliability for all customers connected to the network, not just those who have DER.

increasing private investment in renewable generation, energy efficiency and capability

This section responds to Sections 1 on information failures, 3 on innovating and building capability, as well as Section 5 on boosting investment in energy efficiency and renewable energy technologies.

Requirements for large electricity users to publish energy transition plans, including plans to transition modes of transport and energy sources, can provide greater visibility of changes in the demand. This supports a more efficient network response.

We agree that information failures can compromise our transition to a low emissions future. We support the proposal to require large energy users to publish Corporate Energy Transition Plans (CETPS). Work being undertaken by Vector would be significantly aided by access to transition plans for large users. We do not agree that spend should be used as a reporting threshold however, noting that Australia uses emissions and energy use. We support this approach. Australia also uses a 'sinking lid' threshold to increase the capture of firms over time. We don't oppose this necessarily but note that the compliance burden for New Zealand's large number of SMEs should be considered here.

We believe that such reporting requirements for large users should include plans to transition transport and energy. The electrification of transport – for both commercial and residential customers – will have a significant impact on the network; and, in the case of road freight, the transmission grid. Disclosure of large users' transport electrification intentions would be very valuable in informing network (and grid) planning and asset management. For this same purpose, Vector is seeking information to gain more granular data of EV registrations to better forecast future uptake of residential EVs.

Building the capability and absorptive capacity of businesses supports greater private investment in new clean energy solutions

Encouraging investment in greater renewable generation and energy efficiency requires the capability and conditions for firms to adopt new energy solutions from the embryonic market. We agree that support for demonstration and diffusion both de risks new clean energy projects and helps to train, build and retain new capability. We support the proposal to expand EECA's grants for technology diffusion and capability building; and to collaborate with industry to foster knowledge sharing, develop sectoral low carbon road maps and build capability for the future using a Just Transitions approach.

We support proactive incentive-based interventions to increase private investment in clean energy projects. We believe that there is currently an under-incentive for businesses to invest relative to the wider public good outcomes of such investments. We therefore support the provision of Government funding to overcome this market failure, and to catalyse the industry's transition to low emissions energy and energy efficiency.

We support the goal of boosting investment in energy efficiency and renewable energy technologies. We believe proactive measures are needed alongside the ETS to accelerate the uptake of cost-effective clean energy projects.

We agree that advancing the 'regulatory approach' described in the discussion document to drive investment in clean energy could result in high compliance costs to businesses and we do not support this option. However, we see a role for a proactive, incentives based scheme to increase industry's investment in energy efficiency and renewable energy to compliment the ETS. We note the risk highlighted by the discussion document – that Government finance projects that would have happened in the market anyway, and we appreciate the value of additionality in implementing any Government intervention or investment.

However, we believe that this risk is low given the current cost and uncertainty associated with low emissions energy solutions when compared with alternatives. As highlighted by the Stockholm Environment Institute, in their report, *A public-private path to decarbonising industry and achieving net zero emissions*, "the private sector tends to move fast as soon as the economic incentive is there. But it has limited room to experiment with solutions that are more expensive than the standard one". This is particularly where a business faces competition locally and internationally from those that continue to use, existing, lower cost methods.

We note that the proposed settings of the ETS – including the price controls for the proposed NZ ETS auctions – are designed to manage unacceptably high or low NZU prices, supporting a just transition to a low emissions future. This also means that the ETS is unlikely to provide an adequate economic incentive by itself to support the industry investment in clean energy solutions needed. Investment in low emissions energy solutions is stacked in favour of public outcomes, rather than private returns, currently. For a large electricity user considering these investments a relatively small portion of the wider benefits are returned to that user currently, compared with the public good value.

This results in an under incentivise to invest relative to the wider value for New Zealand – including, helping to reduce emissions targets affordably, supporting New Zealand's innovation ecosystem, and, delivering better health outcomes and savings for customers.

We therefore consider that an intervention logic similar to that which underpins Government funding for business expenditure on research and development (BERD) applies for Government funding for greater private investment in renewable energy and energy efficiency solutions.

This is particularly where new energy solutions are still early stages and high risk. According to the Stockholm Environment Institute, "Demonstration and deployment stages are when investment costs become significant for private industry, and governments may therefore need to start playing a bigger role in providing financing to companies that are ready to pilot and demonstrate carbon-neutral solutions."

Transitioning nascent solutions to commercially viable solutions is a challenge, and traditional funding sources often don't target clean tech solutions because they tend to be very capital intensive and have long paybacks.[13]

Overcoming this market failure to see a step-change in levels of private investment in renewable energy and energy efficiency technologies requires an incentive based intervention which is simple, from Government. We consider the investment in ultra-fast broadband in New Zealand to be an example of how Government investment can succeed in transforming enabling infrastructure to meet the requirements of a rapidly changing future. Whilst there was little private incentive to transition fibre networks in provincial New Zealand to ultra-fast broadband, there were clear benefits for the national economy – and, in particular, for regional economic development. Similarly, there is an opportunity for Government to play a leading role in the transformation of our energy systems by overcoming private under incentives to invest in clear, future, public good. Local, community owned EDBs have a key role to play in supporting this future, and are the logical vehicle to advance community interests, and the Government's wider goal to accelerate renewable generation.

International research shows that the returns of public investment in clean energy can be significant – in terms of both wider public outcomes, and by having a cumulative impact on further private investment – "public investment (in clean energy) will have a significant effect in generating private investment revenue. This analysis is backed by various historical investment successes. Just as past public investment efforts into railroads, the highways, microchips, the Internet, computer science, and the medical biosciences triggered billions in private investment, and paid for themselves many times over, so will these new investments into energy. This pattern of private investment following public investment remains apparent today in both biofuels and biosciences. The econometric analysis described above found that a $300 billion investment would pay for itself in ten years both through energy savings, economic growth, job creation, profit taking."[14]

We acknowledge the NZ Green Investment Finance project (NZGIF) which was established to help overcome this market failure in catalysing investment in lower greenhouse gas emissions activities in New Zealand. We support this initiative as a positive step and note that it is still in its first year of operation.

13. Burger, Murray, Kearney & Ma (2017), The Investment Gap That Threatens the Planet. Stanford Social Innovation Review.
14. Shellenberger et al. "Fast, Clean, & Cheap: Cutting Global Warming's Gordian Knot". Harvard Law & Policy Review. 2013. pg 116.

initiatives to increase private investment in energy efficiency, renewable generation, and capability

To address finance barriers to renewable energy efficiency deployment in Chile, the Chilean Economic Development Agency (CEDA) implemented a concession loan scheme to support commercial banks in providing low interest loans for renewable energy efficiency technologies and projects. The success of the project has been attributed to the fact that it was designed with a long-term timeframe, that it was implemented in a simple way, through a streamlined process, and that it was promoted through broader community outreach and engagement built awareness of the program.

We support the approach described in the OECD Trade and Environment Working Paper Domestic Incentive measures for Renewable Energy with Possible Trade Implications, of pairing incentives to support private investment in renewable energy systems, with interventions for EDBs to increase DER and energy efficiency.[15]

Canada's Scaling Cleantech workshop held at Globe Capital 2019 brought together researchers, innovators, and funders to strengthen Canada's clean energy innovation ecosystem. Key solution-focused themes which emerged from the workshop were to increase and enhance information/knowledge sharing on existing mechanisms; create new financial vehicles/mechanisms and partnerships; and, grow understanding and capacity in cleantech companies and investors.

A recommendation that emerged from the workshop was to "create more blended finance approaches that utilise public funding to increase private sector investment. An example of this is a Public-Private Partnership (PPP) where private investors provide up front funding and are repaid by Government if certain objectives are achieved.[16]

California's Self Generation Incentive Program (SGIP) aims to accelerate the uptake of DER. The program started in 2001 to reduce the financial barriers to the installation of customer sited DER, and, due to the program's success, it has been extended three times. The scheme has evolved to adapt to advances in technology and changing market needs. Most recently, 75% of the budget was allocated to support energy storage technologies and the goals of the program changed from a target of peak demand reduction to targets on GHG reductions, grid support and market transformation. Findings from a 2015 evaluation of the program noted: "To be successful, the overarching policy goal of a transformed distributed generation (DG)/energy storage market needs to be presented clearly and with a unified front. This unified front provides clean tech capital investors with faith that policies and regulations will not present uncertainty or barriers to market growth and will enable them to invest in innovative clean technology projects. This consistent alignment of clean tech policies with the subsequent capital investment from the tech capital investment community will ultimately be a key force in transforming the DG and energy storage markets". As well as spurring private investment in new energy projects, this project demonstrates the enabling role that local networks can play in providing a platform for clean technology and DER, as funding for DER is provided via the network.[17]

15. Bahar, H., J. Egeland and R. Steenblik (2013), "Domestic Incentive Measures for Renewable Energy With Possible Trade Implications", Trade and Environment Working Papers, No. 2013/01, OECD Publishing, Paris, https://doi.org/10.1787/5k44srlksr6f-en;
16. Flowing Investment to Scale Clean Technology. Globe Capital. 2019.
17. SGIP Market Transformation: Final Report. 2015. Submitted to PG&E and the SGIP Working Group. Prepared by Itron. https://www.itron.com/white-paper/sgip-market-transformation-final-report.pdf

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