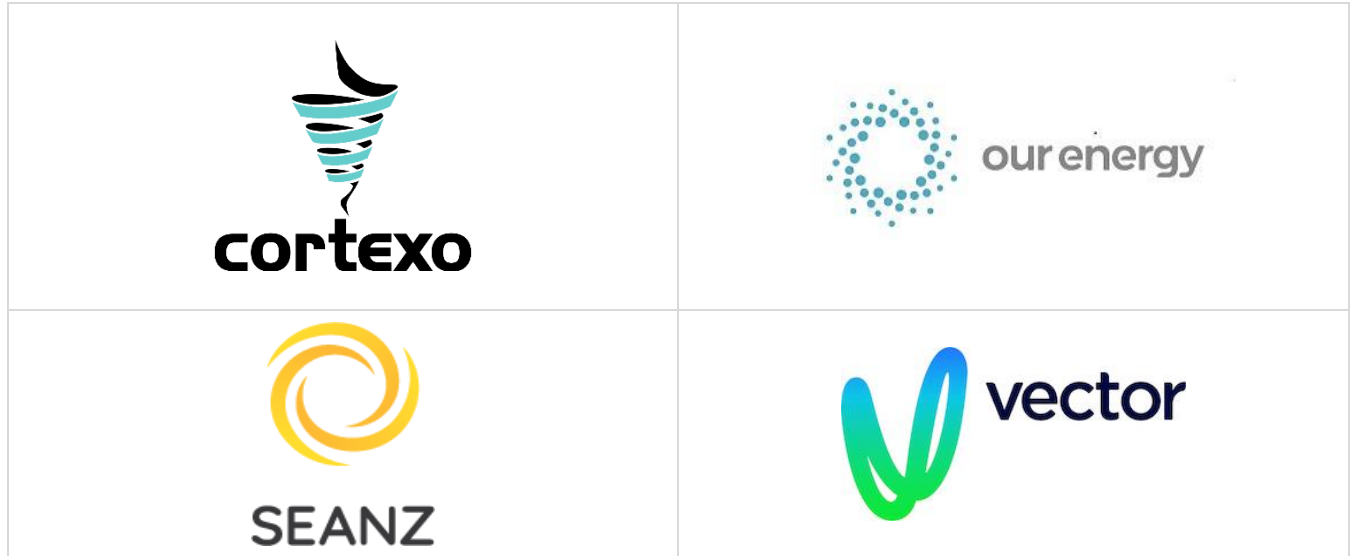


**Submission to the
Electricity Authority
discussion paper on**

**Updating the regulatory settings
for distribution networks**

**A collaborative submission from
DERvolution: A cross industry
supply-chain electricity industry
participants representatives
and consumers**



Cortexo (<https://www.cortexo.com/>) is a grid-edge software platform that enables a greater uptake of distributed energy resources on electricity networks

Our Energy (<https://www.ourenergy.co.nz/>) is an innovative energy technology company with a proprietary online platform that matches real-time data from those producing their own electricity with others in their communities

SEANZ (Sustainable Energy Association New Zealand) (www.seanz.org.nz) leads the distributed energy resources (DER) industry. Stakeholders cover the supply chain in totality – businesses to end-users and consumers of DER, primarily solar PV (residential, commercial, industrial and utility scale) energy storage, smart energy and DER control, aggregation, mini/micro grid development.

Vector (www.vector.co.nz) is an innovative New Zealand energy company, which runs a portfolio of businesses delivering energy and communication services to more than one million homes and commercial customers across Australasia and the Pacific. Vector is leading the country in creating a new energy future through its Symphony strategy, which puts customers at the heart of the energy system.

Our Key Points

- The electricity sector needs to be working to support the electrification of as much economic activity as possible to support our decarbonisation goals while delivering affordable, reliable, safe electricity services
- The practical effects of electrification will be first observed by distributors, particularly in the low voltage networks, as existing connections use more electricity and more electric vehicle chargers, solar panels, battery storage, and smart devices (all distributed energy resources or DER) is connected. The central role of DER in accelerating electrification and decarbonisation means the focus of regulators and policy-makers must be to ensure regulatory settings for distribution networks, but also the wider system and market, are designed to encourage connection of DER and to make full use of the flexibility of that DER.
- Collaboration and partnership across the electricity supply chain will be necessary to develop fit-for-purpose regulatory settings. Working in siloes in a fragmented and uncoordinated way will not result in appropriately focused activity reflecting the relative priority of the actions required.
- We consider the critical overarching requirements to successfully update the regulatory settings for distribution, and the wider system and market, to accelerate electrification and uptake of DER are:
 - explicit and public coordination between the Electricity Authority and Commerce Commission to ensure the Code and Input Methodologies made under Part 4 of the Commerce Act are aligned and complementary to accelerate electrification without imposing unnecessary costs on consumers
 - an inclusive process based on building people power (the demand side) into the electricity market and obtaining a social licence will be important to establishing enduring arrangements which avoid the lack of public (and political) confidence that persists with the 'Bradford reforms' from the 1990's
 - a learning-by-doing approach with industry-led development of products and practical solutions which are scalable across the market and using this to inform updates to the regulatory settings (analogous to how the wholesale market was set up).
- We consider the next step from the Electricity Authority must be to support a series of whole-of-sector – and beyond – workshops alongside the Commerce Commission focused on building a coherent and comprehensive plan for accelerating electrification, uptake of DER and decarbonisation.

- Specific requirements include:
 - distributors need greater visibility of their low voltage networks to support electrification and connection and use of DER (including by flexibility traders). The underlying problem is the continued reliance by electricity sector on analogue data, in part due to the regulatory settings not supporting digitalisation. The focus needs to be on identifying what regulatory settings are required for distributors (and the wider electricity sector) to fully embrace digitalisation as quickly as possible.
 - updating of standards of supply needs to occur in parallel with updating of asset management and the associated network connection requirements to make DER and flexibility a feature of network and system operation.
 - the single-most potent catalyst for creating a flexibility services market is for the Commerce Commission to update its regulatory settings to make flexibility a feature of network management.
 - concerns regarding equal or open access and anti-competitive behaviour by distributors or any other party can only be tested once the market is established.
 - specifying operating agreements is premature in the absence of a market. Terms of trade of flexibility services will emerge with experience, supported by the Electricity Authority assisting an industry-led process to develop the initial terms of trade, particularly the product specification for flexibility services and enabling trials to occur
- Capability and capacity of distributors are a corporate governance issue. The nature and scale of the problem will be observed through implementation of changes needed for electrification.
- Coordination of progress toward more efficient pricing and updating of asset management practices to accommodate uptake of DER and flexibility from DER is needed to assist distributors to realise the full value of flexibility from DER.
- Sapere's estimated benefits for integrating DER into the electricity system and markets warrants placing a high priority on reviewing regulatory settings to accommodate DER and flexibility.
- A coordinated plan is needed to guide the transition and realise the greatest possible benefit to consumers, the economy and the environment.

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Working together to accelerate electrification

The electricity sector must adapt to accelerate electrification and decarbonisation.

No one part of the electricity sector, individual business or agency acting alone will deliver change at the pace and scale needed to for the electricity sector to help meet the decarbonisation goals of Aotearoa New Zealand.

A concerted and coordinated commitment to change is needed from government, regulators, sector participants - present and future, large and small - industry groups, and consumers.

Cortexo, Our Energy, the Sustainable Electricity Association of New Zealand (SEANZ) and Vector are collaborating on this response to the Electricity Authority discussion paper on *Updating the regulatory settings for distribution networks* as a practical step toward embedding a partnership-based approach to accelerating electrification.¹

We consider the next step from the Electricity Authority must be to support a series of whole-of-sector – and beyond – workshops alongside the Commerce Commission focused on building a coherent and comprehensive plan for accelerating electrification, uptake of DER and decarbonisation.

2030 and beyond. What are we working towards?

The Climate Change Commission tells us... *The use of low emissions electricity allows other sectors to reduce emissions. Electrifying transport and process heat will require significant expansion in electricity generation capacity. Demand for electricity will also increase as buildings and process heat switch away from fossil fuels. Increased generation and demand will need to be accompanied by expanding infrastructure for transmission and distribution.*²

The future imagined by the Climate Change Commission includes a major expansion of the electricity system to displace fossil fuels by electrifying transport, electrifying industrial process heat, and electrifying space heating.

¹ Cortexo, Our Energy and Vector are members of SEANZ.

² Climate Change Commission, 31 May 2021, [Ināia tonu nei: a low emissions future for Aotearoa](#), p112. Emphasis added.

Practical impacts of electrification must inform the scope and priority of changes to regulatory settings

We do not know what the electricity system or electricity networks will look like in the future anticipated by the Climate Change Commission. Changes to how networks are used and to network management depend on the pace of localised electrification and a wide range of policy choices across the economy.

We know the effects of electrification will be first observed by distribution networks, but the specific impacts are difficult to quantify because they depend on the choices and needs of households and businesses.

The essential role of electricity networks is recognised by Transpower in its [Electrification Roadmap](#). That says “Transpower and distribution lines companies must directly support and enable rapid electrification. If one part of the supply chain is not prepared with either the equipment, expertise or planning, the electrification of our economy will stumble at the start.”

What we do know is that distribution networks will need to deliver more electricity to existing connections and will be connecting millions of electric vehicle chargers, solar panels, battery storage, and smart devices (all distributed energy resources or DER), mostly on the low voltage networks that supply households and businesses. Much of this DER will be able to modify its operation (generation or consumption patterns) in response to a request or signal (such as a change in price) to provide services within the electricity system.

DER is the difference

DER is the difference between the electricity system and markets we see today and what we will see in 2030.

Compared to what was seen in 2000 or 2020, in 2030 there will be millions of devices (most of which will be, or could be, DER) connected to the power system at the low voltage networks, which:

- fundamentally alter traditional network use patterns, and as noted by the Climate Change Commission will require new network investments to accommodate the ‘extra’ power consumed or produced by all these devices

- significantly extend the potential for optimisation of consumer, producer and network operation outcomes³ due to the capability to instantaneously and automatically receive and respond to internal and external signals (eg, prices, temperature, network power quality thresholds)
- are essential to a low carbon economy and every-day life, including how and when people fuel their vehicles, power their machines, engines, motors, and provide energy for their homes and businesses.

There will be more DER in the future, as declining costs mean people are increasingly able to afford devices with relevant capabilities and as the imperative to reduce carbon emissions encourages the electrification of the economy.

For these reasons, the starting point and necessary condition for accelerating electrification and decarbonisation is to develop regulatory settings for distribution networks that enable non-discriminatory connection of DER, make economic use of the flexibility of that DER in the safe, secure, reliable, and affordable operation the network, the system and the market, and build in people power.

A coordinated approach to updating the regulatory settings is needed

The regulatory settings governing the electricity sector – retailing, distribution, transmission, and generation – need to be fit-for-purpose across the board to support an acceleration of electrification and decarbonisation, plus achieve an affordable, reliable and secure supply of electricity.

³ With digitalisation, consumer (using electricity), generation (producing and selling electricity) and network operation (delivering electricity for consumption and generated) outcomes could eventually be optimised minute-to-minute for each connection to the network based on the value each connection derives from using the network at that time and location, with the value determined as a function of the network operating envelope, the associated network price, and the electricity price.

Network users would make choices to use the network or not, minute-to-minute based on the (price) information available from the network operator about network availability (ie, constraints). For example, a generator could choose to continue generating despite a high network price (signalling a constrained network) because the electricity price made doing so economic. Network capacity would be made available by other network users choosing to reduce or stop using the network either in response to a direct signal (contracted response) or indirect signal (ie, the high network price).

The primary operating principle for the network operator would be to allow each network user to maximise value from using the network, within the network operating envelope.

Regulatory settings for the electricity sector are not fit-for-purpose

Regulatory settings for the electricity sector were designed in the 1990's to deliver safe, reliable and affordable power for circumstances which were quite different to now – DER was not expected to become prevalent.

The Electricity Industry Act 2010, Electricity Industry Participation Code 2010, Electricity Act 1992, Commerce Act 1986, and assorted regulations and instruments continue to reflect the circumstances and priorities of the 1990's (and earlier).

Two features of the current legislative and regulatory settings will increasingly stand in the way of accelerating electrification:

- the settings are designed to deliver incremental improvement in a steady-state environment not the transformational change required by electrification and decarbonisation.⁴
- the carving up of day-to-day responsibility for safe, reliable, and affordable electricity supply outcomes between the Electricity Authority, Commerce Commission, Worksafe, and the Energy Efficiency and Conservation Authority.

The regulatory settings are designed to deliver incremental improvement with decision-makers acting within clearly defined and distinct siloes of responsibility. The impact of this approach during a transition will be siloed decision-making, conflicting outcomes, inertia and a slowed pace of transformation because innovation tends to cut across artificial market segments – being designed around customer needs and values rather than regulation.⁵

A further concern is the regulatory settings do not explicitly consider carbon reduction goals. The risk is that investments which support carbon reduction efforts may not proceed unless they meet reliability or consumer benefit criteria because those do not currently account for carbon costs.

Coordination between decision-makers

Designing regulatory settings for distribution which are fit-for-purpose for accelerating electrification requires explicit coordination between the Electricity Authority and

⁴ This conclusion was highlighted by Cortexo and Our Energy in their [article series on the heavy lifting required from the electricity sector to achieve carbon budgets](#) and by Vector in its [submission to the Climate Change Commission draft advice](#), section 1.4

⁵ Vector, response to the Climate Change Commission draft advice, p56.

Commerce Commission, plus the Ministry of Business, Innovation and Employment as lead policy agency (particularly if legislative change is required).

A narrow focus on a specific part of the electricity sector (eg, distribution) or single regulatory jurisdiction (eg, of the Electricity Authority) raises the risk of disjointed, conflicting outcomes which may delay electrification and raise costs.

Concerns regarding a lack of coordination were raised within the Security and Reliability Council (SRC), a body which exists to advise the Electricity Authority on the performance of the electricity system and the system operator, and reliability of supply. The SRC observed in February 2021 that, “Several members also noted concerns around the lack of cohesive strategy for the future, silo thinking and possible distortions to market dynamics. Recent examples include the Climate Change Commission report, the hold on the project to examine the security and resilience of the electricity sector (G2), the NZ Battery project, the hold up of mandating the inverter standards. The risk of not having a cohesive strategy is that various reviews, projects, and initiatives could produce contradictory outcomes.”⁶

Coordination is particularly necessary between the Electricity Authority and Commerce Commission on regulatory settings for the distribution sector. However, a coordinated outcome is not guaranteed with the current regulatory settings.

Updating the regulatory settings for distribution requires explicit coordination between the Electricity Authority and Commerce Commission to ensure the Code and Input Methodologies made under Part 4 of the Commerce Act are aligned and complementary to enable accelerated electrification without imposing unnecessary costs on consumers.

For example, the Part 4 regime focuses on promoting the efficient supply of distribution services only. A siloed approach is likely to result in situations where the efficient (least cost) network solution is not the efficient (least cost) whole-of-supply chain solution.

Changes must be coordinated and complementary to avoid compromising efficient electrification.

⁶ Security and Reliability Council, 25 February 2021, meeting minutes, available at, <https://www.ea.govt.nz/assets/dms-assets/28/SRC04-Minutes-of-previous-meeting-25-February-2021.pdf>

An inclusive process for the updating of regulatory settings is needed

Electrification means households and businesses will increasingly rely on the electricity sector compared to now, as people use electricity to fuel their vehicles, power their machines, engines, and motors, and power their homes and businesses.

But public confidence in the electricity sector does not appear high. News headlines and reporting do not regularly reflect a positive public regard for the electricity sector. A common theme of reporting is the electricity 'market' is not meeting community expectations, particularly regarding the price of power.⁷

An inclusive process for the updating of regulatory settings will be important to establishing enduring arrangements which avoid the lack of public (and political) confidence that persists with the 'Bradford reforms' from the 1990's.

Particularly important is for participants both current and future in the electricity sector to obtain a social licence for access to consumer DER. Energy Consumers Australia has highlighted the role of a [social licence for control of DER](#) for successful electrification and uptake of DER. The basic idea is that flexibility users (in the electricity sector) will need to obtain the "informal permissions granted by stakeholders for government or institutions to undertake decision making on behalf of energy consumers as to how they operate their DER systems, above and beyond what is required by law".

Gaining a social licence for control of DER and for the electricity market more broadly means building people power (the demand side) into the electricity market. Doing this requires a new approach to developing regulatory settings.

Central to this new approach must be a learning-by-doing process which uses trials and pilots to test new ideas and concepts and demonstrate real-world value to households and businesses.

A possible template is the product development cycle for fast-moving consumer goods which is wholly focused on finding out what people want and how much they are prepared to pay. This 'consumer-centric' approach requires more than consumer advisory panels and getting submissions from consumer representatives. It means industry-led development of 'products', trial and error, listening what people want and need, and using the insights to inform changes to the regulatory settings.

⁷ For example, this Stuff article from 14 July 2021, [Energy Minister Megan Woods concerned high electricity prices may 'persist'](#), talks about concerns electricity prices being unaffordable for the economy.

Framing the issues raised in the discussion paper

The purpose of the discussion paper is to provide the Electricity Authority with feedback on the nature and materiality of six themes or sets of issues to help to refine and prioritise any change to the regulatory settings.

Meeting this purpose requires asking three overarching questions.

1. Does the issue delay or restrict electrification and the connection of millions of DER?
2. What reasoning or evidence suggests that the issue is or will affect the pace of electrification and the connection of DER?
3. What are the actions that are needed prior to or alongside a solution to the issue to accelerate electrification and connection of DER?

Answering these three questions will identify, for each issue, the relative importance and relative priority for addressing the issue (however achieved) for achieving electrification (ie, the future state).

Importantly, each issue needs to be considered from a consumer perspective, across the whole supply chain to understand the interaction and dependencies between the issue and other relevant regulatory settings.

Framing each issue from a consumer perspective within the broader regulatory context will inform the scope and scale of the issue, help to determine priorities, and to provide a clear line of sight between the issue and the desired outcome and future state.

Assessing the impact on electrification and uptake of DER of the six themes

Six themes or sets of inter-related regulatory issues are raised in the discussion paper.

Table 1 frames the themes according to an issue being operational or market-related and a current or future priority. The categories provide a high-level structure to assess the interaction and dependencies between each issue and relevance to accelerating electrification and uptake of DER.

The operational/market-related categories distinguish issues based on physical impacts versus financial and experience-related impacts. The current/future categories distinguish issues based on observed impacts versus expected impacts.

Also included in the table are topics relevant to designing regulatory settings for distribution networks to enable accelerated electrification and uptake of DER. The expanded list of things to consider reflects the importance of a people-first,

comprehensive, coordinated, whole-of-supply chain approach to updating the regulatory settings for distribution networks.

Table 1: Framing issues with regulatory settings affecting electrification and uptake of DER

		Network operations & Planning	
Initial priorities	Information on power flows and hosting capacity	Capability and capacity	Future opportunities
	Electricity supply standards	Transmission investment & operation	
	Digitalisation		
	Asset management and operation		
	Flexibility services performance		
	Efficient price signals, including for flexibility services	Price discovery in the wholesale market	
	Flexibility service product specification	Market settings for equal access	
	Terms of trade for flexibility services	Operating agreements	
	Community confidence in market settings	Customer and small participant (DER owner) protection	
		Market development	

The additional topics will be mentioned where relevant alongside the relevant theme raised in the discussion paper.

Theme one: Information on power flows and hosting capacity

Theme one describes issues faced by distributors and flexibility traders obtaining data on network use, particularly on low-voltage networks.

Distributors need greater visibility of their low voltage networks to support increasing electrification and the connection and use of DER (including by flexibility traders). This means obtaining consumption and power quality (eg, voltage) data for forecasting,

planning and operating decisions – essentially the same data collected now for the high and medium-voltage parts of distribution networks.

- forecasting and planning decisions require historical consumption and power quality data to inform asset management and network investment decisions
- operational decisions to ensure safety and reliability require real-time consumption and power quality data to maintain network performance minute-to-minute and day-to-day.

Low-voltage network visibility has not been a core business need

Distributors do not have visibility of their low-voltage network because very predictable one-way usage patterns made it unnecessary and the capability was expensive to obtain until quite recently. The result is low-voltage visibility has not been a core business requirement or investment priority.

Because low-voltage visibility has not been a core business requirement, the associated capital and operating costs have not been reflected in the revenue (costs) allowed by the Commerce Commission price-quality regime. As the regime uses historical costs to determine the revenue allowance, non-exempt distributors do not have funds to invest in obtaining greater network visibility (without risking the negative impacts of under-investing elsewhere).

Greater network visibility is needed for distributors to actively manage performance of low voltage networks as households and businesses electrify space and water heating, commercial processes, transport and connect distributed generation.

- **Historical consumption data** (for each connection) is available from traders and accessible through the Data template in the Code. The access mechanism is workable but unnecessarily increases transaction costs by requiring each distributor to get permission from each trader to combine the consumption data with other datasets (and make it useful).
- **Historical power quality data** is not routinely available as it has not been required or collected for low-voltage networks. Most digital meters measure power quality and event data, but distributors would need to pay MEPs to access power quality data.

Alternatively, distributors could invest in their own low-voltage network monitoring capability.⁸

⁸ For example, several exempt distributors, eg, Counties Power, WEL Networks, have network monitoring capability by investing in their own metering fleets and back-office systems.

Both options involve new costs and the revenue allowances would need to be adjusted accordingly.

- **Real time consumption and power quality data** is not routinely available beyond distribution substations because it has not been necessary for operation of the low-voltage networks. Current metering does not have the communication capability needed to provide a minute-to-minute data stream if it were necessary. Next generation metering has the communication capability built-in, however there are costs associated with transmitting and storing the data. Given the replacement of current generation metering is starting now there is an opportunity to ensure appropriate settings are in place for the metering services market to achieve appropriate access to data. It is likely that network operational data requirements will not require collecting a constant data stream for each connection on a network at all times, however we do expect a need to selectively access high resolution real-time data for specific areas of the network when network constraints emerge.

Real-time network visibility will require distributors to incur new costs and the revenue allowances would need to be adjusted accordingly.

Regulatory settings have led to a slow embrace of digitalisation

Parts of the electricity sector have been quite slow to embrace digitalisation, which highlights an overarching question: what regulatory settings are required for the electricity sector, including distributors, to fully embrace digitalisation as quickly as possible.

The electricity sector is data and information rich, but digitalisation has not been prioritised across the whole sector to capture and use that data. Data has often remained analogue because this has been the least cost option given the relevant need. The result is information remaining trapped in siloes and either being underutilised or unused completely.

Without digitalisation, planning, forecasting and operating decisions across the sector will increasingly be made without all the available insight and evidence. With investment levels on track to increase given the electrification transition ahead, any unnecessary costs resulting from this lack of information could easily fall on households and businesses least able to afford them.

Decision-making processes can be improved by widespread digitalisation supporting a more robust data-led planning process. Enabling more digital capture of data starts with adapting equipment requirements, software integrations, and the selection of appropriate digital communication standards, such as standardised application programming interfaces (API) and openADR.

Active management of low voltage networks will mean distributors are considering flexibility from DER alongside physical network equipment to maintain network

performance. But digitalisation must begin before this active management can take place.

Options outlined unlikely to accelerate digitalisation

The options outlined in the discussion paper are unlikely to accelerate the embrace of digitalisation by distributors (or the remainder of the electricity sector).

The immediate need is to identify ways to encourage distributors to invest in digitalisation, including growing their low-voltage network visibility to provide information to asset investment decisions of prospective flexibility traders. Options include:

- the Commerce Commission adjusting revenue allowances for non-exempt distributors to invest in digitalisation
- the Commerce Commission requiring all distributors to adjust asset management practices to prefer flexibility services for network management in appropriate circumstances
- the Electricity Authority to support the collaborative industry-led development of a flexibility services market, via pilots and trials to identify flexibility product specifications, terms of trade and pricing
- the Electricity Authority to publish guidance on expectations regarding meeting requirements on distributors to report on export congestion under Part 6 of the Code (s6.3(2)(da))⁹
- the Electricity Authority amending the default Data template to remove the requirement for each distributor to obtain permission of each trader to amalgamate consumption data with other datasets.

Electricity supply standards

Theme two describes issues relating to the existing electricity supply standards which set safety and quality requirements for operation of and connection to distribution networks. These 'standards' collectively establish the operating envelope for each element of a network and inform network operation and investment decisions.

⁹ This is an implementation pathway suggested by the Innovation and Participation Advisory Group in its December 2019 [Equal Access final advice](#) to the Electricity Authority for encouraging the evolution of monitoring and reporting by distributors of performance of low-voltage networks within operating envelopes.

The discussion paper raises a range of concerns:

- high levels of DER may cause a supply voltage problem or overload network assets
- high levels of DER may exacerbate a system frequency problem
- high levels of DER may affect the power quality experienced by network neighbours
- connection and operation standards are inconsistent across network areas
- inconsistent use of the standards suite AS/NZS 4777 (the standard applying to connection of energy systems via inverters to a network)
- the Part 6 DG connection process may not remain fit for purpose because an increase in higher capacity DG could result in distributors not being able to meet prescribed timeframes from increased workload assessing the impact on hosting capacity
- relevant 'standards' need to be updated to ensure appropriate settings exist for connection of, and use of, battery storage, EV chargers, distributed generation and network-interactive devices (eg, heat pumps or any responsive device) – that is, all DER.

Check that network operating envelopes accommodate DER

The standards established in the Electricity Act, Electricity Safety Regulations and other legislation provide the technical and performance requirements for operation of the network (by the network operator) and for use of the network (by parties connected to the network).

The requirements largely reflect expectations for network operation and use up until recently. The operating envelope is premised on predictable patterns of power use by households and business, and inconsequential amounts of DER.

The operating envelope – and the supporting standards – needs updating to accommodate two major changes occurring from now to 2030 and beyond.

- distribution networks will be delivering more electricity to existing connections and will be connecting millions of electric vehicle chargers, solar panels, battery storage, and smart devices (ie, DER)
- the dynamic capability of DER provides network operators with flexibility to manage network performance within the operating envelope without needing to reduce service levels, limiting network use (eg, refusing connection), or upgrading network infrastructure.

The implication is the updating of standards of supply needs to occur in parallel with updating of asset management and the associated network connection requirements to make DER and flexibility a feature of network and system operation.

This means a shift from static to dynamic management of hosting capacity to maximise the amount of generation (eg, solar) or consumption (eg, EVs) that can be connected to a network and used without diminishing the reliability or voltage quality experienced by other consumers.

Avoid dictating what consumers can connect to networks

Successful consumer-oriented businesses deliver the products and services customers want when they want them. This is why, for example, we see different car models sold by different carmakers.

The energy service consumed by most people up to now – of which the distribution service is an input - has been relatively homogenous. This has allowed the distribution service to be provided on a one-size-fits-all basis. However, the homogeneity in network use will diminish during this transition as people electrify and connect DER.¹⁰

It is difficult to see consumers accepting a one-size-fits-all distribution service which attempts to restrict the range of DER purchase options to reflect what suits the network operator. Past examples of distributors imposing direct or indirect restrictions on connection of solar indicate the potential negative reaction to prescriptive efforts to control consumer DER choices.

A customer-centric network management approach would be to ensure the distribution service is delivered in a way which allows each network user to maximise value from using the network (within an appropriate operating envelope) at the same time ensuring each network user meets the cost of that use.

Options need to support a shift from static to dynamic network management

The options outlined in the discussion paper are unlikely to support a shift from static to dynamic network management to support a customer-centric approach.

The role of standards in determining the operating envelope for each level of a distribution network and informs network operation and planning decisions. This means

¹⁰ Homogeneity may return once the electrification process is complete.

updates to the operating envelope need to be coordinated with an update to asset management practices to support electrification and DER.

The key to success will be ensuring new standards are developed to reflect changing operating conditions and uncertain consumer preferences. This suggests preferring:

- principles over prescriptive requirements and trust and incentives over control when updating standards
- avoiding restrictions on connection of DER or equipment, but explicitly rewarding dynamic capability
- distributors collaborating to trial dynamic network management to identify approaches which allow network users to use the network based on their individual value calculations.

Market settings for equal access

Theme three describes issues relating to equal access to distribution networks, including the potential for distributors to distort or discourage competition in the market for flexibility services.

The discussion paper states the objective is for distribution services to be delivered using an efficient mix of network and non-network alternatives. The main concern potentially preventing this outcome is that stronger incentives are needed to encourage (or even require) distributors to use flexibility services, and to avoid distributors favouring in-house solutions.

Equal access is about developing a flexibility services market

The purpose of equal access is to support use of flexibility from DER across the supply chain and the emergence of a flexibility services market.

Flexibility services from DER are not yet an everyday network management tool in Aotearoa New Zealand. Flexibility is seen as an option, and several distributors have actively considered or installed flexible options, for example Powerco (Whangamata battery energy storage system); Aurora Energy (Upper Clutha Non-Network Alternative ROI); and Vector (Glenn Innes battery energy storage system and the Warkworth area upgrades identified in the 2021 asset management plan).

There is a chicken and egg problem. Distributors do not see sufficient flexibility available to rely on, and see it as a not-quite ready yet solution; and flexibility suppliers don't have sufficient certainty their capability will be used to underpin the required investment, and so cannot commit flexibility resources.

The immediate barrier is regulatory settings for asset management

The immediate barrier to emergence of a flexibility services market is the regulatory settings applied by the Commerce Commission create a bias towards traditional asset management solutions.

As pointed out by the IPAG, [existing regulatory settings do not provide sufficient incentives](#) for efficient use of flexibility. We broadly endorse this conclusion with more detail and the reasons outlined in our submissions to the Commerce Commission.¹¹

The input methodologies which specify the regulatory settings for determining the price and quality of distribution services need to provide more explicit support (via financial incentives or obligations) for network operators to do the extra work needed to evolve investment and operating practices to fully leverage the capability and value of DER and flexibility services. Similar encouragement is needed for the distributors only subject to information disclosure.

Experience from Great Britain indicates regulatory intervention is required – with changes to network regulation and market settings and funding – to overcome the coordination problems preventing access to the full value of DER (ie, emerging technologies). Even with the explicit support and dedicated funding, the Great Britain flexibility market has taken over 4 years to get to where it is today.

A flexibility services market requires changes to the input methodologies

Flexibility will only become routine if the Commerce Commission upgrades its regulatory settings (via the Input Methodologies and however else necessary) so that flexibility services become a tool for ensuring network services are delivered according to reliability and quality thresholds.

This is the single-most potent catalyst for reaping the benefits (\$7.1B based on the estimates by Sapere) of DER and flexibility services and making sure the electricity system and market supports electrification and decarbonisation.

Alongside the Commerce Commission updating its regulatory settings to make flexibility from DER a feature of network operation, the Electricity Authority could support industry collaboration to develop:

- flexibility services product specification, and product performance requirements
- consistent terms of trade

¹¹ The [Cortexo & Our Energy submission](#) and the [Vector submission](#) to the Commerce Commission open letter on regulatory priorities for energy networks and airports are available on the Commission website.

- pricing methodologies to efficiently value the flexibility products.

Encouragement for and funding of trials will also support emergence of a flexibility services market. A flexibility services market will not emerge fully formed and perfect one morning. A learning-by-doing process moving from pilots and trials to product testing to production will be necessary to identify capability requirements and build liquidity.

There is significant opportunity to expand the use of pilots and trials in Aotearoa New Zealand to support more informed policy making by moving from the present preference for a closed shop, siloed approach to a more multilateral, multi-party approach which emphasises sharing of experience and insights.

Essential to the learning-by-doing process will be obtaining a social licence for access to consumer DER. Energy Consumers Australia has highlighted the role of a [social licence for control of DER](#) in a successful transition.

Concerns regarding equal or open access and anti-competitive behaviour by distributors or any other party can only be tested once the market is established.

Operating agreements

Theme four describes issues with the costs of developing and negotiating contracts for flexibility services, and the potential for contracts to favour the distributors commercial interests.

Terms of trade will emerge with experience

Specifying operating agreements is premature in the absence of a market. Terms of trade of flexibility services will emerge with experience.

At present there is no agreed product specification for flexibility services, no agreed method for calculating value of flexibility and no real practical experience with the what, when, how and why of delivering a flexibility service. This absence of knowledge makes defining contract terms and operating agreements an exercise in speculation.

Robust and workable contracts will most likely emerge through an evolutionary process as the flexibility services market develops. However, there is value in making sure everyone speaks a common language.

The early development of the network use-of-system agreements in the late 1990's and early 2000's may be a useful model. Industry practitioners – the people dealing day-to-day with buying and selling distribution services documented a standard contracting approach based on practice at the time.

For flexibility services, buyers and sellers could collaborate to develop an initial product specification for flexibility services. This would need to occur in parallel with updating of asset management practices to accommodate the uptake of DER and the flexibility of DER.

The lexicon developed by the IPAG, based on United Kingdom experience, is a useful starting point.

From this process, initial terms of trade should emerge to be used in trials. The terms should be sufficient to support a value discovery process (ie, using flexibility to see what it can do) and gradually moving from trials to market.

Support for industry-led development of initial terms of trade

The Electricity Authority could support the emergence of a flexibility services market by supporting an industry-led process to develop the initial terms of trade, particularly the product specification for flexibility services.

Capability and capacity of distributors is not a barrier to electrification at this stage

Theme five describes issues with the number and scale of distributors. The main concern is some distributors may not have the capability – particularly skilled people – needed to adjust to electrification and uptake of DER.

A secondary concern is the number of distributors (27 operating companies) unnecessarily increases operating costs, with a common argument being there is unnecessary duplication of head office functions and operating systems, plus increased costs of purchasing network services.

This secondary concern is real and has been a significant focus of regulatory effort to minimise transaction costs across the supply chain. However, the number of distributors is not a factor determining the pace of electrification except to the extent it affects capability and capacity.

Corporate governance and shareholder choices

The capability and capacity of individual distributors to appropriately respond to electrification and uptake of DER is not a regulatory problem, although a distributor failing to provide an adequate distribution service should rightly draw regulatory interest.

Capability and capacity are a corporate governance issue.

For incorporated distributors, each director of a distributor must act in good faith and in what the director believes to be the best interests of the company. A director commits

an offence if they act in bad faith towards the company and believing that the conduct is not in the best interests of the company; and knowing that the conduct will cause serious loss to the company.¹²

For trust-owned distributors, the principal objective of the board and management is to operate as a successful business.¹³ The governance of a trust is subject to requirements outlined in the trust deed. Two examples:

- the WEL Energy Trust defines 'successful business' as being as profitable and efficient as comparable businesses and an organisation that exhibits a sense of social responsibility by having regard to the interests of the community and by endeavouring to accommodate or encourage those interests when able to do so¹⁴
- the Scanpower Customer Trust Deed requires an ownership review every five years to compare Scanpower's performance relative to other electricity lines businesses and assess the ongoing trust ownership.¹⁵

Alongside the corporate governance requirements, the Commerce Commission information disclosure regime expects all distributors to produce sufficient information for interested persons to assess whether the Part 4 purpose is being met. This simply means that distributor performance is efficient, and customers are receiving a distribution service of a reasonable quality and price.

Support shareholders and communities make informed decisions

The board of a distributor (incorporated or trust-owned) which is unable to deliver the distribution service due to a lack of capability (or is delivering a higher cost service due to lack of economies of scale and scope) has either:

- made decisions which destroy shareholder (or community) value
- obtained the informed and explicit consent of shareholders (or community) regarding the trade-off associated with operating the business that way.

¹² Companies Act, clauses 131 and 138A.

¹³ Energy Companies Act, clause 36. The clause also enjoins a trust-owned energy company to have regard to the desirability of ensuring the efficient use of energy.

¹⁴ WEL Energy Trust Deed of Trust, available at: <https://www.welenergytrust.co.nz/wp-content/uploads/2021/05/Trust-Deed-with-27-April-2021-Changes-and-Register-of-Amendments.pdf> (retrieved 10 September 2021).

¹⁵ Scanpower Customer Trust Deed, available at: [Scanpower-Customer-Trust-Deed-Updated-to-150321.pdf](#) (retrieved 10 September 2021).

If the former, this reflects a failure of corporate governance and existing mechanisms for promoting good corporate governance. If the latter, this is an efficient and reasonable outcome from the perspective of the beneficiaries or owners of that distributor.

The nature and scale of the problem will be observed through implementation of changes needed for electrification.

At this stage, an appropriate response to concerns regarding distributor capability is to make sure shareholders and communities have access to sufficient information to determine whether the business is being operated as a successful company. A further option could be to review whether shareholders and communities have sufficient opportunity to influence the strategic decisions regarding the company.

Further evolution of pricing needs to account for asset management practices

Theme six describes the role of efficient pricing of distribution services for influencing how consumers use electricity, how distributors and others manage load, when distributors invest in new (or replacement) network assets, and the timing, level, and location of investments in new technology by consumers and sector participants.

Pricing outcomes reflect asset management practices

Efficient distribution pricing broadly means the pricing structure components reflect the costs of supply – variable charges recover variable (avoidable) costs and fixed charges recover fixed (non-avoidable) costs.

Current asset management practices mean a majority of distributor costs are fixed and not affected by changes in behaviour by network users. As distributor planning processes are driven by targets ensuring quality of service and reliability, the opportunities for deferring or avoiding investments are tied to areas where networks experience growth or assets approach end of life or design limits. The timeframe to act on these opportunities can be very short and the level of uncertainty around the contributing factors affect the economics for using flexibility services in lieu of network infrastructure.

Coordination of efficient pricing principles and updates to asset management practices is needed to accommodate uptake of DER and flexibility from DER.

Updating regulatory settings to accommodate DER and flexibility must be a priority given the size of the prize

The estimate by Sapere of the economic benefit of using the unfettered potential of DER indicates updating regulatory settings for distribution, and the broader system and market, to accommodate DER and flexibility must be a priority.

The size of the prize also indicates there is value of taking a coordinated and coherent, whole-of-supply chain approach to updating regulatory settings to guide the transition to realise the greatest possible economic benefit. An uncoordinated and fragmented transition is expected to be slower and more expensive.

Appendix A. Response to questions

Q.1 Have you experienced issues relating to a lack of information or uneven access to information?

Yes. From our whole-of-supply chain perspective we have experienced obtaining access to data a range of purposes, including both consumer and network planning decisions.

We consider part of the underlying problem is the continued reliance by electricity sector on analogue data, in part due to the regulatory settings not supporting digitalisation.

A comprehensive review of regulatory settings, including those administered by the Commerce Commission, is required to identify what changes are necessary for distributors (and the wider electricity sector) to fully embrace digitalisation as quickly as possible.

Q.2 What information do you need to make more informed investment and operation decisions?

Distributors need greater visibility of their low voltage networks to support electrification and connection and use of DER (including by flexibility traders). This means obtaining data suitable for forecasting, planning and operating decisions.

- forecasting and planning decisions are improved with historical consumption and power quality data to inform asset management and network investment decisions
- operational decisions using flexibility from DER require real-time consumption and power quality data to maintain network performance minute-to-minute and day-to-day.

Once this information is available to distributors, it can be used for network planning and to support procurement of flexibility services, including by identifying flexibility supply opportunities.

Q.3 What options do you think should be considered to help improve access to information?

The immediate requirement is to ensure data is available. This requires providing distributors with incentives to invest to develop network visibility.

A key focus of the comprehensive review of regulatory settings to identify what changes are necessary for distributors (and the wider electricity sector) to fully embrace digitalisation as quickly as possible must be ensuring all participants use appropriate

digital communication standards (such as properly authorised API connections) to exchange data.¹⁶

Q.4 Have networks experienced issues from the connection or operation of DER?

From our whole-of-supply chain perspective we are familiar with issues from the connection and operation of DER – from a network perspective and a consumer and DER owner perspective.

We consider a whole-of-sector (and beyond) conversation on the nature and impact of the ‘issues’ experienced by networks from the connection or operation of DER is required to build a shared understanding and to determine the root cause of the ‘issue’.

We particularly caution against treating the DER as the problem rather than taking a broader perspective taking account of the role of traditional planning and operating criteria which do not reflect the dynamic capability of the DER. There is good reason to expect that the root cause of issue will increasingly be the use of outdated or inappropriate technical standards, not the DER.

Q.5 Do the Electrical (Safety) Regulations require review? If so, what changes do you think are needed (a) in the near term and (b) in the longer term?

Yes. The Electricity Safety Regulations must be reviewed in the near term to ensure the technical and performance requirements for connecting to and operating networks provide an appropriate operating envelope which encourages uptake and use of DER.

A key topic for review is the voltage supply thresholds to introduce a wider threshold appropriate for a high-DER environment, alongside development of a flexibility-services market.

Q.6 Does Part 6 remain fit for purpose? If not, what changes do you think are needed (a) in the near term and (b) in the longer term?

Part 6 has been subjected to several reviews over the past decade. Before embarking on another, it would be useful to complete a comprehensive assessment of regulatory settings relating to connection to and use of electricity networks by all forms of DER and load types, not just distributed generation, to provide a comprehensive and coordinated scope for any further work.

¹⁶ An application programming interface (API) is an interface that provides programmatic access to service functionality and data within an application or a database. It can be used as a building block for the development of new interactions with humans, other applications or smart devices.

Q.7 Is there a case to be made for minimum mandatory equipment standards for DER equipment, specifically inverter connected DER?

Yes. However, any minimum mandatory equipment standard for DER must be considered subsequent to reviewing and adjusting voltage supply thresholds, and other technical aspects determining the network operating envelope, to reflect two-way power flows, the dynamic capability of DER, and maximises the connection and use of DER.

Q.8 What standards should be considered to help address reliability and connectivity issues?

All 'standards' must be considered to ensure they recognise the dynamic capability of DER and support development of a flexibility services market. For example, international open standards such as openADR will ensure interoperability between all networks and DER in a flexibility market.

The primary objective for developing standards must be for the network operator to operate to allow each network user to maximise value from using the network, within the network operating envelope.

Q.9 Is there a case to look at connection and operation standards under Part 6 with a view to mandating aspects of these standards?

A comprehensive assessment of the regulatory settings is required to identify appropriate standards which support connection and use of DER, including DG. The review must be broader than 'Part 6' to provide a blank page perspective not anchored to traditional operating and connection practices.

As part of this review, consideration must be given to adopting a universal streamline connection process, including online application and automatic approval based on consistent criteria.

Q.10 What flexibility services are you pursuing?

Flexibility services from DER are not yet an everyday network management tool in Aotearoa New Zealand.

There is a chicken and egg problem. Distributors do not see sufficient flexibility available to rely on, and see it as a not-quite ready yet solution; and flexibility suppliers don't have sufficient certainty their capability will be used to underpin the required investment, and so cannot commit flexibility resources.

Experience from Great Britain indicates regulatory intervention is required – with changes to network regulation and market settings and funding – to overcome the coordination problems preventing access to the full value of DER (ie, emerging technologies). Even with the explicit support and dedicated funding, the Great Britain flexibility market has taken over 4 years to get to where it is today.

Q.11 Are flexibility services being pursued through a competitive process?

Flexibility services from DER are not yet an everyday network management tool in Aotearoa New Zealand.

Q.12 What options should be considered to incentivise non-network solutions?

The immediate barrier to emergence of a flexibility services market is the regulatory settings applied by the Commerce Commission create a bias towards traditional asset management solutions.

Flexibility will only become routine if the Commerce Commission upgrades its regulatory settings (via the Input Methodologies and however else necessary) so that flexibility services become a tool for ensuring network services are delivered according to reliability and quality thresholds.

Alongside the Commerce Commission updating its regulatory settings to make flexibility from DER a feature of network operation, the Electricity Authority could support industry collaboration to develop:

- flexibility services product specification, and product performance requirements
- consistent terms of trade
- pricing methodologies to efficiently value the flexibility products.

Encouragement for and funding of trials will also support emergence of a flexibility services market. A flexibility services market will not emerge fully formed and perfect one morning. A learning-by-doing process moving from pilots and trials to product testing to production will be necessary to identify capability requirements and build liquidity.

Q.13 What options would encourage competitive procurement processes for flexibility services?

Refer answer to question 12.

Q.14 Have you experienced difficulties with negotiating operating agreements for flexibility services?

Flexibility services from DER are not yet an everyday network management tool in Aotearoa New Zealand. There is limited experience with negotiating operating agreements for flexibility services.

Q.15 Are the transaction costs of developing contracts a barrier to entering the market for flexibility services?

Yes, but a secondary issue compared to the immediate barrier represented by the regulatory settings applied by the Commerce Commission creating a bias towards traditional asset management solutions.

Robust and workable contracts will most likely emerge through an evolutionary process as the flexibility services market develops.

Q.16 Would an operating agreement help lower transaction costs and level negotiating positions?

Specifying operating agreements is premature in the absence of a market. Terms of trade of flexibility services will emerge with experience.

For flexibility services, buyers and sellers could collaborate to develop an initial product specification for flexibility services. This would need to occur in parallel with updating of asset management practices to accommodate the uptake of DER and the flexibility of DER.

From this process, initial terms of trade should emerge to be used in trials.

Q.17 What kind of operating agreement would address the issues described in this chapter?

Refer answer to question 16.

Q.18 What are distributors doing to ensure their network can efficiently and effectively manage the transformation of networks?

From our whole-of-supply chain perspective we have observed a range of initiatives from distributors to adapt to electrification and uptake of DER. However, the efforts are typically siloed and network-centric, even when several distributors are collaborating. Cross-sector (and beyond) collaboration is not a feature of efforts currently.

There is significant opportunity to expand the use of pilots and trials in Aotearoa New Zealand to support more informed policy making by moving from the present preference for a closed shop, siloed approach to a more multilateral, multi-party approach which emphasises sharing of experience and insights.

Q.19 How are distributors currently working together to achieve better outcomes for consumers?

Cross-sector (and beyond) collaboration is not a feature of efforts currently.

Q.20 Could more coordination between distributors improve the efficiency of distribution?

Yes. The nature and scale of the opportunities for coordination will be observed through implementation of changes needed for electrification.