

FlexForum Insights

Agile change processes are needed to enable flexibility and accelerate electrification

Table of Contents

| | |
|---|-----------|
| Table of Contents | 1 |
| Main points | 2 |
| Agile change processes are needed to accelerate efforts to unlock flexibility | 4 |
| More flexible decision making is needed | 5 |
| Mismatch between the cost and benefits of learning-by-doing | 6 |
| Material changes require leadership and collaboration | 6 |
| Regulatory processes are designed for incremental change | 7 |
| Calls for technical changes are a canary in the coal mine | 7 |
| Specific rules of the game may not be fit-for-purpose | 8 |
| Desirable outcomes or behaviours are not encouraged | 10 |
| Appendix A: Perspectives on opportunities to accelerate flexibility and electrify faster | 13 |

Main points

About FlexForum – working to maximise the value of distributed flexibility for households, businesses and communities

The FlexForum is an association of people and organisations¹ from across the electricity eco-system² that want to take practical action to make it easier for households, businesses and communities to maximise the value of consumer and distributed energy resources and flexibility to:

- support affordable and reliable operation of the electricity market and power system
- enable accelerated electrification by households and businesses as part of the transition to a zero emissions economy.

Flexibility refers to the ability of an energy resource – including electric vehicles (EV), EV chargers, small and large scale solar and other generation, batteries, heating and cooling equipment, industrial processes, and energy management systems – to alter its generation or consumption patterns in response to external signals to benefit both the resource owner and to support the operation of electricity networks and the power system.

Flexibility is our focus because it is central to electrification and decarbonisation, and unlocking its potential requires collaboration across the electricity supply chain. Encouraging flexibility provides households, businesses, communities and the electricity supply chain with more capability and options to accelerate electrification and decarbonisation while maintaining or improving reliability, affordability of supply and consumer choice.

The Flexibility Plan identifies opportunities to use more agile regulatory change processes

The FlexForum produced the Flexibility Plan 1.0³ in August 2022 with an initial list of the practical, scalable and least-regret steps needed to enable households, businesses and communities to make choices which maximise the value of their energy resources and flexibility. There are steps in the Flexibility Plan requiring input by policy-makers and regulators to realise opportunities that electrify the country faster, for less, while keeping the lights on. This FlexForum Insights:

- summarises perspectives on various policy and regulatory issues raised by FlexForum participants during several discussions and debates between February and August 2022.⁴ The issues are listed in Appendix A. The FlexForum took each issue at face value. They are collated here to highlight questions which are likely to rely on changes to policy and regulatory settings to realise the value of flexibility.
- organises those issues according to the type of opportunity – cultural change or technical change (or both) – to provide a framework to guide the types of action to address an issue to take advantage of these various opportunities.

We want that the FlexForum Insights provides a reference point for policy-makers, regulators and people across the electricity eco-system when discussing opportunities for more agile regulatory processes to enable flexibility and accelerate electrification. Having a

¹ The FlexForum is open to people and firms that want to support practical action to achieve its objective and purpose. FlexForum Members currently include: Ara Ake, ANU Battery Storage and Grid Integration Program, Cortexo, ecotricity, evnex, Influx, Manawa Energy, Mercury, Meridian, Orion, Our Energy, Overlay, Powerco, revolve energy, Robinson Bowmaker Paul, Sustainable Electricity Association of New Zealand (SEANZ), The Energy Collective, Transpower, University of Auckland Energy Centre, Vector, Wellington Electricity, and two individuals who are consumers.

² The electricity ecosystem is the electricity market participants, ie, traders, distributors, metering equipment providers, generators, plus organisations which are not specified in legislation as market participants, including software firms, equipment installers, suppliers and manufacturers, and customer-facing technical advisers, eg, building engineers.

³ You can find the Flexibility Plan 1.0 [here](#). It contains definitions of some common terms and the steps referred to throughout this paper.

⁴ In particular, see the notes from FlexForum session 12, 7 July 2022 at [FlexForum session 12 notes](#).

common reference point for the root causes of issues will make it easier for all parties to develop a common understanding of an issue and then develop workable solutions.

Accelerating the uptake of flexibility and electrification requires both cultural and technical changes

Maximising the value of distributed flexibility for households, businesses and communities means accelerating cultural change and technical change across the electricity ecosystem and the regulatory settings.

FlexForum discussions from February to August 2022 identified opportunities to both increase the amount and quality of learning-by-doing and to support the implementation of new services and business models. Based on the issues raised by FlexForum participants, there are two main types of opportunity.

- cultural changes to enable decision-making by regulators and organisations across the electricity supply chain to align with efforts to increase the amount of collaborative learning-by-doing and experimentation
- technical changes to the legislative and regulatory settings which do not unnecessarily hold back innovation and efforts to identify and implement new services and business models which maximise the value of flexibility.

Collating and synthesising the issues highlighted two main types of opportunity and four main root causes.

| Opportunity | Situation |
|--|---|
| cultural changes to enable more flexible decision-making by regulators and organisations across the electricity supply chain | <ul style="list-style-type: none"> • A mismatch between the cost of learning-by-doing being borne directly by those driving change, and the benefits of this activity which are shared by parties across the eco-system • Material change to the systems, processes and practices underpinning the electricity market and system requires leadership and collaboration, which rely on considerable coordination beyond the capability of individual market participants • Regulatory processes are designed for incremental change in a steady-state operating environment, rather than the fundamental change required to realise the value of flexibility across the breadth of the value chain. |
| technical changes to the legislative and regulatory settings which define roles, responsibilities, and obligations in electricity markets and in operating the power system | <ul style="list-style-type: none"> • Constraints embedded in specific legislative and regulatory settings and in the systems and tools built to deliver prescribed outcomes. |

The specific issues are summarised in Appendix A.

Things that can help accelerate change that realises the opportunities

The opportunities available from cultural change and technical change will be realised sooner by using regulatory processes which reflect a whole-of-system view and respond to the experience of early movers. In particular, the pace of electrification and uptake of flexibility relies on policy and regulatory bodies adopting agile decision-making processes which incorporate the experience of early movers and can quickly realise the value of both the mistakes and successes from learning-by-doing.

The FlexForum believes that cultural change and technical change can be assisted through four actions.

- A shift from the traditional propose and respond policy and regulatory development paradigm focused on getting things “right the first time” to an agile co-design model where regulators and policy bodies dedicate resources to work proactively and promptly with a diverse range of experts from across the electricity ecosystem to resolve issues as they emerge using a learning-

by-doing approach. A learning-by-doing model may need rethinking of the level and type of resources of regulators, but it will be more productive and deliver faster gains than the traditional propose-respond consultation model in the current environment.⁵

- A framework for innovators to request targeted exemptions from market rules to test a concept. The Electricity Authority can help to expand the use of pilots and trials to support evidence-based policy making by producing a framework for parties to request exemptions for learning-by-doing. A sandpit process⁶ would help to accelerate the pace of the transition by providing a process designed to enable regulatory agility and to quickly realise the value of both the mistakes and successes from learning-by-doing.
- More support and clearer incentives for firms to engage in learning-by-doing where the benefits realised are not directly proportional to the time and effort invested by specific parties. Increased learning-by-doing can be achieved by the Commerce Commission providing network operators suitable financial incentives to test and use non-network solutions (ie, flexibility) and by MBIE and other funding agencies increasing the level of investment available for testing new services and processes (not just technologies). The recently announced new funding of \$20 million over 2023-27 to support learning-by-doing to help manage peak electricity demand and improve network resilience and an extra \$30 million over 2023-27 for the Community Renewable Energy Fund are an opportunity to increase learning-by-doing. The four-year timeframe provides time to build the capability and processes needed for effective learning-by-doing into the 2030's.
- Ensuring whole-of-system collaboration and coordination by supporting and using initiatives like the FlexForum to accelerate progress. Regulators can lead by endorsing and participating in collaborative initiatives like the FlexForum to move things forward, particularly when an issue is best solved by gaining practical experience. The leadership demonstrated by the Ministry of Business, Innovation and Employment (MBIE) through its endorsement and financial support of the FlexForum is a key factor in building broad support for its collaborative and get things done approach.

What do you think?

To have a conversation or to send your thoughts and views, please contact us at info@flexforum.nz

⁵ For more detail on this suggestion check out the the [FlexForum advice on updating the regulatory settings for distribution networks](#). The FlexForum discussed these ideas in June 2023 with the Council of Energy Regulators.

⁶ For more detail on how a regulatory sand-pit process could be set up check out the the [FlexForum advice on updating the regulatory settings for distribution networks](#).

Agile change processes are needed to accelerate efforts to unlock flexibility

There are growing efforts from organisations operating in Aotearoa New Zealand to learn how to unlock the value of flexible resources. These efforts are highlighting opportunities for the electricity ecosystem to adapt to its changing circumstances and implement new capabilities, processes or practices.

The experience of FlexForum participants indicates that doing something differently most often relies on both the process of making a change (ie, decision-making about whether something can be done) and the rules of the game (ie, what can or should be done).

Collating and synthesising the issues highlights two main types of opportunity.

- **cultural changes** to enable decision-making by regulators and organisations across the electricity supply chain to align with efforts to increase the amount of collaborative learning-by-doing and experimentation
- **technical changes** to the legislative and regulatory settings which do not unnecessarily hold back innovation and efforts to identify and implement new services and business models which maximise the value of flexibility.

A useful case study is the Kāinga Ora – Homes and Communities Wellington Energy Sharing Pilot.⁷

Kāinga Ora wants to share the benefit of excess electricity from Kāinga Ora owned rooftop solar systems between all of its customers. The approach is expected to deliver more and wider benefits to consumers because the customer with solar continues to buy their electricity from the retailer of their choice, while the exported electricity is sold separately enabling Kāinga Ora to seek the best market price and maximise the benefit of this investment in solar (allocating the benefits as revenue for energy hardship reduction initiatives).

The technical solution is to create duplicate installation control point (ICP) identifiers for each residential ICP. This lets the market systems recognise a different trader (ie, retailer) for each identifier; one receiving consumption/import information and one receiving generation/export information. Implementing the solution was not straight-forward and required decisions from several parties including the distributor, the metering provider, and retailers and required the Electricity Authority to grant exemptions to provisions in the Code relating to the market systems for metering and settlement.⁸ Few things are easy the first time around. The experience gained means a faster and simpler process the next time a multi-party trial requires regulatory exemptions.

More flexible decision making is needed

The common feature of the cultural change opportunities is decision-making. Each of the items in [Table 1](#) of the Appendix relate to one or more aspects of decision-making by electricity sector participants or regulators.

The decision-making behaviours of electricity sector participants and regulators are fundamental to learning-by-doing and implementation of new capabilities, processes and practices. Factors affecting decision-making behaviour include: who makes the decision, what outcomes are sought, the information and evidence needed, how risks and benefits are judged, the range, size and level of interest of affected parties, and the time and process.

⁷ Kāinga Ora released a [request for proposals](#) on 5 July 2023 to support its Wellington Energy Sharing Pilot.

⁸ Refer Electricity Authority announcement, 27 June 2023, about [solar energy sharing for social housing trial](#). The exemptions were given to [Wellington Electricity Lines](#) and [Intellihub Ltd](#). The retailer contracted by Kāinga Ora will also need to apply for and be granted exemptions.

There are three themes affecting decision-making:

- there is a mismatch between the cost of learning-by-doing being borne directly by those driving change, and the benefits of this activity which are shared by parties across the eco-system. This discourages investment by individual organisations in learning-by-doing
- material change to the systems, processes and practices underpinning the electricity market and system requires leadership and collaboration, which rely on considerable coordination beyond the capability of individual market participants
- regulatory processes are designed for incremental change in a steady-state operating environment, rather than the fundamental change required to realise the value of flexibility across the breadth of the value chain.

Mismatch between the cost and benefits of learning-by-doing

The electricity sector in general is averse to change, learning-by-doing and implementation, in part because the cost of learning is not matched by a reasonable expectation of a benefit or commercial advantage to an individual organisation. The mismatch between the cost of learning and the individual reward is a well understood outcome to circumstances where the costs are known and incurred in the present, while benefits are uncertain, will be gained in the future, and potentially shared with others.

Hesitancy by organisations to decide to invest in learning-by-doing is exhibited through the items described in the Appendix as a lack of **'experience and evidence to inform and de-risk big decisions'**, the **'lack of centralised innovation funding'**, **'limited incentives for distributors to explore flexibility'**, and **'resistance to change from people in operational positions'**.

Each of these items can be traced back to an opportunity to strengthen the ability and incentive of firms, individually and collectively, to invest in learning-by-doing and to then apply that learning.

More support and clearer incentives are needed for firms to engage in learning-by-doing where benefits realised are not directly proportional to the time and effort invested by specific parties. Flexibility Plan step #19 is to demonstrate and build knowledge around the effectiveness of using flexibility for network reasons including: the economic business case, resource availability, use cases, performance characteristics etc. Step #23 calls for the same learning-by-doing on using flexibility for ancillary services.

Material changes require leadership and collaboration

Regulatory settings can reduce the appetite of firms to develop and implement novel products and services, because the regulatory framework is designed to provide a stable and predictable investment and operating environment, with well understood roles, rights and responsibilities for participating in a complex physical and commercial system. This creates tension as the sector undergoes fundamental change during the transition to greater electrification and decarbonisation.

Material change to regulatory settings requires a combination of leadership and collaboration from policy-makers, regulators and participants to achieve a specified future state. The leadership is needed to coordinate the activity and provide ongoing momentum to achieve the outcome. Collaboration is needed because the required system and market change rely on multi-lateral arrangements requiring coordination between the firms across the various parts of the supply chain.

The items described in the Appendix as **'lack of strategic alignment about the end-state for flexibility'**, the **'lack of commonality about future energy scenarios and forecasting'** and **'potential that whole of system value is not considered'** represent an opportunity for leadership and collaboration involving regulators and industry participants.

The underlying challenge is leadership and collaboration require considerable effort to bring people together, provide a clear and specific objective to work towards, and to get the work done. The Flexibility Plan aims to provide leadership and support more collaboration to assist households, businesses and communities to maximise the value of their resources and flexibility. The effort and commitment involved from FlexForum participants has been both significant, particularly for smaller firms, yet at the same time relatively trivial compared to the scale of the challenge faced and the benefits of success.

Regulators do not always need to lead the development of a change, particularly when an issue is best solved by gaining practical experience, but do need to be involved due to the closely regulated nature of the electricity sector. Participants will hesitate to invest time and effort to resolve an issue without confidence that the relevant regulator will recognise and promptly respond to those efforts (this does not mean the regulator must agree with the solution).

The endorsement and financial support that MBIE has provided the FlexForum through 2022 and 2023 has greatly assisted in providing the whole-of-system coordination needed to make progress.

Regulatory processes are designed for incremental change

Regulators and regulatory change processes are designed to deliver incremental change which is “right the first time”, resulting in a preference for a conservative and cautious approach and significant time and effort to reach decisions. This creates considerable tension when multiple, interdependent material changes to long-standing systems, processes and practices are needed to accommodate an uncertain future state.

The tension between learning-by-doing and the existing incremental regulatory approach is exhibited in the items described as **‘decision-makers / agencies being rigid and not helpful when asked to resolve a problem’**, the **‘significant effort required to follow regulatory change processes’** and the **‘lack of clarity regarding a clear pathway for changes’**.

The Flexibility Plan 1.0 step #B says, ‘Ensure coordination between agencies and bodies with a role in supporting learning-by-doing’. The purpose is to identify possible improvements to the learning-by-doing ecosystem to ensure organisations attempting learning-by-doing relating to flexibility have access to appropriate and effective support for learning-by-doing.

Shifting from incremental to more agile regulatory processes may need rethinking of the level and type of resources of regulators, for example, to enable a regulator to have the capability and capacity to promptly respond to a request for information or to resolve a specific issue. The resources needed to monitor and deliver incremental iterative change are quite different than those to monitor and deliver an agile regulatory environment.

Calls for technical changes are a canary in the coal mine

Electrification and the uptake of devices capable of flexibility are inevitable and will fundamentally alter the operating assumptions underpinning the power system and market. The electricity sector participants – individually and collectively – will be required to identify and develop new capabilities, processes and practices needed to transition to a decentralised and decarbonised power system.

Calls for changes to legislative and regulatory settings are a canary in the coal mine and a practical example of the tension between learning-by-doing and a regulatory framework designed for a steady state environment.

Organisations attempting to do things differently often find they need technical changes to the regulatory environment. The technical changes listed in [Table 2](#) relate to specific challenges faced by one or more firms wanting to do something or see something happen and finding:

- a specific regulatory setting or rule is not fit-for-purpose (or may not be) given what they are trying to do
- it is difficult to get existing or potential counterparties to do something differently because counterparty interactions are closely prescribed by regulatory settings (ie, a different approach is not allowed) or because competitive pressure is insufficient to deliver an outcome which would realise net benefits to consumers (ie, regulation is probably required).

Requests from organisations seeking regulatory intervention to address a technical issue can be viewed on a spectrum. At one end, the request can be seen as the organisation seeking a change for its individual benefit and commercial advantage. On the other end, the request can be viewed as an early warning of a systemic problem revealed through learning-by-doing or efforts to introduce

materially new products and services (though the change may still involve some commercial advantage accruing to the firm requesting the change).

The FlexForum considers that organisations will increasingly encounter technical issues as they do learning-by-doing. Given this, the pace of the transition will increasingly rely on the ability of policy and regulatory bodies to adopt agile decision-making processes, such as regulatory sandpits, capable of dedicating attention to the canaries and quickly realising the value of both the mistakes and successes from learning-by-doing.

Specific rules of the game may not be fit-for-purpose

The FlexForum discussed seven issues in four areas which indicate regulatory settings may not be fit-for-purpose for accelerating electrification, increasing the availability of flexibility, and supporting more affordable and reliable operation of the power system. The four areas were:

- voltage limits applying to distribution networks
- clarity about who can access flexibility and when
- digitalisation and data flows
- the one-to-one customer-retailer supply relationship.

Voltage limits applying to distribution networks

The items in Appendix A described as '**curtailment of DER due to network voltage**', '**voltage limits are too tight**' and '**inconsistency between the 4777 standard and the Code**' reflect facets of issues arising from existing regulated technical settings for managing distribution and power system stability.

The Electricity (Safety) Regulations 2010⁹ oblige distributors to keep the supply of electricity to installations within 6% of the standard low voltage nominal value of 230VAC, or a range from 216.2V to 243.8V. Voltage performance is managed by distributors and through minimum performance standards for devices connected to a distribution network.

Minimum performance standards for devices can be specified in distributor connection policies or in national standards. Many connection policies set requirements for irrigation pumps and larger electrical motors which can produce reactive power.¹⁰ A key national technical requirement is set through AS/NZS 4777.2:2020¹¹ (on grid connection of energy systems via inverters). It requires inverters to have volt-var and volt-watt modes¹² which automatically curtail the solar system (or any inverter connected device, eg, a battery) from exporting excessive power when voltage on the local network is above a certain threshold.

The two sets of technical requirements – voltage limits and the volt watt/var thresholds – may not be wholly complementary. The existing network voltage range was set assuming little to no solar and DER. Distributors traditional process for managing voltage includes setting the voltage at the start of a service line closer to the upper limits of the permitted range to account for the voltage reductions from consumer demand such that the voltages at the end of the line will remain within statutory limits. The practical effect of the existing narrow voltage range when combined with increased solar penetration results in increased curtailment of solar to keep voltage below the upper limit, mostly using volt-watt and volt-var inverter settings. This imposes costs on consumers with solar from potential inverter wear and tear and they forgo the revenue from selling surplus electricity when there may be no other network or system stability problem aside from maintaining supply within the regulated voltage range.

⁹ Refer [Electricity \(Safety\) Regulations 2010 \(SR 2010/36\) \(as at 18 July 2022\), clause 28 Voltage supply to installations](#)

¹⁰ Reactive power is a feature of the physics of an electrical system. Simply put, more reactive power reduces capacity. Network operators endeavour to minimise reactive power to maximise available capacity.

¹¹ And previous versions, eg, 4777.1:2016.

¹² Volt-Watt response model reduces inverter power output when voltage levels rise above 250V. Volt-Var response mode using the customer's inverter to absorb reactive power from the grid when voltage levels rise above 235V.

A critical step in the Flexibility Plan (#11) is to explore the use of dynamic operating envelopes (DOEs). This task involves identifying the indicators of network performance - such as available network capacity, voltage, power factor etc - which could be used to clarify the operating envelope for the network and enable flexibility suppliers to manage DER to remain within the operating envelope.

Flexibility Plan step #15 calls for a review of voltage limits to ensure they do not create a barrier to the uptake of DER. Power quality, particularly voltage, is an input to consumer decisions to invest in solar. The potential for unneeded curtailment will discourage investment in solar. Step #26 gives an example of the need to ensure technical standards for devices remain up to date and interlinked with international standards.

Prompt action to address issues around voltage limits would provide a positive signal for investment in solar and other flexible resources. The most straightforward solution is to identify voltage limits which enable distribution networks to support more distributed generation and more consumers. Electricity Networks Aotearoa requested MBIE in February 2022 to revise voltage requirements to allow voltage to be 10% above and 6% below the nominal 230V. At the same time, consistent regulatory guidance is needed that resolves the trade-offs between delivering the whole-of-system benefits of flexibility and efficiently managing network safety and reliability.

Clarity about who can access flexibility and when

The issues described in Appendix A as '**Part 12 of the Code and the new DDA have clauses that create a risk of locking customer load to the distributor**' and '**over-use of emergency response/protection/load management systems**' refer to a concern that distributors may take priority use of flexible resources for the management of system security over-riding the interests of other users and the resource owner.¹³ The underlying concern is uncertainty about the extent of discretion available to distributors about the circumstances for taking priority use, the implications for value stacking, and the potential for inconsistency between distributors.

Clarity would be provided through Flexibility Plan step #6 to develop a common definition for network services which could be supplied using flexibility and learning-by-doing to understand the practicalities of value-stacking to maximise the value of flexibility. Without this clarity, flexibility suppliers may hesitate to invest in learning-by-doing due to doubts about their ability to access consumer flexibility, while distributors may have ongoing concerns about their ability to access flexibility to manage network and system security in emergency situations.

Digitalisation and data flows

The issue described in Appendix A as '**current arrangements for third party access to historical meter data are not practical**' refers to ongoing difficulties with the time taken to respond to requests from third parties acting on behalf of customers and the use of incompatible data formats. Flexibility Plan step #2 is to ensure consumers and their agents have streamlined (automated) access to historical consumption information.

Stepping beyond the reasons for the difficulties, the circumstances highlight the need for the electricity sector to embrace digitalisation. Digitalisation means converting information into a digital and computer-readable format so all types of information in all types of formats to be processed, intermingled, stored, shared and transmitted with less fuss, bother or hassle and at lower cost.

Decarbonisation will put millions of EVs, solar, battery storage on our distribution networks. These will need to be seamlessly integrated into the networks, electricity system and market in a way that gives power (and value) to the households and businesses who own the resource.

Digitalisation must be at the heart of this integration to make sure that data and information are securely available to appropriate parties to balance, second-by-second, the electricity and capacity required to keep the lights on, and to make sure that people and businesses have the information they need to make their electrification decisions and to participate in the electricity market.

¹³ Part 12A, Schedule 12A.4, Appendix A, clause 5.6.

The one-to-one customer-retailer supply relationship

The barrier described as the '**regulatory framework mandates a one-to-one supply relationship**' refers to the prevailing market and system settings which cause households and businesses to be functionally limited to dealing with a single retailer at a time, preventing opportunities to maximise the value of their DER and flexibility by separately buying and selling power and flexibility.¹⁴

Flexibility Plan step #5 aims to consider how to provide consumers with the ability to choose across the range of options for buying and selling electricity services with separate providers. Market systems need to adapt to enable consumers to choose to contract with one or more traders or flexibility suppliers. Doing so will increase the availability of flexibility by allowing consumers to contract with their preferred flexibility supply.

Desirable outcomes or behaviours are not encouraged

The FlexForum discussed 10 situations in three areas where the outcomes being experienced may not be consistent with maximising long-term benefits for consumers.

- incentives to invest
- digitalisation and data flows
- price and value of flexibility.

Incentives to invest

The items described in Appendix A as '**input methodology (IM) and default price-quality path (DPP) related barriers for distributors**', limited '**visibility of low voltage network conditions**' and '**distributor reliability performance requirements**' refer to various aspects of the existing IMs and the 2020-2025 DPP which collectively influence the ability and incentives for distributors to engage in learning-by-doing and invest in obtaining new capability (eg, capability to get low voltage network visibility).

These items are a source of the mismatch between the cost of learning-by-doing and the reward for doing so (or lack of). Regulatory settings do not encourage learning-by-doing because they currently limit the incentives and funding to explore the prospect to use flexibility and invest in capability needed to use flexibility. At the same time, the reliability thresholds raise the risk and cost of exploring how to use flexibility (ie, discouraging experimentation).

Several steps in the Flexibility Plan call for action to adjust regulatory settings to encourage learning-by-doing and support investment needed to implement what is learned. Step# 13 calls for action to ensure distributors have the ability and incentive to invest in the capability to obtain and produce network information. Step #18 calls for regulatory settings to provide Transpower and distributors with sufficient resources and incentives to explore and use flexibility options. Similarly, step #22 calls for regulatory settings to enable the System Operator to use flexibility options.

Digitalisation and data flows

The items described in Appendix A as '**communication protocol selection**', '**non-standardisation of a communication protocol across the country and distributors**' and '**flexibility cannot be accessed because devices do not have smart functionality**' reflect a desire for clarity about the communication and connectivity capabilities to enable flexible resources to be interoperable and used to full effect, whether by households and businesses or within the power system.

¹⁴ Information about the Multiple trading relationships pilot project is available [here](#).

Connectivity and communication capabilities underpin the exchange and use of data about what services are needed, and how to confirm who provided what service, when, where and how.

The various technical standards and protocols are constantly evolving. The goal is to work towards common and interoperable data exchange systems and requirements, starting with existing capability and building over time towards fully automated, scalable, secure, reliable, interoperable and internationally certified data exchange systems.

A clear understanding of the minimum capabilities will underpin investment by firms ranging from equipment manufacturers to distributors to flexibility suppliers dealing directly with consumers. Providing more clarity will both encourage investment to build in the capability needed to use flexibility and avoid mis-directed investment.

Greensync told the FlexForum in April 2022 how most DER in Australia was not flexible because it did not have the needed communication capability.¹⁵ Aotearoa New Zealand has a window to provide clarity about connectivity and communication functionality ahead of the inevitable surge in DER

Communication and connectivity are particularly key to Flexibility Plan steps #35 and #36 to identify the coordination capability, roles and functions required for distributors and the System Operator to optimise network and power system operation, and to identify a common process for validation and settlement of services using flexibility.

The Energy Efficiency and Conservation Authority (EECA) and Electricity Engineers' Association (EEA) Demand Flexibility Communications Protocols Project¹⁶ (FlexTalk) will provide insights into communication and connectivity capabilities through a review of international communications standards and the real-world learnings from using the OpenADR 2.0 communication protocol to achieve active managed EV charging to provide flexibility.

Price and value of flexibility

The items described in Appendix A as '**different methodologies for incentivising distribution flexibility**', the '**difficulty for DER investors to determine the capital cost savings of installing DER**', the '**value of services is not visible to DER owners/operators**' and '**potential limits on the ability to value stack**' are facets of a broader issue; a need for more clarity about the financial and pricing signals for flexibility and about the criteria for responding to those signals. People want to know how much their flexibility is worth or could be worth, and the hoops they must jump through to realise that value.

Electrification decisions will involve material investment, with long-term consequences (more material than switching retailers). Choices to lock in or lock out flexibility will last many years. Decision-making must be assisted by access to authoritative and useable information about obligations and options associated with using DER and flexibility, costs, prices and potential revenue streams.

Several steps in the Flexibility Plan relate to understanding the value of flexibility to enable more informed decisions about investing in flexibility. Step #7 is to check that consumers have streamlined access to the retail pricing (buy) and power purchase (sell)

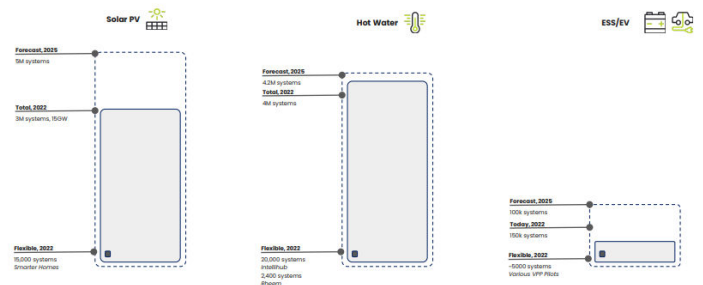
Communication and connectivity are critical for using flexibility.

DER can be 'smart', but if it is not possible to talk to a resource, it cannot be flexible.

Clear and early signals of minimum functionality will guide the investment needed to have the capability in place.

However Most DER Remains Inflexible

DER is increasingly smart, but is not connected for flexibility beyond pilots and trials.



¹⁵ FlexForum session 6, presentation by Greensync, at: [FlexForum Session 6 Greensync Presentation](#)

¹⁶ More information on the FlexTalk project is available [here](#).

information. Step #8 is to check that consumers have streamlined access to the wholesale market information. Step #21 is to develop a common method for valuing flexibility used for network services and making associated investment decisions.

Putting a price on flexibility when and where it is useful is the simplest route to encouraging investment in the capability and functionality required for DER to be flexible, and a critical step on the pathway to encouraging investment in flexible DER when and where it would be most useful.

Appendix A: Perspectives on opportunities to accelerate flexibility and electrify faster

Tables 1 and 2 summarise the perspectives on cultural change and technical change opportunities discussed by the FlexForum on 7 July 2022. Each issue is taken at face value as they represent a question which needs to be answered to enable flexibility.

Table 1 Opportunities which may result from cultural change

| Situation | Impact | Opportunity |
|---|---|--|
| Decision-makers / agencies being rigid and not helpful when asked to resolve a problem Examples were discussed | Prevents/delays service/product development, and raises costs | Positive commitment from leadership of decision-makers (eg, CEOs, Boards) to be collaborative and supportive |
| Significant effort is required to follow regulatory change processes Examples were discussed, including the nearly 6 years required to make the DG connection guideline Code change request by the EEA | Prevents/delays service/product development and R&D, and raises costs | Streamline and simplify change processes Enable a central point for collating and supporting changes Ensure regulatory framework allows for 2 speeds so there is flexibility for innovation while allowing codes and standards to slowly catch up |
| Resistance to change because people in operational positions and the front line of decision making don't have the time / don't see need for / aren't empowered to enact changes to BAU processes | Prevents/delays service/product development and R&D, and raises costs | Education and sharing of learning from experiments and real examples to build understanding and buy in Cultural shift where the default response is to try and make new things work rather than avoid changes to existing processes. |
| Lack of centralised innovation funding for growing the market - cf UK, Aus – Arena, etc | Less R&D / innovation, particularly by smaller firms. R&D is less coordinated | Coordinated and dedicated R&D funding, with specific requirements to ensure access by smaller firms |
| Lack of clarity regarding a clear pathway for changes, eg, process from exemption to permanent change | Increases investment risk, and thereby prevents/delays service/product development and R&D, and raises costs Example mentioned was the process for transitioning from MTR pilot to permanent arrangement | Clarity around pathway and process from experiment to permanent regulatory change, eg, regulatory sandbox arrangements in place in UK, Australia, Singapore etc |
| Limited incentives for distributors to use flexibility, creating a preference for distributors to deploy capex | Flexibility is not preferred, limiting investment in flexibility and reducing liquidity | Options to consider to provide a level playing field for capex/opex options include: <ul style="list-style-type: none"> • a flexibility commitment similar to that adopted by UK distributors • a prescribed/transparent test for consideration of poles wires vs flex/non-wires alternatives (like RIT-D in NEM). |

| Situation | Impact | Opportunity |
|--|--|---|
| Lack of strategic alignment about the end-state for flexibility, ie, will flexibility be directly managed by distributors or via third parties | Inconsistent and non-complementary approaches and differing timescales to using flexibility | <ul style="list-style-type: none"> dedicated R&D funding to support flexibility to build liquidity and reach scale to be able to compete more effectively with the incumbent approach. |
| Availability of experience and evidence to inform and de-risk big decisions | Prevents/delays service/product development, and raises costs | <p>Build alignment on technical and commercial arrangements via:</p> <ul style="list-style-type: none"> practical experiments and knowledge sharing regulation |
| Lack of commonality about future energy scenarios and forecasting | Decisions are made for differing reasons, with differing priorities | <p>Get commitment at CEO and Board level</p> <p>Develop experience through coordinated experiments, eg, via sandboxes</p> <p>Common language and view about what future looks like</p> <p>A common method about scenarios and forecasting</p> |
| Potential that the whole of system value is not considered | Flexibility available at the network level is not available at the system level and vice versa | A whole of system approach to ensure the value of flexibility is optimised |

Table 2 Opportunities which may result from technical changes

| Situation | Impact | Opportunity |
|---|---|---|
| Inconsistency between the 4777 standard and the Code | Solar installations are forced to choose between breaching work safety or Code requirements | Consistency and coordination between regulatory agencies |
| IMs and DPP related barriers for distributors <ul style="list-style-type: none"> Insufficient allowances for distributors to purchase flexibility and invest in R&D Very small funding allowance for innovation by distributors, with strict rules on how it can be applied and an application process Lack of incentive / allowance / flexibility for the buy side to build and develop the market via loss leading - doing so could potentially be in conflict with regulation, even if there are broader dynamic efficiency benefits Lack of flexibility in regulated distributor funding. Opex vs. capex buckets fixed within regulatory period (not totex) and | R&D competes for funding and resources with activities that directly affect performance (and hence penalties and incentives). Flexibility is not used | Current IM review provides Distributors with sufficient funding and incentives to invest in R&D and incentives to use flexibility |

| Situation | Impact | Opportunity |
|--|--|---|
| <p>buckets also based to an extent on past regulatory period</p> <ul style="list-style-type: none"> Lack of funding allowance for EDBs to run third-party procurement processes (on top of usual procurement) | | |
| Distributor reliability performance requirements create a catch 22 for flexibility (in the early stages of commercialisation) | Barriers to using/providing flexibility are high. Distributors want reliability performance obligations to mitigate SAID/SAIFI breach risk; but flex providers absorbing these obligations discourage participation. | Explicit recognition and allowance of the costs of commercialisation of flexibility |
| Part 12 of the Code and the new DDA have clauses that create a risk of locking customer load to the distributor | Restricting access to consumer load limits opportunity for flexibility services | <p>Access to consumer load is not restricted</p> <p>The role of emergency access of consumer load is recognised, use cases are defined and communication of use is standardised.</p> |
| Current arrangements for third-party access to historical meter data are not practical | Information required to understand load / benefit of DER is not readily available | <p>Third-party access to historical consumption data is readily available to authorised parties</p> <p>Ensure that Customer data right enables rapid and efficient sharing and protection of data</p> |
| Voltage limits are too tight | Current voltage limits will prevent connection/use of solar as uptake increases, resulting in missing value. Not compatible with the 4777 standard | Regulated voltage limits are fit-for-purpose |
| Regulatory framework mandates a one-to-one supply relationship | <p>Reduces opportunity to use flexibility, eg, because the inability to separate import and export prevents engagement with a preferred flexibility provider</p> <p>Limits the ability and incentive for parties to invest in flexibility by restricting the opportunity to maximise value</p> | Enable multiple trading relationships |
| Communication protocol selection | Protocol may prevent/limit value stacking or may limit the commercial models that can be realised | Careful selection of standard with input from all stakeholders Consider the work done in Australia, ie, “Post 2025 DER Implementation Plan – interoperability policy framework” which references a DEC 21 consultation on how to select a technical standard. |
| Potential limits on the ability to value stack and develop missing markets (in wholesale market sense) | <p>Harder to realise the value of flexibility/DER</p> <p>The complexity involved in value stacking is a barrier - the sum of each of the smaller barriers to accessing value in each part (eg, participate in spot market, contract with EDB, contract with Transpower) adds up to a big barrier</p> | Identify/resolve barriers to value stacking |

| Situation | Impact | Opportunity |
|--|--|--|
| Visibility of low voltage network conditions is limited | <p>DER Owner/investor can not understand where DER is required, and if investment will be impacted by network voltages.</p> <p>Distributors may not have adequate geo-spatial maps of LV network assets (including asset locations, ICP phasing, asset condition etc.) to match against the associated LV network conditions which would allow the targeting of localised DER services</p> | <p>Enable investment in digitalisation of EDB assets and network configurations. Ensure ongoing support is provided to account for ongoing changes to network.</p> <p>Ensure voltage information is available to DER investor and/or their advisors.</p> |
| Inefficient market design results in over-use of emergency response/protection/load management systems | Distorted market conditions and impaired opportunities for flexibility providers | Transparent operating decisions and market development are needed to ensure market mechanisms are maximised and protection/control is a genuine last resort solution |
| Curtailment of DER due to network voltage | Increased risk to investment case for DER | Open up network data to third parties |
| Different methodologies for incentivising distribution flexibility are in place across NZ (eg, distribution pricing and flexibility markets) | Reduced participation from DER owners due to complexity | Collaborative learning-by-doing to identify common approaches to valuing and incentivizing flexibility services |
| Value of services not visible to DER owner/operators | Underinvestment in DER/flexibility | Network capacity information is developed by distributor to signpost flexibility opportunities and inform consumer decisions about electrification |
| Flexibility can't be accessed because devices do not have 'smart' functionality | Lack of flexibility leads to higher overall system cost | Consider equipment standards/requirements, while managing risk of stifling innovation |
| Difficult for DER investor to determine the capital cost savings of installing DER to reduce connection capacity capex and opex. | Favours network solution over DER which may not be the most efficient for the customer. | Consider ensuring process for investor to access information on the cost of different connection sizes and grid capacity. |
| Non-standardisation of a communication protocol across the country/distributors. | Creates barriers to participation and/or increased costs of participation. | Standardisation of a communications protocol nationally |