

FlexForum Insights

A framework for learning-by-doing will bring forward the benefits of flexibility and accelerate electrification

Table of Contents

Table of Contents.....	1
Main points	2
Flexibility is expected to play a big role in electrification	4
Learning-by-doing is a key ingredient of a successful electrification	5
Learning-by-doing isn't as easy as it needs to be.....	6
Whole-of-system coordination and collaboration is needed to support forward-looking learning	7
More learning-by-doing relies on improving the incentives and funding models.....	8
Regulatory frameworks need to become more agile and accepting of experimentation	9
Three complementary measures to make learning-by-doing easier.....	10
Measure 1: an entity to provide a whole-of-system view of learning-by-doing.....	10
Measure 2: make dedicated funding available until 2026 to accelerate learning-by-doing.....	11
The size of the fund should reflect the scope and scale of the learning and the desire to move faster than we are.....	12
A flexibility-first commitment	13
Measure 3: regulators prioritise and fast track support for learning-by-doing	13
Appendix A: some information on how this advice was developed	14

Main points

The FlexForum is an association of diverse organisations from across the electricity eco-system that want to take practical action to accelerate progress to ensure distributed energy resources (DER) and flexibility are available 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.

The FlexForum produced the Flexibility Plan 1.0¹ to provide 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 DER and flexibility.

The Plan relies on industry-led, coordinated and collaborative learning-by-doing provide practical experience and insights into the capability, practices and processes required to maximise the value of DER and flexibility.

Step #B in the Flexibility Plan called for action to ‘ensure coordination between agencies and bodies with a role in supporting learning-by-doing.’ The call to action was prompted by the FlexForum perspective² that learning-by-doing about flexibility and other known and unknown unknowns is very difficult.

The FlexForum drew on the experience of members, completed a series of interview and a survey to identify ways to increase the amount and quality of learning-by-doing about the role of flexibility, and also integrating DER into the power system and market and electrification.

The FlexForum recognises that the conclusions could be viewed as biased because the approach is not statistically representative or reflecting all views across the electricity ecosystem. However, the FlexForum is confident the conclusions are robust because the counterfactual – that learning-by-doing is easy and is occurring at the level and quality required – is not credible or plausible.

Learning-by-doing isn’t as easy as it needs to be to achieve the pace of progress required

The effort and difficulty of developing a smart and more flexible electricity system should not be underestimated. Learning-by-doing is the key to unlocking significant consumer benefits from innovation and experimentation and by mitigating the costs of implementing untested rules and practices. Three things can help improve the amount and quality of learning-by-doing.

1. Whole-of-system coordination and collaboration is needed to support forward-looking learning.
2. Incentives and funding models can be improved to increase the amount and quality of learning.
3. Regulatory frameworks need to become more agile and accepting of experimentation.

Three complementary measures to increase the amount and quality of learning-by-doing

The FlexForum thinks three complementary measures could quickly increase the amount and quality of learning-by-doing.

Measure 1: Ensure whole-of-system coordination and collaboration to help realise more bang for the learning-by-doing buck by having an entity which provides a whole-of-system view of learning-by-doing by providing coordination and supporting collaboration across the electricity eco-system, including with and between industry associations and partners.³

¹ You can find the Flexibility Plan 1.0 [here](#). It contains definitions of some common terms and the steps referred to throughout this paper.

² See FlexForum session 15, 18 August 2022, at [FlexForum: Session Fifteen](#). The group heard perspectives on learning-by-doing from Ara Ake, the Commerce Commission, the Energy Efficiency and Conservation Authority (EECA), and the Ministry of Business, Innovation and Employment (MBIE).

³ Industry associations include Electricity Networks Aotearoa, Electricity Retailers Association of New Zealand, Sustainable Electricity Association of New Zealand, Independent Electricity Generators Association.

A founding purpose of the FlexForum is to support coordinated, collaborative learning-by-doing. There is a lot of activity underway and more needed. Having an entity take a whole-of-system view of who is doing what, and as importantly, what is not being done, to use flexibility and integrate DER will help the electricity sector to better leverage the benefits of a broad perspective and make best use of finite resources and expertise.

Measure 2: Improve incentives and increase the level of investment in learning-by-doing, particularly in the short-to-medium term.

A well-rounded contestable programme fund is needed to support a range of learning-by-doing projects and collaborative, customer-focused trials about DER and flexibility. The funding needs to be available from as soon as possible (ie, June 2023) until 2026 initially, and potentially longer, to provide additional support for learning-by-doing in the critical early stages of the transition to electrification. The approach suggested by Orion to the MDAG is a good starting point for designing the fund.

- **Explore, then align:** Learning-by-doing and experimentation is needed to explore and learn from trialing different approaches, before driving alignment on those that work best and scaling insight and fit-for-purpose solutions.
- **Start small and keep options open:** Funding should encourage a phased approach to project delivery. By increasing the scale of funding at each phase, governing bodies encourage agile exploration while managing risk and ensuring funding is used efficiently as concepts evolve
- **Shared learning:** To leverage the greatest value from the fund, it should focus on supporting initiatives that demonstrate the potential to scale, avoid duplication and develop shared intellectual property (IP).

The size of the fund should reflect the scope and scale of the learning and the desire to move faster than we are. A reasonable starting point is to ensure sufficient funding to deliver an additional 4-6 medium-sized collaborative projects and 1-2 larger collaborative projects every 18 months to 2 years. Achieving this level of activity is estimated to require government and industry to each commit \$4.6 million over four years towards a contestable funding pool.

Incentives for distributors to support learning-by-doing should be complemented as soon as possible (ie, 2023) by a flexibility first commitment developed and agreed by MBIE, the Commerce Commission, and network operators.

Measure 3: Ensure regulators dedicate resources to enable faster-paced learning-by-doing by adopting more agile decision-making and accommodating experimentation.

Regulators – particularly the Electricity Authority and Commerce Commission – can adapt their practices to better support learning-by-doing, including by committing resources to supporting experimentation. The types of support which would contribute to fasttracking learning-by-doing includes prioritising resources to answering questions, provide guidance and otherwise support innovators and start-ups navigate complex regulatory frameworks, and trial new products and services. The Australian Energy Regulator Energy Innovation Toolkit is a useful reference point.

More information on the FlexForum and its members can be found on the [FlexForum](#) webpage

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

Flexibility is expected to play a big role in electrification

Households, communities and businesses are starting on an electrification journey resulting in the proliferation of electric vehicles (EV), EV charge points, local generation, battery storage, electric space and water heating, electric motors and other smart devices. These DER will need to be seamlessly integrated into the networks, electricity system and market in a way that gives opportunities to provide additional value to their owners, while preserving the security and reliability of the physical networks for all consumers.

The FlexForum considers that electrification and decarbonisation will have a material impact on the electricity market and system at least comparable to the changes to industry structure, capability, processes and practices completed in the 1990's. Electricity consumption is forecast to increase by 50-100% over the coming 30 years.

The Boston Consulting Group *The Future is electric* report referred to the Sapere view about the implicit challenges in developing DER given 'integrating DER and distribution networks with grid supply resources will be as profound a change, both technically and economically, as New Zealand's transition to an electricity market in 1996', going on to say the 'right market conditions and incentives must be in place to build DER where they are most valuable to the individual consumer, as well as wider electricity sector. Building DER in the wrong place could be hugely problematic, particularly if built at too large a scale. **Coordination across the sector is imperative.** (emphasis added)'.⁴

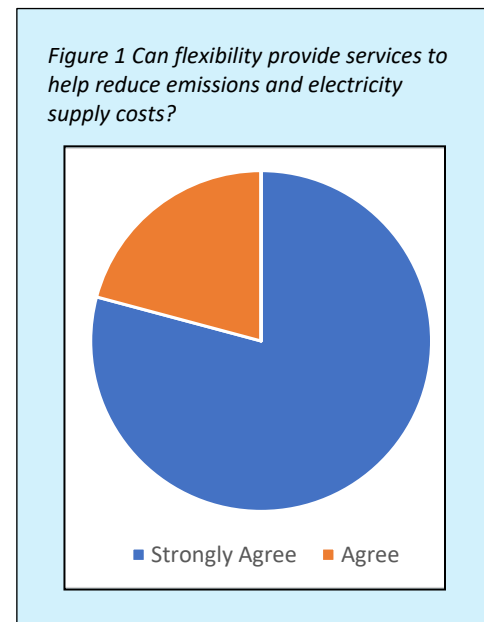
The FlexForum is a recognition of and direct response to the step change the electricity sector needs to make to how it operates by identifying new ways of managing supply and demand and new ways of working across the sector which take account of DER and flexibility.

Flexibility is shorthand for using the capability of DER to modify how electricity is produced or consumed in response to external signals. The opportunity is that flexibility makes electrification and decarbonisation a bit more reliable and a bit more affordable than otherwise, and better accommodates consumer choices and preferences.

Responses in interviews and a survey undertaken to better understand the current state of the learning-by-doing all indicated a clear expectation that DER and flexibility will become more pervasive and it could help Aotearoa New Zealand to achieve its electrification and decarbonisation objectives.

Figure 1 shows the responses to the survey question 'Do you think flexible resources which can be used to provide various services (eg voltage response, peak management, etc) could help reduce emissions and/or avoid the cost and time to build all the new electricity system infrastructure that would otherwise be required?'

The benefits of using flexibility are expected to be material. Flexibility will be an important (but not the only) tool for maintaining a reliable and affordable power supply. Electricity retailers, distributors, and Transpower as the Grid Owner and the System Operator will need to use the flexibility available from household, business and community DER to manage costs of supply. Flexibility will also be an important tool for households and businesses to manage both the upfront costs of electrification and ongoing electricity costs.



⁴ Boston Consulting Group, [The Future is Electric](#), October 2022, page 94. y Sapere and BCG ...Sapere identified several challenges implicit in developing DER. It stated integrating DER and distribution networks with grid supply resources will be as profound a change, both technically and economically, as New Zealand's transition to an electricity market in 1996 (p94 BCG, and ref 74

Learning-by-doing is a key ingredient of a successful electrification

The Flexibility Plan identifies practical, scalable and least-regrets steps to unlock the value of DER and flexibility for households, businesses, communities, the power system and Aotearoa New Zealand.

The Plan relies on industry-led, coordinated and collaborative learning-by-doing providing practical experience and insights into the capability, practices and processes required to maximise the value of DER and flexibility.

We have used flexibility from hot water cylinders to manage reliability and affordability in the power system for a long time. This experience makes it reasonable for us to learn how we can leverage the flexibility of DER such as solar and other distributed generation, electric vehicles, battery storage, heating and cooling devices.

Learning-by-doing is seen as a key step toward working out how to use flexibility in the electricity system and market.

- technical research and development – working out if technology works
- counterparty interfaces, business models and commercialisation – working out new ways to supply products or services to customers, including potentially using a new technology or an existing technology in a new way.

The collected experience of the FlexForum and the views shared through interviews and the survey indicate the critical unknown relates to counterparty interfaces and business models for commercialising flexibility.

People appear broadly comfortable that ‘the technology’ works. The unknown is how it will work in a market environment, for example testing and bedding down the business-to-business and business-to-market interfaces which will be needed to unlock the capability and value of the DER and flexibility which will be in the hands of consumers, businesses and communities.⁵

Without learning-by-doing, consumers will not experience any tangible benefits of DER and flexibility to the same extent or as quickly. Further, implementing new arrangements without testing to make sure they work and systems are ready can have material and long-lasting negative impacts. For example, retail switching was introduced in April 1999. There were material problems with the market systems and retailer processes which resulted in it taking customers on average over 200 days to switch retailers, customers being disconnected, and customers receiving backbills after not being invoiced for extended periods. All of this contributed to low consumer confidence in the retail market and depressed switching rates for nearly a decade which in turn meant consumers missed out on significant benefits of retail choice.

There is much that we don't understand in this space, and thus learning by doing will be critical. Internationally a number of countries have much more advanced programs than NZ, but we need to explore which of their approaches transfer to our electricity ecosystem and which don't.

Survey response, February 2023

⁵ BCG shares this perspective ‘While the technological infrastructure to enable smart demand response is relatively mature and developing every year, there are potential headwinds. The systems, processes, and communications required to link assets to the grid require significant technology upgrades.’ (p74)

Learning-by-doing isn't as easy as it needs to be

Learning-by-doing isn't as easy as it needs to be to achieve the pace of progress required.

The BCG Future is Electric report talks about investment in new technologies like distribution network visibility and coordination being needed to have a smart, more flexible electricity system which enables \$10 billion in net present benefits by 2050) and an additional 2 gigawatts (GW) (or more) of demand-side flexibility by 2030.⁶

An additional 2 GW of flexibility by 2030 means adding 250 megawatts of new flexibility each year from 2023 to 2030.⁷ Bringing on flexibility at this scale and pace will be challenging.

- we don't fully know what specific investments in smart systems (capability, processes and practices) are needed to enable virtual infrastructure and DER orchestration or to scale up the physical network for electrification.
- the investment need goes beyond distributors. A smart system must accommodate a complex array of multi-lateral interactions involving households, businesses, communities, flexibility suppliers, network operators, the system operator and others.
- the pace of change (and working out what and how to change) needs to accelerate, but there are no obvious reasons or incentives at play right now which would cause this acceleration to happen.

... the flexibility required to meet peak demand will increase substantially to 2030 and beyond. The deployment of smart technologies will need to accelerate in the near-term to match the pace of the future system. Ensuring that electricity markets provide the right signals to attract and retain flexible capacity, as well as frameworks to enable increased demand-side participation and flexibility in networks, will be critical.

BCG, The Future is Electric, page 131

The effort and difficulty of developing a smart and more flexible electricity system should not be underestimated.

A useful reference point is the United Kingdom. Flexibility started becoming mainstream there around 2018 and grew quickly. However, this outcome rested on the back of effort and learning going back to 2010's.

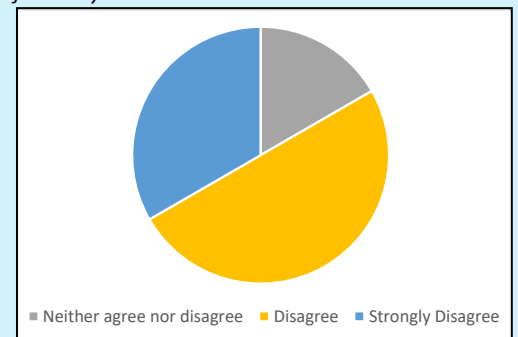
The FlexForum perspective about the effort and difficulty inherent in learning-by-doing was shared by most people surveyed and interviewed. Nearly 90% of the people surveyed agreed that a key step to use new and commercially scalable flexibility resources is to increase the amount of learning-by-doing.

A similar proportion of people believed better systems and incentives are needed to increase the amount and quality of learning-by-doing. Figure 2 shows the responses to the survey question 'Does Aotearoa New Zealand have the right systems and incentives in place now to support the use of flexibility resources and the delivery of any new flexibility services we need?'

The interviews and survey highlighted three themes about how to increase the amount and pace of learning-by-doing. The themes are similar to perspectives shared by others.

1. Collaboration is not encouraged to the extent it needs to be given the scale of the benefits and challenges.

Figure 2 Do we have the right systems and incentives to support the uptake and use of flexibility?



⁶ Boston Consulting Group, [The Future is Electric](#), October 2022, pages 11, 14, 118 and others

⁷ For context, this is equivalent to a new Turitea Wind Farm (222MW) each year.

2. Incentives and funding models do not support the amount and quality of learning-by-doing needed.⁸
3. We are not well paced to act quickly and make changes in the timeframes required.

Whole-of-system coordination and collaboration is needed to support forward-looking learning

Working out (ie, learning) how to use flexibility, and more generally to how to integrate DER and prepare for a step change in electrification, requires the individual and collective efforts of firms across the electricity ecosystem.

Learning has been occurring, but often within existing frameworks and paradigms and in siloes to address a specific organisations problem, eg, a distributor learning how to integrate EVs into the low voltage layer of their network or developing low voltage management capability or a supplier developing a service to leverage latent capability of household or commercial flexibility.

Collaborative learning focused on evolving existing market and system arrangements is less common. The two examples of future-focused, multilateral and collaborative learning underway now are the Ara Ake sponsored [Multiple trading relationships pilot](#) and the EEA/EECA sponsored [FlexTalk project](#).

There are several reasons for the current preference for learning in siloes over collaborative learning.

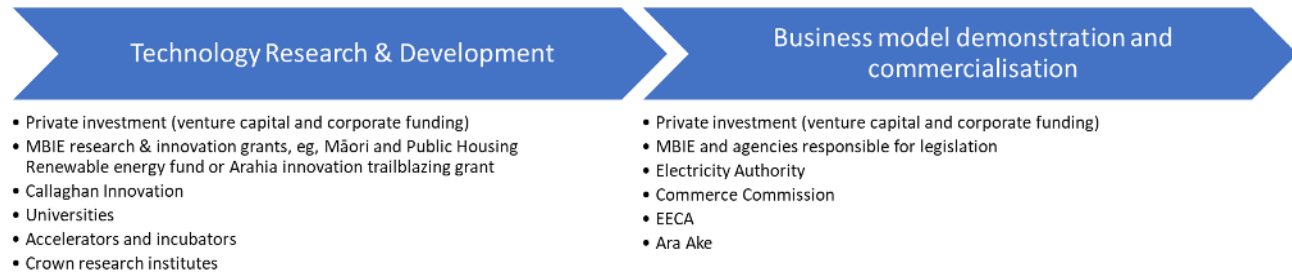
- The costs of learning-by-doing are often significant, with potentially significant upfront costs incurred during the scoping and set up stage with no guarantee of progress or a return on the investment. Setting up projects is the most difficult step, particularly if the idea (like most steps in the Flexibility Plan) requires multi-lateral collaboration – it takes considerable time and effort (ie, resources) to find willing participants, scope and agree the project, design operational parameters. A key reason the MTR and FlexTalk projects are happening is the financial support from Ara Ake, EECA and EEA to get the projects off the ground.
- There is little incentive for organisations to share experience and insights obtained through learning-by-doing resulting in niche and proprietary solutions and duplication of effort through repeated re-inventing the wheel. Sharing of findings is rarely a priority, particularly when the learning is commercially focused because anything learned becomes proprietary intellectual property, even if it is not unique. Firms have very few incentives to share what they have learnt given the possibility other organisations might get a free ride from giving away potentially valuable intellectual property, even when the experience is not necessarily unique to Aotearoa New Zealand or globally. Additionally, sharing involves incurring extra costs to collate and present the results, without always an obvious benefit to the incurring those costs. Public reporting of findings is only routine where external funding clearly comes with a requirement for reporting, engagement and information dissemination, eg, ARENA, EECA funding.
- A perspective shared through the survey is the existing market and regulatory frameworks are biased against innovation, and by extension, learning-by-doing. Reasons given for this view included a status quo bias of established industry participants, an innate conservatism and a low tolerance for risk of trying new things in the regulatory frameworks. The underlying message was a perceived lack of interest from key parts of the supply chain to participate in multi-lateral demonstration projects.

Several of the conclusions reached by the Productivity Commission in its [follow-on review of New Zealand firms: reaching for the frontier inquiry report](#) are very relevant to amount and quality of learning-by-doing, including how 'Industry Transformation Plans lack resources, co-investment by business, connections with researchers, and enough focus and ambition to spark transformational change. In addition, material decision making for Industry Transformation Plans, National Research Priorities, and other processes remain largely centralised and top-down, rather than being collaborative and devolved.'

⁸ BCG noted 'another important element that will assist with the delivery of virtual network solutions is innovation funding and support' See [The Future is Electric](#), October 2022, page 190.

More learning-by-doing relies on improving the incentives and funding models

There are many organisations in the learning-by-doing ecosystem which fund learning-by-doing and provide incentives through responsibility for the legislative, regulatory and operational environment.



But the existing incentive and funding models are not sufficient to drive the amount and pace of learning-by-doing needed to achieve electrification and decarbonisation goals, or to ensure that consumers realise the full value of DER and flexibility.

Commercial incentives are determined by the market framework (ie, revenue streams from participating in various 'markets') and associated business decisions. Businesses are investing to take advantage of existing revenue streams, eg, spot price arbitrage and reserves market. However, commercial incentives are insufficient to support development of new markets, for example frameworks for network operators to routinely purchase contracted flexibility. Further, investors lack sufficient certainty that commercial incentives and revenue streams for flexibility will be developed to commit to investing in the capability and capacity required.

We face a classic chicken and egg problem.

- learning-by-doing is needed to identify, test and embed the economic incentives and commercial frameworks which are needed to integrate flexibility into the electricity system and market
- incentives are not sufficient to encourage investment from all the key parties in the amount and quality of learning-by-doing needed to establish the economic incentives and commercial frameworks.

The overwhelming perspective from interviews and the survey is that flexibility will become available by providing a route to market and ways to monetise DER across the value stack, particularly by defining the service(s) and providing adequate price signals for flexible resources to supply that service(s).

Economic incentives are needed for suppliers and consumers to be interested, but reaching this point requires investment and active involvement of network operators, retailers, flexibility suppliers and others to create the route to market. The challenge was described in a survey response as 'Need to prove we can do it, however the revenue mechanisms aren't readily available just yet. Our experience is no one is really prepared to pay for the learning by doing.'

Addressing this challenge involves providing the right environment:

- for the firms which could be using flexibility to invest in the relevant capability and processes to work out when, where and why they will use flexibility and incentives to start paying for flexibility services.
- for the firms which could be supplying flexibility to invest in developing solutions, including effective ways to engage with and aggregate household, business and community flexibility.

Both these outcomes must develop together. However, more emphasis and support for learning-by-doing will be required to encourage flexibility suppliers to invest in scaling up at the pace implied by BCG, particularly given there currently are very few incentives and sources of funding available to kickstart investment in this area.

With the status quo, flexibility buyers will keep finding the shelves are bare because suppliers have no reason to invest in having flexibility in stock.

There are a number of options for firms to apply for grant funding from Callaghan Innovation, EECA, MBIE, and Ara Ake amongst others. However, these options are not coordinated, are often narrowly focused requiring people to try to fit square pegs into round holes, emphasise technology development by individual firms, and the application processes can often involve material time and effort cobbling (which is not available to many applicants).

The interviews and survey indicate distributors are seen as a key partner in helping to build the supply of flexibility, but currently do not have sufficient capacity to participate (and invest) in the learning process. A common perspective can be characterised as ‘fundamentally we believe distributors aren't incentivised enough to drive change’ due to an emphasis on ‘short term optimisation of costs versus growing flexibility resources to achieve a more optimal long term result’. This pessimistic view of things must be countered by the view of several parties (some distributors) highlighting that distributors are already constrained in their operational budgets and adding payments for flexibility services makes things more challenging.

The UK's flexibility first approach was effective in stimulating parties to work on exploring solutions and has resulted in a thriving and successful market. This was partly supported by funding available through the low carbon networks fund and electricity network innovation competition. A similar scheme here would be valuable in speeding up the learning by doing that is already beginning.

Survey response

Regulatory incentives (determined by the Commerce Commission) influence the ability and incentive of distribution networks and Transpower (GO) to invest in developing, scaling and using flexibility. These incentives are currently insufficient to encourage widespread investment by distributors in capability needed to use flexibility, eg, low voltage management capability, and to overcome risks and costs of developing and scaling flexibility as a solution.

Improvements to incentive models are anticipated. The Commerce Commission, through the Input Methodology Review and subsequent 2025 Default Price Quality Path Determination, has the opportunity to improve incentives for distributors to invest in more learning-by-doing. This is a positive step, but may not happen and is anyway still two years away. Similarly, the Electricity Authority, with the recent changes to the Electricity Industry Act 2010 which provide it with more flexibility to exempt an industry participant from the Code, has the opportunity to enable an environment more accommodating to learning-by-doing (common shorthand for this is a regulatory sandpit).

Regulatory frameworks need to become more agile and accepting of experimentation

The electricity sector is closely regulated. Most activities of firms operating across the electricity supply chain are prescribed in some way through various regulatory instruments. The regulatory settings make everything work smoothly (most of the time), but the close regulation of business-to-business and business-to-customer relationships in the electricity sector reduces opportunities to test new products and services and business models (particularly those requiring changes to existing multi-lateral relationships). The status quo legislative, regulatory and operational environments can restrict testing or implementation of a business model, product or service.

- legislation administered by MBIE and other agencies may (unintentionally) prevent participants from testing new business activities or business models.
- the Electricity Industry Participation Code 2010 may (unintentionally) prevent participants from testing new business activities or business models.

Learning-by-doing and innovation are difficult with a tightly regulated and prescriptive ruleset. The challenge was described as the ‘...regulatory framework is not well placed to fix things quickly and in the timeframes required. We don't move fast due to conservative structures ... and lack of coordination.’ The ‘regulatory framework does not support the pace of change required in the industry given market design barriers and friction are everywhere.’

A further concern is the perceived hands off approach of regulators which assume 'the market will solve via commercial means. But regulated monopolies and vertically integrated oligopolies don't need to do this, so they don't.'

Three complementary measures to make learning-by-doing easier

The FlexForum thinks three complementary measures could quickly increase the amount and quality of learning-by-doing.

1. Ensure whole-of-system coordination and collaboration to help realise more bang for the learning-by-doing buck by having an entity which provides a whole-of-system view of learning-by-doing by providing coordination and supporting collaboration across the electricity eco-system, including with and between industry associations and partners.
2. Improve incentives and increase the level of investment in learning-by-doing about flexibility and electrification generally, particularly in the short-to-medium term. A well-rounded contestable fund is needed to support a range of learning-by-doing projects and collaborative, customer-focused trials.⁹
3. Ensure regulators dedicate resources to enable faster-paced learning-by-doing by adopting more agile decision-making and accommodating experimentation.

Measure 1: an entity to provide a whole-of-system view of learning-by-doing

Having an entity which supports coordination and collaboration to provide a whole-of-system view of learning-by-doing will help to realise more bang for the learning-by-doing buck.

There is a lot of activity underway and more needed. Having an entity take a whole-of-system view of who is doing what, and as importantly, what is not being done, to use flexibility and integrate DER will help the electricity sector to better leverage the benefits of a broad perspective and make best use of finite resources and expertise. Coordination and collaboration will be made easier with:

- a single point of contact for discovering and sharing expertise across and within industry siloes
- a direct connection to industry activities and demonstration projects, particularly through having people involved who can influence and are actively involved in the learning-by-doing
- a source of whole-of-system (ie, cross sector) and evidence-backed advice and input on standards and regulatory settings
- a governance structure which supports agile decision-making, wide participation and robust outcomes.

A founding purpose of the FlexForum is to support coordinated, collaborative learning-by-doing. The FlexForum considers that the alternative of relying on existing structures and regulatory settings will result in slower pace and disconnected effort. The FlexForum (or its mirror) is a must have to achieve or exceeding affordability, reliability and decarbonisation goals.

⁹ This measure draws on the Market Development Advisory Group suggestions on [Price discovery in a renewables-based electricity system](#) and subsequent [advice to MDAG from Orion](#).

Measure 2: make dedicated funding available until 2026 to accelerate learning-by-doing

Dedicated funding for learning-by-doing is required to identify the capability, processes and practices required to use flexibility in anger (and in peaceful situations too).

The support is for learning and developing new services involving flexibility, including to decrease the risk of experimentation and learning, and to stimulate efforts to make flexibility available.

Current funding support options are not fit-for-purpose. What is needed to quickly accelerate learning-by-doing is a well-rounded contestable programme fund is needed to support a range of learning-by-doing projects and collaborative, customer-focused trials about DER and flexibility. The fund would:

- act as a stop-gap measure to encourage more investment and involvement of network operators in learning-by-doing between now and 2026 pending the Commerce Commission strengthening incentives for distributors to invest in learning-by-doing
- provide a mechanism for flexibility suppliers to invest in learning-by-doing required to develop economic incentives and commercial frameworks without relying on agreeing co-funding from network operators given the potential for learning priorities to not always be aligned.

Key requirements of the fund are:

- The funding needs to be available from as soon as possible (ie, June 2023) until 2026 initially, and potentially longer, to provide additional support for learning-by-doing in the critical early stages of the transition to electrification.
- Funding should be available to any firm or group of firms prepared to participate in a multi-lateral experiment which is testing ideas that have whole-of-system implications, and particularly those which will inform a step in the Flexibility Plan 1.0. The idea is to provide 'safe to fail' options and make it easier for the sector to do things at higher cost than otherwise to learn how to do things differently (and potentially more cheaply).
- The funding is available to firms across the electricity ecosystem to help drive whole-of-system learning, while also encouraging the involvement of distributors as their participation is essential for much of the learning. The funding allocation should encourage industry to look outside and across sectoral siloes by getting involved in learning-by-doing with whole-of-system benefits.
- Access should be easier than for existing funding programmes, including by ensuring the application process does not require excessive effort, the co-funding requirements are flexible and take account of the relative financial resources of applicants, the funding criteria are not so tightly constrained to exclude beneficial learning-by-doing, eg, activities which will inform a step in the Flexibility Plan 1.0.
- Results must be shared.

The approach suggested by Orion to the MDAG is a good starting point for designing the fund.

- **'Explore, then align:** Learning-by-doing and experimentation is needed to explore and learn from trialing different approaches, before driving alignment on those that work best and scaling insight and fit-for-purpose solutions.
- **Start small and keep options open:** Funding should encourage a phased approach to project delivery, such as Ofgem's Strategic Innovation Fund. By increasing the scale of funding at each phase, governing bodies encourage agile exploration while managing risk and ensuring funding is used efficiently as concepts evolve
- **Shared learning:** To leverage the greatest value from the fund, it should focus on supporting initiatives that demonstrate the potential to scale, avoid duplication and develop shared intellectual property (IP). Orion support knowledge sharing requirements for publicly funded projects and encourage engagement with relevant groups (including the ENA and FlexForum)

on how to effectively share information across the industry to minimise duplication, leverage resource and facilitate collaboration.’

The size of the fund should reflect the scope and scale of the learning and the desire to move faster than we are

The Wellington Electricity EV Connect project is a useful reference point for the type of learning-by-doing needed. The project cost about \$550,000, with \$275,000 in co-funding from EECA, and involved practical learning about smart EV charging and developing advice about the implications of the learning.

The FlexTalk project being delivered by the EEA in partnership with industry and EECA to look at flexibility common communication protocols has a total project cost of about \$1 million.

A reasonable starting point to accelerate learning-by-doing is to have sufficient funding to deliver an additional 4 to 6 collaborative demonstration projects of an EV Connect-like scale and 1 to 2 projects of a FlexTalk-like scale every 18 months to 2 years. This suggests a project funding pool drawn from both government and industry of between \$3.4 million and \$5.6 million for 2023 and 2024, and a similar amount for 2025 and into 2026.

The learning-by-doing funding pool of would require government and industry to each commit \$4.6 million over four years. However, a strict 50/50 cofunding approach for projects should not be a condition because this can exclude participation of smaller, innovative firms.

Looking overseas highlights that learning is not cheap. Here is a list of 5 of 40 projects supported by the Australian Renewable Energy Agency (ARENA) between 2012 and 2021 relating to DER and learning about issues which are referred to in the Flexibility Plan.

<p>The Project Converge ACT Distributed Energy Resources Demonstration Pilot aims to demonstrate new distributed energy resources (DER) orchestration capabilities known as ‘Shaped Operating Envelopes’ which will allow Distribution Network Service Providers (DNSPs) to improve network congestion management, minimise network expenditure and improve DER market bidding into energy and ancillary service markets.</p>	<p>Total project cost \$8.4m</p>
<p>The Western Australia Distributed Energy Resources Orchestration Pilot is piloting the orchestration of customer-owned distributed energy resources (DER) such as rooftop solar, batteries and major appliances to participate in a future energy market.</p>	<p>Total project cost \$35.44m</p>
<p>The Rheem Active Hot Water Control project aims to demonstrate active control over 2,400 residential hot water systems in South Australia.</p>	<p>Total project cost \$8.8m</p>
<p>DER 2.0: Customer focused design for DER participation aims to understand how customers can be used to reshape Distributed Energy Resources (DER) orchestration program design to increase participation.</p>	<p>Total project cost \$0.943m</p>
<p>The evolve DER project aims to increase the network hosting capacity of distributed energy resources (DER) by maximising their participation in energy, ancillary and network service markets, while ensuring the secure technical limits of the electricity networks are not breached.</p>	<p>Total project cost \$12.94m</p>

For context, the total cost of the 40 DER-related projects supported by ARENA over the 11 years is \$224 million. However, this is not the complete list of flexibility-related projects. ARENA funding categories include EVs and charging, battery storage, solar and demand response. Since 2011 ARENA has funded 632 projects that advance renewable energy technologies – DER, geothermal, hydrogen, ocean energy etc – from early stage research to demonstration in the field with a total investment of \$1.96 billion.

A flexibility-first commitment

MBIE and the Commerce Commission should work with network operators – distributors and Transpower – to adopt a flexibility first commitment.

The central role that distributors are and must play in enabling electrification and flexibility should be explicitly recognised by regulators and by distributors themselves through a forward looking commitment to investing in capability, practices and processes and actively supporting collaborative learning-by-doing that goes alongside that investment.

The UK [flexibility first approach](#) was effective in stimulating parties to work on exploring solutions and has resulted in a thriving and successful market. The approach started with the [2018 commitment](#) by network operators to ‘opening up requirements for building significant new electricity network infrastructure to include smart flexibility service markets as part of day-to-day operations’, and was supported by OFGEM – the UK electricity sector regulator - in a range of ways, including through a £500M [low carbon networks fund](#) available between 2010-2015 to support network operators to try out new technology, operating and commercial arrangements. The [2015-2023 price control period](#) also provided £70M a year (on a contestable basis) for projects which help all network operators understand how to provide environmental benefits, reduce costs, and maintain security of supply as Great Britain moves to a low carbon economy. A similar scheme here would be valuable in speeding up the learning by doing that is already beginning.

Measure 3: regulators prioritise and fast track support for learning-by-doing

Regulatory support is a key ingredient of learning-by-doing.

Market regulation of business-to-business and business-to-customer relationships in the electricity sector can restrict learning about the performance or a business model, product or service. Network regulation of reliability and quality performance means distributors hesitate to experiment because there is no safe-harbour from the regulatory consequences of things not working as expected (which is a key reason for experimenting).

Regulators – especially the Electricity Authority and Commerce Commission – can contribute to fasttracking learning-by-doing by prioritising resources to support learning-by-doing, such as answering questions and otherwise supporting energy innovators and start-ups navigate complex regulatory frameworks, and trial new products and services.

The [Australian Energy Regulator Energy Innovation Toolkit](#) is a useful reference point. The AER provides an enquiry service and there is a mechanism to provide time-limited exemptions from obligations to eligible projects. This approach could be adapted by the Electricity Authority and Commerce Commission to collaborate to establish a framework which gives a one-stop-shop for people to navigate the complexity of the regulatory framework, seek exemptions from the Code and request exclusions for reliability and quality performance relating to experiments.

Regulators can also support learning-by-doing by dedicating resources to enable fast-paced triaging of issues and responding to queries and requests on a best endeavours basis in days.¹⁰

¹⁰ The FlexForum offered [advice to the Electricity Authority on this topic](#) in March 2023.

Appendix A: some information on how this advice was developed

The FlexForum discussed learning-by-doing in August 2022. The discussion highlighted two reasons for learning-by-doing:

- technical research and development – working out if technology works
- business model demonstration and commercialisation – working out new ways to supply products or services to customers (potentially using a new technology or an existing technology in a new way).

The FlexForum concluded that improvements are needed to the learning-by-doing ecosystem to accelerate uptake of DER and flexibility. Four main areas where improvements to the learning-by-doing ecosystem could lead to an increase in the amount and quality of learning-by-doing were identified:

1. Processes for obtaining (public) support for flexibility related learning-by-doing are streamlined and do not require unnecessary effort and cost
2. (Public) support for flexibility related learning-by-doing is available for both technology research and development and business model demonstration and commercialisation (and there is a strong preference for the latter)
3. Policy and regulatory agencies responsible for legislation and regulation (including Part 4) provide the appropriate type and level of support for learning-by-doing, particularly where it involves testing new business activities or business models
4. Learning-by-doing is collaborative, involves external parties, focuses on scalable solutions, experience is shared to avoid duplication, and has a clear focus on consumer benefit.

Overview of methodology

The FlexForum decided to undertake a project to confirm or reject the perspectives heard during 2022 about the difficulty of learning-by-doing and enable it to develop robust advice about possible improvements to the learning-by-doing ecosystem.

The project used interviews, a survey and round-table discussions to collate, synthesise and test perspectives and conclusions about

1. the main challenges faced by organisations attempting learning-by-doing
2. the nature of those challenges and whether they related to gaps in the support available from organisations enabling learning-by-doing
3. the options which could improve the extent and quality of learning-by-doing given the challenges and any gaps in support.

The insights and experience were obtained through:

- four interviews with FlexForum members. See Table 1
- five interviews with organisations with a role in supporting learning-by-doing. See Table 2
- roundtable discussions of the FlexForum on 1 December 2022, 2 March 2023, 6 April 2023 about the issues and emerging conclusions. Notes from these sessions are available on the [FlexForum webpage](#)
- An industry survey to inform and validate findings. The survey was taken in February 2023 and received 24 responses. See Table 3 for an overview of respondents and Table 4 for the survey questions.

The research was undertaken on a just-enough basis. The FlexForum recognises that the conclusions could be viewed as biased because the approach is not statistically representative or reflecting all views across the electricity ecosystem.

The FlexForum is confident the conclusions are robust because:

- we are not seeing the coordinated and collaborative learning-by-doing which is needed to increase the pace at which we learn how a smart, more flexible electricity system will work in a market environment and the practical steps needed to unlock the capability and value of the DER and flexibility
- the people contributing their views on the nature of the problem and ways to solve it have direct experience in attempting learning-by-doing.

The counterfactual – that learning-by-doing is easy and is occurring at the level and quality required – is not credible or plausible. Given this, more extensive and more expensive research is considered waste of resources.

Table 1 List of interviews with FlexForum members on experience with learning-by-doing

FlexForum member
Cortexo
Orion
Our Energy
Mercury

Table 2 List of interviews with organisations with a role in supporting learning-by-doing

Organisation
Commerce Commission
Callaghan Innovation
Ara Ake
Electricity Authority
Ministry of Business, Innovation and Employment

Table 3 List of stakeholders responding to the survey

Stakeholder	Total responses	Numer of FlexForum members
Distributor	7	2
Consumer	1	-
Aggregator	3	2
Technology provider	6	3
Retailer	3	1
Support	3	2
Total	23	10

Table 4 List of questions in the survey

#	Question
1	Do you agree that we are facing a changing world driven by households, businesses and communities changing how they use electricity and how they use the power system.
2	Do you agree that the number, types, capacity and capabilities of distributed energy resources will increase significantly in the next 5 years and that, if the resources are available, they could assist in achieving a more affordable power system?
3	Do you think flexible resources which can be used to provide various services (eg voltage response, peak management, etc) could help reduce emissions and/or avoid the cost and time to build all the new electricity system infrastructure that would otherwise be required?
4	Are you attempting to provide any flexibility services?
5	If yes to Q4, Are you doing this commercially or on a 'learning-by-doing' basis? Please provide the reason for the basis of your approach. What is your biggest challenge/barrier?
6	What support and incentives are available to you for learning by doing related to flexibility services? This could be where to get funding or understanding what rules apply or that need to change etc. What support is available?
7	Do you think that a key step to use new and commercially scalable flexibility resources is to increase the amount of learning-by-doing initiatives underway that will consider actual NZ electricity challenges and opportunities?
8	Does NZ have the right systems and incentives in place now to support the use of flexibility resources and the delivery of any new flexibility services we need?
9	What is the most important gap that needs to be closed now to facilitate the use of flexible resources (and or to increase the amount of learning-by-doing initiatives underway)?
10	Who is best placed to close the gap? (from Q9). For example, this could be an industry sector working with end consumers who understands their needs, or it could be a sector that could trade off the cost of using flexibility resources vs traditional network solutions or could be a regulator to create an expanded NZEM solution, etc
11	What support does the organization(s), from Q10, need to be successful?- What support is required to close the gap? What else needs to happen to the industry if this change is implemented?
12	Rate and Define the significance of the benefits of the change to end consumers of closing the gaps discussed in Q9 to 11. How significant would changes be in terms of where we need to be in 5 years?
13	Are there examples of missing items in NZ (regulations, policies, incentives etc) that are working in other countries (especially related to the gaps discussed in Q9 to 11). Examples of NZ current gaps being closed in other countries?