ELECTRICITY AUTHORITY
TE MANA HIKO

A regulatory roadmap for battery energy storage systems

11 November 2025

Executive summary

New Zealand is gradually transitioning most of its remaining fossil-fuelled generation to renewables-based intermittent and variable generation. Having a greater proportion of intermittent and variable generation creates challenges for how the power system operates, including the reliability and security of electricity supply.

This transition will create fundamental changes to our power system as New Zealand moves to a more decentralised system where we no longer purely rely on centralised generation, and consumer-owned energy resources (eg, rooftop solar generation, electric vehicles, and energy storage systems (ESSs)) will play an increasingly important role in our power system. A decentralised power system enhances resilience, reduces reliance on centralised infrastructure and empowers consumers and communities to participate more actively in electricity markets.

As we electrify our economy, we also expect a significant increase in electricity demand. One projection indicates electricity demand will increase 82 percent by 2050.[1] This increased demand is expected to require significant investment in electricity infrastructure. The Authority's former Market Development Advisory Group estimated up to $37 billion in new investments will be needed in generation, demand-side flexibility and energy storage by 2050, to meet increased electricity demand.[2]

The Electricity Authority Te Mana Hiko (Authority), along with others, expects ESSs to play an important role in the transition to a renewables-based power system as ESSs will enhance the stability of the power system and support the integration of renewable electricity generation. ESSs enable electrical energy to the stored and then injected into the power system when it is needed most. This ensures that homes and businesses are powered even when the sun does not shine or the wind is not blowing.

Battery energy storage systems (BESSs) are the most common new form of ESSs in New Zealand. The Authority is expecting a significant increase in the amount of BESSs connecting to New Zealand's power system over the coming years and decades, especially as the cost of BESSs continues to fall.

In the coming years we are likely to see a proliferation of BESSs dispersed across New Zealand's power system ranging from small-scale consumer BESSs such as electric vehicle batteries to large-scale grid-connected BESSs.[3]

For consumers, BESSs offer benefits such as greater energy independence and lower electricity bills by enabling stored energy to be used during periods of high electricity prices and providing a back-up source of electricity supply during power outages. When paired with on-site generation such as solar generation, BESSs offer consumers even greater energy independence.

Our role

The Authority plays a key role in promoting a competitive, reliable and efficient electricity industry, for the long-term benefit of consumers. To help achieve these objectives, we need

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1 Electricity Demand and Generation Scenarios: Results summary July 2024.

2 Price discovery in a renewables-based electricity system: Final Recommendations paper 2023.

3 See Meridian's Ruakaka Battery Energy Storage System.

appropriate regulatory settings that can deliver a modern and innovative energy sector that provides reliable electricity to consumers at the least cost.

We recognise the important role new and evolving technologies such as BESSs will play in the future in the power system, and we have already implemented regulatory changes to enable new and evolving technologies to participate in the electricity market. These include enabling ESS owners/operators to offer energy and energy reserves into the wholesale electricity market and amending the transmission pricing methodology to enhance functionality and support the efficient integration of BESSs. Changes such as these have benefitted consumers by promoting competition in the wholesale market and promoting reliable electricity supply.

We have several workstreams to continue updating the Electricity Industry Participation Code 2010 (Code) to enable ESSs to integrate efficiently into New Zealand's power system. These workstreams are not happening in isolation and there are interdependencies between our work and initiatives underway by BESS investors, industry bodies, and other government agencies.

This document sets out the regulatory roadmap for the Authority’s BESS-related work over the next two years and discusses some of the initiatives underway led by others within the industry. We have chosen to focus on BESSs for this regulatory roadmap, as these are the main type of ESS likely to connect to New Zealand’s power system over the next few years.

Contents

1. Purpose

1.1. This regulatory roadmap sets out work the Authority has done, and is planning to do over the next two years, in relation to BESSs. We have prepared a BESS regulatory roadmap, rather than an ESS regulatory roadmap, because the main type of ESSs connecting to New Zealand's power system over the coming years are expected to be BESSs.

2. Introduction

2.1. New Zealand's power system is undergoing a rapid transformation as the country's economy electrifies. While this creates opportunities, this also brings challenges for power system operation and for electricity reliability, including security of supply.

2.2. As New Zealand shifts towards a more electrified economy, decentralisation is emerging as a key trend in the generation and transportation of electricity. A decentralised power system leverages distributed and consumer-owned energy resources such as rooftop solar generation, electric vehicles (EVs) and BESSs, to enable consumers to generate, store and trade electricity. This approach enhances resilience, reduces reliance on centralised infrastructure, and empowers consumers and communities to participate more actively in electricity markets.

2.3. Electrifying New Zealand's economy will increase the demand for electricity significantly. Demand for electricity in New Zealand is projected to increase by up to 82 percent by 2050 (from 2023).[4] This may be challenging for a sector that has experienced relatively flat demand for the last 15 years.

2.4. The uptake of EVs is growing in New Zealand. EVs benefit the consumers who own them and also have the potential for wider benefits to the power system. They can contribute to demand management and grid stability by acting as flexible loads. However, integrating a large number of EVs will require careful management to avoid network constraints, especially during peak periods.

2.5. An additional challenge will be a change in the country's electricity generation mix, with more variable and intermittent renewable generation connecting to the power system.

2.6. For consumers, the electrification of New Zealand's economy presents many opportunities. Changes to technology[5] and retail offerings present an opportunity for consumers to participate in electricity markets and support the operation of the power system and security of electricity supply. The Authority expects more and more consumers will be in a position to choose whether to offset their consumption and reduce costs, or to become generators, selling excess solar or BESS energy capacity into an electricity market.

2.7. This will result in two-way power flows on distribution networks, which will present operational challenges for them since typically these networks have not been designed for two-way power flows.

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4 Electricity Demand and Generation Scenarios: Results summary July 2024.

5 Such as rooftop solar generation, BESSs, and electric vehicle charging and discharging.

2.8. New Zealand's evolving energy landscape is expected to include significant investment in electricity infrastructure. The Authority's former Market Development Advisory Group estimated that $27–$37 billion of new investment in generation, demand-side flexibility and energy storage (eg, BESSs) will be needed by 2050 to meet increased electricity demand.[6]

ESSs play an important role in a renewables-based power system

2.9. ESSs are expected to become increasingly important for managing some of the challenges to the power system brought on by the uptake of variable and intermittent electricity generation and the planned retirement of some fossil-fuelled generation.

2.10. ESSs enable electrical energy to be stored and then injected into the power system when the power is needed most. They can play an important role in ensuring that homes and businesses are powered even when the sun is not shining and/or there is no wind.

2.11. There are a variety of ESSs, including[7]:

(a) Pumped hydro storage – involves pumping water uphill from a lower reservoir through specially designed hydro machines, storing the water in an upper reservoir, and later releasing it back to the lower reservoir through the same hydro machines operating as generating units.

(b) Thermal energy storage – involves storing surplus energy as heat, usually from renewable sources, to be used later. Water, sand, and rocks can store thermal energy.

(c) Compressed air energy storage – air is compressed and stored under pressure until energy is needed, at which point the compressed air is released.

(d) Liquid air energy storage – air is cooled until it liquifies and stored at low pressure until energy is needed, at which point the liquid air is evaporated.

(e) Hydrogen energy storage – converts electrical power into hydrogen. The energy can then be released by using the gas as fuel in a combustion engine or a fuel cell.

(f) Battery energy storage – uses an electro-chemical solution that stores electrical energy and can be charged and discharged.

2.12. BESSs are widely recognised as an efficient way to store and deliver energy for finite periods of time. They are the most common new form of ESS connecting to New Zealand's power system. The cost of BESSs has fallen over the past several years, and they are now more prevalent, in the form of either electric vehicle batteries or stationary batteries. In the coming years, we are likely to see a proliferation of BESSs dispersed across New Zealand's power system.[8]

2.13. A BESS may be connected directly to:

(a) an electricity network

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6 Price discovery in a renewables-based electricity system: Final Recommendations paper 2023.

7 Renewable energy storage systems to power the future - Atlas Copco New Zealand.

8 Price discovery in a renewables-based electricity system: Final Recommendations paper 2023, p.118.

(b) a generating station

(c) an electrical load

(d) a combination of two or more of the above.

2.14. The term ‘hybrid’ plant is typically used to describe an arrangement comprising a BESS being co-located with, and connected to electricity generation. Hybrid plants can play an important role in the power system to support resilience (eg, through islanding and forming micro-grids).

Different sizes of BESS bring different challenges and opportunities

2.15. BESSs come in different sizes, connect to different parts of the power system, and serve different purposes. They can be used throughout the power system, from small residential consumer installations to large utility-scale installations.

Small-scale BESSs

2.16. Small-scale BESSs are typically used in homes and some businesses (ie, they are used by mass market consumers). The most common forms in use in New Zealand are electric vehicle batteries and stationary batteries integrated with rooftop solar installations.

2.17. Consumers with small-scale BESSs have the opportunity to be active participants in the power system. They can use electricity from the BESS when electricity prices are high, which will help lower their electricity bills. Consumers can also use their BESSs to manage the risk of power outages, by maintaining their BESSs at a certain level of charge.

2.18. Small-scale BESSs can be aggregated to form virtual power plants. This allows consumers to participate in the wholesale electricity market (eg, by providing demand response or selling electricity into the market during high price periods).

2.19. While small-scale BESSs create opportunities for consumers, they also bring challenges for network operators. A single small-scale BESS is unlikely to have any significant impact on an electricity network, but many BESSs operating on a network could cause power quality issues if not properly managed. Network operators are often not aware of when and where small-scale BESSs are installed, which makes it difficult for them to predict and manage the impact of these BESSs on their networks.

2.20. The Authority wants to ensure we have the right regulatory settings for consumers to maximise the value of their small-scale BESSs and for network operators to efficiently manage their networks. We acknowledge that the regulatory settings for small-scale BESSs are likely to differ from the regulatory settings for utility-scale BESSs. Different issues will arise in relation to the two size categories.

Utility-scale BESSs

2.21. Utility-scale BESSs are typically connected to the transmission network or to distribution networks. Utility-scale BESSs can actively participate in the wholesale electricity market (eg, energy price arbitrage, and provide ancillary services) and can support power quality.

2.22. In 2024, the country’s first utility-scale BESS began charging from, and discharging to, an electricity network. It is owned by Hamilton-based electricity distributor WEL Networks and is located near the Huntly power station. The BESS has a

maximum charge/discharge rate of 35MW and can store up to 35MWh of energy, which is enough to meet the daily energy needs of approximately 2,000 homes.[9]

2.23. The Authority is expecting more utility-scale batteries in the future. Transpower in its role of a transmission network owner, is seeing an increase in connection enquiries for utility-scale solar generation paired with a BESS, ie, a hybrid plant. Transpower currently has 6GW of enquiries for combined utility-scale solar electricity generation and BESSs. This is up from 2.3GW in January 2023. [10] Of the 6GW, 630MW of plant is in the delivery stage. Projects include Meridian Energy's Ruakākā Energy Park[11], comprising a 100MW BESS and 130MW solar farm, Contact Energy's 100MW BESS at Glenbrook[12] and Genesis Energy's 100MW BESS at Huntly.[13]

The Authority's role

2.24. The Authority is focused on promoting a competitive, reliable and efficient electricity industry for the long-term benefit of consumers. As New Zealand's power system becomes increasingly complex, we are focused on delivering change that supports a modern and innovative energy sector and ensures New Zealanders receive a reliable electricity supply at the least cost.

2.25. Key to this is having regulatory settings that promote competition, reliability, and efficiency in the supply of electricity to consumers, including supporting new technologies such as BESSs. We want the regulatory environment to result in:

(a) innovation in New Zealand's electricity industry, including investment in new and emerging technologies

(b) New Zealand's power system accommodating more variable and intermittent renewable generation

(c) consumers having the tools and confidence to participate in electricity markets[14] and to support the operation of New Zealand's power system and the reliability of electricity supply.

The Authority's work is informed by overseas experience

2.26. Many countries are experiencing similar energy transitions to New Zealand, including a growing number of BESSs connecting to their power systems.

2.27. The Authority is monitoring developments in other countries and learning from their experiences. In an example relatively close to home, Australia has seen a significant rollout of BESSs, both utility-scale and smaller scale. This rollout has been supported by a combination of co-ordinated federal and state government investment, market design reform, and regulatory flexibility. Examples of this include:

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9 Launch of New Zealand's First Utility Scale Battery Energy Storage System (BESS).

10 Whakamana i Te Mauri Hiko Monitoring report, October 2024.

11 The BESS was completed in May 2025 and construction on the solar farm is set to begin in August 2025 - Completion of Ruakākā Battery Energy Storage System | Meridian Energy.

12 Major milestone reached for Contact's new grid-scale battery | Contact Energy.

13 Genesis kicks off battery construction at Huntly Power Station | Genesis NZ.

14 For example, the wholesale electricity market, ancillary services market, and electricity futures market.

(a) A national BESS strategy[15] with a clear vision for scaling local BESS manufacturing, deployment and skills.

(b) State-led programmes such as South Australia's Home Battery Scheme and Victoria's Big Battery projects.

(c) National-led programmes such as the Small-scale renewable energy scheme (provides around 30% discount on the cost of installing a battery).[16]

(d) Specific market reforms to better accommodate energy storage (eg, the Integrated Resource Provider model and dedicated connection frameworks).

(e) Ongoing trials and scaling of vehicle-to-grid and virtual power plant technologies, supported by the Australian Renewable Energy Agency and the Australian Energy Market Operator.

3. Work on enabling increased participation of BESSs is underway

3.1. The Authority started making regulatory changes several years ago in preparation for the uptake of new and emerging technologies such as BESSs in New Zealand.

3.2. In 2018, the Authority published its view that a BESS injecting energy into a network met the definition of 'generating unit' in the Code. This interpretation enabled BESS owners to offer energy into the wholesale electricity market.[17] The Authority also said a BESS owner was able to offer interruptible load into the instantaneous reserve market while charging a BESS. We began investigating how BESSs could offer other forms of reserve.

3.3. In 2022, the Authority amended the Code to enable ESSs to participate more fully in the instantaneous reserve market.[18] This amendment enabled an ESS to offer not only interruptible load when charging but also generation reserve, even when charging or discharging. As we noted at the time, by enabling a broader range of technologies to participate in the instantaneous reserve market, this amendment benefitted consumers by promoting competition and the reliable supply of electricity.

3.4. In 2024, the Authority amended the transmission pricing methodology in the Code to enhance the functionality and to support the efficient integration of new and emerging technologies such as BESSs, and the building of renewable electricity generation.

3.5. Looking forward, the Authority has several workstreams planned or underway that relate to BESSs. These workstreams are focused on ensuring the Code accommodates new technologies, unlocking the benefits of BESSs to consumers, and enabling BESSs to be used efficiently and effectively within New Zealand's power system. These workstreams are described below, including key milestones for each project through to June 2027.

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15 Australia's National Battery Strategy.

16 Government rebates and loans for solar | energy.gov.au

17 Electricity Authority Market Brief 29 May 2018.

18 Enabling-energy-storage-systems-to-offer-instantaneous-reserve-Final-Decision-paper.pdf.

3.6. Note that the workstreams discussed below are not happening in isolation and that there are interdependencies between them.

Reviewing the common quality requirements in Part 8 of the Code

3.7. In 2022, as part of our Future Security and Resilience (FSR) work programme, the Authority published a 10-year roadmap indicating activities needed to unlock the opportunities, and address the challenges, of the transition to a low-emissions power system.[19] This roadmap focuses on preparing New Zealand's power system for increased reliance on variable and intermittent generation, technological advancements, and changing power flow and electricity demand patterns.

3.8. Key goals of the roadmap include improving power system reliability, accommodating new energy technologies like electric vehicles and BESSs, demand response and enhancing the integration of generation sources such as wind and solar. The roadmap emphasises the need for flexible and adaptive systems that can respond to the variable and intermittent nature of these generation sources while maintaining power system stability.

3.9. A critical part of the Authority's FSR programme is reviewing the common quality requirements in Part 8 of the Code[20] to ensure they enable new and evolving technologies, particularly inverter-based resources such as wind generation, solar generation, and BESSs. The common quality requirements are foundational to the safe and reliable supply of electricity to consumers.

3.10. On 1 May 2025, several Code amendments came into effect to update various common quality requirements in the Code. One of these amendments was to treat any ESS that exports 30MW or more as generation for the purposes of Part 8 of the Code, when the ESS is charging or discharging (but not when in an 'idle' state). This amendment means the same asset owner performance obligations apply to the owner/operator of an ESS and the owner/operator of any other generating station, where the ESS or generating station exports 30MW or more to the transmission network or to a local distribution network.

3.11. This amendment is an important step in enabling ESSs to support the management and reliability of the power system, with ESSs able to offer more reserves into the wholesale electricity market than before. The amendment also reduces transaction costs associated with larger ESSs putting in place equivalence arrangements or seeking exemptions from their obligation to provide automatic under-frequency load shedding systems.

3.12. The Authority considers the uptake of hybrid plants is likely to require some changes to the common quality requirements in Part 8 of the Code and the trading arrangements in Part 13 of the Code.

Next steps/timelines through to June 2027

3.13. Looking forward over the next two years, the key BESS-related activities in the Authority's FSR programme are to consider:

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19 Implementing activities for a secure and resilient low-emissions power system.

20 Review of common quality requirements in Part 8 of the Code.

(a) the extent to which the definition of ESS in the Code remains fit for purpose

(b) what asset owner performance obligations should be placed on an ESS when it is idle – ie, not charging or discharging

(c) whether it is appropriate for an ESS to continue being treated as generation and/or load under the Code's common quality requirements, or whether an ESS should instead be treated as something else[21]

(d) common quality requirements for hybrid plants.

BESS-related wholesale electricity market enhancement work

3.14. BESSs can provide significant flexibility to the wholesale electricity market, including during winter electricity demand peaks. The existing bid and offer requirements and the tools used to schedule and dispatch market participants' offers and bids currently limit the flexibility that BESSs can offer the market and may also result in inconsistent market dispatch.

3.15. The Authority has work underway to improve BESS participation in the wholesale electricity market, including optimising the dispatch of BESSs. This work may lead to Code amendments enabling a BESS to access more revenue streams (eg, enabling a BESS to participate in the multiple provider frequency keeping market). This would result in a better value proposition for a BESS, thus making it a more attractive investment.

3.16. Our work to enhance the wholesale electricity market arrangements for BESSs examines the following issues:

(a) Dispatch requirements for BESSs when charging.

(b) Bid and offer forms for BESSs and the option of moving to a bi-directional offer form so that a BESS can be offered and dispatched as a single entity.

(c) Gate closure arrangements for BESSs and the option of state of charge constraints to ensure dispatched quantities remain feasible if a BESS's capability changes after gate closure.

(d) Constrained-off payments for BESSs.

Next steps/timelines through to June 2027

3.17. The Authority has released, alongside this updated roadmap, a consultation document on issues and options for rule changes and upgrades to the System Operator's tools. We intend to consult on any proposed Code amendments in the first half of 2026.

Better visibility of the pipeline of new generation and load investments

3.18. As already noted, the electrification of New Zealand's economy poses challenges for New Zealand's electricity industry. One such challenge is investing in enough electricity generation to meet the rising demand.

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[21] Treating an ESS as something other than generation and/or load may require a new regulation, in accordance with section 109 of the Electricity Industry Act 2010. This is because section 7 of the Act, which defines industry participants, uses the traditional categories of generator and consumer.

3.19. The Authority wants to ensure information about proposed generation and load projects is transparent, to promote competition and efficiency in the market for new generation. Currently, available information about proposed generation and load investment is limited, not robust, and not centralised. This means it does not enable current and prospective industry participants, regulators, and other stakeholders to form a complete view of the pipeline of generation and load investment.

3.20. This is why the Authority is increasing the amount and type of information available, including information on the size, location, and stage of new electricity generation and load projects.

3.21. In 2024, the Authority issued two information gathering notices under clause 2.16(1) of the Code, to collect information about the pipeline of new generation and load development.[22] Both notices applied from 1 February 2025.

3.22. Comprehensive, reliable, and regular information about the pipeline of generation and load projects supports better outcomes for consumers. These include:

(a) better and more informed investment decisions delivering the right generation projects to efficiently meet electricity demand

(b) a better understanding of the security of electricity supply (ie, whether sufficient generation is coming to market to meet demand) helping the Authority and industry participants to ensure the lights stay on for consumers

(c) more transparent information about the projects in the generation and load pipeline assisting developers (particularly independent developers) to bring their projects to market, thereby promoting competition.

3.23. These outcomes will place downward pressure on the price consumers pay for electricity in the long-term and will enhance consumers' ability to make informed choices about their electricity consumption.

Next steps/key milestones through to June 2027

3.24. The Authority is publishing, on a monthly basis, information on the generation and load pipeline.[23]

3.25. The Authority intends to review the information collected within the next two years, to ensure the information is sufficient and fit for purpose.

Improved forecasts of wind and solar generation

3.26. Based on the current generation investment pipeline, approximately 80% of the new generation expected to be built in New Zealand over the next five years will be from intermittent sources, such as wind and solar energy.[24]

3.27. While growth in wind and solar generation will contribute to relatively lower electricity prices for consumers over time, forecasting generation from these sources is a key challenge. Our analysis shows that historically, intermittent generators' forecasts have often been inaccurate. This can affect the reliability and efficiency of the power

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22 Improving visibility of generation investment.

23 Generation investment pipeline | Electricity Authority

24 Not all projects in the pipeline are expected to be built.

system and increase costs for consumers. For example, inaccurate forecasting of intermittent generation was a contributing factor to the events of 9 August 2021, when some consumers had their electricity disconnected.

3.28. Inaccurate forecasts can also have flow-on effects for BESSs. Accurate forecasts are critical to helping industry participants make good decisions about things like when to charge/discharge BESSs, utilise flexible generation, or undertake demand response. Better decisions in these areas will help to minimise power system costs and maintain reliable supply.

3.29. The Authority has put in place a hybrid forecasting arrangement to improve the accuracy of wind and solar generation offers submitted to the system operator.

3.30. Under the arrangement, a centralised forecaster provides wind and solar forecasts for each wind and solar farm in New Zealand. Generators are able to submit generation offers using their own forecast if they have been authorised by the Authority to do so. The arrangement came into effect on 31 July 2025.

3.31. This work also implemented recommendation 1 of the Market Development Advisory Group's final report on price discovery in a renewables-based power system.[25]

Next steps/key milestones through to June 2027

3.32. With the hybrid forecasting arrangement now in place, the Authority will:

(a) monitor the accuracy of the centralised forecast provider's forecasts

(b) monitor intermittent generators' compliance with the new Code requirements

(c) observe whether the overall policy objectives of the initiative are being achieved.

Updating the regulatory settings for distribution networks

3.33. New Zealand's electricity distribution sector has a key role to play as the economy electrifies. This includes helping to unlock the benefits of innovation and technological change, and realise the potential of distributed energy resources.

3.34. Distributed energy resources are technologies used to generate, store, or manage energy. They include communicating/controllable appliances, solar panels, batteries and power inverters. These technologies can provide flexibility by modifying generation and/or consumption patterns, including in response to a price signal, to provide a service within the power system.

3.35. Distribution networks will need to accommodate the growth of technologies such as solar panels and BESSs, which will increase local generation and two-way energy flows. The extent of this change will depend on technological developments and consumer behaviour.

3.36. Upgrades to electricity substations and cabling are disruptive, time-consuming and expensive. New Zealand's distribution sector and consumers are considering new ways to create additional capacity without building physical infrastructure. Controllable distributed energy resources offer much potential to assist with this.

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25 Price discovery in a renewables-based electricity system: Final Recommendations paper 2023.

3.37. The Authority wants the regulation of distribution networks to support innovation, promote competition and consumer choice in contestable markets such as flexibility services, and maintain electricity reliability (including the security of electricity supply).

3.38. The Authority's work programme to improve the regulatory settings for distribution networks is set out below.

Network connections project – removing barriers to efficient connection to distribution networks

3.39. Distributors are facing more, and increasingly complex, requests for generation or load to connect to their networks. Examples include large electricity users such as public electric vehicle charging stations and data centres, generators like solar farms, and BESSs. In addition, commercial and industrial consumers are looking to switch from fossil fuels to electricity.

3.40. There is also strong competition amongst those seeking to connect to a distribution network or to upgrade their existing connection to a distribution network (network capacity access seekers), or to access distributors' processing resources.

3.41. The network connections project aims to address barriers to efficient connection to distribution networks. The Authority wants to ensure the Code supports fit-for-purpose distribution network connection application processes and standards. This is so that distribution networks operate efficiently and reliably. These processes and standards are addressed primarily through Part 6 of the Code.

3.42. The project is focusing on non-price barriers to connecting load and generation (including BESSs) to distribution networks. It complements the Authority's network pricing work relevant to BESSs (see paragraphs 3.698 to 3.73).

3.43. The Authority has broken down the network connections project into stages so that we can focus initially on the most important issues for stakeholders. We are currently progressing stage one of the project, which has four main amendments for Part 6 of the Code:

(a) improve the processes for larger-capacity distributed generation connection applications (includes BESSs)

(b) include processes for larger-capacity load connection applications

(c) require distributors to publish a 'network connections pipeline' for larger capacity distributed generation and load, and to provide information on this pipeline to the Authority

(d) require distributors to provide stakeholders with more information on network capacity.

3.44. Stage two of the project started in mid-2025. It is considering a range of issues, such as export limits, application processes for residential solar generation and the fees network capacity access seekers pay for their applications to be processed.

Next steps/timelines through to June 2027

3.45. As part of stage two of the network connections project the Authority planned to undertake two key consultations between now and June 2027:

(a) A consultation paper was released in the fourth quarter of 2025 on maximising the benefits from local electricity generation[26]

(b) a consultation paper in the second quarter of 2026.

Improving visibility of distribution network constraints

3.46. Distributors generally do not have visibility of the low voltage sections of their networks. Where they do have visibility, there is no consistency amongst distributors in the publication of low voltage network data.

3.47. This lack of network visibility is a problem for both distributors and other parties. It impedes distributors' ability to make efficient network operating and planning decisions. It also prevents flexibility service providers and distributed generators targeting their services to provide the highest value to consumers, distributors and others.

3.48. The Authority is considering options to improve distribution network visibility. This is to support better targeted investment in distributed energy resources, including BESSs, which in turn supports better optimisation of distribution networks and lowering the cost of electrifying New Zealand's economy.

Next steps/timelines through to June 2027

3.49. Planned next steps for this project are to publish two papers:

(a) the first was a discussion paper in September 2025 to elicit views on the information currently available and suggestions for next steps.

(b) a consultation paper in the first half of 2026, to contain a draft Code amendment (pending the outcomes from the discussion paper).

Expand the registry to include detail about distributed generation installed

3.50. The number of distributed generation installations are growing as New Zealand's economy electrifies and consumer-based energy resources, including BESSs, are more widely adopted. This will increasingly put pressure on distributors who must facilitate distributed generation connections to the network.

3.51. To better support the growth of new distributed generation, the Authority amended the Code to expand the Electricity registry to include more detail on the distributed generation installed at an Installation Control Point.[27] This amendment came into effect on 1 August 2025.

3.52. This change will enable distributors to roll out distributed generation more quickly. It will also encourage more consumers to take advantage of distributed generation, as there are likely to be fewer barriers to investment with increased information visibility.

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26 Maximising benefits from local electricity generation | Our consultations | Our projects | Electricity Authority

27 Code amendment omnibus #3 | Our consultations | Our projects | Electricity Authority

Next steps/timelines through to June 2027

3.53. The next step in this project is to clarify who is using the distributed generation that is connected and consider if flexible load should be included in the registry information.

Flexibility markets for distribution networks

3.54. During 2025–2026 the Authority will look at arrangements that could be put in place to facilitate competitive markets for flexibility services in distribution networks. Examples of such arrangements might include registering distributed energy resources in the registry of installation control points and making flexibility services visible to all industry participants.

Next steps/key milestones through to June 2027

3.55. The Authority expects to finalise our draft guidance on distributor involvement in flexibility services by the end of 2025. This may involve ringfencing distributors' existing load control use, pending further consideration, likely during 2025–2026.

Network pricing work programme

3.56. The Authority is committed to improving network pricing to help deliver better outcomes for consumers. This includes helping to manage how much traditional network investment, such as poles and wires, will be required as New Zealand's economy electrifies. Network pricing reforms aim to maximise consumer benefits from, for example, increased electric vehicle adoption, new and emerging technologies such as BESSs, and the building of renewable electricity generation.

Improving the price signals for distributed generation

3.57. The Authority is reviewing the regulatory arrangements for distribution price signals for injection, which includes distributed generation and potentially BESS when injecting into a network. In February 2025, the Authority released an Issues Paper exploring the multiple issues the incremental cost rule (in the distributed generation pricing principles (DGPPs) in Schedule 6.4 of the Code) is creating and considering four possible options for addressing the issues.[28]

3.58. Currently, distributors are prevented from recovering more than incremental costs from distributed generation, which may prevent distributors from efficiently planning for future connections. This incremental cost rule is a big part of the DGPPs, which may no longer be fit for purpose. Therefore, it's timely that we consider whether the regulatory arrangements should be updated to drive more efficient investment in injection connections.[29]

Next steps/key milestones through to June 2027

3.59. The Authority is currently reviewing submissions to the Issues Paper and preparing a Consultation Paper and proposed Code amendment, which are expected to be released in early 2026. Following that consultation, and subject to analysis of

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28 Distributed generation pricing principles | Our consultations | Our projects | Electricity Authority

29 Distributed generation pricing principles: Issues paper

stakeholder feedback, the Authority expects to release a Decision Paper later in 2026.

Improving the transmission pricing methodology to better support BESSs

3.60. In December 2024, the Authority decided to amend the transmission pricing methodology to enhance functionality and support the efficient integration of new and emerging technologies, such as BESSs. Changes have been made to connection charges and residual charges.

Connection charges

3.61. With the arrival of New Zealand's first utility-scale BESS, an issue was identified with the transmission pricing methodology. The existing approach to allocating transmission connection charges for shared connection assets might discourage the efficient connection of BESSs.

3.62. Currently charges for shared transmission network connection assets are based on the sum of a transmission customer's maximum injection and maximum demand. This means BESSs face significantly higher connection charges than similar-sized load and generation customers. The higher charges reflect that a BESS offtakes and injects electricity from/to the transmission network, despite not using additional transmission network capacity.

3.63. The Authority has addressed this issue by revising the allocation method for transmission connection charges. From 1 April 2026, charges for shared transmission network connection assets will be based on the greater of a transmission customer's maximum demand or maximum injection. This ensures a more proportionate cost allocation for BESS transmission customers.

Residual charge

3.64. An issue was also identified with the allocation of the residual transmission charge. This meant some transmission customers (including BESS transmission customers) would pay disproportionately high transmission charges when connecting new plant to the transmission network or changing their consumption of electricity taken from the transmission network.

3.65. The Authority has addressed this issue by amending the Code to ensure the allocation methodology for residual transmission charges reflects the customer's incremental consumption and is therefore more consistent across transmission customers in these circumstances. This amendment will take effect on 1 April 2026.

3.66. This amendment will ensure changes in consumption have a more consistent effect on residual charges for transmission customers with different load profiles. It will promote more efficient investment, including in utility-scale BESSs and other new and emerging technologies. In turn this will support more efficient electrification of New Zealand's economy and relatively lower electricity prices for consumers.

Ensuring correct incentives for investment in smaller-scale BESSs

3.67. In 2024, the Electricity Authority and Commerce Commission jointly established the Energy Competition Task Force (Task Force) to investigate ways to improve the performance of the electricity market.[30]

3.68. Proposals put forward in two workstreams[31] within the Task Force's work programme would incentivise BESSs amongst mass-market consumers, by requiring the value of BESSs services to be paid to these consumers. Specifically, the Authority is proposing to introduce:

(a) Cost-reflective distribution export tariffs – distributors would be required to pay retailers the value of generation at times of peak distribution network use (incentivising BESS use by mass-market consumers) (Task Force initiative 2A).

(b) Time-varying retail feed-in pricing – retailers would be required to offer a time-varying injection tariff rate to all their customers (incentivising BESS investment by mass-market consumers) (Task Force initiative 2C).

3.69. Both workstreams focus on mass-market consumers and intentionally exclude standalone utility-scale BESSs.

Next steps/key milestones through to June 2027

3.70. The Authority considered submissions on the Task Force initiatives 2A, 2B and 2C and made final decisions in July 2025. Following those decisions, we have developed guidance to support these initiatives, which was published in October 2025.

3.71. In November, the Authority is consulting on amendments to clarify the kind of business consumers eligible for a rebate from distributors when supplying electricity at peak times. Final decisions are expected later in 2025.

Tools to manage risks – standardised flexibility products

3.72. As noted earlier in this roadmap, variable and intermittent generation (eg, from wind and solar) is growing as a share of New Zealand's electricity generation. This will make New Zealand's power system more sensitive to short-term weather effects. Industry participants will need better tools to manage their financial exposure to the resulting increase in spot price volatility.

3.73. Contracts for flexible electricity supply (flexibility contracts) will become more important as they can protect buyers from spot price risk during periods of high demand or when variable and intermittent generation output is low. They provide price certainty for buyers and sellers of electricity. However, the Authority has found that the market for flexibility products is neither deep nor liquid.

3.74. In 2024, the Authority convened an expert group of industry representatives (the Standardised Flexibility Product Co-design Group[32]) to develop a standardised flexibility hedge contract. Trading in the new product, a super-peak hedge contract, started in January 2025.

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30 Energy Competition Task Force | Our projects | Electricity Authority.

31 Energy_Competition_Task_Force_programme.pdf.

32 Standardised Flexibility Product Co-design Group | Electricity Authority.

3.75. Active trading of these contracts will also improve information about the expected future price of flexible electricity supply, which will help industry participants to make better hedging and investment decisions. This information will be especially useful for BESS owners/operators, to estimate revenues from their investment. Ultimately, consumers will benefit from more competition in the electricity market placing downward pressure on electricity prices.

3.76. This work implements recommendation 8 from the Market Development Advisory Group's report on price discovery in a renewables-based power system.[33]

Next steps/key milestones through to June 2027

3.77. The Authority is using the revised hedge disclosure obligations to monitor and publish information about the trading of flexibility contracts, as part of a broader suite of competition indicators. The flexibility competition dashboard was published in April 2025. This information will help inform any decision we make to implement stronger pro-competition measures, if necessary.

4. Other relevant work the Authority is considering

4.1. New Zealand's power system is transitioning at a rapid pace and the Authority's work programme discussed above highlights the areas we consider to be priorities in the short-term to support the uptake of BESSs during this transition.

4.2. In addition, we are keeping abreast of emerging issues and how other countries are addressing these issues. This helps us prioritise our work programme and what we should focus on in the medium term. This section discusses emerging issues we consider relevant to BESSs beyond the timeframe of the roadmap in this report.

A capability market for control system response

4.3. In 2018, the Authority decided new arrangements should be developed to replace the performance obligations for generating unit governor / frequency control response.[34]

4.4. The Authority decided that, subject to costs and practicality, the new arrangements should be in the form of a capability market for governor response (and other future forms of control response). Using a tender-based procurement approach, the system operator would procure adequate resources through the capability market to maintain system security and an acceptable level of frequency quality.

4.5. However, the Authority decided to pause further development of a capability market for control response until the outcomes of several Authority projects could be considered. These projects included:

(a) Enabling new generating technologies to participate in the wholesale market.

(b) Identifying whether there are effective arrangements in place for equal or open access to transmission and distribution electricity networks.

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33 Price discovery in a renewables-based electricity system: Final Recommendations paper 2023, recommendation 8.

34 See the Electricity Authority's paper: Normal Frequency Management, Decision Paper, 18 September 2018, p.3.

(c) Identifying and addressing barriers to consumers using electricity or electricity services provided by more than one party at the same time, at the same location.

(d) Improving the efficiency of distribution pricing.

(e) Implementing a default distribution agreement template in Part 12A of the Code.

4.6. We considered that accounting for the outcomes of these projects would potentially improve the level of participation of alternative technologies in the capability market for control response (eg, BESSs and demand-side response).

4.7. Some of these projects are yet to be completed. In the meantime, as noted earlier, we have work underway to enable BESSs to participate in the multiple frequency keeping market.

Using evolving technologies to help maintain power system stability

4.8. The Authority is in the early stages of considering how to mitigate potential operational issues for New Zealand's power system due to low system strength.

4.9. We will be looking at how technologies such as grid-forming inverters and grid-following inverters[35] can support a secure and resilient power system. This work will be relevant to BESSs since a BESS with grid-forming technology can support the stability of the power system.

4.10. As part of this work, we will look to learn from overseas jurisdictions. For example, the Australian Energy Market Operator outlined in a 2021 white paper the role of grid-forming technologies in supporting a future power system with 100 percent renewable generation.[36] Later that year the Australian Renewable Energy Agency announced a A$100 million funding pool for utility-scale batteries that could demonstrate the use of grid-forming battery inverter technologies.[37]

Vehicle-to-grid services

4.11. As New Zealand transitions away from fossil fuels, a significant increase in electric vehicles is expected. By the end of 2023, there were over 100,000 battery electric and plug-in hybrid cars registered in New Zealand, a 57 percent increase on 2022.[38] As the number of electric vehicles grows, so too will the demand for electricity, which could cause challenges for the power system if left unmanaged.

4.12. Vehicle-to-grid is an emerging technology that can help with this challenge. It allows electric vehicles to not only draw electricity from the distribution network but also to return electricity to the network. Vehicle-to-grid systems enable electric vehicles to function as mobile energy storage units, which can help stabilise and support the power system. This is done through bi-directional charging, whereby an electric vehicle's battery can be discharged into the distribution network during times of peak

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35 A 'grid-following' inverter tracks the voltage angle of the network to which it is connected, to control the output of the inverter-based resource and thereby remain synchronised with the network. In contrast, a 'grid-forming' inverter forms a voltage angle independently of the network to which it is connected and controls its output voltage so as to synchronise with, and remain synchronised with, the network.

36 AEMO | Engineering the future – application of advanced grid-scale inverters.

37 Charging ahead with new funding for big batteries - Australian Renewable Energy Agency.

38 Plugging into the future: How New Zealand is electrifying its roads | EECA.

demand or when electricity generation is low, and then recharged when electricity demand is lower or electricity generation is more abundant.

4.13. Vehicle-to-grid technology can also improve the stability and reliability of a renewables-based power system. By utilising vehicle-to-grid technology, the power system can store excess renewable energy in electric vehicle batteries and release it when there is a shortfall, providing for a more stable and reliable power system.

4.14. Australia is progressing work to harness the potential of vehicle-to-grid technology. In February 2025, the Australian Renewable Energy Agency published its national roadmap for bi-directional electric vehicle charging.[39] The roadmap lays a foundation on which key industry and government stakeholders can identify and adopt policy setting and strategy initiatives to realise the benefits of bi-directional electric vehicle charging for Australians. Vehicle-to-grid technology was successfully tested in Australia, highlighting potential future benefits for electric vehicle owners such as giving them new opportunities for energy management and potential cost savings.

5. Industry-wide work to prepare for more BESSs connecting to the power system

5.1. The work we are doing forms part of the wider initiatives underway by BESS investors, industry bodies, and other government agencies to unlock the full potential of BESSs. We also acknowledge that there are interdependencies between our work and other initiatives.

5.2. For example, New Zealand needs people with the right skills to install, operate and maintain BESSs. There is a shortage of power system engineers and other relevant skills within the electricity industry. New Zealand is competing with other countries for these skilled people.

5.3. Another example is the increasing importance of cybersecurity, as more of our homes, cars and power system equipment are connected and controlled through the internet. This growing reliance on digital infrastructure makes the power system more vulnerable to cyber threats.

Energy system regulators

5.4. There are several regulators within the energy markets regulatory system, including the Ministry for Business, Innovation and Employment (MBIE), the Energy Efficiency and Conservation Authority (EECA), the Commerce Commission, and WorkSafe New Zealand.[40] The BESS-related work that they have underway is discussed in more detail below.

5.5. MBIE administers the Electrical (Safety) Regulations 2010 which sets safety requirements and standards for electrical systems and work. These regulations will apply to BESSs to ensure they meet electrical safety requirements for installation, operation, and maintenance to protect consumers and infrastructure.

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39 Racing ahead: Australia's roadmap to bidirectional charging launched - Australian Renewable Energy Agency.

40 Energy markets regulatory system | Ministry of Business, Innovation & Employment.

5.6. EECA sets minimum energy performance standards and labelling for residential, commercial, and industrial energy products, processes and systems sold in New Zealand. These regulations and standards mean New Zealanders have access to and are encouraged to use well-performing products and technologies, including vehicles for home, commercial and industrial use, saving money and energy.

EECA is working on various initiatives related to BESSs in New Zealand:

(a) Residential solar and battery storage guidelines – EECA is developing a publicly available specification (PAS) to help consumers understand different solar and battery storage technologies. This guidance aims to assist homeowners in selecting appropriate systems, navigating regulatory requirements, and maximising energy efficiency.[41]

(b) Industrial Battery Storage Applications: EECA commissioned research to explore the potential uses of BESSs for industrial consumers, including process heat users and electric vehicle depots. Their research focuses on optimising market participation, improving network utilisation, and enhancing capacity scheduling.[42]

(c) Energy Flexibility for Businesses: EECA is investigating how industrial businesses can leverage energy flexibility, including battery storage, to reduce costs, enhance grid stability, and integrate more renewable energy. This work supports businesses in managing energy expenses and improving resilience.[43]

5.7. The Commerce Commission administers the default price-quality path (DPP) regime. This regime applies to Transpower and most electricity distribution businesses (EDBs) in New Zealand. It intends to influence regulated businesses' behaviour by setting the maximum price that businesses can charge or the maximum revenue that businesses can recover and the quality standards that businesses must meet. The components of the DPP are reset every five years. This regime allows EDBs the flexibility to prioritise opex and capex spending, including investing in innovative projects and non-traditional solutions, such as BESSs.

5.8. In November 2024, the Commerce Commission introduced an additional funding mechanism into the DPP process known as the Innovation and Non-Traditional Solutions Allowance (INTSA). This is an additional incentive to encourage EDBs to try out new solutions that benefit their consumers, either on their own or working collaboratively with others. However, this fund is technology agnostic and does not relate specifically to BESSs.[44] INSTA applies from 1 April 2025.

Industry bodies

5.9. The Electricity Engineers' Association (EEA) develops industry technical guidelines that promote safe, efficient, and consistent engineering practices across the electricity system — including for BESSs.

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41 Residential solar and battery storage guidelines | EECA.

42 Report-2024-potential-uses-of-battery-energy-storage-storage-systems-for-industrial-consumers.pdf.

43 Energy flexibility for industrial businesses | EECA.

44 Default-price-quality-paths-for-electricity-distribution-businesses-from-1-April-2025-Final-decision-Reasons-paper-20-November-2024.pdf.

5.10. While the EEA does not develop formal standards, it works closely with Standards New Zealand and acts as the main conduit for industry input into relevant New Zealand, joint AS/NZS, and international standards (eg, IEC, IEEE) for the electricity supply industry.

5.11. The EEA is currently progressing work to develop a technical connection guide for BESSs. This will support the safe, consistent, and efficient integration of BESSs into distribution networks and complements the EEA's broader efforts to enable distributed energy resources.

Collaborative initiatives across industry

5.12. As discussed above, there are several individual work programmes being progressed but there is also collaboration between regulators and others. We have included some examples below.

5.13. EECA administers an approved Smart EV charger list.[45] This list is based on a technical specification developed with industry and EV charger suppliers. MBIE and EECA are working together on a proposal to regulate EV chargers for smart charging capability. This will include considering Vehicle-to-Grid and Vehicle-to-Home capabilities in chargers.

5.14. EECA have also been piloting open communication protocol standards for interoperability with electricity system participants, including consumers, through scaled demand flexibility projects. These pilots focus on how smart technologies such as EV chargers and thermostats for hot water cylinders, can shift electricity use to maximise the use of our current electricity infrastructure. Having a more flexible electricity system will save New Zealand money and reduce power bills for consumers.[46]

5.15. The EEA supports collaborative initiatives focused on emerging technologies, including how BESSs can enhance resilience and flexibility in the electricity system. For example, the EEA has worked with EECA and industry partners on FlexTalk[47] and a current system-led initiative that is testing BESS alongside other flexible resources for load shifting and value stacking in residential and industrial applications. The EEA has also partnered with Energy Resources Aotearoa to deliver a nationally coordinated energy workforce strategy and action plan, aligning industry, education and government.[48]

5.16. Ara Ake is New Zealand's future energy centre, focused on advancing the energy sector through innovation. They collaborate with local and global innovators to develop sustainable energy solutions. Ara Ake has completed several BESS-related research projects with more underway. In 2024, they collaborated with EECA and

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45 EV Smart Charger Approved List | EECA.

46 EECA and Counties Energy scale demand flexibility with Karaka Harbourside DSO pilot | EECA.

47 Flextalk is a demand flexibility project that aims to maximise participation in electricity demand flexibility services, making it easier for consumers to adjust their energy usage in response to grid conditions – see EEA leads FlexTalk in partnership with the Energy Efficiency and Conservation Authority and industry.

48 Energy Sector Unites to Future-Proof Tomorrow's Workforce - Energy Resources Aotearoa

Sapere to provide insights on how to realise the value of BESSs in several different commercial settings.[49]

5.17. In 2025, Ara Ake published a report – *Value Stacking: Application of BESS to many typical use cases* – which models real-world scenarios to show where BESSs can be commercially deployed and identifies key barriers to adoption. The report also highlights how non-network solutions could help solve network challenges, creating greater value for the system. Ara Ake is currently building on this previous research by partnering with CentrePort to demonstrate how these new commercial opportunities can be applied in the real world.[50]

5.18. In May 2025, Ara Ake launched the National Flex Discovery Fund which offers up to $1 million in grants to accelerate the development and visibility of flexible energy resources such as batteries, EVs and smart appliances. Flexible energy sources have immense potential to support the electricity grid during peak demand periods and reduce the need for infrastructure investment.[51]

6. Attachments

6.1. Attached to this paper is:

(a) **Appendix A**: Battery energy storage systems roadmap

49 Energy flexibility for industrial businesses | EECA.

50 CentrePort Battery Energy Storage Pilot.

51 Ara Ake launches $1 million National Flex Discovery Fund to boost flexibility innovation in Aotearoa New Zealand.

Appendix A Battery energy storage systems roadmap

Battery energy storage system regulatory roadmap

ELECTRICITY AUTHORITY
TE MANA HIKO

Work programme	2025		2026		2027
	January - June	July – December	January - June	July – December	January - June
Review Part 8 Code common quality requirements	First Code amendments come into effect	Defining an ESS / AOPOs for hybrid plants & when ESS idle / Grid forming technologies			
Ensure efficient use of BESS / BESS market enhancement			Consult on issues and options	Joint work: Hybrid plants / BESS / System strength (incl. grid forming technologies)	
Network connections project to remove barriers		Consult on proposals	Further consultation		
Improving visibility of distribution network constraints		Identify concerns with current disclosures	Consult on options	Implementation	
Distributor involvement in flexibility markets		Finalise guidance	Consider next steps in flexibility markets (incl. how to monitor)		
Improve functionality of transmission pricing methodology for BESS			Code amendments come into effect		
Ensuring correct incentives for investment in BESS (Task Force 2A, 2C)	Final decisions	Consult on business customers' eligibility for 2A rebates			
Improve price signals for distributed generation	Release issues paper		Consult on proposed Code amendments	Decision paper	
Generation pipeline disclosure	Publish monthly information				
Improved forecasts of wind and solar generation	New forecasting arrangements take effect – on-going monitoring of compliance with the Code				
Standardised flexibility product	Publish flexibility competition dashboard				