Capability, Roles and Functions to enable distributed flexibility

Open webinar – 26th September

ena electricity networks aotearoa

āhuarangi. kiritaki. mahi ngātahi. climate. customers. collaboration.

Opening karakia

E te hui	*For this gathering*
Whāia te mātauranga, kia mārama	*seek knowledge, for understanding*
Unuhia te anipā,	*draw out the anxiety*
te nguha, kia mahea	*and uncertainty, clear it away*
Kia whai take ngā mahi katoa	*have purpose in all that you do*
Tū māia, tū kaha	*stand tall, be strong*
Aroha atu, aroha mai	*let us show respect*
Tātou i a tātou katoa	*for each other.*
Hui e tāiki e	*Forward together!*

Agenda

1. Context and project overview
2. Initial questions
3. Progress to date
4. Proposed next steps
5. Getting your input
6. Closing Karakia

Project Team - People

Evie Trolove

Project Lead

Head of Market and Customer Innovation - Orion

James Tipping

Project Team Member & FNF Co-Chair

GM Market Strategy / Regulation - Vector

Astad Kapadia

Project Team Member

Head of DSO Strategy – Counties Energy

Jason Larkin

Project Team Member
FNF Steerco Member

GM Commercial & Central Lines - Unison

Murray Henderson

Project Team Member

Principal Market Advisor Transpower New Zealand Ltd - Transpower

Context & Project Overview

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FNF Value Proposition: *'Putting collaboration on steroids….'*

FUTURE NETWORKS FORUM: LEADING THE FUTURE OF NETWORKS

Hei ārahi i te anamata o ngā whatunga

PURPOSE

We come together to **harness the collective power of EDBs** to help **Aotearoa New Zealand reach its climate goals**, by:

- **Exploring the future** and **aligning expectations**
- Providing a **forum for collaborating** with our EDB colleagues and our stakeholders
- Bringing the **Network Transformation Roadmap** to life through **collaboration** towards its objectives
- Strengthening the **mana** and **influence** of EDBs and the ENA

AMBITION

Success for us will mean:

- EDBs have **shared expectations** of potential future scenarios, and our role in enabling the transition
- EDBs understand and are enabling our **consumers' and stakeholders' ambitions**
- EDBs are **collectively evolving through collaboration**, with priorities being delivered efficiently and **at pace**
- There is a **high degree of confidence in EDBs** enabling an **affordable**, **equitable** transition to a **reliable**, **decarbonised** energy system

FOCUS AREAS

- **Outreach with purpose**
- **Exploring strategic context**
- **Delivering aligned solutions**

OPERATING MODEL

- **Communities of practice**
- **Collaborative initiatives**
- **Innovation forums**

Multi-EDB FNF steering group

Capability, roles and functions (CRF) to enable distributed flexibility

Project purpose

Improve **understanding** and **alignment** between NZ EDBs on the potential roles, functions and industry architecture to **enable distributed flexibility**. This includes distribution system operation to unlock whole-of-system value.

Desired outcomes

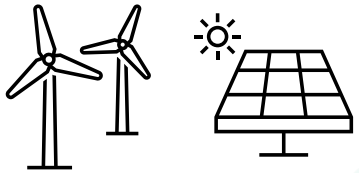
Common understanding and terminology between EDBs

Widespread EDB involvement and leadership support

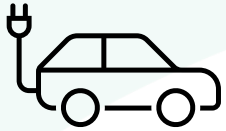
Customer and stakeholder expectations understood

Inform regulation that enables capability development

We’re imagining a future in Aotearoa with …

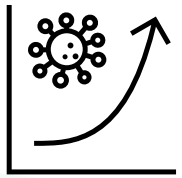


~100% renewable generation

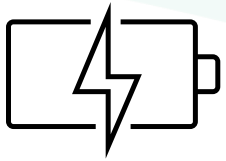


Mass uptake of flexible CER/DER

DER used for non-wires & system balancing



EVs and hot water following prices



‘Herded’ load and discharge

… overlaid with strong focusses on **efficiency, affordability** and **sustainability** across the whole value chain.

That’s quite the **sea change** – ‘**after diversity**’ of demand may be an assumption of the past.

Independence and **misalignment** between regions may no longer be tolerable.

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What could this mean for BAU in the life of an EDB in 2035?

Calculating dynamic hosting capacity	Real-time signalling to network users	Automated SO⇔EDB comms	Full self-service experience for customers	Automated AMP including flex providers and multiple energy vectors
Allocating headroom in real-time	Orchestration for switching and emergencies	Portfolio management of network support services	Designing and operating flexible connections	Deep customer insight capability

All of this will need to be delivered through **digitised platforms**, and with a significantly increased level of **transparency** for our stakeholders

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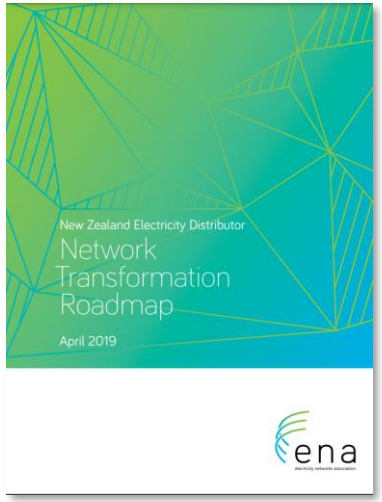
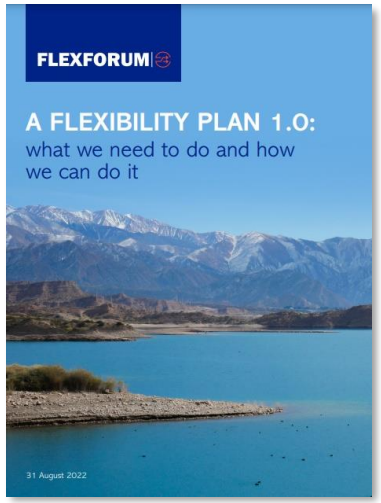
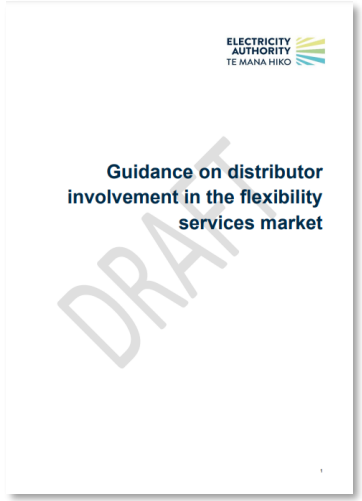
What will happen as a result of this project

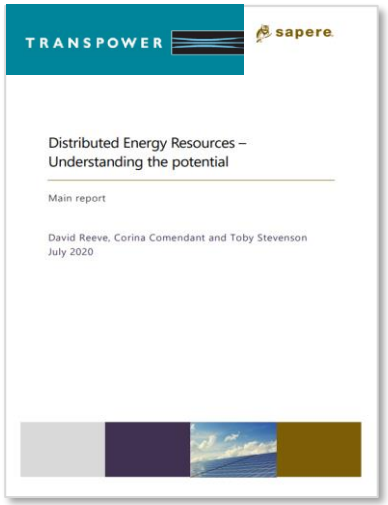
- EDBs develop a **shared understanding** of the plausible futures and associated drivers for industry architecture, roles and functions to enable distributed flexibility.
- EDBs **engage** with participants in the wider flex ecosystem and **understand the needs** and perspectives of these stakeholders.
- EDBs contribute to the timely development of an **effective industry architecture** and ecosystem for flexibility services.
- EDBs identify the capabilities required to enable and participate in these plausible futures, and develop a **'least regrets' capability development roadmap.**
- EDBs **monitor the drivers** of future industry architectures to enable flexibility and the evolution of the flexibility environment and respond by continually adjusting the roadmap.
- EDBs develop the **right capabilities** needed to fulfil the roles and functions needed for the emerging future, **or** determine who should perform these roles and functions on their behalf.

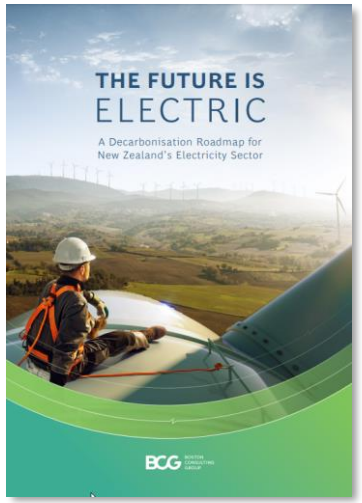
EDB capability is required to support sector wide change

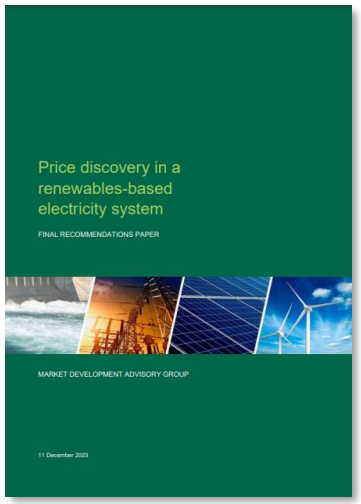


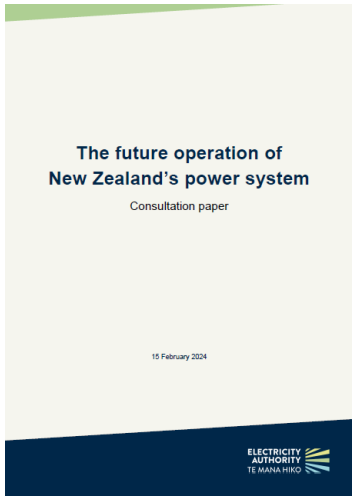










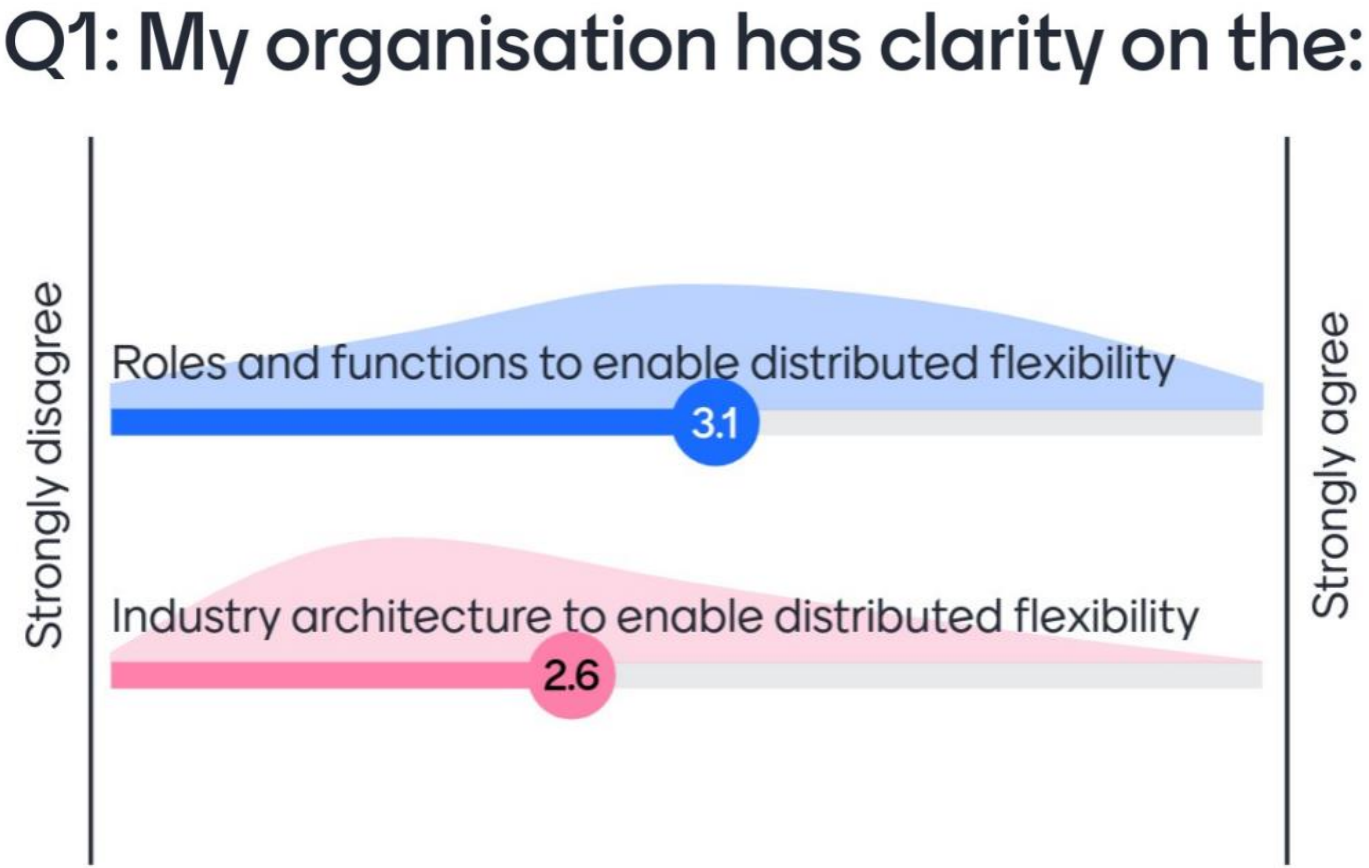


This initiative delivers on the need for an aligned NZ EDB view

The **ENA Board** advised ENA take forward South Island Distribution Group work.

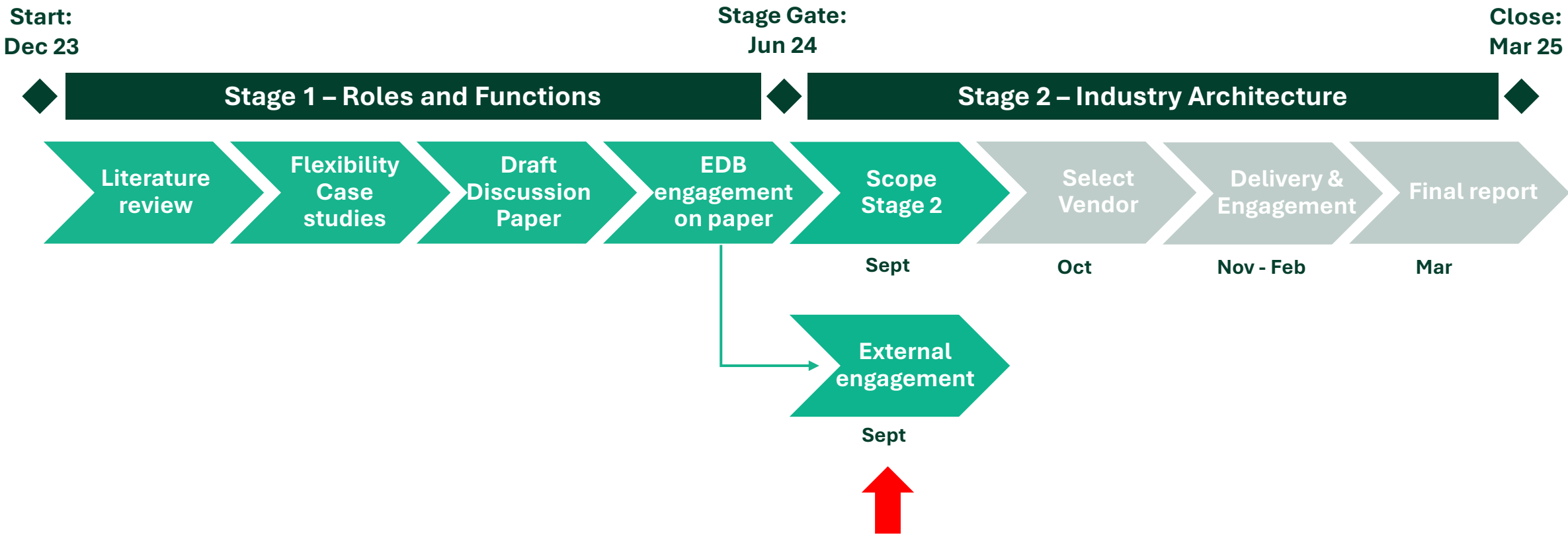
FNF members voted work as one of the highest priority initiatives.

EDB feedback Nov 2023



Progress till date

"Industry Architecture in this context relates to understanding the different relationships of different electricity value chain members (information, commercial, value, services flows) for different DSO operating models to recommend an appropriate model for the NZ context."



Progress to date

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Key learnings from literature review

New Zealand's focus on Australia and the Great Britain (GB) is strategic, based on relative similarities in market structures and regulatory environments required for integrating DER.

New Zealand

- Opportunity to leverage flexibility to avoid costly network investment and support wholesale market.
- Case studies emerging across NZ to enable flexibility
- Collaborative initiatives have explored models to support distribution system operation.

Australia

- Solar PV uptake has triggered a need to manage two-way energy flows.
- Response includes standards, dynamic pricing, and dynamic operating envelopes (DOEs) to manage LV network capacity.

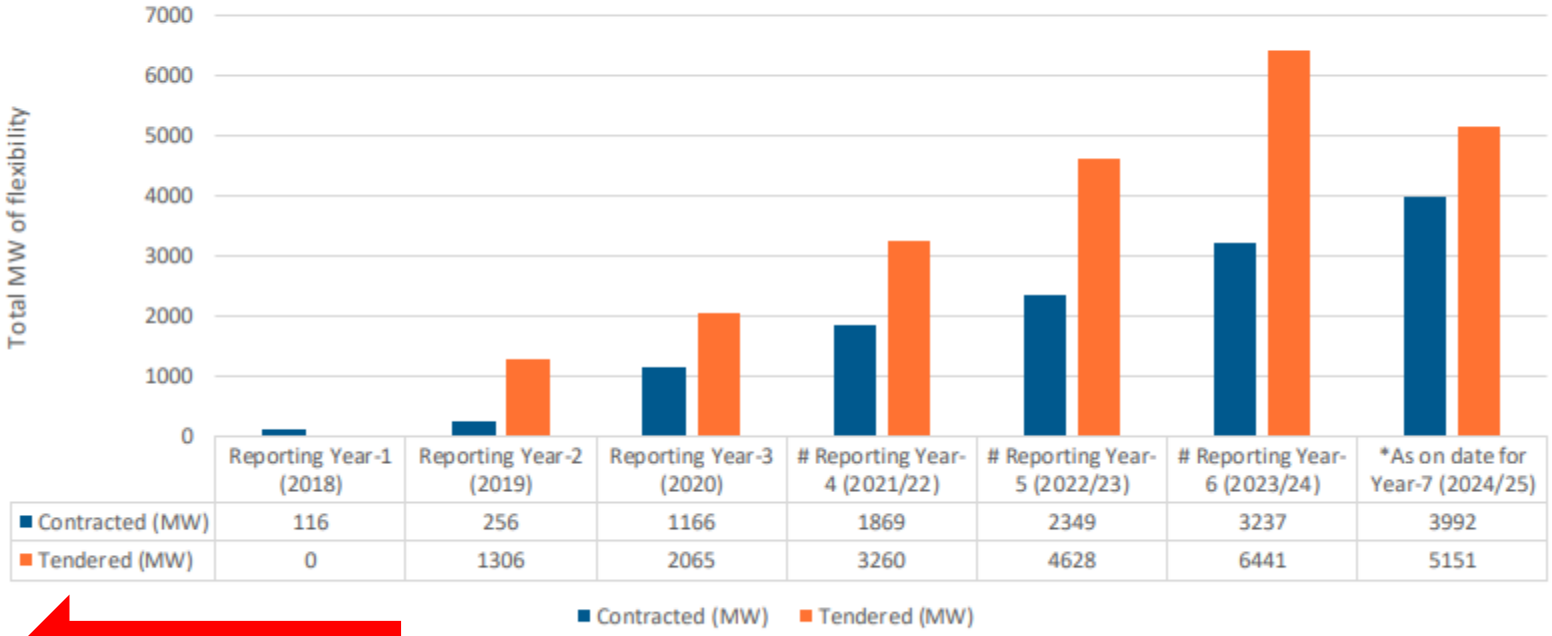
Great Britain

- Desire for smarter and flexible energy system to support decarbonization.
- Strong reliance on local flexibility markets and flexible connections
- Roles defined by Ofgem are network planning, network operation, and market development.

Great Britain – How started

Flexibility Services in GB

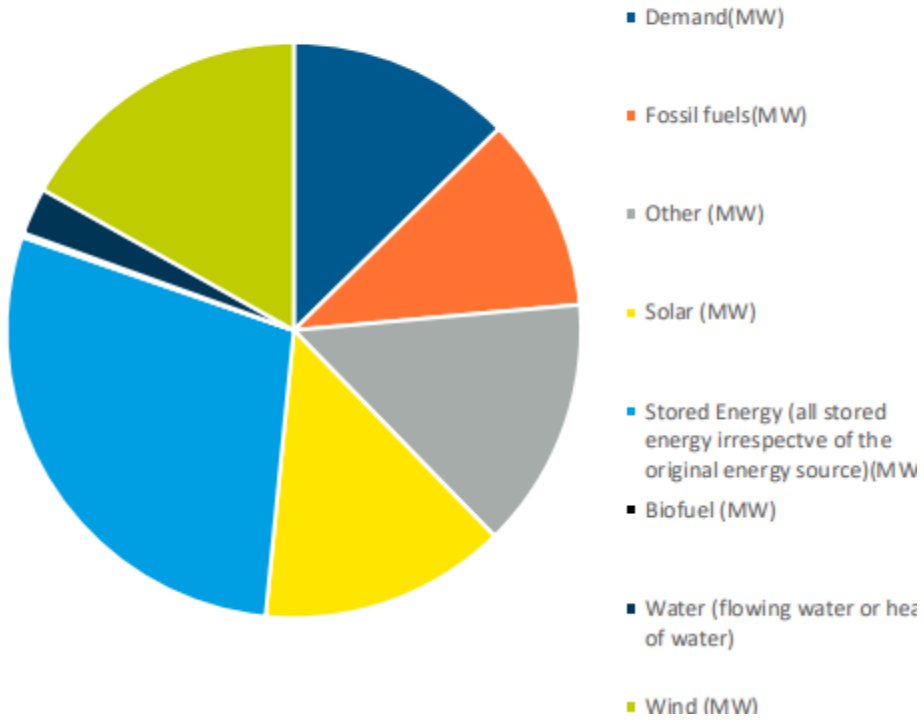
(Tendered and Contracted Services for delivery in the reporting year)



	Reporting Year-1 (2018)	Reporting Year-2 (2019)	Reporting Year-3 (2020)	# Reporting Year-4 (2021/22)	# Reporting Year-5 (2022/23)	# Reporting Year-6 (2023/24)	*As on date for Year-7 (2024/25)
Contracted (MW)	116	256	1166	1869	2349	3237	3992
Tendered (MW)	0	1306	2065	3260	4628	6441	5151

Innovation from 2010

DSO Contracted flexibility fuel sources for delivery in 2023/24

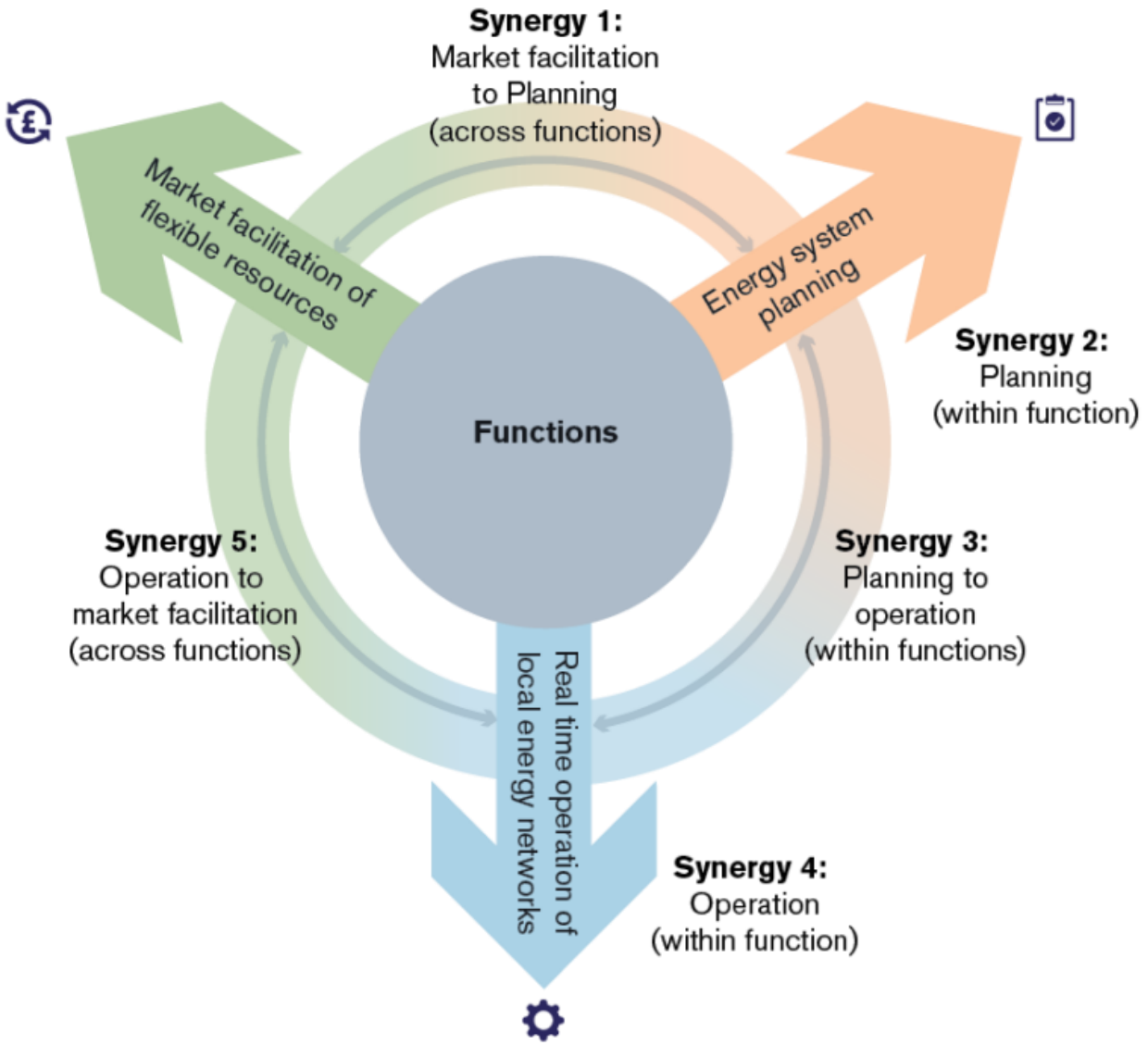


https://www.energynetworks.org/assets/images/insights-forum-slides.pdf?1724301473

Great Britain – How it's going

Table 2 Proposed roles and responsibilities for the market facilitation of flexible resources

Activities	**Actors**		
	Market facilitator	Market enabling infrastructure & platforms	DNO
Product development & standardisation	x		
Managing market rules (primacy & revenue stacking rules, contracts, processes, etc)[10]	x		
Engaging with market participants	x		
Customer registration and management		x	
Pre-qualification		x	
Identify and specify requirements			x
Submit requirements on platform			x
Hosting flexibility tenders		x	
Issue flexibility tenders		x	
Match trades		x	
Evaluating and selecting options			x
Inform successful participants		x	
Publish tender results		x	
Platform analytics		x	
Recording and publishing market data		x	x
Settlement, credit and clearing		x	
Market oversight	x		



Source: Ofgem Future of local energy institutions and governance

Great Britain – How it's going

Roles and Functions (What)

DSO Roles	Activities
Planning and Network Development	Plan efficiently in the context of uncertainty, taking account of whole system outcomes, and promote planning data availability.
Network Operation	Promote Operational Network Visibility and Data Availability
	Facilitate Efficient Dispatch of Distribution Flexibility Services
Market Development	Embed Simple, Fair, and Transparent Rules and Processes for Procuring Distribution Flexibility Services
	Provide Accurate, User-Friendly, and Comprehensive Market Information

Source: Ofgem Distribution System Operation Incentive Governance (2023)

Industry Architecture (Who)

Primary roles to transition to a smart, flexible energy system:

Energy planning: The National Energy System Operator (NESO) will oversee 10-13 Regional Energy Strategic Planners responsible for cross-vector strategic plans (gas and electricity)

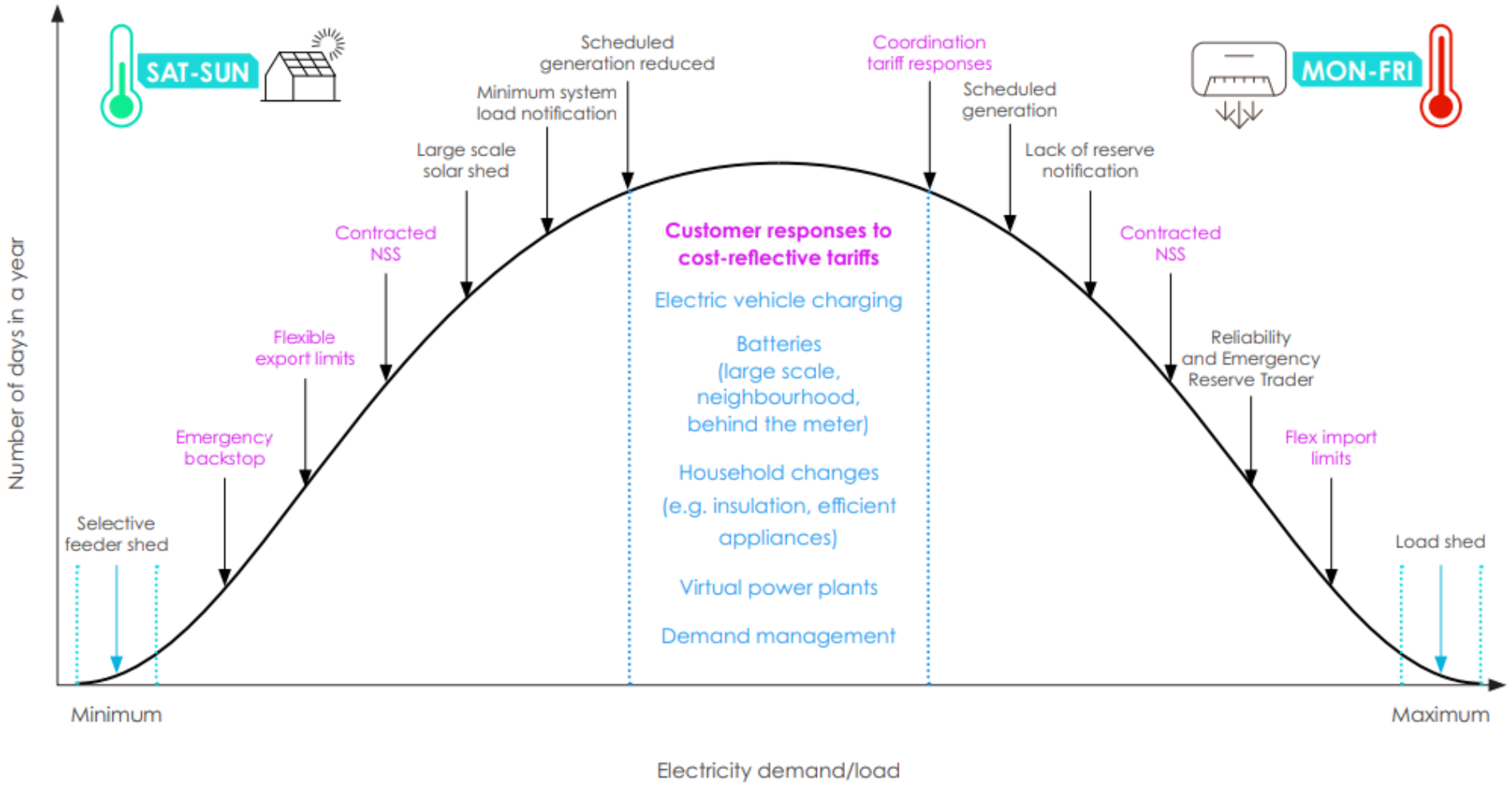
Real time operations: DNOs remain responsible for real time operations, reliability and safety. No requirement for DNOs to create separate DSOs but must enhance their DSO capabilities.

Market Facilitation: A new role allocated to Elexon to lead market coordination, reduce friction across DSOs and ensure aligning national and local markets

Source: Ofgem Future of local energy institutions and governance (2023)

Australian example – Available measures

Figure 8 | Range of available measures for managing minimum demand from peak PV exports, and maximum demand event[59]



Source: Australia's Project Edge final report

Australia – How it's going

Roles and Functions (What)

DSO[1] Roles	Functions
Network Optimisation	Optimising how they configure and operate the network
	Calculating and communicating the limits of their distribution networks (such as DOEs)
	Procuring / managing network support services to support efficient network operations and development
Network monitoring	Visibility / monitoring of power flows and DER in the distribution network
	Conformance monitoring,[2] conformance assessing, and conformance enforcement of DOEs and DER technical standards associated with customer connection agreements
Support whole of system optimisation	DNSPs could utilise DOEs and/or flexible capacity in network infrastructure to support efficient whole of system outcomes to benefit all consumers

[1]DNSPs evolving to Distribution System Operators (DSOs) over time

[2] Could be outsourced. For example, to an MEP

Industry Architecture (Who)

Primary roles to transition to a smart, flexible energy system:

DNSP: Distribution Network Service Providers (DNSPs) are responsible for managing their respective operating zones. Their roles is enhanced to support DER integration, facilitate efficient outcomes for the wholesale market, drive network development, and handle network capacity allocation.

AEMO: As the National Electricity Market (NEM) Market and System Operator, AEMO would be tasked with maintaining the security of the power system, managing system security, and overseeing the central dispatch process

Aggregators and Retailers: coordinate consumer-owned DER to deliver services or respond to market price signals. They must comply with Dynamic Operating Envelopes (DOEs) and are integral in facilitating market interaction for DER assets.

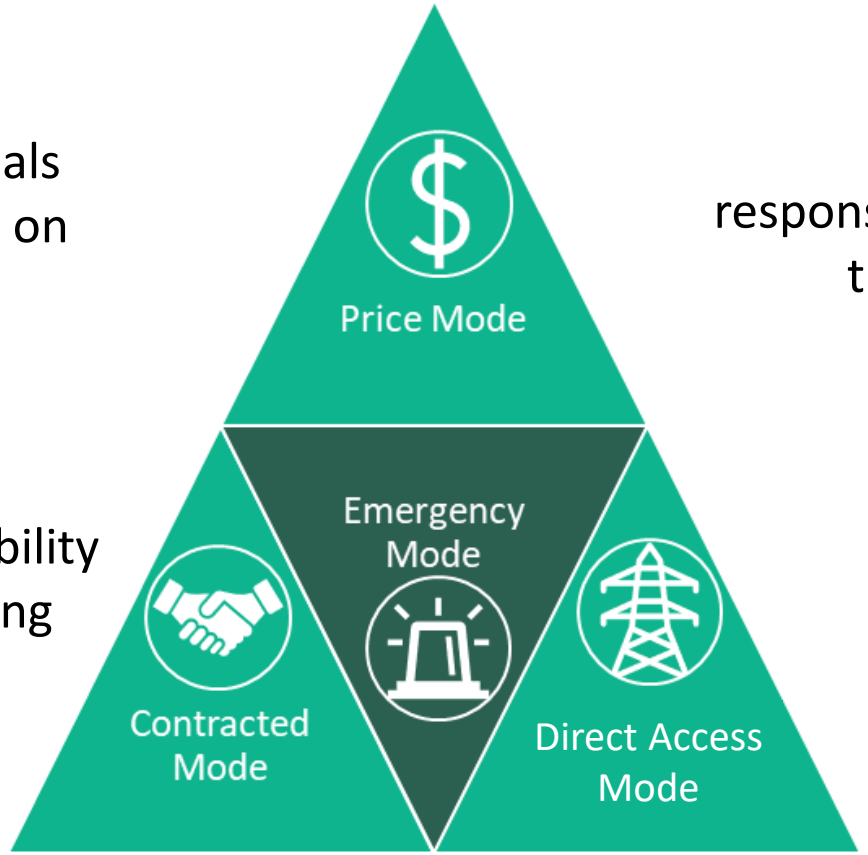
Source: Project EDGE (2023)

Enablement modes

Flexibility can be enabled in many ways, with different levels of firmness. EDBs will need **new capability** to **access** flexibility OR **accommodate** flexibility activated by others on the network.

Price mode: Uses pricing signals to encourage flexibility based on network conditions

Contract Mode: Secures flexibility through agreements, increasing certainty of response



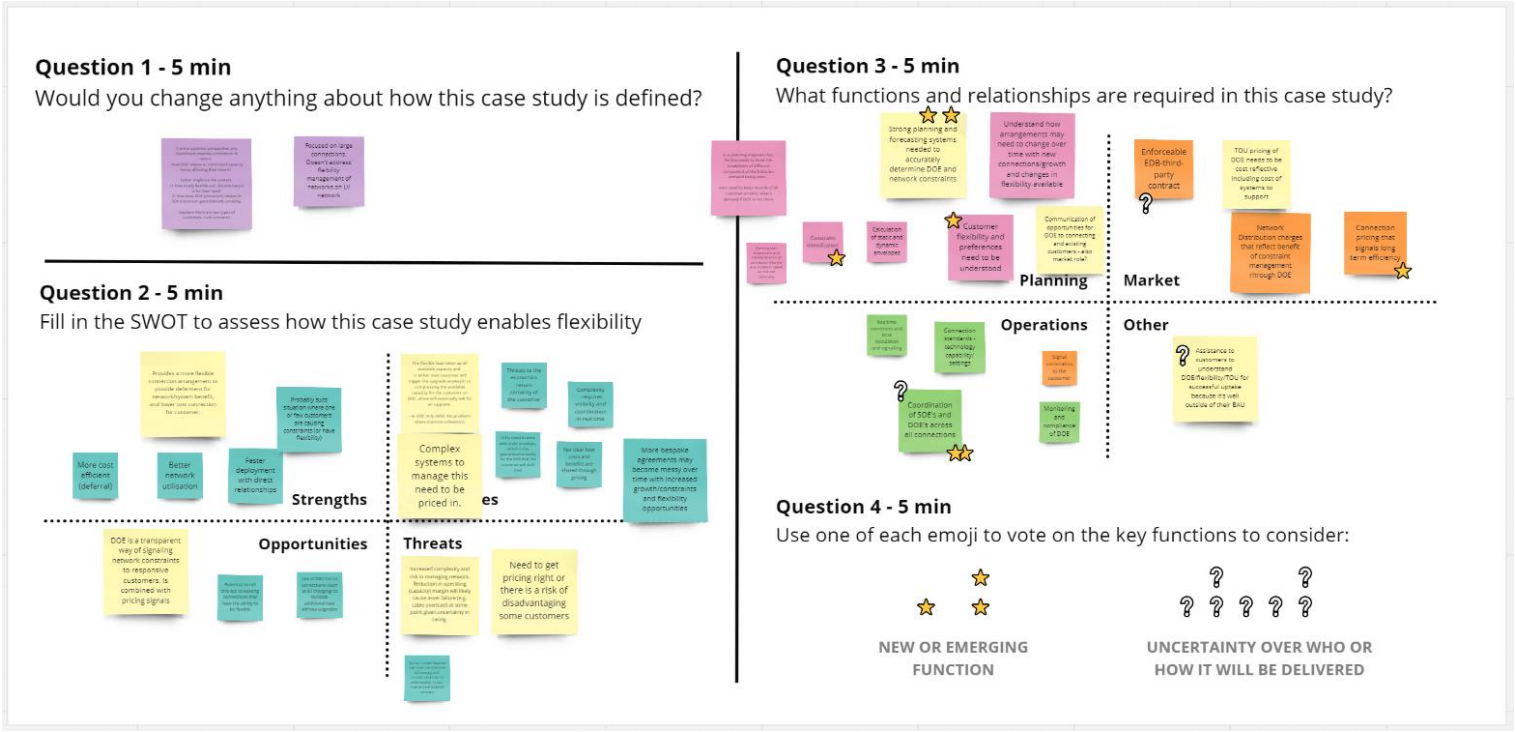
Emergency Mode: Mandatory response to avoid outages and protect the network in critical situations

Direct Access Mode: Allows direct access or physical control of flexible resources

Case studies in New Zealand

Four detailed case studies were developed showcasing enablement modes in action. These were essential in workshops to establish the roles and functions relevant for EDBs to enable flexibility, and where there is uncertainty.

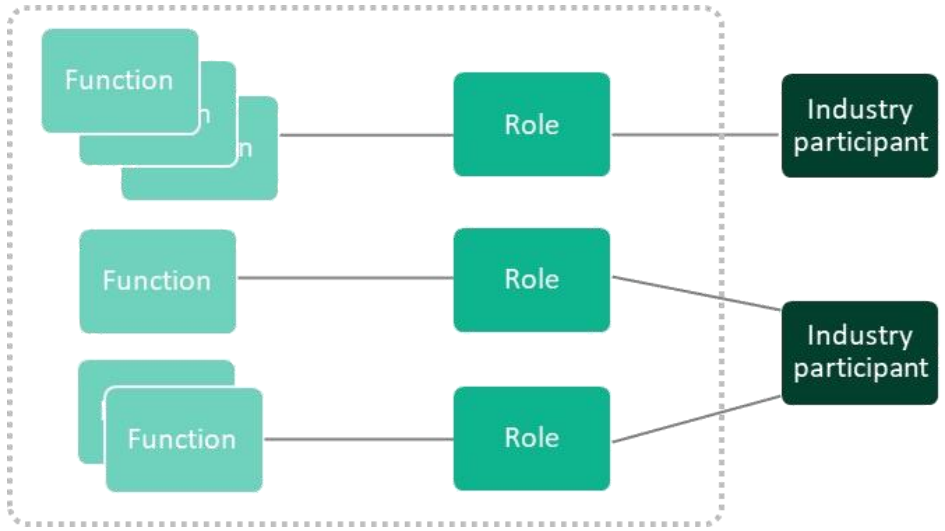
Use Case	Price mode	Contract mode	Utility mode	Emergency
Flexibility Service (Aurora Upper Clutha)	✓	✓		
Ripple hot water load management	✓	✓	✓	✓
Retailer / aggregator hot water load management	✓	✓	✓	✓
Flexible Network Connection (Vector)	✓	✓		



Roles and functions to enable distributed flexibility

Literature reveals there are three pivotal evolving roles. We have drafted a catalogue of functions and activities within each.

A common framework will guide EDBs in their transformation efforts and ensure coordinated progress towards these.

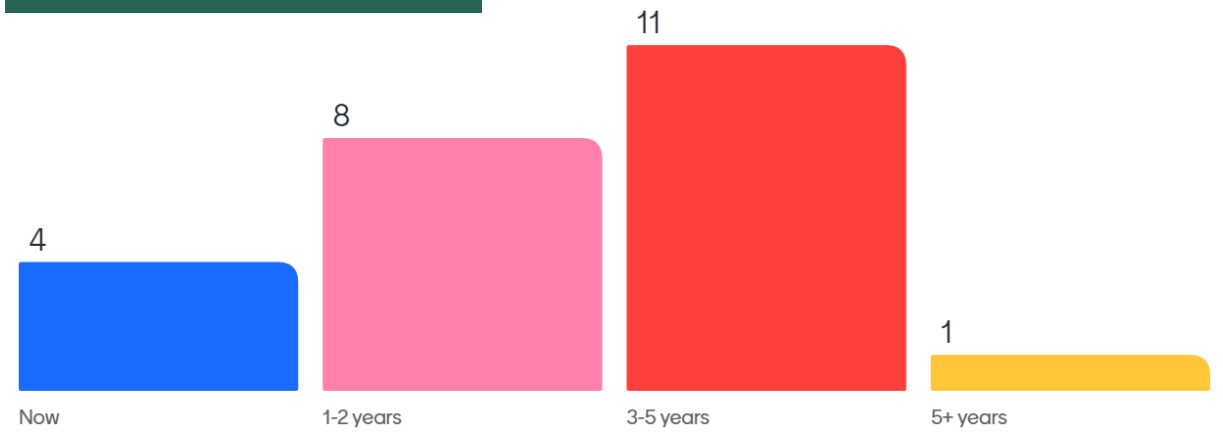


Role	Function
Planning	Connections
	Visibility
	Forecasting
	Optioneering
	Whole systems planning
Commercial	Pricing and connection charges
	Market governance
	Flexibility services
	Validation and settlement
	Market coordination
	Emerging markets
Operating	Network management systems
	Operational visibility and forecasting
	Capacity management
	Services dispatch
	Systems interoperability

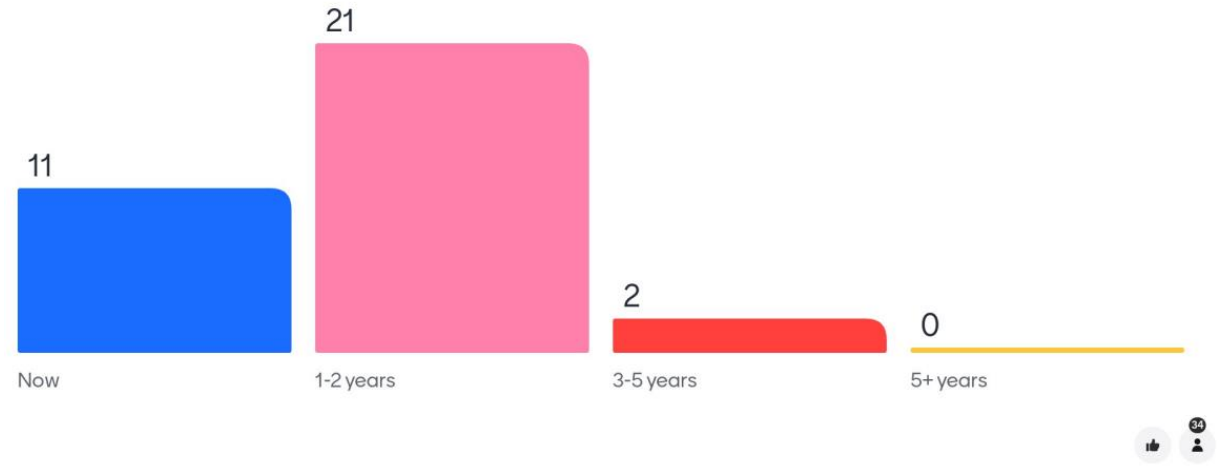
EDBs need for new functions is accelerating

When do you think new functions will be needed to enable distributed flexibility?

EDB feedback Nov 2023



EDB feedback Sep 2024



EDB feedback and views

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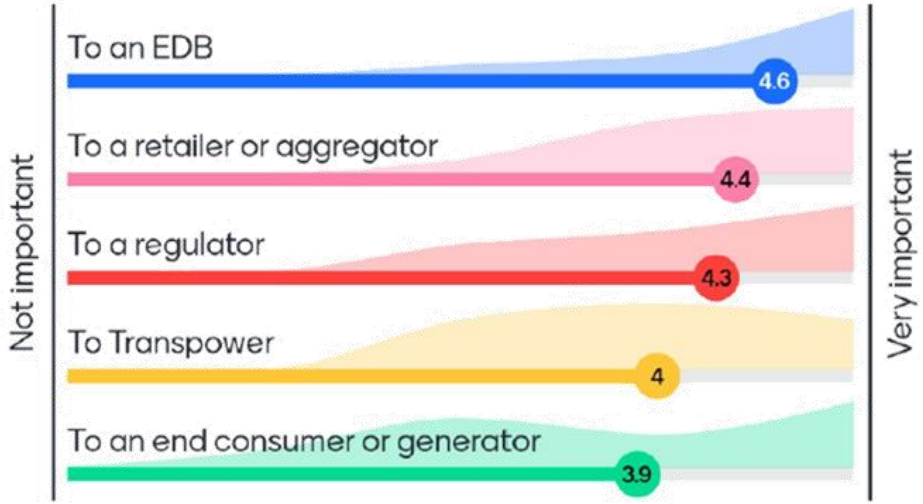
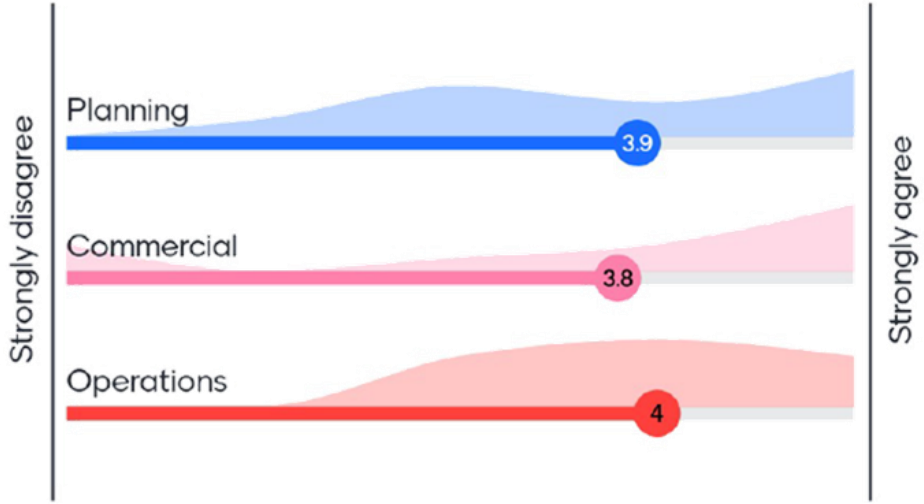
EDBs recognise the importance of alignment

How important do you think alignment between EDBs on roles and functions is to different stakeholders?



Do you think there is benefit in pooling relevant capabilities to deliver any roles or functions identified?



Initial focus has been on building alignment across EDBs

5 x project engagements

These enabled widespread participation from 24 EDBs and Transpower, with 15 networks participating in each event on average.

4 x ENA Innovation Forum updates

EDBs were kept informed of progress and able to influence the direction of the project to deliver the desired outcomes.

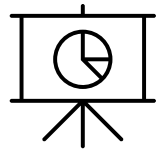
1 x discussion paper

Consolidating work to date and seeking feedback on 18 questions to check alignment before progressing to Stage 2

Broader engagement and more accessible insight

- **A more inclusive approach:** A desire for greater inclusion of a wide range of stakeholder and industry participant perspectives. Consumers value a variety of attributes, like flexibility and reliability which should help guide the strategy but delivery must be approached pragmatically.

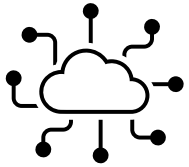
- **Simplified materials:** Ensure consultation documents are clear and accessible, with consistent terminology to engage a wider audience and gather feedback efficiently.



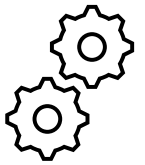
- **Tailored international insights:** Continue to tailor insights from Australia and the UK to New Zealand's specific context, ensuring relevance in research.

Clarify enablement modes and DSO roles

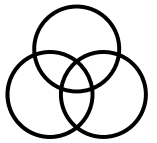
- **Rename “utility mode”:** This will be renamed “Direct Access Mode” to reflect an inclusive and forward-looking approach, reflecting a future where multiple parties can participate in flexibility market.



- **Clarify how Enablement Modes work:** Modes are overlapping, rather than mutually exclusive. Enhance mode descriptions with real-life case studies for practical application, particularly at the device level.



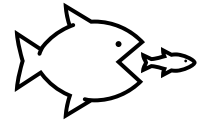
- **Clarify DSO roles :** Define the core DSO functions and relationship to DNO, including managing DER, demand response, and real-time monitoring.



Greater focus on market outcomes and interfaces

- **Balance WESV with other priorities**: Delivering whole energy system value (WESV) remains important. The framework must also address other priorities like security, decarbonisation, and equity.

- **Market competitiveness and fair access:** Promoting competitive flexibility markets, fair access to devices, and maximising efficient use of assets to serve the best interests of consumers.



- **Interfaces and systems architecture**: Increase focus on data compatibility, interoperability, and cybersecurity. Define interactions between EDBs, aggregators, and stakeholders.

Proposed next steps

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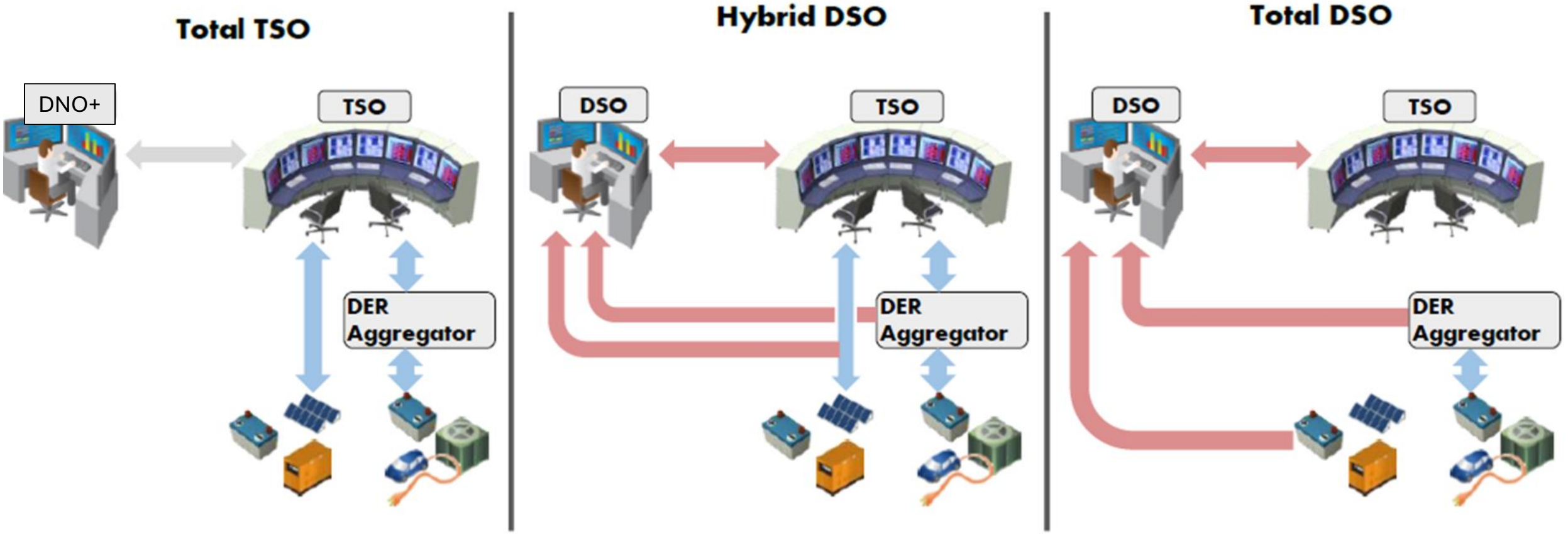
Industry Architecture and DSO Models

- **Background:** Many different technology trials and industry architectures currently being tested in UK, AUS and US. Many local EDBs (Orion, Vector, Counties Energy, PowerCo, WEL Networks, etc.) and Groups (NEG & SIDG) have formed researched opinions, but currently no clear unified and agreed way forward.

- **ENA's commissioning of RFP:**
  - **Purpose:** Provide EDBs, other electricity market participants and regulators with guidance on the optimal Industry Architecture to support and unlock the use of flexibility in NZ via a Distribution System Operations (DSO).
  - **Output:** A well-researched document that; leverages overseas expertise, creates a framework and evaluates architecture options, engages various stakeholders.

As a Diagram


Total TSO
DNO+
TSO
DER Aggregator
Hybrid DSO
DSO
TSO
DER Aggregator
Total DSO
DSO
TSO
DER Aggregator

Industry Architecture Options

- **Option 1: Only System Operator (SO):** Flexibility traders/aggregators engage directly with Transpower. EDBs provide relevant data to enable SO to undertake this function.
- **Option 2: Extending EDB capability to build DSO:** Flexibility traders/aggregators engage directly with the DSO, DSO performs local optimizations with traders/aggregators and co-ordinates with TSO and TNO as required.
  - **Option 2a: 29 vs 1 vs 2 DSOs:** Determination as to whether a DSO function and role can be provided "as-a-service" by EDBs to other EDBs. Benefits vs. Costs of this.
- **Option 3: Hybrid (SO takes some Roles and Functions, DSO takes some):** A DSO's roles and functions are split between Transpower and EDBs. The Flexibility traders/aggregators have an engagement with both entities.
- **Option 4: Non-EDB solutions (Amazon, Google, Retailer, Flex Aggregator/Trader):** The DSO roles and functions are undertaken by a Flexibility Trader/Aggregator, and the EDBs and Transpower provide relevant data to the Trader/Aggregator for co-ordination and dispatch.

Evaluation Criteria for Options

- Speed to market/implementation
- Highest benefit i.e. Unlocking flexibility market that achieves value stacking benefit
- Stability of grid and networks
- Resiliency as climate change weather impacts get worse
- Simplicity and Standardisation for all value chain members
- Enabling customer choice
- Regulatory change required
- Required level of investment
- Whole of System Value benefit; efficiency/utilisation/productivity gains
- Contribution to decarbonisation outcomes

Closing karakia

Kia whakairia te tapu
Kia wātea ai te ara
Kia turuki whakataha ai
Kia turuki whakataha ai
Haumi e. Hui e. Tāiki e!

Restrictions are moved aside
So the pathway is clear
To return to everyday activities

Thank you!

ena electricity networks aotearoa

āhuarangi. kiritaki. mahi ngātahi. climate. customers. collaboration.