Resi-Flex Project

Phase 3b

Innovation and Non-Traditional Solutions Allowance (INTSA) Application

Orion

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Introduction

This is **Orion's Innovation and Non-Traditional Solutions Allowance (INTSA) application for Phase 3b of the Resi-Flex project.** It demonstrates how the project meets INTSA eligibility criteria and provides additional information for the Commerce Commission's assessment.

Demand-side flexibility allows for the modification of electricity consumption patterns in response to various signals, such as price changes, providing valuable services to the energy system. The **benefits of leveraging demand-side flexibility are substantial, including enhanced network stability, optimised use of existing infrastructure, potential deferral of network upgrades, and the creation of opportunities for consumers to actively participate in the energy market**, potentially leading to lower energy costs to consumers. The Boston Consulting Group's (BCG) analysis[1] suggests that building flexibility into the energy system could generate significant long-term cost savings for the electricity sector.

Orion and Wellington Electricity have collaboratively initiated the Resi-Flex project. **Resi-Flex is a learning-by-doing and exploratory project aimed at incentivising flexibility from residential consumers by testing commercial mechanisms in collaboration with flexibility stakeholders**. The project is structured into three distinct phases:

- Phase 1 focused on understanding user requirements, (complete)
- Phase 2 on developing commercial mechanisms, (complete)
- **Phase 3 centres on the co-design and trial of these mechanisms with residential consumers (underway)**.
    - **Phase 3a** – activities up to 31 March 2025 (complete)
    - **Phase 3b** – activities and forecast costs from 1 April 2025 – 31 March 2027 (this application)

Resi-Flex Phase 1, 2 and the start of 3a were supported through the Innovation Project Allowance (Orion and Wellington Electricity). Orion and Wellington Electricity funded the remainder of Phase 3a activities until 31 March 2025. Learnings and publications can be found at Resi-Flex | The Orion Group and a close out report for the Phases up to 31 March 2025 will be submitted by the project partners (Orion and Wellington Electricity) by the deadline.

The objectives of Phase 3 are to observe real-world consumer responses to various customer offerings, inform Electricity Distribution Businesses (EDBs) on which mechanisms are effective and scalable, and ultimately create opportunities for residential consumers to provide flexibility. Key activities within this phase include partnering with flexibility suppliers to co-design consumer offerings, signing up customers, conducting trials, and subsequent analysis of the trial results. **The next steps for Phase 3b involve continuing the trials through to the end of winter 2026 with between 400-800 customers on the Orion network, and producing summary reports to share insights with industry**.

This INTSA application specifically seeks funding to support the **remaining activities within Phase 3b of the Resi-Flex project for 100% of Orion's share of forecast costs** during FY26 and FY27 ($285,400).

Wellington Electricity is expected to lodge a separate application at the same time or shortly after this application is lodged.

We are happy to discuss any aspects of this application with the Commission. The first point of contact for this application is Mitchell Davis, Flexibility and Markets Developments Lead, mitchell.davis@oriongroup.co.nz.

No parts of this application are confidential, and we will publish this application in full.

[1] https://www.bcg.com/publications/2022/climate-change-in-new-zealand

1. Eligibility criteria

Table 1 outlines how Resi-Flex meets the eligibility criteria for INTSA.

#	INTSA Eligibility Criteria	Alignment	How Resi-Flex Phase 3 addresses each criterion
1	**Relates to the supply of electricity distribution services**	**Aligns**	The project directly engages with the physical delivery of electricity by seeking to understand and influence when and how consumers use electricity, thereby optimising the demand on the existing distribution network. Resi-Flex will test various commercial mechanisms to inform future pricing policy with the goal of incentivising the efficient use of the network.
2	**Promotes the Part 4 Purpose of the Act**	**Aligns**	Resi-Flex effectively addresses three limbs (a, b, and c) of Section 52A (1) of the Commerce Act, Part 4, demonstrating a strong alignment with its core objectives. Specifically, the project incentivises innovation in demand-side flexibility, creates learning to optimise electricity network efficiency while prioritising consumer needs, ensures efficiency gains are shared with consumers, and safeguards the long-term interests of consumers by promoting sustainable and equitable energy solutions.
3	**Benefits** **The project or programme is unlikely to otherwise result in any financial benefits to the EDB in the five disclosure years after the date by which it indicates that it expects it will complete its project:** and/or **the benefits of the project or programme are sufficiently uncertain that the EDB would not carry out the project or programme if it could not recover some or all of the forecast costs of the project from its INTSA**	**Aligns**	Resi-Flex Phase 3b is unlikely to result in a financial benefit to Orion within five years after the project is completed. Trials will not sufficiently address a current network constraint as the number (in the hundreds) and concentration of customers will not be enough to enable asset deferral. The financial benefits to Orion of having more effective pricing due to learnings from Resi-Flex are hard to measure, as the lead time between implementation and impact is long. In addition, the complexity around how customers receive network pricing makes analysis of benefits to Orion difficult in the near term. The benefits of Resi-Flex Phase 3b are also uncertain. We expect that Resi-Flex will provide learnings that will ultimately result in benefits to consumers (section 1.2 and 5.2), Orion, EDBs and other market participants. Resi-Flex will help Orion make better decisions on how to price and pay for flexibility however the current lack of distributed energy resources and flexible demand make the likelihood of achieving these benefits uncertain.

Table 1: Resi-Flex Project INTSA Eligibility Alignment

2. Project-specific Information

2.1. The project's purpose and steps

Full Project Overview

Resi-Flex utilises a learning-by-doing approach and comprises three phases, described in Figure 1 and Table 2, covering three main objectives:

1. Understand the needs, preferences, and barriers of all stakeholders across the flexibility value chain and estimate the value of flexibility from households to all.
2. Inform the development of fair and effective distribution pricing and flexibility services.
3. Observe the response from real-world residential consumers to customer offerings that reflect the value of flexibility.

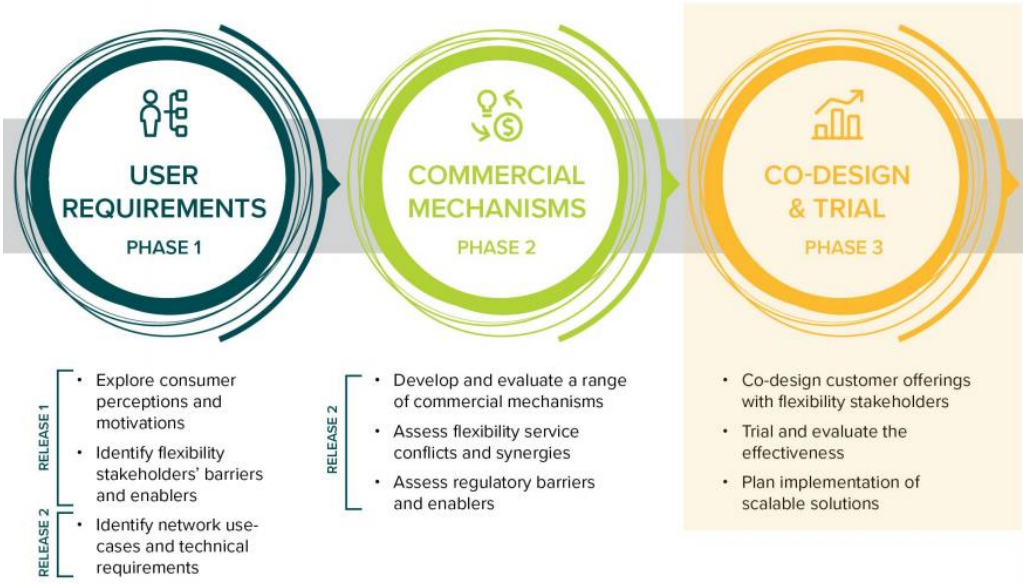


Figure 1: Resi-Flex Project Phases

Activities Breakdown by Project Phase

Each phase in the Resi-Flex project is organized with distinct objectives and a set of activities. The subsequent table details each phase's timeline, key objectives and steps required. Phase 3 of the project is in progress and Phase 3b is the subject of this application. The forecast costs for Phase 3b are from 1 April 2025 – 31 March 2027 (FY26 and FY27).

Resi-Flex Phase 1 and 2 were supported through the Innovation Project Allowance. Orion funded Phase 3a activities until 31 March 2025. Learnings and publications can be found at Resi-Flex | The Orion Group and a close out report for the Phases completed up to 31 March 2025 will be submitted by the project partners by the deadline.

Project phase	Phase 1: User requirements	Phase 2: Commercial mechanisms	Phase 3a: Co-design and trials	Phase 3b: Co-design and trials
Start	**Year ending 31 March 2023**	**Year ending 31 March 2023**	**Year ending 31 March 2024**	**1 April 2025**
Completion	**Year ending 31 March 2024**	**Year ending 31 March 2024**	**Year ending 31 March 2025**	**Year ending 31 March 2027**
Progress	**Completed**	**Completed**	**Complete**	**In progress**

Project phase	Phase 1: User requirements	Phase 2: Commercial mechanisms	Phase 3a: Co-design and trials	Phase 3b: Co-design and trials
Key objectives	- Explore consumer perceptions and motivations. - Identify flexibility stakeholders' barriers and enablers. - Identify network use-cases and technical requirements	- Develop and evaluate a range of commercial mechanisms. - Assess flexibility service conflicts and synergies. - Assess regulatory barriers and enablers	- Co-design customer offerings with flexibility stakeholders	- Co-design customer offerings with flexibility stakeholders - Trial and evaluate the effectiveness of the commercial mechanisms. - Plan implementation of scalable solutions
Activities / Steps by Phase	○ Defined consumer groups for flexibility adoption. ○ Mapped potential flexibility journeys and user experiences. ○ Analysed international flexibility trials and behaviour change. ○ Gathered stakeholder feedback on flexibility barriers and enablers. ○ Mapped flexibility stakeholders' roles and responsibilities.	○ Mapped EDB, stakeholder, and consumer relationships within the flexibility value chain. ○ Defined commercial mechanisms to incentivize flexibility. ○ Evaluated flexibility mechanisms for practicality, scalability, and fairness. ○ Developed a calculator for EDBs to value flexibility. ○ Assessed flexibility service conflicts and synergies. ○ Identified regulatory barriers and enablers to flexibility.	○ Partnered with one retailer (Octopus) after the EOI process (executed NDAs and MOUs. ○ Co-designed trial specifications and customer propositions. ○ Recruited residential customers and delivered one flexibility trial with participating households.	○ Execute NDAs and MOUs with retailers, co-design trial specifications and customer propositions. ○ Recruit residential customers to participate in the trials. ○ Deliver the flexibility trials with 400-800 households (Orion). ○ Collect data from retailers on customer participation and DER information. ○ Share early learnings. ○ Refine trial co-design on initial results. ○ Analyse trial data. ○ Reports - lessons learned and insights. ○ Implementation recommendations for scalable solutions
Results shared	EEA Conference Paper for all users (High-level summary)[2] (June 2023) Public report[3] for Consumers and Flex Stakeholders (July 2023) EOI for Network Use Cases[4] (March 2024)	EEA Conference Paper for High-level summary[5] (June 2023) EOI for Trial Commercial Mechanisms[6] (March 2024) In progress with ENA[7] FNF for Commercial Framework and Calculator (outside of the Resi-Flex project)		

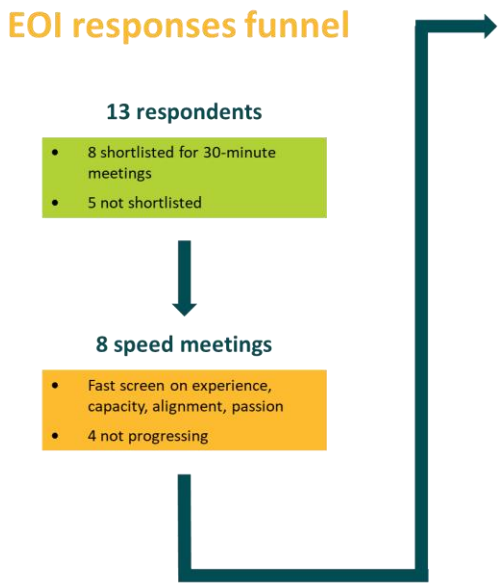
Table 2: Resi-Flex objectives, progress, and key activities by Phase

[2] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-EEA-conference-paper-Jun-2023.pdf
[3] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-Public-Report-Release-2023.pdf
[4] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-EOI-phase-3-trials-Mar-2024.pdf
[5] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-EEA-conference-paper-Jun-2023.pdf
[6] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-EOI-phase-3-trials-Mar-2024.pdf
[7] https://www.ena.org.nz/our-work/working-groups-and-forums

Partner Selection

Orion and Wellington Electricity took the following process to partnering with flexibility suppliers to co-design consumer offerings based on the selected commercial mechanisms[8].

Following a trial design workshop with Wellington Electricity and Orion staff in August 2023, the EOI was published in March 2024[9]. Thirteen responses were received from potential partners. Review of their responses in relation to our criteria led to eight speed meetings to better understand which commercial mechanisms the partners were able to trial with us, refer to Figure 2 for more details.



4 shortlist recommendations	Commercial mechanism	Customer offering
Octopus Energy NZ (both EDBs) – builds on their deep flex end consumer product experience in the UK. Successfully delivered a consumer behaviour response option and a CER integrated option is underway.	Procured flexibility or Managed Service	Consumer action ('Saving Sessions') Managed EV charging ('Intelligent Octopus')
Small retailer (both EDBs) – agile, innovation focus to iterate new service and dynamic customers. Could deliver most innovative outcome (we will need to manage innovation).	Procured flexibility or Managed Service	Iteration dependent – includes consumer action & hot water/EV management
Medium retailer – high customer penetration so offers path to test if scalable for mass market. Launching strategically important flex products over the coming months.	Procured flexibility (non real-time)	Battery Exports
Large retailer (both EDBs) – high customer penetration so offers path to test if scalable for mass market. They have just completed platform selection for flex products.	Consumption Bands	Hot water + EV management

Figure 2: Phase 3 Partner Selection Process

We selected four partners to start **Phase 3** of Resi-Flex. The partners are a mix of small and large retailers with different customer types and capabilities.

The Next Stage – Resi-Flex Phase 3b

Building on the foundation laid in the previous phases, the Resi-Flex project is now in Phase 3: Co-design and Trial. **Phase 3b starting 1 April 2025 is the focus of our INTSA application.** Currently, we are actively working with retailers to design customer offerings using the commercial mechanisms outlined in appendix 4.1.

A significant portion of the budget required for Phase 3b will be allocated to consumer incentives and rewards for trial participation and response. One of the key learnings from Resi-Flex is exploring innovative ways to package these commercial mechanisms with our partners to maximise consumer engagement. See appendix 4.2, 'Potential Customer offerings', for details on expected consumer benefits.

The development of systems to control load in consumers' homes by our partners has proven more complex than initially anticipated. Consequently, we propose trialling Resi-Flex over two winters. Initial trials will commence before winter 2025, with partners starting trials throughout the winter. The trials are scheduled to conclude on September 1, 2026. We aim to announce all trial partners by June 2025. A summary report for winter 2025 will be completed by October 2025. Trials will continue through shoulder and summer seasons where appropriate. Ongoing co-design with partners will extend until March 2026, at which point we will reassess trials for winter 2026 and initiate customer sign-ups. A final

[8] https://www.oriongroup.co.nz/assets/Your-energy-future/Orion-Wellington-Electricity-Incentivising-flexibility-with-Resi-Flex-January-2025.pdf
[9] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-EOI-phase-3-trials-Mar-2024.pdf

trial summary report and close-down report will be submitted 50 days after project completion (expected 31 March 2027). For a comprehensive list of outputs, please refer to Table 3.

As detailed in Table 5, the estimated annual forecast costs include a financial breakdown encompassing funding, project support, legal support, consumer incentives/rewards reimbursement, and internal resources.

Phase 3 Trials Objectives

The main **objectives** of the trials are to:

- Test the effectiveness of different commercial mechanisms at solving the network use cases and attracting residential consumer participation;
- Estimate the economic and financial value of flexibility on households and communities.
- Quantify the benefits of residential flexibility (including non-financial to consumers, the environment and society at large).
- Gain insights into the needs of both consumers and flexibility stakeholders regarding flexibility incentives.
- Inform the development of fair and effective distribution pricing and flexibility services, including appropriate spatial and temporal granularity.
- Analyse the responses from real world consumers to customer offerings that reflect the value of flexibility.

The desired **outcomes** are:

- Test commercial mechanisms that increase participation in residential flexibility and consumer value.
- Collect quantitative data to assess the amount of demand flexibility
- Collect qualitative data to assess customers response to the trials
- Share insight with the whole of industry

2.2. Resi-Flex Phase 3b output dates and expected consumer benefits

Table 3 outlines the anticipated delivery dates for the key project outputs or deliverables of the Resi-Flex Phase 3b. These dates represent the expected completion milestones for various activities and reports, providing a clear timeline for the project's final stages.

Resi-Flex Phase 3b - Project Outputs (Deliverables)		Completed by	Disclosure Year
Output 1	All trials partners announced (where possible)	***06/2025***	***FY26***
Output 2	Agree on mechanism to signal load control (if required for trial)	***06/2025***	***FY26***
Output 3	Winter 2025 trial and summary report	***10/2025***	***FY26***
	Continue trials through shoulder and summer seasons	***(where appropriate)***	
	Co-design of trials with partners	***(continuous)***	
	Sign up customers for trial	***(continuous)***	
Output 4	Trial summary report	***03/2027***	***FY27***
Output 5	Close down report	***03/2027***	***FY27***

Table 3: Resi-Flex Phase 3b Project Outputs

During Resi-Flex Phase 3, consumers who participate in the trials are expected to receive some financial benefit in the form of an incentive payment, or reduction in their energy bill. The longer-term benefit to consumers of the Resi-Flex project are outlined below in Table 4.

Benefit to Consumers	Measured amount if possible	Assumptions/ Description
Financial	2.8-6.6 million per year in cost reductions	BCG estimates the cost of adding a new load as $130/kW. This trial will test the reliability and cost of reducing load on the network, minimising the requirement for new load to be built. Orion's Future Energy Scenarios forecasts between 22 MW and 51 MW of peak reduction due to demand response by 2032.
Financial	$1 billion NPV basis to 2050 from all flexibility	BCG expects a system saving of $10 billion NPV basis to 2050 from demand flexibility. Orion connects 10% of New Zealand's customers, so approximately $1 billion of this value will come from Orion's network. This trial helps to unlock this $1 billion value by gathering results and proving the ability of residential consumers to shift load.
Non-financial: Community engagement		Consumers learn how to contribute to a secure, affordable, and sustainable energy system.
Non-financial: Environmental contribution		Consumers learn how their behaviour/decisions can help reduce carbon emissions or minimise carbon intensity.
Non-financial: Influence future solutions		Provide feedback through trials to influence the design of customer offerings and electricity networks.
Non-financial: Innovation and Learning		Ability to test and provide feedback on new solutions (e.g. optimised smart charging or home automation).

Table 4: Benefit to Consumers

2.3. Estimated annual forecast costs of Resi-Flex Phase 3b.

Table 5 presents Orion's share of the estimated annual forecast costs for Resi-Flex project phase 3b. These costs are projected on an annual basis, covering the period from 1st of April to March 31st of the following year for each fiscal year (FY) until the delivery of its outputs is complete (expected to be by 31st of March 2027). The actual costs to Orion will depend on contributions from Wellington Electricity and the level and amount of consumer incentives determined during the design phase with each partner. Amendments to forecast costs will be proposed as required.

Item	Forecast costs Orion FY26	Forecast costs Orion FY27	Total
Project Support	$ 15,000	$ 40,000	$55,000
Legal Support	$ 10,000	$ 10,000	$20,000
Consumers Incentives/rewards reimbursed	$ 100,000	$ 48,000	$148,000
Internal Resource	$ 31,200	$ 31,200	$31,200
Total	**$ 156,200**	**$ 129,200**	**$285,400**

Table 5: Estimated Annual Forecast Costs of Resi-Flex Project Phase 3b

2.4. Proportion of forecast costs that EDB wishes to recover.

Orion proposes that 100% of the forecast costs of Resi-Flex Phase 3b are eligible for recovery under INTSA as the project is unlikely to result in any financial benefit to Orion within five years of project completion (see Table 1). The current lack of distributed energy resources and flexible demand also make the likelihood of achieving the proposed benefits of the project uncertain. The costs and revenues attributed to this project relate to the delivery of the regulated service as defined in section 54C and will be allocated in the appropriate proportions according to the cost allocation IMs. Being able to recover project costs through an innovation allowance is a key factor in Orion continuing the Resi-Flex project. Orion is eligible to recover up to $11.8 million of INTSA allowance during DPP4. This is Orion's first application, so none of the allowance has yet been approved as allocated to other projects. See Table 6 below.

Item	Proportion	FY26		FY27		Total
		Capex	Opex	Capex	Opex	
Resi-Flex Phase 3b proposed recoverable costs	100%		$156,200		$129,200	$285,400
		Collaborative allowance (0.2 MAR)		Orion allowance (0.6 MAR)		Total Orion allowance (0.8 MAR)
		$2,950,000		$8,850,000		$11,800,000
Resi-Flex Phase 3b		$285,400				$285,400
Previously approved		$0		$0		$0
Remaining allowance		$2,664,600		$8,850,000		$11,514,600

Table 6: Proposed Proportion of Forecast Costs Under Orion's Allowance

2.5. Collaboration with EDBs

Partnership with Wellington Electricity

Orion continues to work in collaboration with Wellington Electricity. This partnership is important to the success of the project in several ways:

- **Leveraging shared resources and expertise:** The collaboration allows both Orion and Wellington Electricity to pool their resources, knowledge, and expertise in exploring residential flexibility. This reduces the individual burden on each EDB and allows for a more comprehensive approach to the project.
- **Developing scalable insights:** By working together, Orion and Wellington Electricity aim to develop insights that are more scalable and applicable across different network and customer contexts. This is particularly valuable as both companies serve different regions and face slightly different challenges (e.g., Wellington Electricity's high number of gas users).
- **Understanding diverse needs:** While having a shared interest in understanding flexibility, both Orion and Wellington Electricity have different flexibility use cases based on their specific network and customer characteristics. Collaboration allows project findings to be reviewed through the lens of each company's differing needs, leading to a richer and more nuanced understanding of flexibility and its users.
- **Providing consistency for retailers:** The partnership ensures greater consistency for flexibility stakeholders, particularly retailers, who may be participating in trials across both networks. This streamlined approach can make participation more attractive and efficient for these partners.
- **Sharing learning:** A key objective of the collaboration is to share ideas and learnings about flexibility, enriching understanding for the benefit of all of New Zealand. The project intends to share high-level learnings and insights publicly (with partner agreement) for the wider energy sector.
- **Joint project governance:** The Resi-Flex project has a clear governance structure with sponsors from both Orion (Evie Trolove) and Wellington Electricity (Greg Skelton).

Knowledge Sharing with Other EDBs and the wider Industry

The Resi-Flex project aims to share learnings as much as possible with the wider industry, some examples are:

- **Publicly available reports,** such as the Resi-Flex Public Report and the EOI for Phase 3 trials, detail the project's background, objectives, methodologies, and findings, including insights into consumer behaviour and the developed commercial framework. These reports allow other EDBs to understand the Resi-Flex approach and its preliminary findings.
- **Industry events:** The project's progress and key learnings have been presented at industry events like the EEA conference[10] and Downstream, providing a platform to reach a wide audience of energy professionals, including those from other EDBs. We also share the learnings with other EDBs through one-on-one sessions regularly.
- **Industry bodies collaboration:** Resi-Flex also collaborates closely with industry bodies like the Electricity Networks Aotearoa (ENA) Future Networks Forum and FlexForum, directly sharing valuable outputs. *Resi-Flex commercial framework and payment calculator* were transferred to the ENA for industry-wide development, and the consumer personas informed their work on customer segmentation.

The project's "learning-by-doing" approach, with scalability in mind, is designed to generate practical and real-world insights that can be adopted by other EDBs. The focus on co-designing and trialling solutions with real consumers provides valuable data on the effectiveness and consumer acceptance of different commercial mechanisms, directly relevant to other EDBs considering similar initiatives.

2.6. Quality standards exclusion

Resi-Flex Phase 3 is not expected to result in any change to quality performance and Orion is not seeking SAIDI or SAIFI exemptions .

[10] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-EEA-conference-project-presentation-June-2024.pdf

3. Voluntary Information

3.1. Scope

The Resi-Flex project is a collaborative initiative between Orion and Wellington Electricity aimed at incentivising flexibility from residential consumers. **The project's scope encompasses the geographical regions served by the respective EDBs' networks.** Orion owns and operates the electricity distribution network delivering power to central Canterbury, while Wellington Electricity manages the local lines network serving customers in Wellington, the Hutt Valley, and Porirua.

The project focuses on exploring and testing commercial mechanisms in partnership with flexibility stakeholders (e.g., retailers, flexibility suppliers, aggregators) to encourage residential consumers to provide demand-side flexibility. This involves co-designing trials with residential consumers to assess various commercial mechanisms and consumer offerings. The Resi-Flex project is currently in its third phase, which involves partnering with flexibility suppliers to co-design consumer offerings based on selected commercial mechanisms and trialling these with consumers. The project aims to inform EDBs on which mechanisms to scale, ultimately creating opportunities for residential consumers to provide flexibility.

3.2. Scale

Orion, the third largest electricity distribution network in New Zealand, owns and operates the electricity distribution network supplying power to central Canterbury. Its network spans over 8,000 square kilometres across Canterbury, delivering electricity to approximately 220,000 homes and businesses. This includes remote rural areas, regional towns, and the city of Christchurch.

Wellington Electricity manages the local lines network, covering over 4,650 square kilometres of poles, wires, and equipment, safely supplying electricity to around 173,500 homes and businesses across Wellington, the Hutt Valley, and Porirua.

We anticipate between 400-800 participants in the trial across Orion's network (0.2-0.4%).

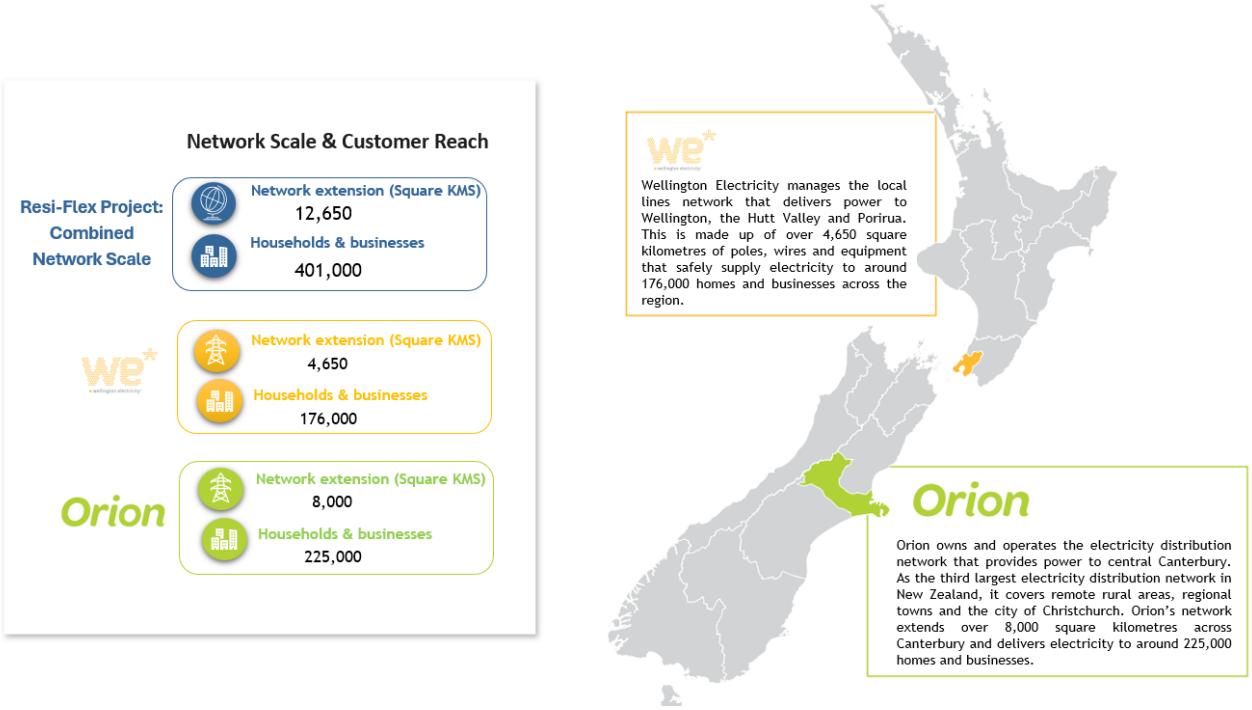


Figure 3: Resi-Flex Project Network Scale and Customer Reach

3.3. Geographical area

The Resi-Flex project's geographical area encompasses a diverse range of urban and rural landscapes across the networks of Orion and Wellington Electricity. Orion's network extends from the Rakaia to the Waimakariri, and from Banks Peninsula to Arthur's Pass, providing power to central Waitaha Canterbury. Wellington Electricity manages the local lines network serving customers in Wellington, the Hutt Valley, and Porirua.

While the project is geographically focused on these regions, its goal is to generate learnings and identify commercial mechanisms that can inform other EDBs in New Zealand and **potentially be scaled nationally.**

The project looks to understand how flexibility can address local network constraints specific to each region, such as projected LV transformer and 11kV feeder constraints. The project also considers the unique winter peak load profiles in each region, with Orion experiencing typically larger morning peaks while Wellington Electricity sees larger evening peaks.

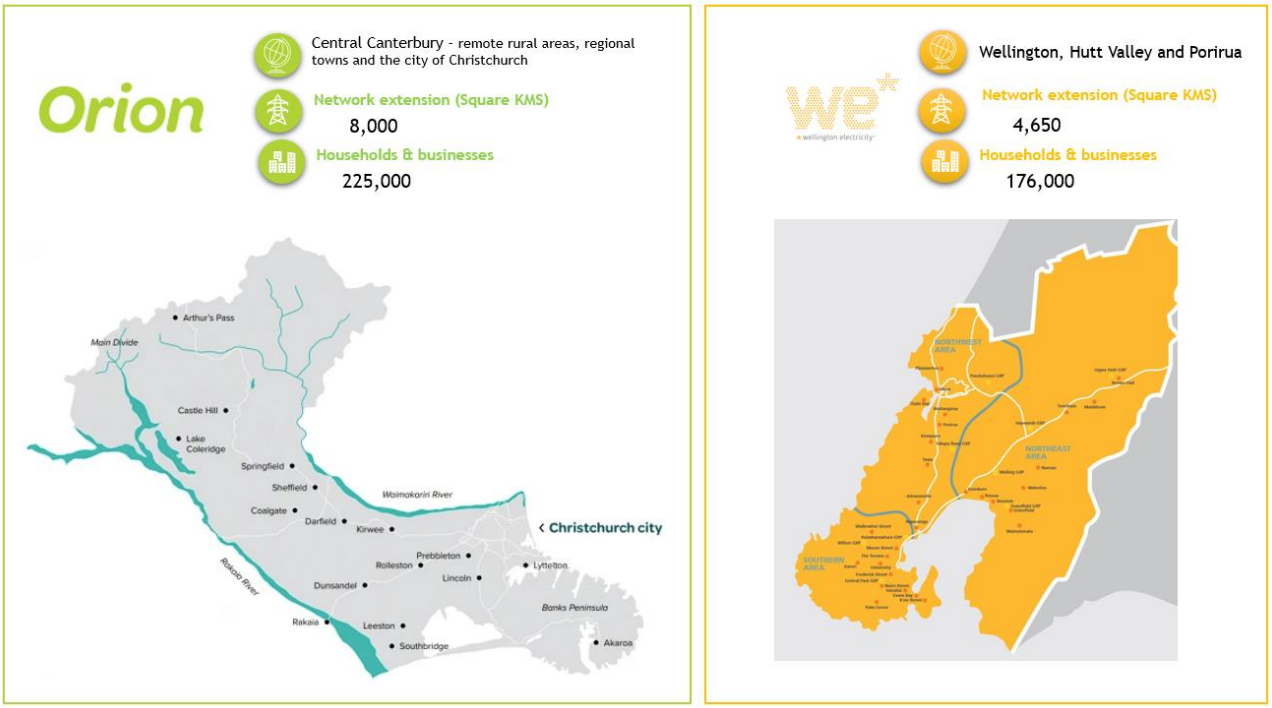


Figure 4: Resi-Flex Project Geographical Coverage

3.4. How does project build on prior learning

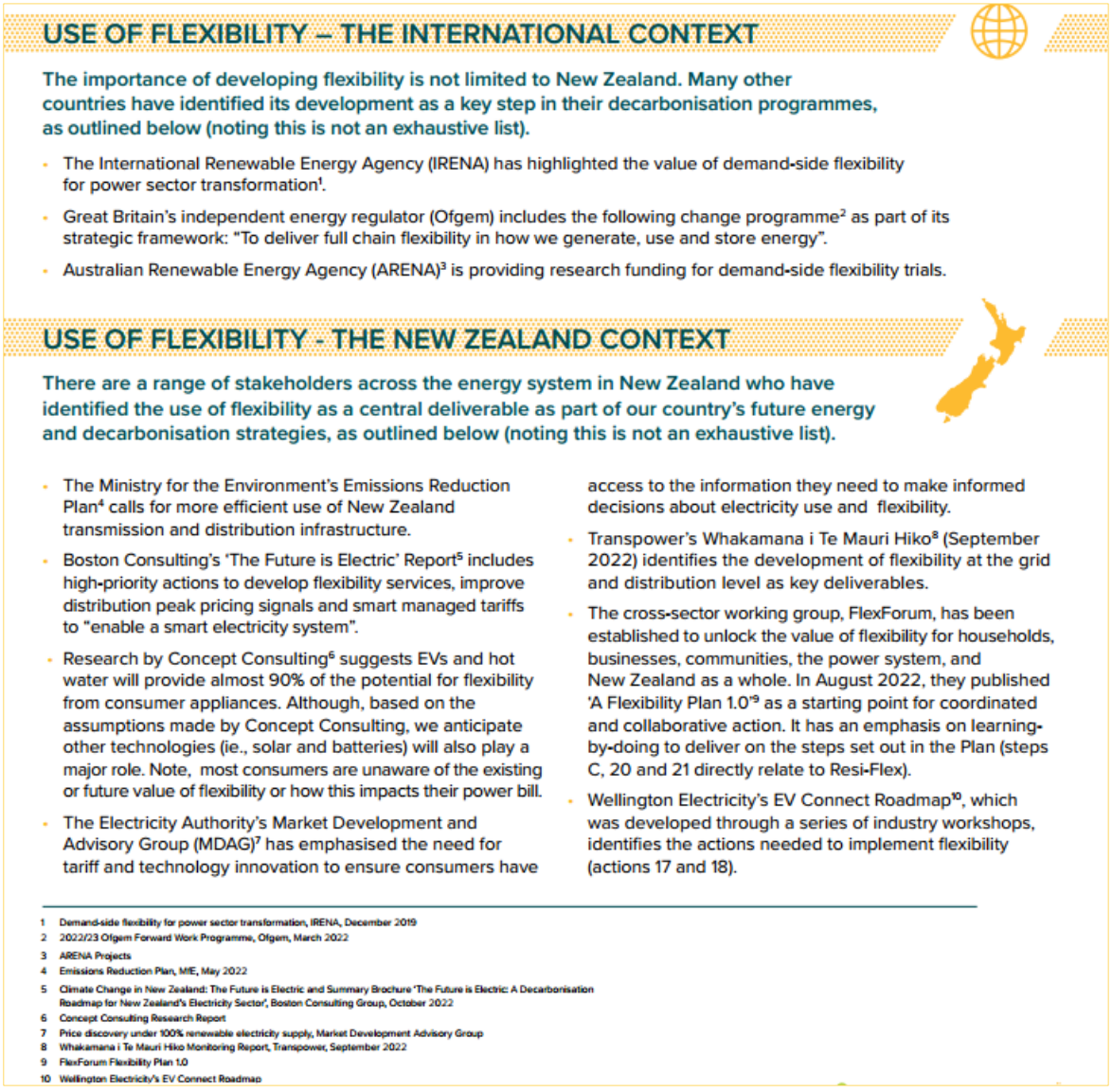
Resi-Flex utilises insights from New Zealand's historical demand-side management practices with knowledge acquired from international initiatives, research, and data. Furthermore, it leverages key findings from its own preceding phases and benefits from collaborative information sharing through industry bodies. Each of these areas is explored in greater detail below:

- **Learning from Earlier Phases:** Resi-Flex Phase 3 builds directly on the outcomes of its own earlier phases (Phase 1 and Phase 2), using the understanding of user requirements and the developed commercial framework as a basis for the Phase 3 co-design and trials. These learnings were documented in public reports and an Innovation Project Allowance application.

- **New Zealand historical approach to demand-side management:** Historically, New Zealand EDBs have managed peak demand by controlling hot water heating through ripple relays, demonstrating the principle of modifying

consumer consumption. Resi-Flex leverages this understanding as a foundation for exploring more sophisticated commercial mechanisms.

- **Use of Flexibility in the Local and International Context:** With the demand increase due to decarbonisation, the smart capabilities of Distributed Energy Resources (DER) and the increasing share of intermittent generation, the potential and need for demand-side flexibility has been increasing. Therefore, the benefits of using flexibility had been actively explored across Aotearoa and internationally, and had been a useful component of the Resi-Flex project to understand the context as part of researching flexibility user requirements. This information was published in our Resi-Flex Public Report Release 2023[11], see Figure 5 below.



USE OF FLEXIBILITY – THE INTERNATIONAL CONTEXT

The importance of developing flexibility is not limited to New Zealand. Many other countries have identified its development as a key step in their decarbonisation programmes, as outlined below (noting this is not an exhaustive list).

- The International Renewable Energy Agency (IRENA) has highlighted the value of demand-side flexibility for power sector transformation[1].
- Great Britain's independent energy regulator (Ofgem) includes the following change programme[2] as part of its strategic framework: "To deliver full chain flexibility in how we generate, use and store energy".
- Australian Renewable Energy Agency (ARENA)[3] is providing research funding for demand-side flexibility trials.

USE OF FLEXIBILITY - THE NEW ZEALAND CONTEXT

There are a range of stakeholders across the energy system in New Zealand who have identified the use of flexibility as a central deliverable as part of our country's future energy and decarbonisation strategies, as outlined below (noting this is not an exhaustive list).

- The Ministry for the Environment's Emissions Reduction Plan[4] calls for more efficient use of New Zealand transmission and distribution infrastructure.
- Boston Consulting's 'The Future is Electric' Report[5] includes high-priority actions to develop flexibility services, improve distribution peak pricing signals and smart managed tariffs to "enable a smart electricity system".
- Research by Concept Consulting[6] suggests EVs and hot water will provide almost 90% of the potential for flexibility from consumer appliances. Although, based on the assumptions made by Concept Consulting, we anticipate other technologies (ie., solar and batteries) will also play a major role. Note, most consumers are unaware of the existing or future value of flexibility or how this impacts their power bill.
- The Electricity Authority's Market Development and Advisory Group (MDAG)[7] has emphasised the need for tariff and technology innovation to ensure consumers have access to the information they need to make informed decisions about electricity use and flexibility.
- Transpower's Whakamana i Te Mauri Hiko[8] (September 2022) identifies the development of flexibility at the grid and distribution level as key deliverables.
- The cross-sector working group, FlexForum, has been established to unlock the value of flexibility for households, businesses, communities, the power system, and New Zealand as a whole. In August 2022, they published 'A Flexibility Plan 1.0'[9] as a starting point for coordinated and collaborative action. It has an emphasis on learning-by-doing to deliver on the steps set out in the Plan (steps C, 20 and 21 directly relate to Resi-Flex).
- Wellington Electricity's EV Connect Roadmap[10], which was developed through a series of industry workshops, identifies the actions needed to implement flexibility (actions 17 and 18).

1 Demand-side flexibility for power sector transformation, IRENA, December 2019
2 2022/23 Ofgem Forward Work Programme, Ofgem, March 2022
3 ARENA Projects
4 Emissions Reduction Plan, MfE, May 2022
5 Climate Change in New Zealand: The Future is Electric and Summary Brochure 'The Future is Electric A Decarbonisation Roadmap for New Zealand's Electricity Sector', Boston Consulting Group, October 2022
6 Concept Consulting Research Report
7 Price discovery under 100% renewable electricity supply, Market Development Advisory Group
8 Whakamana i Te Mauri Hiko Monitoring Report, Transpower, September 2022
9 FlexForum Flexibility Plan 1.0
10 Wellington Electricity's EV Connect Roadmap

Figure 5: Resi-Flex Use of Flexibility in the Local and International Context

- **International initiatives:** The project has actively incorporated learnings and methodologies from international initiatives[12]. Examples include UK Power Network's Project Shift 2.0[13], which explored the potential for dynamic

[11] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-Public-Report-Release-2023.pdf
[12] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-EOI-phase-3-trials-Mar-2024.pdf
[13] https://innovation.ukpowernetworks.co.uk/projects/shift-2-0/

and locational pricing to address challenges like secondary peaks and herding behaviour, and insights from reports like UK Power Network Project Shift Reports and Learnings, Monash University Future Home Demand Project report and the RACE for 2030 Report on rewarding flexibility demand customer-friendly cost-reflective tariffs and incentives.

- **International research with local validation:** The consumer personas developed in Phase 1 were based on learnings gained from secondary international research[14], highlighting the application of prior global learning to the New Zealand context, although with a recognition of the need for local validation.
- **Collaboration and information sharing:** Industry bodies like Flex Forum and the ENA Future Networks Forum have played a crucial role, allowing Resi-Flex to build on collective industry knowledge and contribute its own findings to a wider learning ecosystem[15]. For example, to develop the JOURNEY STAGES, which describe each consumer persona's journey to flexibility, the 'Discover, Assess, Enable and Operate' journey developed by FlexForum was used.

3.5. Potential for new learning

The Resi-Flex project has significant potential for generating new learnings. Phase 3 involves co-designing and trialling novel commercial mechanisms with flexibility suppliers and residential consumers. This practical experimentation in a real-world setting is intended to yield valuable insights into the effectiveness of different approaches in attracting consumer participation and addressing network use cases.

Below are five points summarizing how the project will continue to provide new learnings:

1. **New Data through testing the effectiveness of different commercial mechanisms:** A primary objective of the Phase 3 trials is to assess the effectiveness of different commercial mechanisms at solving network use cases and attracting consumer participation. By trialling various customer propositions and incentives co-designed with flexibility suppliers, the project will generate new, empirical data on which mechanisms are most successful in motivating residential consumers to provide flexibility. This includes understanding how different commercial constructs impact consumer behaviour and their willingness to shift electricity usage.

2. **Understanding real-world residential consumer experience and response:** Phase 3 is designed to observe the response from real-world residential consumers to customer offerings that reflect the value of flexibility. By actively engaging consumers in trials, the project will provide new insights into consumer preferences, motivations, and barriers related to providing flexibility in a New Zealand context. This includes collecting customer feedback on their participation in the trials.

3. **Informing EDBs on scalable mechanisms:** The trials in Phase 3 are specifically intended to help inform EDBs on which commercial mechanisms to scale. By identifying successful mechanisms through real-world testing, the project will provide valuable new knowledge that EDBs can use to develop and implement effective, scalable solutions for residential demand-side flexibility. The learnings will help EDBs understand the potential for these mechanisms to address network issues, such as those related to EV uptake.

4. **Building internal capability and informing external stakeholders:** The Resi-Flex project aims to build internal flexibility capability within Orion and Wellington Electricity. The experience gained through co-designing and running the trials will equip both EDBs with new skills and knowledge in this evolving area. Furthermore, the project intends to inform or influence external organizations (ENA, regulation etc.) by sharing its findings and insights, potentially contributing to new industry standards, regulations, or best practices for residential flexibility.

[14] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-Public-Report-Release-2023.pdf

[15] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-Public-Report-Release-2023.pdf

5. **Documenting and sharing lessons learned with the wider industry:** A key component of Phase 3 involves developing reports of lessons learned and insights collected from all parties (consumers, partners, and EDBs). The explicit intent is to share these findings with the wider industry, as agreed with partner(s).

These points highlight how the Resi-Flex project, particularly through its current Phase 3 trials, is actively generating new learnings about residential demand-side flexibility, with a focus on practical outcomes and broad industry benefit.

3.6. Collaboration and/or partners

Figure 6 and Table 7 outline the key project resources, and the various stakeholders involved, along with their respective roles and the impacts of the project on each group.

Figure 6: Resi-Flex Project Governance Arrangements

Stakeholder/Stakeholder Group	Impact – how will the project impact the stakeholder or stakeholder group?
Residential customers on Orion's Network	Customers will provide demand flexibility and be rewarded for doing so.
Orion	Provides learnings that can inform future work and assumptions for flexibility on networks.
Wellington Electricity	Wellington Electricity is in partnership with Orion. They coordinate to provide consistency for retailers participating in the trial and share learning from the projects on their networks.
Octopus Energy	Supplying the platform & customers to trial demand flexibility. This trial directly impacts their customers.
Partner 2	Supplying the platform & customers to trial demand flexibility. This trial directly impacts their customers.
Partner 3	Supplying the platform & customers to trial demand flexibility. This trial directly impacts their customers.
Partner 4	Supplying the platform & customers to trial demand flexibility. This trial directly impacts their customers.

Table 7: Resi-Flex Project Collaboration Partners

3.7. Alignment to sector programmes

The Resi-Flex project is positioned to contribute to, and learn from, various sector programmes and collaborations, with a strong emphasis on working with FlexForum and the ENA Future Network Forum (FNF) to advance the understanding and implementation of residential flexibility in New Zealand as described below:

- **Alignment with FlexForum:** The Resi-Flex project is explicitly aligned with the work of FlexForum, a cross-industry group focused on unlocking the value of flexibility. The FlexForum's Flexibility Plan 1.0 is a key document that Resi-Flex contributes toward, specifically in areas like understanding how households make choices about flexibility, and creating a common framework for valuing flexibility and the interaction of commercial mechanisms. The project's definition of flexibility even aligns with that used by FlexForum[16]. Furthermore, FlexForum members participated in testing and verifying the consumer personas developed by Resi-Flex.
- **Contribution to the ENA Future Network Forum:** Resi-Flex actively shares its learnings and methodologies with the ENA Future Network Forum[17]. Specifically, the Resi-Flex methodology and learnings on consumer personas have informed the FNF's customer segmentation work. Additionally, the Commercial Framework developed by Concept Consulting for Resi-Flex has been transferred to the ENA Future Network Forum project to serve as a starting point for developing an industry commercial framework for valuing and trading EDB flexibility. Representatives from both Orion and Wellington Electricity are involved in this forum.

[16] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-Public-Report-Release-2023.pdf

[17] https://www.ena.org.nz/our-work/working-groups-and-forums

- **Wellington Electricity's EV Connect Roadmap:** Resi-Flex aligns with Wellington Electricity's EV Connect Roadmap, which identifies actions needed to implement flexibility. Resi-Flex contributes to this roadmap by researching consumer preferences and price points, and by developing and trialling residential flexibility offerings.
- **Broader industry collaboration and information sharing:** Beyond specific programmes, the project aims to share its learnings with the wider industry through various channels, including the ENA, FlexForum, and publications on their websites and presentations at events like the EEA's annual conference[18]. The intent is to contribute to the overall understanding and development of residential flexibility in New Zealand.
- **Alignment with regulatory goals:** The project implicitly aligns with regulatory goals by exploring mechanisms that can lead to optimised distribution network investment and increased whole-of-system value. The project also considers the need for regulatory allowances to purchase flexibility services.

In summary, the Resi-Flex project exhibits strong alignment with key sector programmes and initiatives aimed at advancing flexibility in the New Zealand electricity system.

3.8. Replicable in New Zealand

The Resi-Flex project is designed to be more than a bespoke solution for Orion and Wellington Electricity. Its focus on understanding fundamental consumer behaviour and the effectiveness of various commercial mechanisms in real-world settings directly supports the replicability of its outcomes for other New Zealand EDBs.

To ensure replicability, Resi-Flex is committed to sharing its findings. The project adopts a learning-by-doing approach, producing reports that detail lessons learned, and insights gathered from consumers, partners, and EDBs for wider industry dissemination. Furthermore, Resi-Flex actively collaborates with industry bodies like FlexForum and the ENA Future Network Forum, sharing methodologies and the developed commercial framework to contribute to industry-wide standards and understanding.

Ultimately, the goal of the Phase 3 trials is to inform EDBs about effective and scalable commercial mechanisms for addressing network challenges and incentivising residential flexibility. All learnings and publications are made readily accessible on Orion and Wellington Electricity's websites, empowering other networks to adopt and adapt the project's successful outcomes.

[18] https://www.oriongroup.co.nz/assets/Your-energy-future/Resi-Flex-EEA-conference-project-presentation-June-2024.pdf

4. Appendix

4.1. Trial Commercial Mechanisms

Trial Commercial Mechanisms	1- Managed service	2- Procured Flexibility	3- Consumption bands
Mode	**Standard-led**	**Market-led**	**Price-led**
Commercial Mechanisms Summary	Flexibility standards with flex discount or availability payments (in $/day) - *with $/kWh ToU pricing as default pricing* Option for higher flex discount or payment depending on location	Scheduled utilisation payments (in $/kWh or $/event) - *with $/kWh ToU pricing as default pricing*	Consumption bands (tiered $/kWh charges) applied to half hour peak electricity use at GXP or Zone substation level.
Description	Requires the device to be managed by a party (partners and/or EDB) in exchange for a tariff discount (to fixed daily charges or 24/7 off-peak rates for the managed device) or additional payment. Management conditions are either static (i.e., fixed) or more dynamic (with instructions or signals submitted)	Scheduled utilisation payments for customers opting in to respond. The scheduled utilisation payment would be $/kWh or $/event for load reduction in comparison to a baseline. Non-performance results in non-payment. Flexibility capacity and response time windows (e.g., all weekdays in winter from 6-10am) would be pre-agreed.	Solving network constraints in specific locations using "static price" consumption tariff bands. Pricing is set at GXP or zone substation level, based on tiered $/kWh charges, with increasing rates for higher consumption in a given half hour. Higher charges are only levied on consumption within that band. Retailers are free to allocate/manage the charge across their customer base as they see fit.
Partner(s) – Market roles	There are 2 options: - Flex Discounts applied in the form of reduced fixed daily charges or off-peak rates. These are retail tariffs and so the financial benefits flow via retailers. - Availability payment, which can be used by all market roles including aggregators.	Any market role	Since this commercial mechanism is retail tariff based, financial benefits flow via retailers. Aggregators may need to partner with retailers.
General response type	Shed or shift - responding to congestion	Shift or shape - behavioural change (preventative)	Shape - behavioural change (preventative)
Constraint	Specific constraint (11KV or 400V)	Specific constraint (11KV or 400V)	GXP or 11kV
Targeted load	Manageable device (i.e., EV or hot water load)	Whole household load or manageable device (for aggregator)	Whole household load

Table 8: Trial Commercial Mechanisms High level description

4.2. Potential Customer Offerings

Below are a few examples of customer offerings we could explore:

- Novel retail tariff for consumers to encourage flexibility
- Discount on hardware purchase and/or rental for manageable devices e.g. EV charger.
- Payments or customer rewards for customers providing flexibility services
- Peer-to-peer offerings to encourage local balancing e.g., optimised use of solar PV

Other non-financial benefits for participating consumers may include:

- Community engagement: Consumers learn how they can contribute to a secure, affordable, and sustainable energy system
- Environmental contribution: Consumers learn how their behaviour/decisions can help reduce carbon emissions or minimise carbon intensity
- Influence future solutions: Provide feedback through trials to influence the design of customer offerings and electricity networks
- Innovation and Learning: Ability to test and provide feedback on new solutions (e.g., optimised smart charging or home automation).

Relevant examples and insights from overseas projects which could be of interest include:

- UK Power Network Project Shift Reports and Learnings[19];
- An article about examples of customer offerings from Kaluza[20] summarising the effectiveness of different types of customer offerings to incentivise smart charging either with a carrot or stick approach.
- RACE for 2030 report on rewarding flexibility demand customer-friendly cost-reflective tariffs and incentives[21]
- Monash University Future Home Demand Project report[22]

[19] https://innovation.ukpowernetworks.co.uk/projects/shift
[20] https://www.kaluza.com/global-lessons-in-incentivising-ev-smart-charging/
[21] https://www.racefor2030.com.au/rewarding-flexible-demand-customer-friendly-cost-reflective-tariffs-and-incentives/
[22] https://www.monash.edu/__data/assets/pdf_file/0012/3416889/Future-Home-Demand-Report-hi-res-1_compressed.pdf

4.3. INTSA application requirements reference table

Schedule 5.3 requirement		How the requirement is met
Process for seeking Commission approval of an INTSA proposal		
(2)	A non-exempt EDB may at any point prior to six months before the end of the DPP regulatory period submit an INTSA proposal to the Commission.	This application is made before the stated deadline
(3)	If a non-exempt EDB proposes to work together with 1 or more other EDBs to carry out the project or programme in an INTSA proposal, each non-exempt EDB carrying out the project or programme that proposes to recover any of the forecast costs from the non-exempt EDB's innovation and non-traditional solutions allowance must submit an INTSA proposal.	This project is a collaborative project with Wellington Electricity who will submit their application separately.
(4)	An INTSA proposal must set out the following:	
(4)(a)	the purpose of the project or programme in the INTSA proposal, and the steps that the non-exempt EDB intends to take to achieve that purpose if the Commission approves the INTSA proposal	Refer section 2.1
(4)(b)	the INTSA outputs and expected benefits of the project or programme for consumers	Refer section 2.2
(4)(c)	the date by which the non-exempt EDB expects all of the INTSA outputs for the project or programme to have been delivered	Refer section 2.2
(4)(d)	the forecast costs of the project or programme for each disclosure year up to the date by which the non-exempt EDB expects all of the INTSA outputs to have been delivered	Refer section 2.3
(4)(e)	the proportion of the forecast costs of the project or programme that the non-exempt EDB seeks to recover from the non-exempt EDB's innovation and non-traditional solutions allowance (e.g., 75% of the forecast costs of the project or programme)	Refer section 2.4
(4)(f)	an estimate of any anticipated SAIDI INTSA values or SAIFI INTSA values that the non-exempt EDB expects to exclude under Schedule 3.1 or 3.2	Refer section 2.6 (N/A)
(4)(g)	the cause or causes of the interruptions for the SAIDI INTSA values and SAIFI INTSA values referred to in subparagraph (f)	Refer section 2.6 (N/A)
(4)(h)	any steps that the non-exempt EDB has taken, or proposes to take, to reduce the likelihood or impact on consumers of any interruptions referred to in subparagraph (f)	Refer section 2.6 (N/A)
(4)(i)	whether the non-exempt EDB intends to work together with 1 or more other EDBs to carry out the project or programme in the INTSA proposal and, if so, how it intends to work together with the other EDBs	Refer section 2.5
(4)(j)	sufficient information to enable the Commission to decide under paragraph (7) whether the project or programme meets the eligibility criteria under paragraph (6)	Refer sections 1, 2, 3, 4
Eligibility criteria for a project or programme in an INTSA proposal		
(6)	For the purposes of the Commission's decision on whether to approve a non-exempt EDB's INTSA proposal under paragraph (7), the eligibility criteria for a project or programme in an INTSA proposal are that—	Refer section 1
(6)(a)	the project or programme relates to the supply of electricity distribution services;	Refer section 1
(6)(b)	the project or programme promotes the purpose of Part 4 of the Act; and	Refer section 1
(6)(c)	one or both of the following applies:	
(6)(c)(ii)	the project or programme is unlikely to otherwise result in any financial benefits to the non-exempt EDB in the five disclosure years after the date by which the non-exempt EDB indicates in its INTSA proposal that it expects all of the INTSA outputs to have been delivered:	Refer section 1

Schedule 5.3 requirement		How the requirement is met
(6)(c)(ii)	the benefits of the project or programme are sufficiently uncertain that the non-exempt EDB would not carry out the project or programme if it could not recover some or all of the forecast costs of the project or programme from the non-exempt EDB's innovation and non-traditional solutions allowance.	Refer section 1
EDB closeout report		
(14)	Within 50 working days of the delivery of all of the INTSA outputs for the project or programme in a non-exempt EDB's INTSA proposal that the Commission has approved under paragraph (7), the non-exempt EDB must submit a closeout report to the Commission […]	The closeout report will be submitted to the Commission within 50 working days of outputs being completed (forecast to be by 31 March 2027)
Limit on innovation and non-traditional solutions allowance for each non-exempt EDB		
(19)	Subject to paragraph (20), the limit on the innovation and nontraditional solutions allowance for each non-exempt EDB for the DPP regulatory period is specified in Table 5.1 […]	Refer section 2.4
Confidential information		
(21)	Where a non-exempt EDB considers that it has a right to confidentiality in any information that it provides to the Commission under this Schedule and the non-exempt EDB does not waive the right, the non-exempt EDB must—	
(21)(a)	include that information in an appendix; and	Refer 'Introduction' (N/A)
(21)(b)	clearly mark the information as confidential.	Refer 'Introduction' (N/A)

Table 9: INTSA application requirements and how it is met