Government Leadership

Regional Energy Transition Accelerator (RETA)

Manawatū-Whanganui — Summary Report

May 2025

TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

He kupu whakataki

He mahi nui te whakatutuki i te whāomoomo ā-pūngao kaitā me te tautoko i ngā kora mā, heoi anō, he waiwai. Waihoki, me whai pārongo horopū, me pakari anō hoki te mahi tahi a ngā rohe.

E whakaatu ana te Manawatū–Whanganui Regional Energy Transition Accelerator (RETA) i tētahi tūāoma waiwai i tēnei ara, e tuku ana i te māramatanga whānui mō ngā mahi me mātua mahi ki te whakapiki i te whāomoomo ā-pūngao, ki te whakahaukaha i te whakaratonga, me te whakaheke mārika i ngā tukunga puta noa i te rohe.

Ko te rohe o Manawatū–Whanganui he pokapū tuari matua mō Te Ika-a-Māui, he kāinga anō hoki ki tētahi ahumahi pāmu kararehe pakari e whakaputa ana i te huamiraka me te kiko. Kei tēnei pūrongo tētahi aromatawai ā-rohe whānui, e tūhura ana i ngā arawātea me ngā wero anō hoki i te rohe i roto i tōna haerenga whakawhiti pūngao. Mā ēnei pārongo e mātau ai, e rīrā ai anō hoki ngā whakatau a ngā pakihi me ngā kaiwhakarato e pā ana ki ō rātou matea ā-pūngao.

E kitea ana i te hōtaka RETA i te mana o ngā whakatau takitini, e whakaatu ana i ngā hua o te mahi tahi a ngā kaiwhakamahi pūngao huhua, arā, ko ngā urupare ki ngā wero tūāhanga, i te tirohanga whakarato me te popono anō hoki.

Ko tētahi o ngā aronga matua o tēnei pūrongo nei ko te wāhi hirahira ki te papatipu koiora whakahou hei kāinga rua utu-ngāwari, horopū anō hoki ki ngā kora mātātoka mō te pōkākā tukatuka tū i te ahumahi. Ka whakarārangi tēnei tātaritanga i ngā ara rau e whakawhiti ai ngā kaiwhakamahi pōkākā tukatuka o te rohe ki ngā puna pūngao whakahou. Ka whakamuramuratia ngā arawātea o te rohe – arā, te ngāwari o te utu me te mātotorutanga o te kora koiora.

E tō mai ana te hōtaka RETA i ngā kaupapa kua whakaritea kētia i te rohe, e whanake ana i ngā kokenga kua kitea kētia ki Manawatū–Whanganui ki ngā kāinga rua whāomoomotanga ā-pūngao, tukuwaro iti anō hoki. He huhua ngā pakihi, i te taha o EECA, kua whakamahere kē, kua whakauru kē rānei i ngā ara waro-iti, e whakaatu ana i ngā ahatanga ka taea. Mei kore ake rātou i tuari i ngā mōhiotanga ki te whakaahua i tēnei pūrongo nei.

Ko tēnei puka te whakakapitanga o te tūāoma whakamahere o RETA, e tuku ana i ngā matapae, e whakamahere ana i te popono pūngao pōkākā tū i te rohe i te taha o ngā aromatawai whakarato pūngao whakahou. Kua whakawhanaketia ēnei mōhiotanga i runga i te āta mahi tahi ki ngā pakihi tuku hiko – The Lines Company, Powerco, Electra, me Scanpower – waihoki ngā kamupene ngahere ā-rohe, ngā kaitukatuka rākau, ngā kaiwhakaputa hiko me ngā kaihoko, otirā, ngā kaiwhakamahi pūngao waenga ki te rarahi i te ahumahi.

I a mātou ka neke whakamua, e ū tonu ana mātou ki te tautoko i te rohe ki te tūhura i tōna pitomata whakawhiti pūngao whānui. Ka whakaū hoki i tā te tauritetanga o te whakarato me te popono whāngai i te whakamaru ā-pūngao, te ngāwari o te utu me te whāomotanga.

1 Foreword

Achieving large-scale energy efficiency and supporting clean fuels is a complex, yet essential task, one that demands both reliable data and strong regional collaboration. The Manawatū–Whanganui Regional Energy Transition Accelerator (RETA) represents a vital step forward in this journey, providing a comprehensive understanding of the actions necessary to enhance energy efficiency, bolster supply security, and significantly reduce emissions across the region.

The Manawatū–Whanganui region is a key distribution hub for the North Island and home to a robust pastoral industry in both dairy and meat production. This report offers a complete regional assessment, revealing both the opportunities and challenges the region faces in its energy transition journey. Armed with this information, businesses and suppliers can make informed, future-proof decisions about their energy needs.

The RETA programme underscores the power of collective decision-making, illustrating how collaboration among multiple energy users can lead to shared solutions for infrastructure challenges, from both a supply and demand perspective.

A central focus of this report is the pivotal role of renewable biomass as a cost-effective and reliable alternative to fossil fuels for industrial stationary process heat. This analysis outlines various pathways for transitioning the region's process heat users to renewable energy sources, highlighting region-specific opportunities — particularly the affordability and abundance of biofuel.

Building on the significant progress already made in Manawatū–Whanganui toward energy efficiency and low-emissions alternatives, the RETA programme draws on the region's existing initiatives. Many businesses, in partnership with EECA, have already mapped out or implemented low-carbon pathways, proving what is possible. Their willingness to share insights has been indispensable in shaping this report.

This document marks the completion of RETA's planning phase, offering forecasts and mapping regional stationary heat energy demand alongside renewable energy supply assessments. These insights have been developed through close collaboration with local electricity distribution businesses — The Lines Company, Powerco, Electra, and Scanpower — as well as regional forestry companies, wood processors, electricity generators and retailers, and medium-to-large industrial energy users.

As we move forward, we remain committed to supporting the region in unlocking its full energy transition potential while ensuring the balance of supply and demand contribute to energy security, affordability and efficiency.

Dr Marcos Pelenur
Chief Executive, EECA

EECA

2 Acknowledgements

This RETA project has involved a significant amount of time, resource and input from a variety of organisations. We are especially grateful for the contribution from the following organisations:

- Process heat users throughout the Manawatū–Whanganui region
- Manawatū–Whanganui electricity distribution businesses — The Lines Company, Powerco, Electra, and Scanpower
- National grid owner and operator Transpower
- Regional forestry companies
- Regional wood processors
- Electricity generators and retailers

This RETA report is the distillation of individual workstreams delivered by:

- **DETA** — process heat demand-side assessment
- **Whirika and Margules Groome** — biomass availability analysis
- **Ergo Consultants** — electricity network analysis
- **EnergyLink** — electricity price forecast
- **Sapere Research Group** — report collation, publication, and modelling assistance

Photo credit: ManawatuNZ

> *A central focus of this report is the pivotal role of renewable biomass as a cost-effective and reliable alternative to fossil fuels for industrial stationary process heat.*

Dr Marcos Pelenur, Chief Executive, EECA

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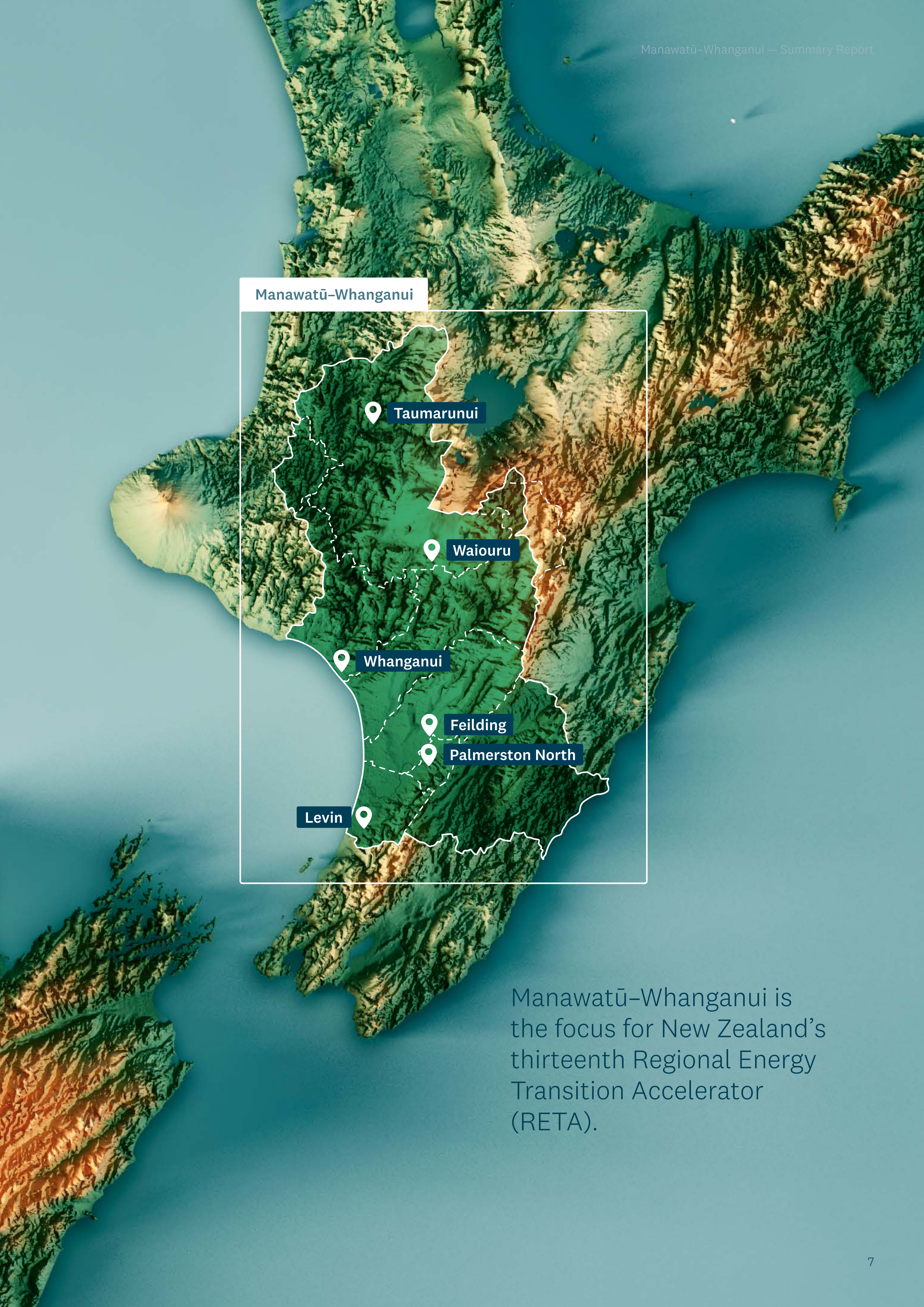


Manawatū–Whanganui is the focus for New Zealand's thirteenth Regional Energy Transition Accelerator (RETA).

4 Manawatū–Whanganui overview

This report provides a snapshot of the planning phase of the Regional Energy Transition Accelerator (RETA) prepared for the Manawatū–Whanganui region (shown in Figure 1).

The report brings together information on the demand for fossil fuels for process heat in Manawatū–Whanganui, along with information on electricity network and biomass availability in the region, in order to:

- Provide process heat users with coordinated information specific to the region that can be used to make more informed decisions on fuel choice and timing.
- Improve fuel supplier confidence to invest in supply side infrastructure (including electricity and biomass).
- Surface issues, opportunities, and recommendations.

The next phase of the RETA programme focuses on implementing recommendations from phase one to remove barriers or accelerate opportunities for fuel-switching of process heat.

Our analysis of energy requirements in Manawatū–Whanganui uses year 2022 as baseline. We note that since then, constraints in gas supply have affected prices and availability of fossil gas, and as a result have altered fossil gas consumption patterns.[1] This means that it is increasingly important for organisations to understand the alternative fuel options available for their processes, to ensure a secure and affordable supply.

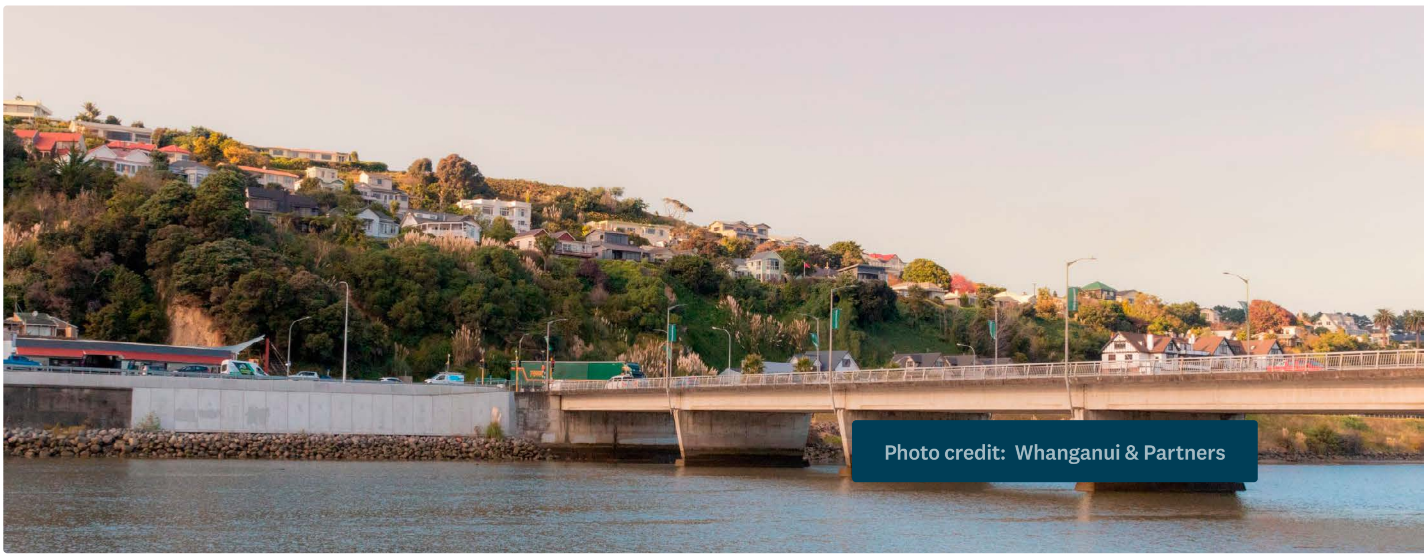
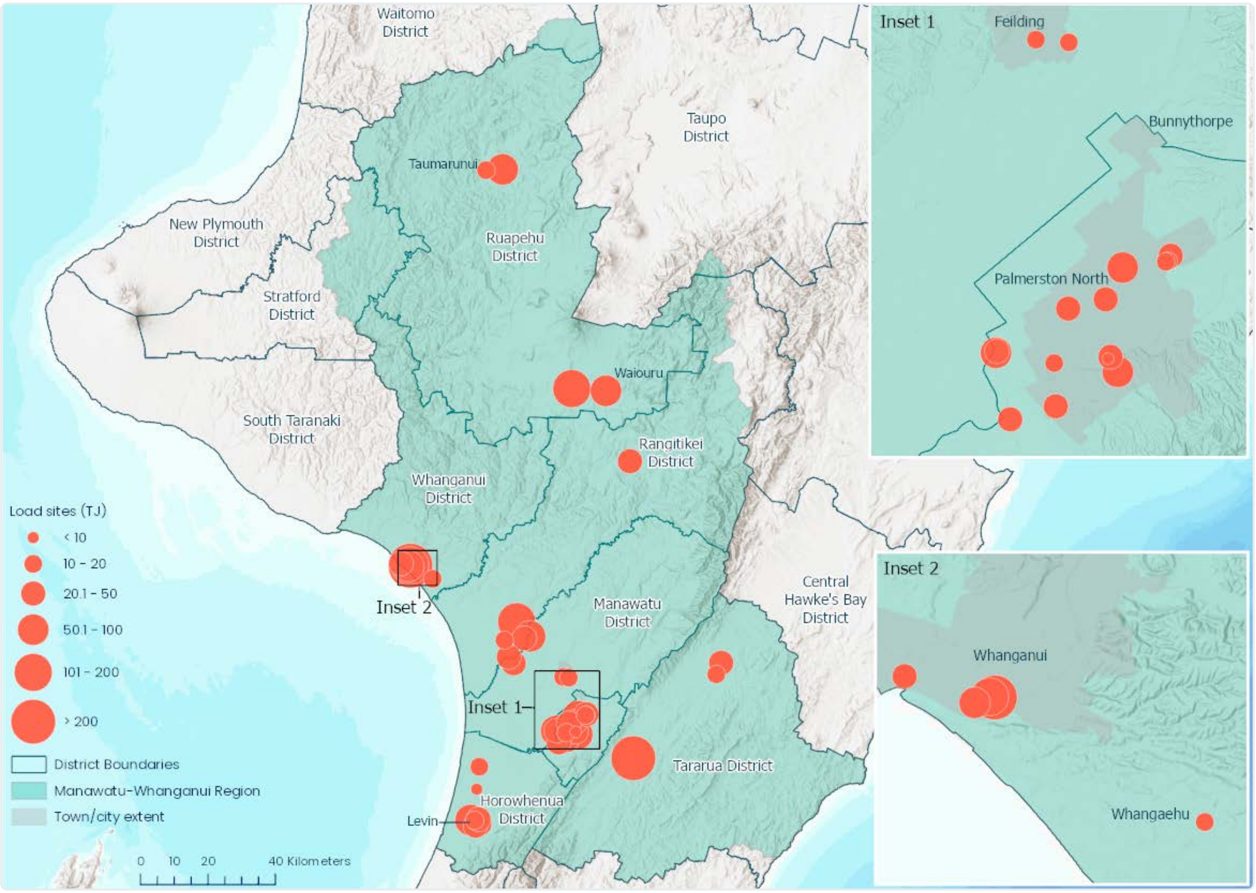


Photo credit: Whanganui & Partners

[1] MBIE notes that gas production forecast is expected to fall below demand https://www.mbie.govt.nz/about/news/gas-production-forecast-to-fall-below-demand.

Figure 1 – Process heat demand sites in the Manawatū-Whanganui region



There are 42 sites covered in the report, spanning the dairy, meat, industrial and commercial sectors.[2] These sites have fossil-fuelled process heat equipment larger than 500kW and include sites for which EECA has detailed information about their potential projects to reduce energy use and switch to renewable fuels.[3] The sites, shown in Figure 1 by location and size of their annual energy requirements, collectively consumed 2,611 TJ of process heat energy, predominantly in the form of fossil gas, and produced 142kt per year of carbon dioxide equivalent (CO_2e) emissions.

Table 1 shows that the industrial sector, particularly dairy and meat, dominates fuel use and emissions, and that the fossil fuel consumption of the six dairy sector sites in the region is equal to the total fossil fuel consumption of all the other industrial sites in the region combined.

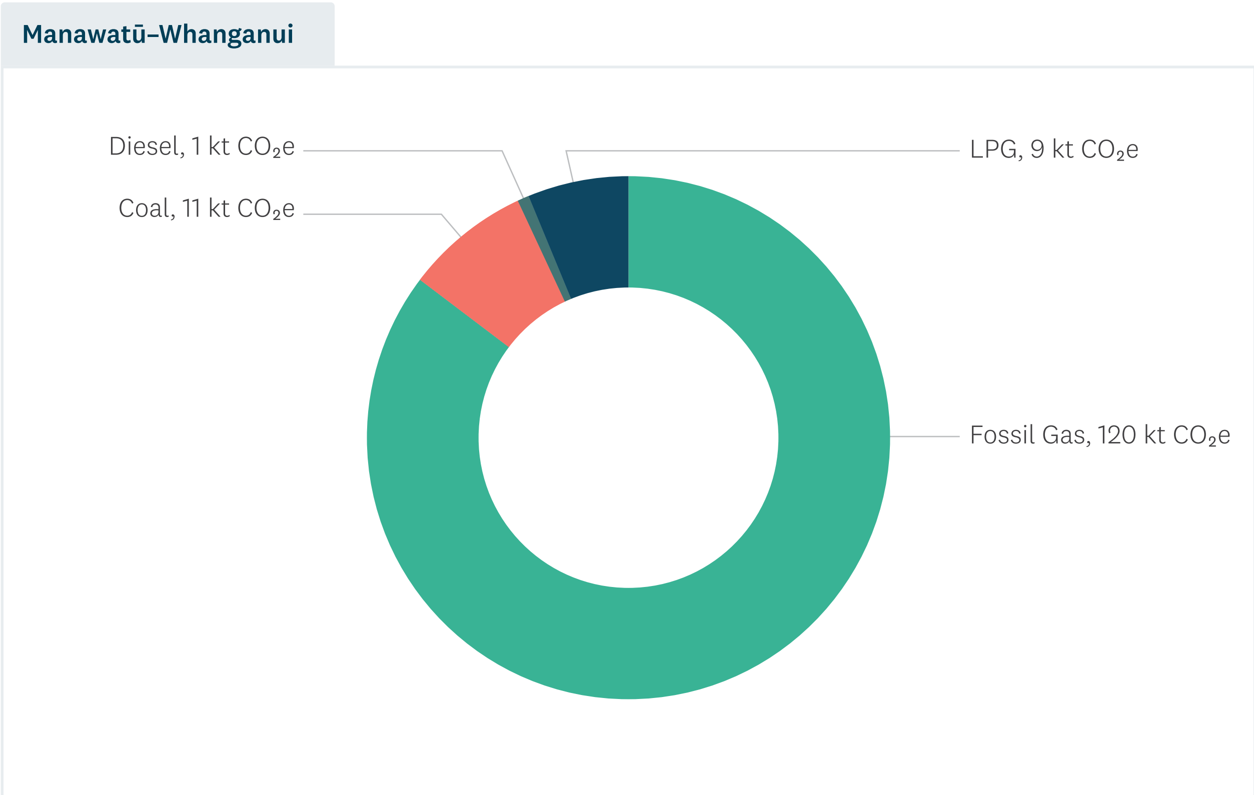
2 The industrial sectors include dairy, meat, food & beverage, and wood processors. The commercial sector includes schools, hospitals, and accommodation facilities.

3 For many large process heat users in New Zealand, process heat fuel-switching opportunities have been captured in an EECA Energy Transition Accelerator (ETA) report.

Table 1 – Summary of fossil fuel consumption and emissions from Manawatū-Whanganui process heat sites, 2022.

Sector	Sites	Thermal capacity (MW)	Thermal fuel consumption (GWh/yr)	Thermal fuel demand (TJ/yr)	Thermal fuel emissions (kt CO_2e/yr)
Dairy	6	117	313	1126	60
Meat	14	56	146	527	28
All other industrial	13	78	154	555	28
Commercial	9	65	112	403	25
Total	**42**	**316**	**725**	**2611**	**142**

Figure 2 – Annual emissions by process heat fuel, 2022.

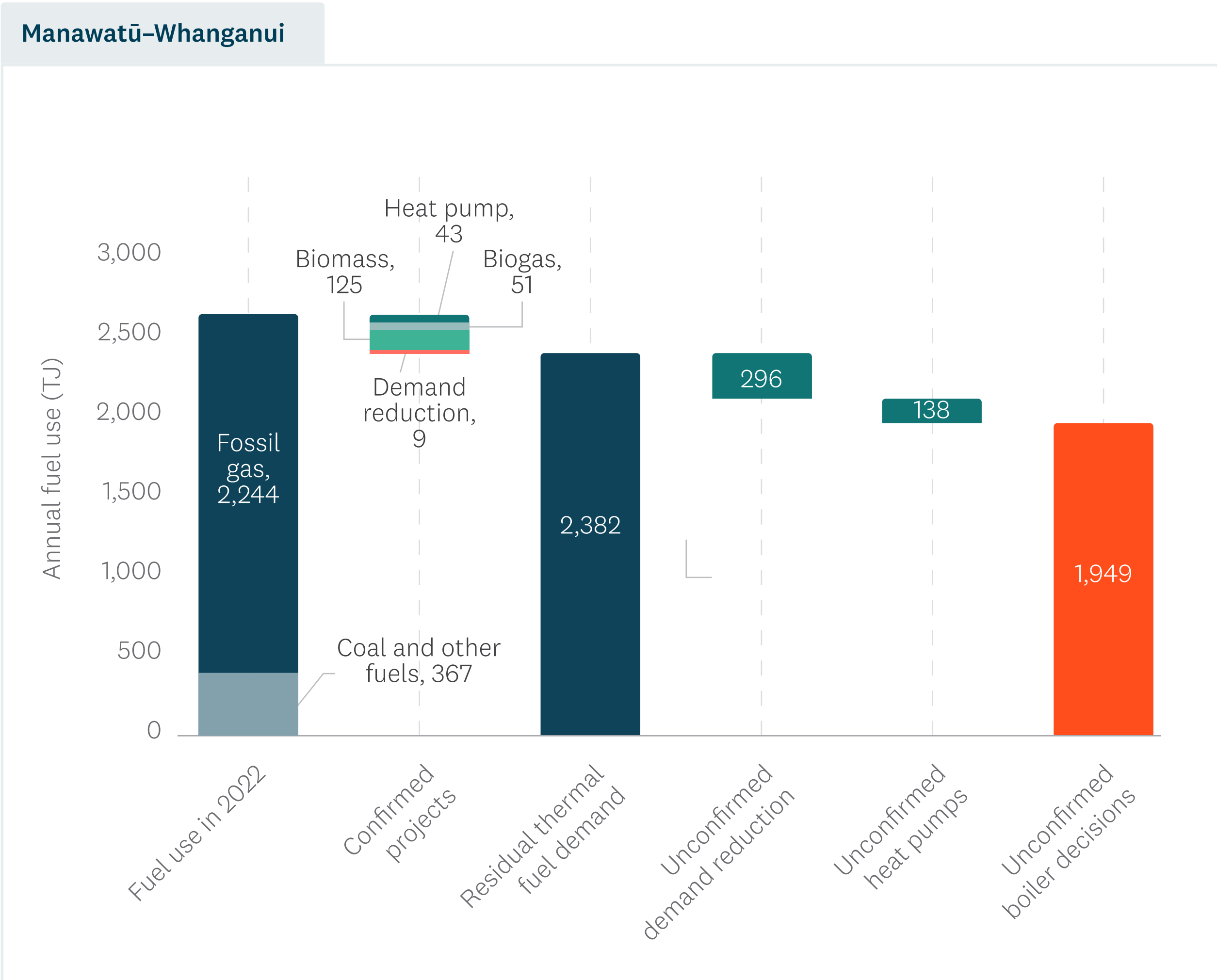


The objective of the Manawatū-Whanganui RETA is to demonstrate pathways that eliminate as much of these process heat emissions as possible. It does this by supporting organisations in their consideration of:

- Demand reduction (for example reducing heat demand through process optimisation).
- Heat pumps (for heat requirements <100oC, which may be integrated with heat recovery).
- Fuel-switching (from fossil-based fuels to a renewable source such as biomass and/or electricity).

Figure 3 illustrates the potential impact on Manawatū-Whanganui's regional fossil fuel demand of process heat demand reduction and fuel-switching decisions for those investments that are already confirmed and those where decisions are yet to be made.

Figure 3 – Potential impact of demand reduction and fuel switching on fossil fuel usage.



Based on our analysis, there is 1,949 TJ of residual thermal demand that could be considered for fuel-switching (referred to as unconfirmed fuel-switch decisions). The RETA analysis looks at the pathways by which these fuel-switches could occur, considering both biomass and electricity as potential fuel sources. EECA's assessment focuses on the key issues that are common to all RETA process heat sites contemplating fuel-switching decisions. This includes the availability and cost of the resources that underpin each fuel option, as well as the capacity of the networks to deliver the fuel to the process heat users' sites. This assessment is unique to the Manawatū–Whanganui region and has been used to simulate possible fuel-switching pathways under different sets of assumptions. This provides valuable information to individual process heat decision makers, infrastructure providers, resource owners, funders, and policy makers.

Gaseous biofuels, derived from organic waste materials from households, industry and/or agricultural sources, landfills and wastewater treatment plants, are an alternative, renewable supply of gaseous fuel that can be produced on an individual site or added to the existing gas network as a replacement for fossil gas. Most biogas currently produced is associated with wastewater treatment or landfills, and is commonly used for electricity generation. There are some locations where biogas is being used for process heat, for example at Nelson Hospital and at the Turners and Growers Reporoa site. However for the purposes of this analysis there is insufficient information about the potential volume and cost of biogas available in the region, therefore it has not been considered as an alternative fuel in this report's modelling. We note that the Bioenergy Association is working with EECA and other industry stakeholders to identify opportunities to establish and grow the biogas market in New Zealand.


Photo credit: Whanganui & Partners

4.1 RETA site summary

Across the 42 sites considered in this study, 95 potential projects were identified spanning the three categories discussed above – demand reduction, heat pumps and fuel-switching.[4]

Table 2 shows the current status of these projects. Seven projects have been confirmed by the process heat organisation (i.e. the organisation has committed to the investment and funding allocated). The other 88 are unconfirmed (i.e. the process heat organisation is yet to commit to the final investment).

Table 2 – Number of projects considered in Manawatū-Whanganui RETA: confirmed vs unconfirmed.

Status	Demand reduction	Heat pump	Fuel-switching	Total
Confirmed	1	1	5	7
Unconfirmed	34	16	38	88
Total	**35**	**17**	**43**	**95**

Demand reduction and thermal efficiency are key parts of the RETA approach and, in most cases, enable (and help optimise) the fuel-switching decision. This RETA report has a greater level of focus on the fuel-switching decision, due to the higher capital and fuel intensity of this decision.

Table 3 shows the expected fuel demands remaining at each site after any demand reduction projects and/or heat pump projects are accounted for. The table presents biomass demands in TJs and reports the peak demand from the boiler, should it convert to electricity.

Five sites have already confirmed their fuel of choice (shaded in blue), representing a peak demand for 0.56MW of electricity in two sites, and 173 TJ of bioenergy in three sites.

For unconfirmed projects, the cells shown in bold and shaded green indicate the preferred fuel option according to our commercial decision-making criterion, described in Section 5.

[4] This is the number of projects once the optimal fuel switch decision has been determined for a given site (i.e. this reflects the number of projects in the MAC Optimal pathway). The total number of potential projects assessed across all of the sites, including all fuel switch options, was 130.

Table 3 – Summary of Manawatū-Whanganui RETA sites with fuel-switching requirements.

Site name	Industry	Project status	Bioenergy Required (TJ/yr)	Electricity peak demand, MVA
Alliance Group Dannevirke	Industrial	Confirmed		**0.35**
Alliance Group Levin	Industrial	Confirmed	**51**	
Fonterra Brands Palmerston North	Industrial	Confirmed		**0.21**
Hautapu Pine Products Taihape	Industrial	Confirmed	**31**	
NZ Defence Force Waiouru Millitary Camp	Commercial	Confirmed	**91**	
AFFCO Castlecliff	Industrial	Unconfirmed	**17**	2.59
AFFCO Imlay	Industrial	Unconfirmed	**82**	7.09
AFFCO Manawatū	Industrial	Unconfirmed	**11**	1.26
AgResearch Grasslands Research Centre	Industrial	Unconfirmed	**8**	0.44
Alsco Palmerston North	Industrial	Unconfirmed	**27**	2.67
ANZCO Foods Manawatū	Industrial	Unconfirmed	**14**	1.56
ANZCO Foods Rangitīkei	Industrial	Unconfirmed	**18**	1.61
Farmland Foods Bulls	Industrial	Unconfirmed	**13**	0.72
Fonterra Longburn	Industrial	Unconfirmed	**25**	1.8
Fonterra Pahiatua	Industrial	Unconfirmed	**576**	38
Fonterra R&D Centre	Industrial	Unconfirmed	**35**	3.96
Godfrey Hirst Dannevirke	Industrial	Unconfirmed	**8**	2.38
Goodman Fielder Ernest Adams	Industrial	Unconfirmed	**21**	1.7
Goodman Fielder Longburn	Industrial	Unconfirmed	**44**	3.25
Higgins Palmerston North Asphalt Plant	Industrial	Unconfirmed	**14**	10.7
Kakariki Proteins	Industrial	Unconfirmed	**35**	2.5
King Country Pet Food Taumarunui	Industrial	Unconfirmed	**76**	7.04
Malteurop Marton	Industrial	Unconfirmed	**101**	14.4
Mitchpine Levin	Industrial	Unconfirmed	**9**	0.49
Moana New Zealand	Industrial	Unconfirmed	10	**0.51**
Nestle Purina Petcare Marton	Industrial	Unconfirmed	**35**	2.4

Site name	Industry	Project status	Bioenergy Required (TJ/yr)	Electricity peak demand, MVA
NZ Pharmaceuticals	Industrial	Unconfirmed	**25**	3.75
Oji Fibre Solutions Central	Industrial	Unconfirmed	**29**	3.75
Open Country Dairy Whanganui	Industrial	Unconfirmed	**294**	28.43
Ovation NZ Feilding	Industrial	Unconfirmed	**15**	0.2
RJs Confectionery Levin	Industrial	Unconfirmed	**10**	1.08
Tasman Tanning Castlecliff	Industrial	Unconfirmed	**21**	1.79
Turk's Poultry	Industrial	Unconfirmed	**13**	2.31
Winstone Pulp International (site closed in 2024)	Industrial	Unconfirmed		**1.19**
Department of Corrections Whanganui Prison	Commercial	Unconfirmed	**16**	3.31
Horowhenua District Council Levin Aquatic Centre	Commercial	Unconfirmed	**26**	3.87
Massey University Palmerston North Campus	Commercial	Unconfirmed	**15**	5.7
Health NZ Horowhenua Health Centre	Commercial	Unconfirmed	**34**	1.5
Health NZ Palmerston North Hospital	Commercial	Unconfirmed	**84**	3.49
Health NZ Taumarunui Hospital	Commercial	Unconfirmed	**16**	0.9
NZ Defence Force Linton	Commercial	Unconfirmed	**40**	0.55
NZ Defence Force Ōhakea Air Base	Commercial	Unconfirmed	**33**	1.14

5 Simulated fuel-switching pathways

There are a range of decision criteria that individual organisations may apply to determine the timing of their investments. Decisions are impacted by available finance, product market considerations, strategic alignment and other factors.

Rather than attempting to model all these factors for individual process users, we have developed a range of different scenarios, referred to as pathways, that reflect different decision-making criteria that process heat users (who have not confirmed their fuel choice) might use. The pathways are summarised in Table 4.

The Biomass Centric and Electricity Centric pathways represent 'bookends' that focus exclusively on one of the two fuel options (biomass or electricity) for unconfirmed projects. In these pathways, it is assumed that fuel-switching decisions proceed either in 2036 (for sites using coal)[5] or in 2049 (in line with New Zealand's target of net zero greenhouse gas emissions by 2050 in the Climate Change Response (Zero Carbon) Amendment Act).

As only two sites in Manawatū–Whanganui were using coal in 2022 and both of these sites have since switched to biomass, all of the unconfirmed fuel switch projects in this RETA analysis were therefore assumed to occur in 2049.

It is acknowledged that these are artificial scenarios, but in the absence of information about confirmed plans, it serves to provide an indication of the possible total future fuel demand for each type of fuel considered.

For the BAU Combined and MAC Optimal pathways, the fuel-switch decision is based on a global standard 'marginal abatement cost' (MAC), that quantifies the cost to the organisation of decarbonising their process heat, expressed in dollars per tonne of CO_2e reduced by the investment. A MAC allows us to determine what the lowest cost investment is (electricity or biomass), as well as the best timing of the investment. In the MAC Optimal Pathway, the timing of the fuel-switch is chosen to be the earliest point when a decision saves the process heat user money over the lifetime of the investment — the point in time that the MAC of the project is exceeded by the expected future carbon price.

[5] The timing for coal boiler fuel-switching projects is in line with national direction that came into effect in July 2023, as detailed here: https://environment.govt.nz/assets/publications/climate-change/National-Direction-for-Greenhouse-Gas-Emissions-from-Industrial-Process-Heat-Industry-Factsheet.pdf

Table 4 – Fuel-switching pathways used in the RETA analysis.

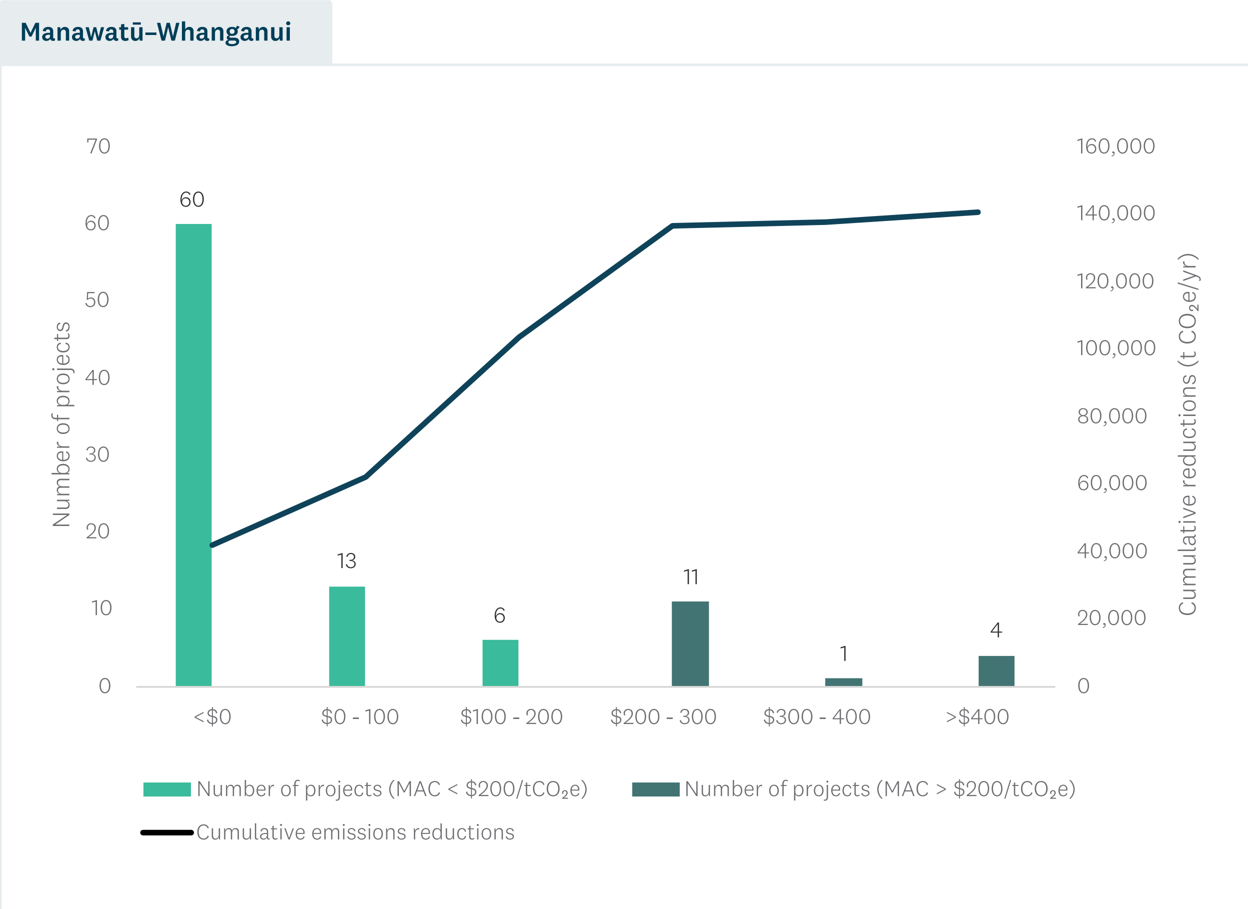
Pathway name	Description
Biomass Centric	All unconfirmed site fuel-switching decisions proceed with biomass, where possible, either in 2036 (for coal) or in 2049.
Electricity Centric	All unconfirmed fuel-switching decisions proceed with electricity, where possible, either in 2036 (for coal) or in 2049.
BAU Combined	All unconfirmed fuel-switching decisions (i.e. biomass or electricity) are determined by the lowest MAC value for each project, with the timing as for the fuel-centric pathways above.
MAC Optimal	Each site switches to a heat pump or switches its boiler to the fuel with the lowest MAC value for that site. Each project is timed to be commissioned in the first year when its optimal MAC value first drops below a ten-year rolling average of the future New Zealand Treasury's shadow carbon prices. If the MAC does not drop below the ten-year rolling average before 2049, then the timing based on the fuel-centric pathway is used.

Photo credit: Vicki Timpson The Horowhenua Company Ltd

5.1 Estimated MAC values for Manawatū–Whanganui projects

Using the biomass and electricity costs outlined in Section 6 and Section 7, Figure 4 summarises the resulting MACs associated with each of the 95 individual projects identified in Table 2, and the potential emissions reduced by these projects.

Figure 4 – Number of projects and cumulative emissions reductions by range of MAC value.

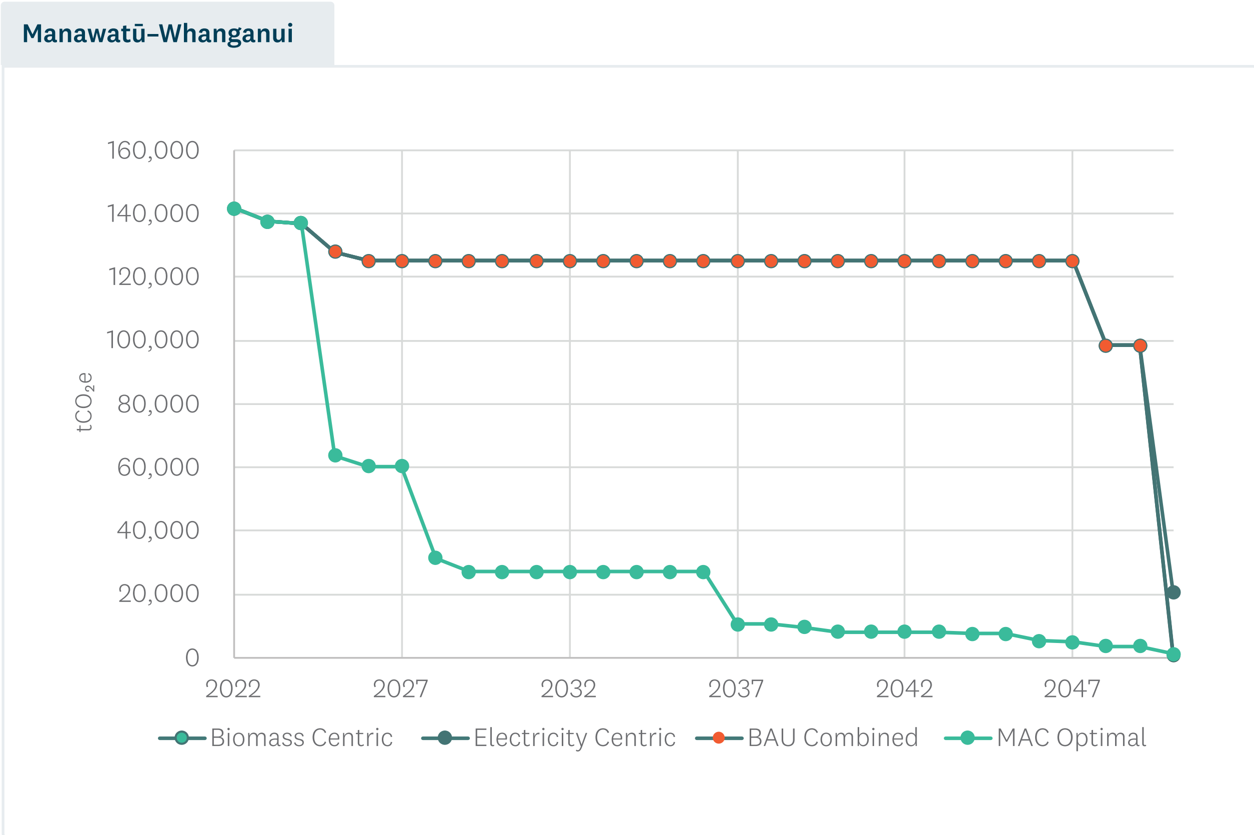


Out of 142kt of process heat emissions from Manawatū–Whanganui RETA sites, 42kt CO_2e (30%) have MACs less than zero, meaning they are economic now even without a carbon price, while a total of 103kt (72%) have MACs less than $200/t$CO_2e$.[6] Using a commercial MAC decision-making criterion, combined with expected future carbon prices (MAC Optimal), it would be commercially favourable to execute these projects over the next eight years.

Compared to a scenario where each of these projects was executed based on the BAU Combined pathway, the MAC Optimal scenario would accelerate fuel-switching, and reduce emissions by a cumulative 2,500kt over the period of the RETA analysis to 2050, as shown in Figure 5.

6 By 'economic', we mean that at a 6% discount rate these projects would reduce costs for the firms involved over a 20-year period (i.e. the Net Present Value would be greater than zero, at the assumed trajectory of carbon prices).

Figure 5 – Simulated emissions reductions under fuel-switching pathways.

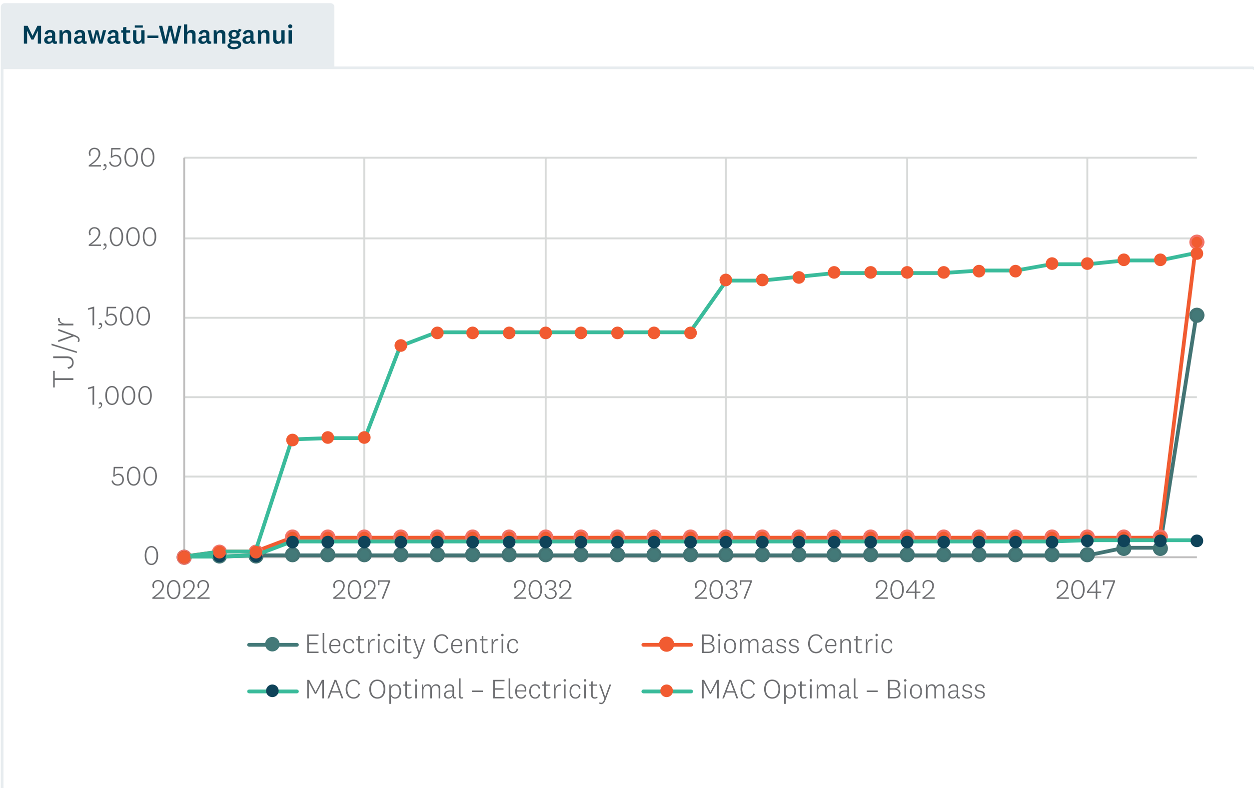


The MAC Optimal pathway proceeds faster, with the majority of emissions reductions economic immediately, primarily as a result of a large number of demand reduction and heat pump projects which are economic at today's carbon prices. Note that the Electricity Centric and Biomass Centric pathways are obscured in the chart by the BAU Combined pathway. This is because the project timings, and therefore the emissions reductions associated with these three pathways, are identical until fuel-switching occurs in 2049.

5.2 Pathway implications for electricity and biomass demands

The MAC Optimal pathway sees fuel decisions that result in 5% of the region's energy needs in 2050 supplied by electricity, and 95% supplied by biomass (Figure 6). We expand further on these fuel-switching outcomes in sections 6 and 7.

Figure 6 – Electricity and biomass demand in the fuel-switching pathways.



It is important to recognise the impact that demand reduction has on the overall picture of the Manawatū–Whanganui region's process heat. As show in Figure 3, investment in demand reduction meets 12% of the process heat demands[7] from Manawatū–Whanganui process heat users in 2022, which in turn reduces the necessary fuel switching infrastructure required: thermal capacity from new biomass or electric boilers would be reduced by around 22MW if these projects were completed. We estimate that demand reduction would avoid investment of between $25m and $27m in electricity and biomass infrastructure.[8]

7 This is true for both energy consumption and the peak thermal demand required from biomass or electric boilers.

8 On the assumption that the capital cost of electrode boilers is $1.1m and biomass boilers is $1.2m. The electrode boiler cost does not consider the connection cost of electrode boilers, which average $1.8m for Manawatū-Whanganui, but are very site specific.

5.3 Sensitivity to gas price

A range of sensitivities have been tested in the modelling, including electricity, biomass and carbon prices and are discussed in the main report. Given the importance of fossil gas in Manawatū–Whanganui and the current constraints in supply, additional analysis of the sensitivity to gas prices was undertaken.

The modelling assumed a base gas price of $18/GJ ($0.065/kWh) (excluding ETS charges) for industrial process heat users (based on the mid-point of MBIE estimates for commercial and industrial users). As shown in Figure 7, we found that halving the annual price escalator for natural gas from 3% to 1.5% resulted in eleven fuel-switching decisions being deferred, causing 406kt CO_2e of additional emissions on a cumulative basis through to 2050. By contrast, doubling the price escalator to 6% accelerated four projects, delivering 425kt CO_2e of emissions reduction by 2050. A significant increase in the natural gas price to $45/GJ by 2035 (equivalent to escalators of 6% for commercial users and 10% for industrial users) also accelerates four projects with a cumulative additional reduction of 451kt CO_2e by 2050.

Figure 7 – Sensitivity of emissions reductions pathways to different gas price assumptions.

6 Biomass — resources and costs

To assess the total availability of harvestable wood in the Manawatū–Whanganui region, both a top-down and bottom-up analysis has been undertaken. The bottom-up analysis is based on interviews with major forest owners, as forest owners' actual intentions will often deviate from centralised forecasts due to changes in log prices and other dynamic factors. It also provides an assessment of where the wood is expected to flow through the supply chain – via processors to domestic markets, or export markets, as well as volumes that are currently being utilised for bioenergy purposes. This analysis allows us to estimate practical levels of sustainably recoverable woody residues.

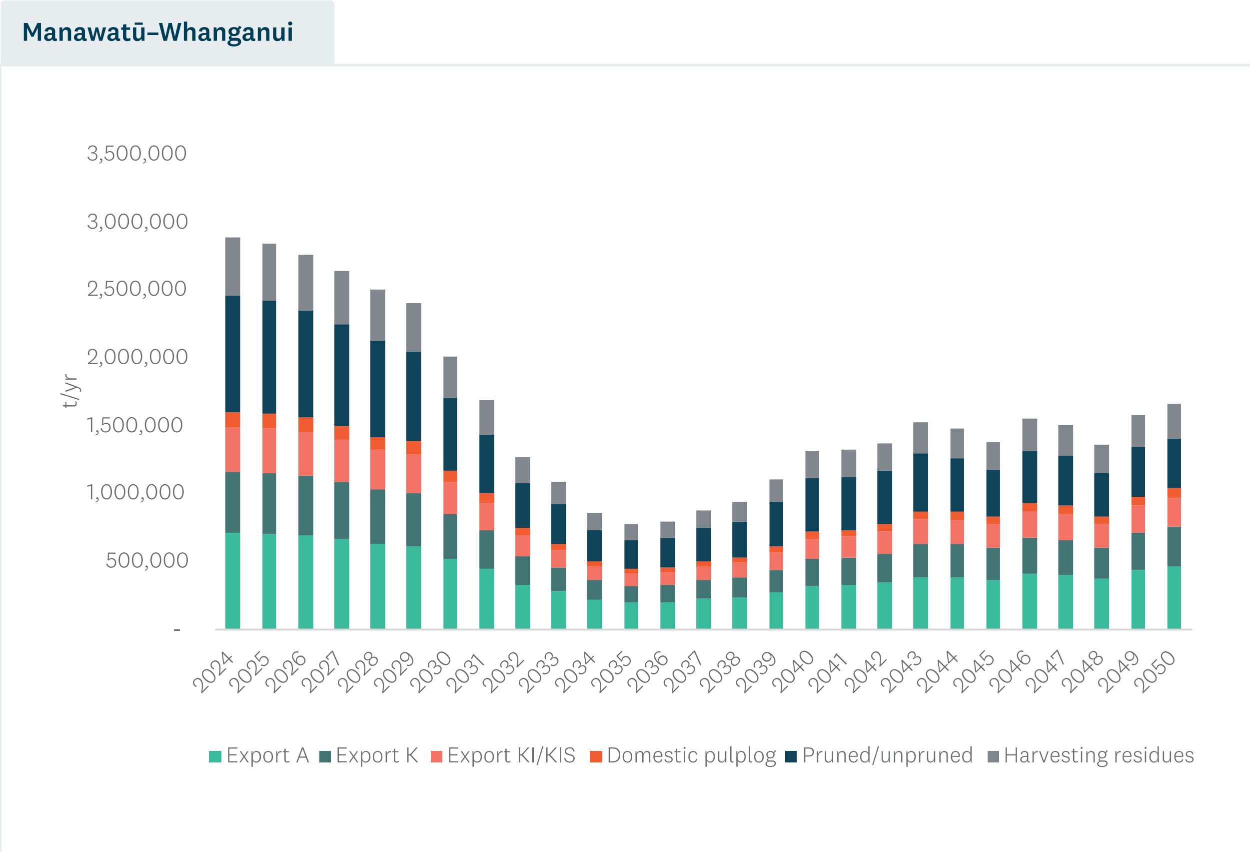
A top-down analysis suggests that an average of around 1,645kt pa (11,815 TJ pa) of wood will be harvested in the Manawatū–Whanganui region over the next 15 years.[9]

Figure 8 shows that there is some annual variation in total available wood resource, with a visible decline in the 2030s. The annual variation occurs due to the age distribution of the existing forests, and yield assumptions combined with assumptions on how forests are harvested, but there are many factors, including market demand, pricing and availability of harvesting contractors that influence harvesting patterns.

Discussions with forestry industry stakeholders as part of this RETA programme indicate that the peak volumes of harvesting shown in Figure 8 in the near years (2024 and 2025) are not being realised. Therefore actual harvest volumes are expected to be lower in the near term, allowing for additional volumes being available to fill some of the troughs in the mid-2030s.

[9] We use 15 years as a reasonable assessment of the near-term period that process heat users considering biomass would likely want to contract for, if they were making the decision in the next few years.

Figure 8 – Forecast of Manawatū-Whanganui wood availability, 2024-2050.

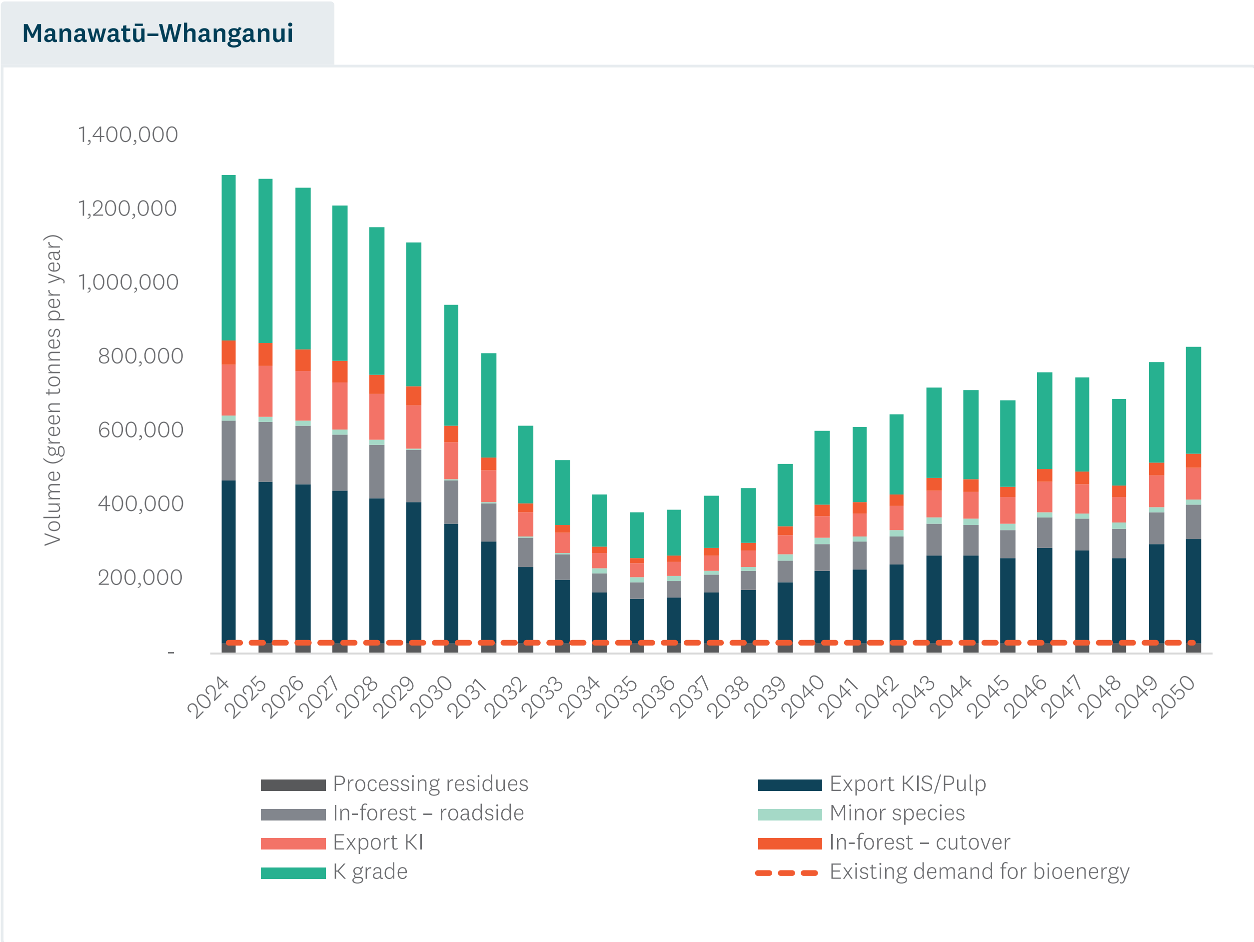


A more comprehensive view of resource availability, that combines the top-down and bottom-up analyses reveals:

- On average, 140kt of harvest residues can be economically recovered. Around 4kt (26 TJ) per year of roadside residues is currently being recovered and is used for bioenergy. The remaining available harvest residues (136kt or 978 TJ) are not currently utilised and could be available for new bioenergy demand.
- Interviews with sawmills suggested that around 82kt (588 TJ) per year of processing residues are produced. Out of this, 44kt (319TJ) per year is woodchip sold to Oji (Kinleith), and 25kt (180 TJ) per year is already used for bioenergy (mainly sawdust and shavings). Around 11kt (80 TJ) per annum are used for animal bedding or landscaping. The remainder 3kt (20 TJ) of processor residues is currently unutilised.
- On average through to 2038, K log resources are 281kt (2,016TJ) per year, the KI/KIS log resource is 208kt (1,493 TJ) per year, and the total pulp resource is 68t (488 TJ) per year.

The resulting potential volume for bioenergy is shown in Figure 9.

Figure 9 – Woody biomass available for bioenergy in the Manawatū-Whanganui region. Source: Whirika and Margules Groome.



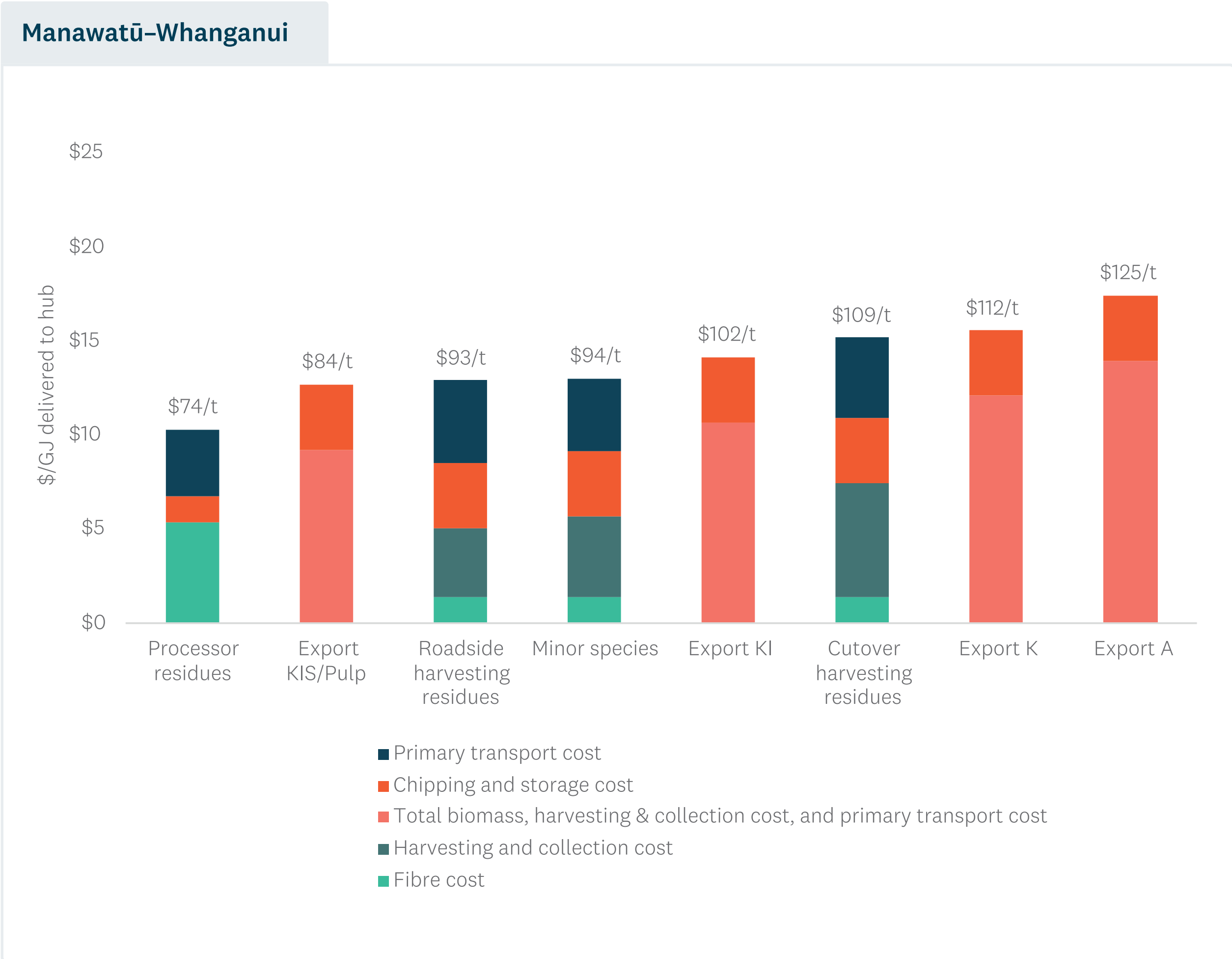
The overall analysis of the Manawatū-Whanganui region is summarised in Figure 10.

Figure 10 – Average wood flows in the Manawatū-Whanganui region, 2024-2038. Source: Whirika and Margules Groome.

Overall, EECA estimates that, on average over the next 15 years, **approximately 217kt per year (1,557 TJ per year) of woody biomass (forest and processor residues, and pulp) is currently unutilised and could be recovered for new boiler demands without disrupting low grade export markets or existing bioenergy consumers.** However, this average disguises the significant variance in the annual availability noted previously.

The costs of accessing this biomass, and delivering it to the process heat user's site, is presented in Figure 11.

Figure 11 – Average estimated delivered cost of potential bioenergy sources ($/GJ and $/green tonne). Source: Margules Groome (2024).



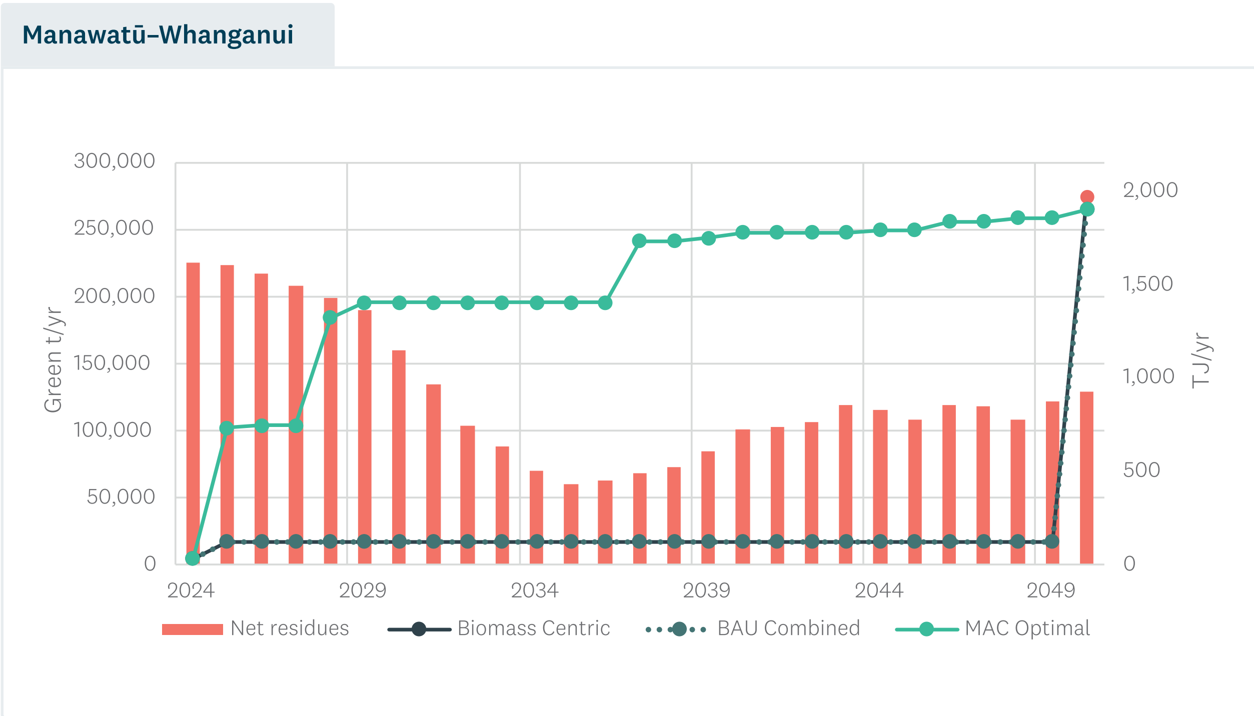
Export grade K and A logs have been retained in the analysis to represent 'scarcity values' if our scenario analysis indicates that other more plausible and sustainable sources of bioenergy are insufficient. However, we do not believe these are sustainable or practical sources of bioenergy.

6.1 Impact of pathways on biomass demand

Our analysis shows the growth in biomass demand (in both tonnes and TJ per year) arising from each of the fuel-switching pathways against the expected available residues (net of existing demand, Figure 12).

Expected harvesting and processor residues will no longer be sufficient to meet the MAC Optimal biomass demand after 2029. To meet demand, either more expensive local sources (e.g. diversion of export timber) needs to be used, or biomass needs to be imported from other regions.

Figure 12 – Potential growth in biomass demand and available residues.



The degree to which these resources are used is a commercial decision, which would include a comparison with alternatives in terms of cost, feasibility, and desirability. Depending on the process heat users' preference of fuel type some types of resources may not be suitable. In some situations, higher cost pellets may be required, which in turn require higher-grade raw material.

7 Electricity — network capacity and costs

The availability of electricity to meet the demand from process heat users is largely determined at a national 'wholesale' level. Supply is delivered to an individual site through electricity networks – a transmission network owned by Transpower, and a distribution network, owned by electricity distribution businesses (EDBs), that provides power to individual consumers. The EDBs connect to the transmission network at grid exit points (GXPs). There are four EDBs serving the Manawatū–Whanganui region – Electra, The Lines Company, Powerco and Scanpower.

The price paid for electricity by a process heat user comprises two main components plus a range of smaller components including metering and regulatory levies. The main components are:

- A price for 'retail electricity' — the wholesale cost of electricity generation plus costs associated with electricity retailing.
- A price for access to the transmission and distribution networks.

As shown in Figure 13, the forecast price of retail electricity (excluding network charges) is expected to increase (in real terms) from 10c/kWh in 2026 to 11.5c/kWh in 2040 under a 'central' scenario. However, different scenarios could see retail prices higher or lower than that level.

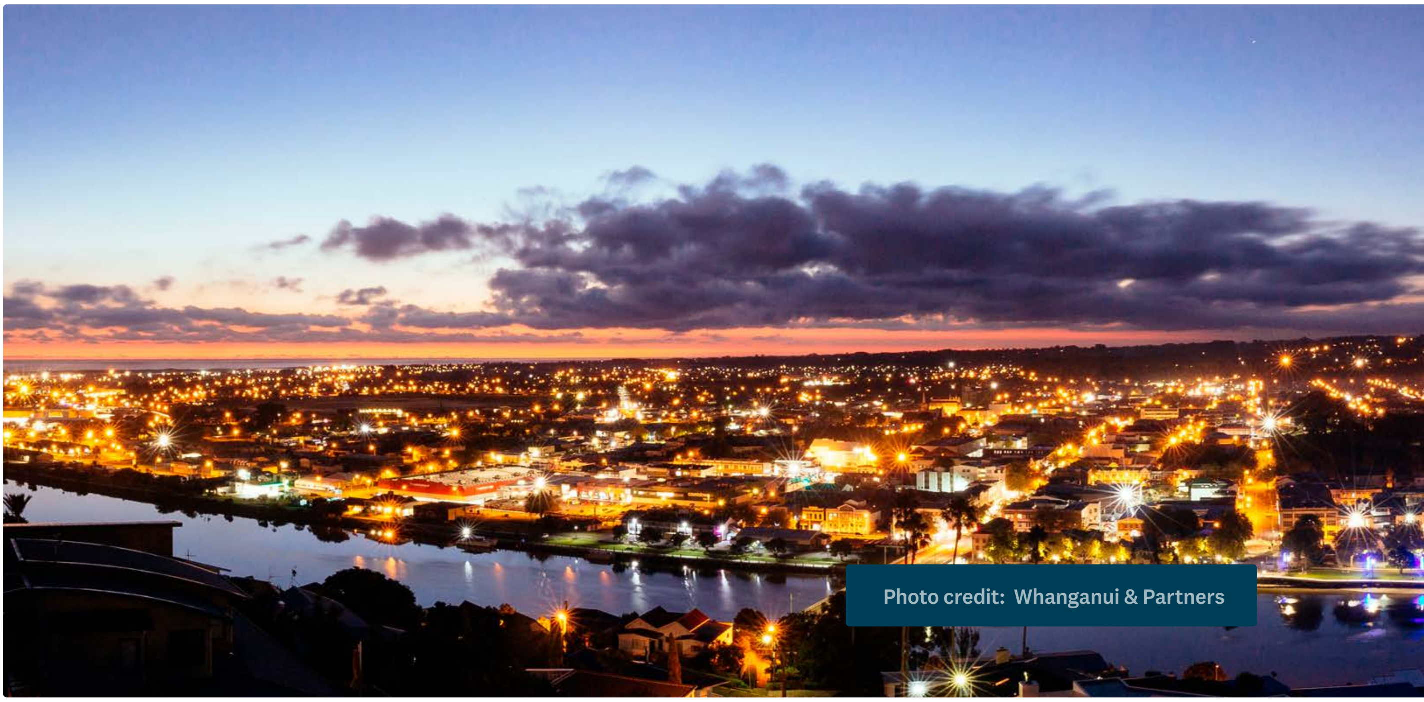


Photo credit: Whanganui & Partners

Figure 13 – Forecast annual average electricity price for large commercial and industrial demand in the Manawatū-Whanganui region (real $2022). Source: EnergyLink.

Beyond 2040, this forecast sees more significant increases in electricity prices. However, it is difficult to predict pricing out to 2050. Some New Zealand market analyses suggest real prices may remain constant after 2035, due to the downward pressure on generation costs (especially solar and wind) as technology and scale increases. Other analyses see continued increases. We cannot be definitive about electricity prices 20 years into the future and suggest business cases consider a range of scenarios.

On top of retail charges, EDBs charge electricity consumers for the use of the existing distribution network. Relevant EDBs set their distribution charges for large commercial and industrial customers based on the size of the connection (kVA) and peak coincident demand (kW). As such, distribution prices will vary per site. In addition, transmission charges are a combination of capacity (kVA) and average demand (kW) charges. Our modelling approximates these charges for each site.

An approximation of the potential charges faced by process heat users who electrify is presented in Table 5. These are based on each of the EDB's announced prices for the year 2024/2025. We note that the Commerce Commission's final decision on allowable revenue for EDBs for the period 2025-2030, announced in December 2024, will result in significant increases in network charges. **In our modelling, we have assumed increases of around 60% in the total charge by 2030, over and above the levels in Table 5.**

Table 5 – Estimated and normalised network charges for Manawatū–Whanganui large industrial process heat consumers, by $/MVA per year (at 2024/2025).

EDB	Distribution charge $/MVA per year (2024)	Transmission charge $/MVA per year (2024)	Total charge $/MVA per year (2024)
Powerco	$72,000	$48,000	$120,000
Electra	$121,000	$1,000	$122,000
The Lines Company	$146,000	$62,000	$208,000
Scanpower	$180,000	$38,000	$218,000

Finally, where the connection of new electric boilers requires EDBs to invest in distribution network upgrades, the cost of these can be paid through a mix of ongoing network charges, and an up-front 'capital contribution'.

Transpower and the relevant EDBs are experiencing an increasing need for investment as a result of continued population and business growth, distributed generation, and the electrification of transport and process heat. While this RETA analysis only examines demand from process heat electrification, this broader context of potentially rapid growth in demand is important to understand the challenges associated with accommodating new load. The timing of demand growth (that drives this investment) is uncertain, which results in a challenging decision-making environment for network companies. As we recommend below, it is important that process heat users considering electrification keep relevant EDBs abreast of their intentions.

The primary considerations for a process heat user considering electrification are:

- The current 'spare capacity' (or headroom) and security of supply levels in Transpower and EDBs' networks to supply electricity-based process heat conversions.
- The cost of any upgrades required to accommodate the demand of a process heat user, considering seasonality and the user's ability to be flexible with consumption, as well as any other consumers looking to increase electricity demand on that part of the network.
- The timeframe for any network upgrades (e.g. procurement of equipment, requirements for consultation, easements and regulatory approval).
- The price paid for electricity to an electricity retailer (or direct to the wholesale market, for large sites), and any other charges paid by electricity consumers (e.g. use-of-network charges paid to EDBs and Transpower).
- The level of connection 'security' required by the site, including its ability to tolerate any rarely occurring interruptions to supply, and/or the process heat user's ability to shift its demand through time in response to a signal from the network or the market. This flexibility could reduce the cost of connection, and the supply costs of electricity.

For the majority of sites considering electrification, the 'as designed' electrical system can likely connect the site with minor distribution level changes and without the need for substantial infrastructure upgrades. Our estimates suggest most of these minor upgrades would have connection costs under $300,000 and experience connection lead times of less than six months.

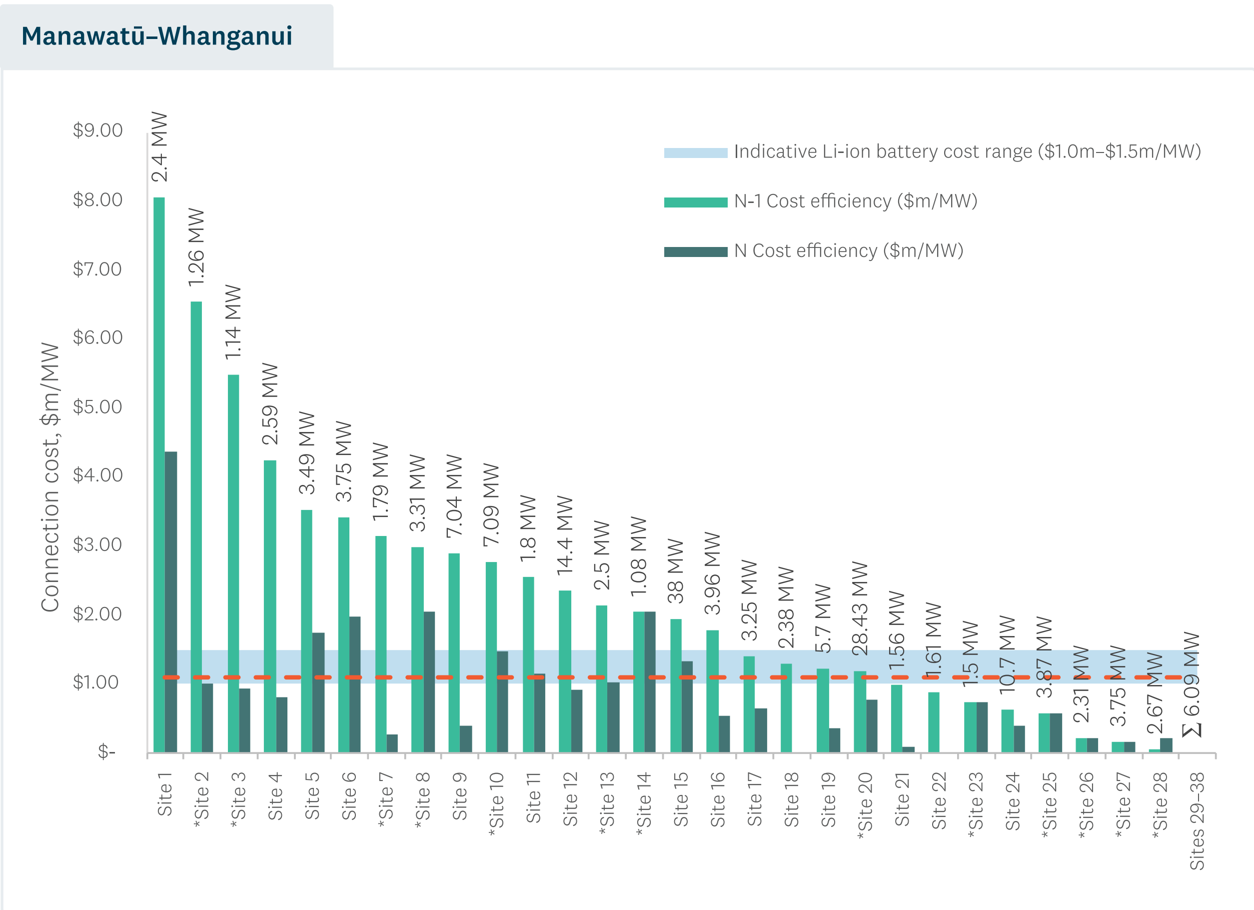
However for some sites, the costs of connection can be a significant part of the overall capital cost associated with electrifying process heat demand, and process heat users need to engage with EDBs to discuss connection options and refine the cost estimates we have included in this report.

More substantial upgrades to the distribution network are required for 11 of the sites, with higher costs (up to $20m, dependent on the level of security) and longer lead times (up to 48 months).

Seventeen sites may require major distribution and transmission upgrades, depending on level of network security required. The cost of the upgrades may reach $80m for one site (which includes a number of stages). These upgrades may take up to 48 months per stage to execute.

Figure 14 shows each site's connection costs expressed in per-MW terms, i.e. relative to the capacity of the proposed boiler. It shows that there are 22 sites which are likely to have connection costs that are very low.

Figure 14 – Normalised cost of network connection vs boiler cost. Source: Ergo, EECA.
Note: boiler capacity in MW shown in labels. Sites with an asterisk may trigger additional upgrades depending on the security level required (described in the full report).



The red dashed line in Figure 14 compares these per-MW costs to the estimated cost of an electrode boiler ($1.1m per MW). We note that these costs represent the total construction costs of the expected upgrades. The degree to which process heat users need to make capital contributions to these upgrades depends on a variety of factors and needs to be discussed with the relevant EDB.

The timeframes for connection above assume these investments do not require Transpower or the relevant EDB to obtain regulatory approval. We note that if connections also rely on wider upgrades to the network, EDBs would have to seek regulatory approval for these investments, which could also add to the timeline.

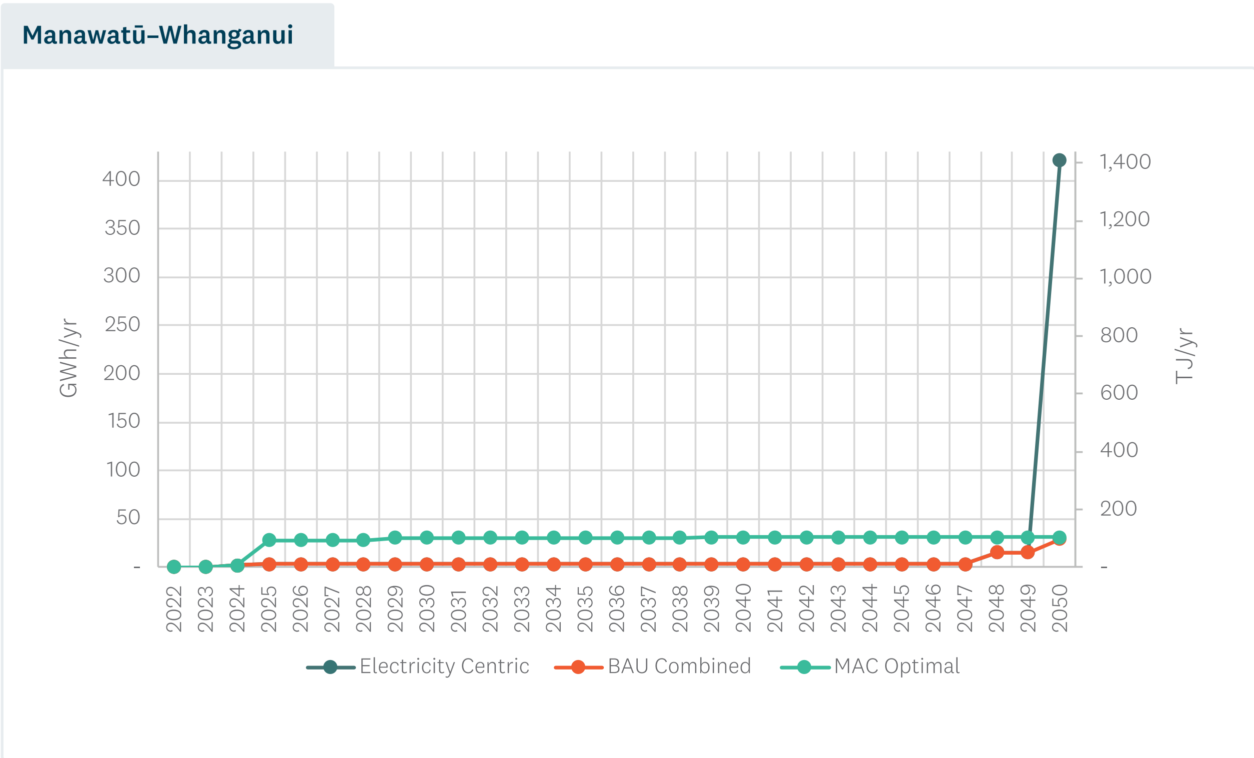
The costs provided above are indicative and appropriate for a screening analysis. They should be further refined in discussion with network owners, and the final costs in some situations will depend on the collective decisions of a number of sites who may require access to similar parts of the network.

Photo credit: Transpower

7.1 Impact of pathways on electricity demand

Figure 15 shows the pace of growth in electricity consumption under the different pathways.

Figure 15 – Growth in electricity consumption from fuel-switching pathways.



The Electricity Centric pathway, where all unconfirmed sites choose electricity, would result in a significant increase in the annual consumption of electricity in the region. Figure 15 shows this occurring in 2050, as that is the assumption made in the pathway, but in reality, it is unlikely to occur all at once. In the more commercially realistic MAC Optimal pathway, very little additional investment in electricity as a fuel occurs between 2025 and 2050.

EDB investments will be driven more by increases in peak demand than by growth in consumption over the year. Figure 16 shows how the different pathways affect peak demand across the local network.

Figure 16 – Potential increase in peak electricity demand under fuel-switching pathways.

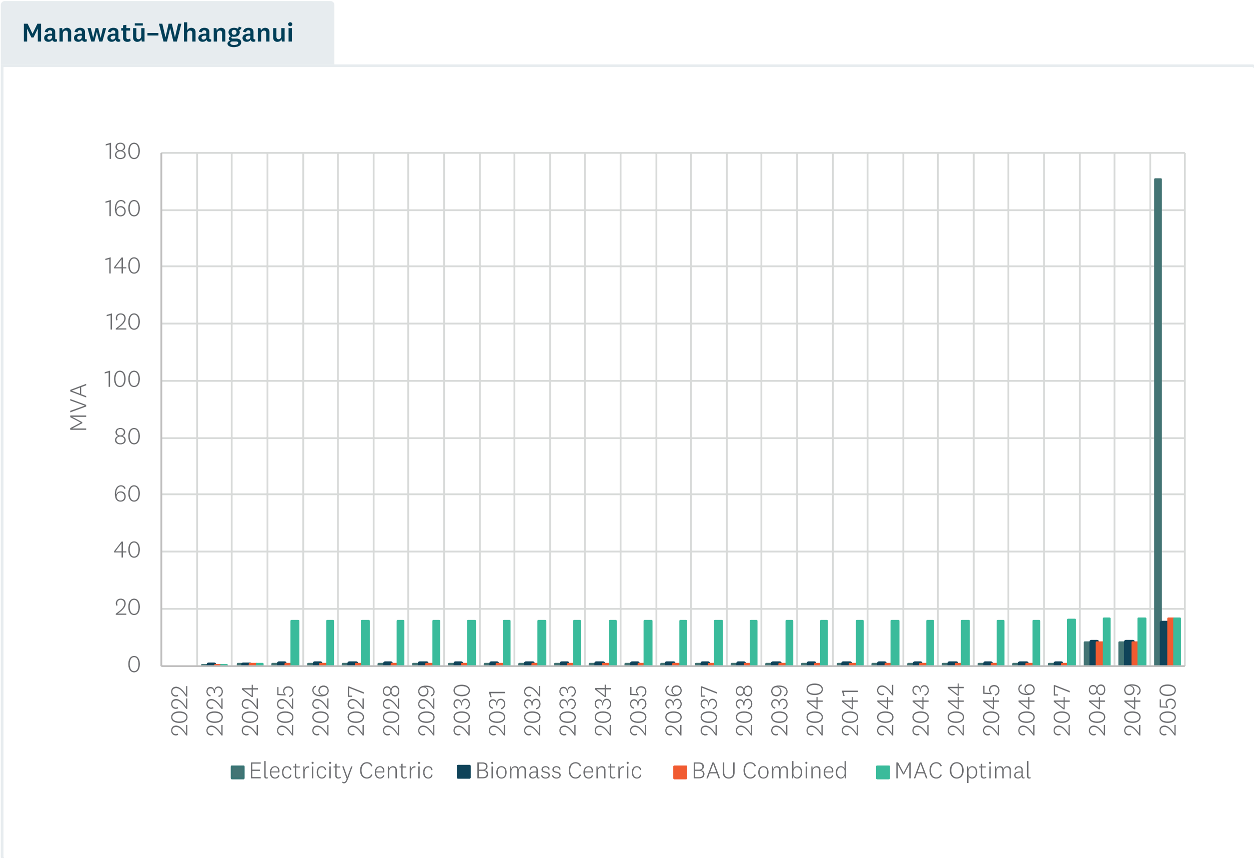


Figure 16 shows that should all unconfirmed process heat users in Manawatū–Whanganui convert to electricity (the Electricity Centric pathway), the increase in demands could be significant — an increase in peak demand of 171MVA by 2050 (an increase of 51% compared to today's peak demand) assuming all electricity projects are at peak usage at the same time.[10] However, in the MAC Optimal pathway, the increase would only be 17MVA (5%), most of which would occur by 2026.

[10] This chart shows the cumulative increase in peak demand assuming all electricity projects peak at the same time. The main report discusses a more realistic view which considers the natural diversity between process heat users in terms of when each is likely to peak. This results in a slightly lower peak demand requirement from the networks.

EDBs are responsible for any upgrades required to accommodate process heat users who electrify. Table 6 breaks down these costs under the two pathways.

Table 6 – New connections (MW) and customer-driven connection costs under Electricity Centric and MAC Optimal pathways.

EDB	New connections – Electricity Centric pathway		New connections – MAC Optimal pathway	
	Connection capacity (MVA)	Connection cost ($)	Connection capacity (MVA)	Connection cost ($)
Electra	13	$52m	0.26	$1.3m
PowerCo	147	$279m	11.3	$29.1m
Scanpower	2.7	$3m	0.35	-
The Lines Company	8.0	$17m	0.05	-
Total	**170.7**	**$351m**	**11.97**	**$30.4m**

A total of $351m would be spent connecting new process heat plant to the local networks in the Electricity Centric pathway. Again, the more commercially realistic MAC Optimal pathway would see around $30m spent.

Table 6 may not necessarily reflect the connection costs paid by process heat users, as they may be shared between the relevant EDB and the new process heat user. The degree of sharing of capital contributions to upgrades depends on the policies of individual EDBs.

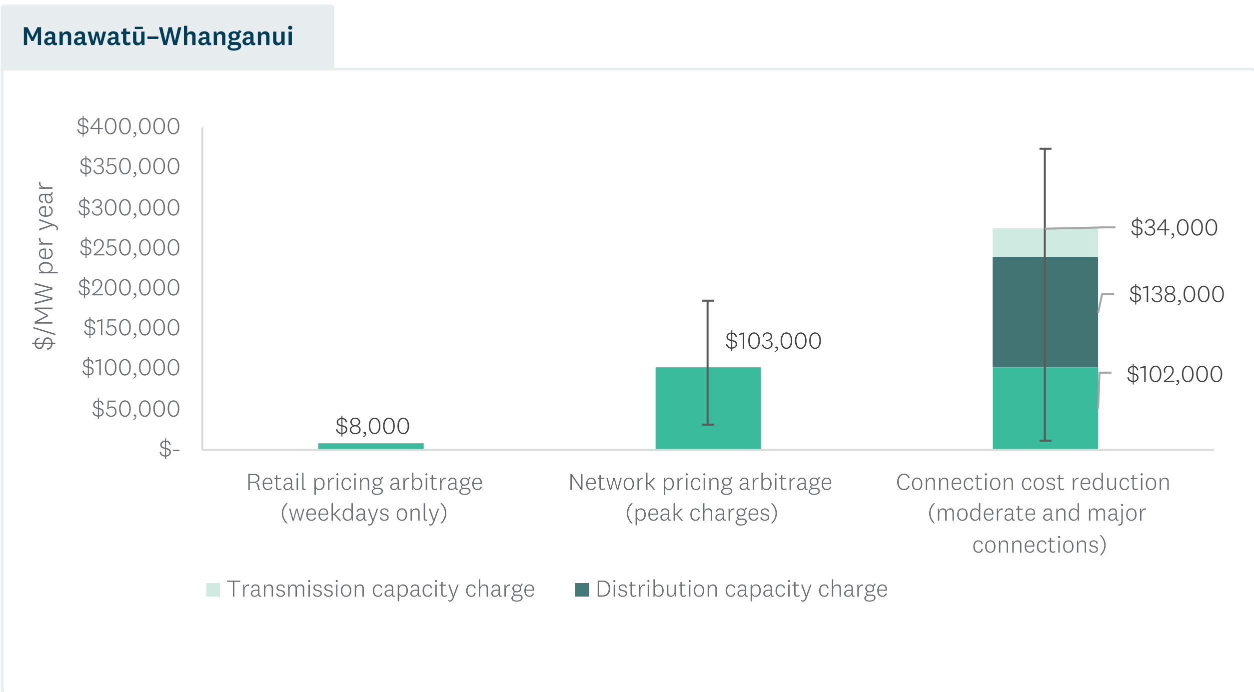
7.2 Opportunity to reduce electricity-related costs through flexibility

Process heat flexibility can improve system resilience and reduce both electricity system costs and process heat electricity-related costs.

Analysis was carried out to illustrate the potential cost savings associated with enabling flexibility in process heat demands.

As shown in Figure 17, Manawatū–Whanganui process heat users could potentially reduce their electricity procurement costs by up to $111,000 per MW of flexibility deployed every year. In addition, at the planning stage, they could also reduce costs associated with the size of their connection to the electricity network, both the investment required in the physical connection and any network charges from the relevant EDB that relate to the size of the connection.

Figure 17 - Estimates of the value of flexibility in Manawatū–Whanganui RETA.
Note: the error bars indicate the 10th and 90th percentile values calculated across different projects.



Some process heat users may find it challenging to alter their underlying process to achieve this. Even then, onsite batteries could be used to extract these cost savings. Over a 20-year timeframe, the cost savings above could be sufficient to underwrite an investment in a battery. Onsite battery storage also provides extra resilience in network failure scenarios. EECA is working with process heat users to better understand the value streams associated with batteries that are integrated into their electrification plans.

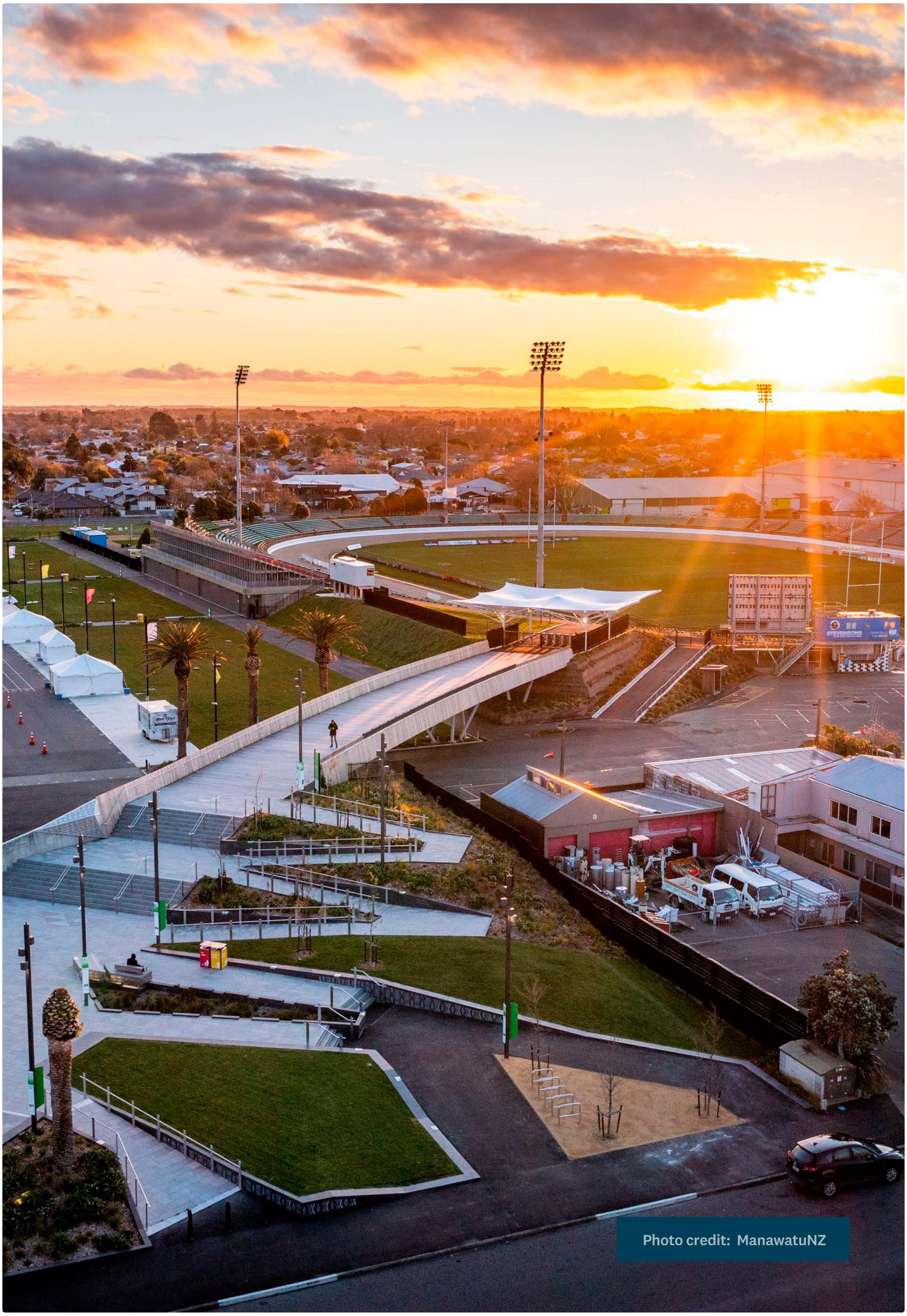


Photo credit: ManawatuNZ

8 Recommendations

Our analysis has highlighted a range of opportunities and recommendations which would improve the overall process heat fuel-switching 'system'. These recommendations are summarised here.

Recommendations to improve the use of biomass for process heat fuel-switching:

- Although information is improving since the commencement of the RETA programme (nationally), there may still be opportunities to refine the understanding of residue costs, volumes, energy content (given the potential susceptibility of these residues to high moisture levels) and alternative methods of recovering harvesting residues.
- Work should be undertaken with forest owners to understand the logistics, space and equipment required for harvesting residues.
- The development of an 'energy- grade', or E-grade would greatly assist in the development of bioenergy markets. Further, clarity regarding the grade and value of biomass should help the development of an 'integrated model' of cost recovery, achieving the best outcomes in terms of recovery cost and volumes.
- Investigate and establish mechanisms to help suppliers and consumers within and outside the region to see biomass prices and volumes being traded and have confidence in being able to transact at those prices for the volumes they require. These mechanisms could include standardised contracts which allow longer-term prices to be discovered, and risks to be managed more effectively.
- EECA should collaborate with forest managers in the region to progress biomass supply.
- EECA should collaborate with process heat users to develop their biomass options.
- National guidance or standards should be developed, based on international experience tailored to the New Zealand context regarding the sustainability of different bioenergy sources, accounting for international supply chain effects, biodiversity, carbon sequestration and the risk of forest fires.
- Undertake research into the likely competing demands for wood fibre from other emerging markets, such as biofuels and wood-derived chemicals.

Recommendations to improve the use of electricity for process heat fuel-switching:

- EDBs should proactively engage on process heat initiatives to understand intentions and help process heat users obtain a greater understanding of required network upgrades, cost, security levels, possibilities for acceleration, use of system charges and network loss factors. EDBs should ensure Transpower and other stakeholders (as necessary) are aware of information relevant to their planning at an early stage, especially since, in Manawatū–Whanganui, Bunnythorpe and Marton may need to be upgraded as a result of process heat decisions.
- Process heat users should proactively engage with EDBs, keeping them abreast of their plans with respect to fuel-switching, and providing them with the best information available on the nature of

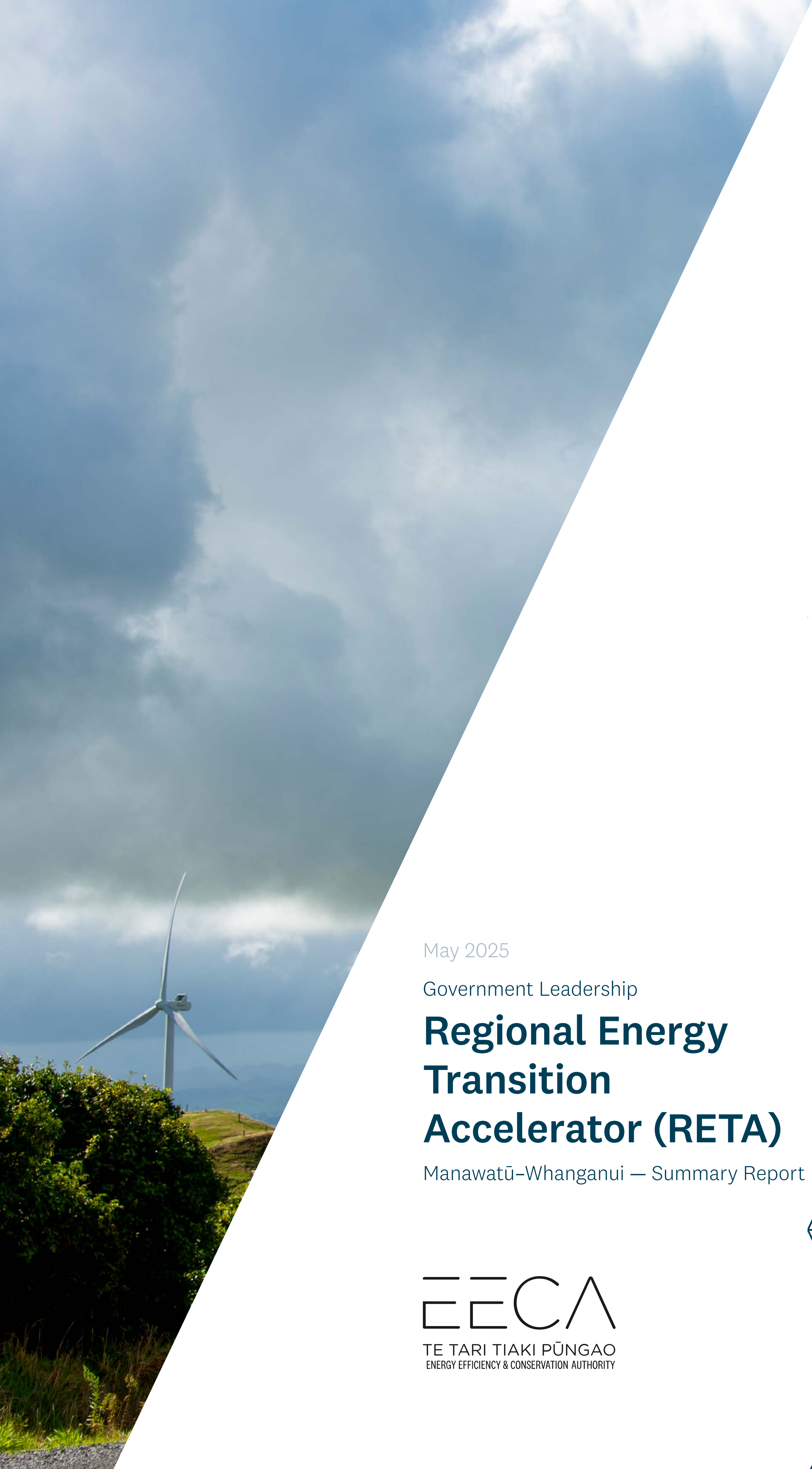
their electricity demand over time (baseload and varying components); the flexibility in their heat requirements, which may allow them to shift/reduce demand, potentially at short notice in response to system or market conditions; the level of security they need as part of their manufacturing process, including their tolerance for interruption; and any spare capacity the process heat user has onsite. While the costs associated with network connection used in this report have been estimated based on the best publicly available information available to us, when process heat users provide the information above, it will allow EDBs to provide more tailored options and cost estimates.

- EDBs should develop and publish clear processes for how they will handle connection requests in a timely fashion, opportunities for electrified process heat users to contract for lower security, and how costs will be calculated and charged, especially where upgrades may be accommodating multiple new parties (who may be connecting at different times).
- To support this early engagement, EDBs should explore, in consultation with process heat users and EECA, the development of a 'connection feasibility information template' as an early step in the connection process. This template would include a section for process heat users to provide key information to EDBs, and a network section where EDBs provide high-level options for the connection of the process heat user's new demand. Information provided by EDBs would include the potential implications of each option for construction lead times, capital contributions, network tariffs and the use of the customer's flexibility.
- Retailers, flexibility aggregators, EDBs and the Electricity Authority should assist by sharing information that helps process heat consumers model the benefits of providing flexibility.
- The electricity sector and process heat users should collaborate to explore and demonstrate flexibility. This is consistent with steps in the FlexForum's Flexibility Plan.
- EDBs and retailers should ensure that the tariffs they offer process heat users are incentivising the right behaviour.
- EECA should work with process heat users to better understand the value and operability associated with batteries that are integrated into their electrification plans.

We note that many aspects of these recommendations are currently being considered through the Electricity Authority's network connections project.

Recommendations to assist process heat users with their fuel-switching decisions:

- EECA to work with the Treasury and Ministries (such as Ministry for the Environment) to create an easily accessible centralised portal that publishes up-to-date carbon price assumptions and scenarios that are used to guide policy and regulatory decisions, e.g. Treasury's shadow carbon prices used for cost-benefit analysis, Treasury's NZ ETS price assumptions for fiscal forecasting etc.



May 2025

Government Leadership

Regional Energy Transition Accelerator (RETA)

Manawatū-Whanganui — Summary Report

TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY