Government Leadership

Regional Energy Transition Accelerator (RETA)

Auckland — Summary Report

July 2025

TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

He kupu whakataki

He mahi whīwhiwhi te whakapai ake i te whāomoomo ā-pūngao whānui me te whakapiki i te manawaroa ā-pūngao puta noa i ngā rāngai ahumahi, engari he mahi waiwai – me whai raraunga horopū, me whai whakamaheretanga ruruku, me te mahi ngātahi pakari anō hoki.

Kei tēnei pūrongo mō Auckland Energy Transition Accelerator (RETA) tētahi tirohanga torowhānui ki ngā wero me ngā arawātea hei whakapai ake i ngā pūnaha pūngao ahumahi o te rohe, me tōna manawaroa pae tawhiti anō hoki.

Ko Tāmaki Makaurau te kāinga ki ngā kaiwhakamahi pōkākā tukatuka nui katoa i Aotearoa – tōna 195 wāhi ahumahi, e pātata ana ki te rearuatanga o te rohe nui ka whai ake. Tērā i ētahi rohe ko ētahi kaiwhakamahi ruarua noa iho kei te whakatuani i te tonotonoa, he kanorau ake te kāhua pūngao o Tāmaki Makaurau, arā, e hōrapa ana te tonotonoa ki ngā wāhi iti-ki-te-waenga maha.

E tuku ana tēnei pūrongo i tētahi aromatawai ā-rohe whai taipitopito e āhei ai ngā pakihi, ngā kaiwhakarato pūngao, me ngā kaiwhakamahere tūāhanga ki te whakaputa whakatau mātau e ai ki ngā matea pūngao e motuhake ana ki ia wāhi, me ngā mātautanga ā-pūnaha. Ka tūhura te pūrongo i ētahi kōwhiringa hangarau maha hei whakapai ake i te whāomoomo, i ngā kōwhiringa kora, me te tautoko i ētahi pūnaha pūngao pakari ake, e rite ana mō te anamata, ā, e motuhake ana ki ngā herenga whakahaere o tēnā ahumahi, o tēnā ahumahi.

Ka aromatawaihia te papatipu koiora whakahou hei kōwhiringa tautoko i ngā herenga pūngao mō ngā pāmahana nui ake. Ahakoa ka āhei pea e ai ki te ōhanga i ōna wā, me whai whakaaro hoki ki ētahi atu āhuatanga pēnei i te tepenga o te popono ā-rohe, ngā herenga ā-tūnuku, ngā tepenga ā-wāhi, me ngā āhuatanga waeture.

Ka arotakengia ngā kōwhiringa whakawhitinga hiko pērā i ngā papu wera me ngā korohuhū hiko, me te aro ki ngā matea tūāhanga me ngā pūtea whakangao. Mō ngā wāhi me whai i te pāmahana nui, ko ngā whakapainga ki te whatunga hiko me ngā utu tāuta ngā māharahara matua. E whakapūmau ana tēnei i te hiranga o ngā rautaki ka whāia pērā i te whakaiti i te tonotono pūngao, te ngawari o ngā kawenga, me te whakamahinga o ngā hangarau rokiroki pūngao hei whakahaere i ngā taumahatanga o te whakamahinga. Ko te pūrongo RETA e tuku ana i ngā matapae popono ā-rohe me ngā aromatawai mō ēnei puna kora pitomata nui e rua.

Kua whakawhanakehia tēnei pūrongo i te taha o ngā whāngaitanga a Vector, a Counties Energy, a ngā rōpū mahi ngahere, a ngā kaiwhakarato pūngao, me ngā kaiwhakamahi tūāhanga. Ka whakamuramura i ngā mahi a ngā pakihi huhua kua whakahou i ngā pūnaha, kua whakapiki hoki i te whāomoomo – i te nuinga o te wā, e mahi tahi ana ki a EECA, e tuku ana i te ārahitanga me ngā rangahau whakapūaho whai hua. He waiwai ō rātou whakaaro ki te whakawhanaketanga o te pūrongo.

I ngā pakihi o Tāmaki Makaurau ka tūtaki ki ngā whakatau pūngao matua ināianei, ā, hei te anamata – arā tētahi arawātea ki te whanake i tēnei ānga – te mahi tahi me te whakahāngai i ngā hangarau, i ngā tūāhanga me ngā whakahaere ki te whanake i tētahi anamata mārohirohi ake, whāomoomo ake anō hoki.

1 Foreword

Enhancing energy efficiency at scale and strengthening energy resilience across industrial sectors is a complex but essential task – one that demands reliable data, coordinated planning, and strong regional collaboration.

This Auckland Regional Energy Transition Accelerator (RETA) report provides a comprehensive view of the challenges and the opportunities available to improve the region's industrial energy systems and long-term resilience.

Auckland is home to the largest number of process heat users in New Zealand – about 195 industrial sites, nearly twice that of the next largest region. Unlike regions where a few large users dominate demand, Auckland's energy profile is more diverse, with demand spread across many small-to-medium-sized sites.

This report delivers a detailed regional assessment that enables businesses, energy suppliers, and infrastructure planners to make informed decisions based on site-specific energy needs and system capabilities. It explores a range of technical options to improve efficiency, fuel options, and support more robust, future-ready energy systems tailored to the operational requirements of different industries.

Renewable biomass is assessed as an option for supporting higher-temperature energy requirements. While it may be economically viable in some cases, a range of practical considerations – such as limited regional supply, transportation constraints, site limitations, and regulatory factors – need to be considered.

Electrification options like heat pumps and electric boilers are evaluated, with a focus on infrastructure and capital needs. For high-temperature sites, electricity network upgrades and installation costs are key concerns. This reinforces the importance of complementary strategies such as energy demand reduction, load flexibility, and the use of energy storage technologies to manage peak usage. The RETA report providing region-specific demand forecasts and energy potential assessments for these two high-potential fuel sources.

This report has been developed with input from Vector, Counties Energy, forestry groups, energy providers, and industrial users. It highlights the work of a number of businesses who have – often in partnership with EECA – upgraded systems and improved efficiency, offering leadership and valuable case studies. Their shared insights were crucial to the report's development.

As Auckland businesses face key energy decisions now and in the near future – there is an opportunity to build on this momentum – working together and aligning technology, infrastructure, and operations to advance a more efficient, resilient energy future.

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 Auckland region
- Auckland local electricity distribution businesses — Vector and Counties Energy
- 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:

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

> *By improving efficiency first, Auckland businesses can reduce costs and make smart decisions about infrastructure upgrades.*

Dr Marcos Pelenur, Chief Executive, EECA

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Auckland is the focus for New Zealand’s fourteenth Regional Energy Transition Accelerator (RETA).

4 Auckland overview

This report provides a snapshot of the Regional Energy Transition Accelerator (RETA) prepared for the Auckland region (shown in Figure 1).

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

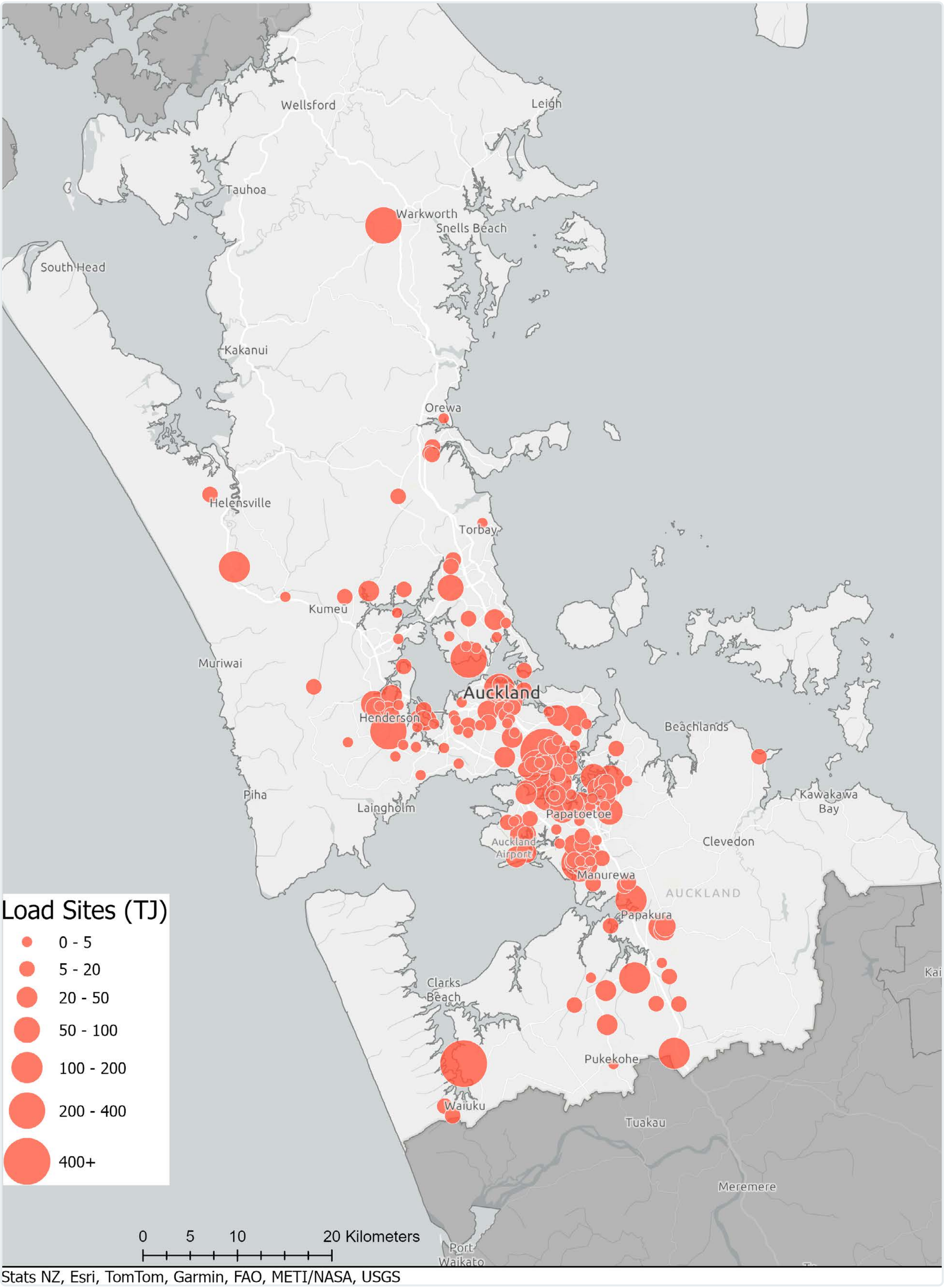
- provide process heat users with coordinated information specific to the region that can be used to make more informed decisions on fuel choice and timing
- improve fuel supplier confidence to invest in supply side infrastructure (including electricity and biomass)
- surface issues, opportunities, and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

Our analysis of energy requirements in Auckland 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 their options for alternative fuels for their processes, ensuring a secure and affordable supply.

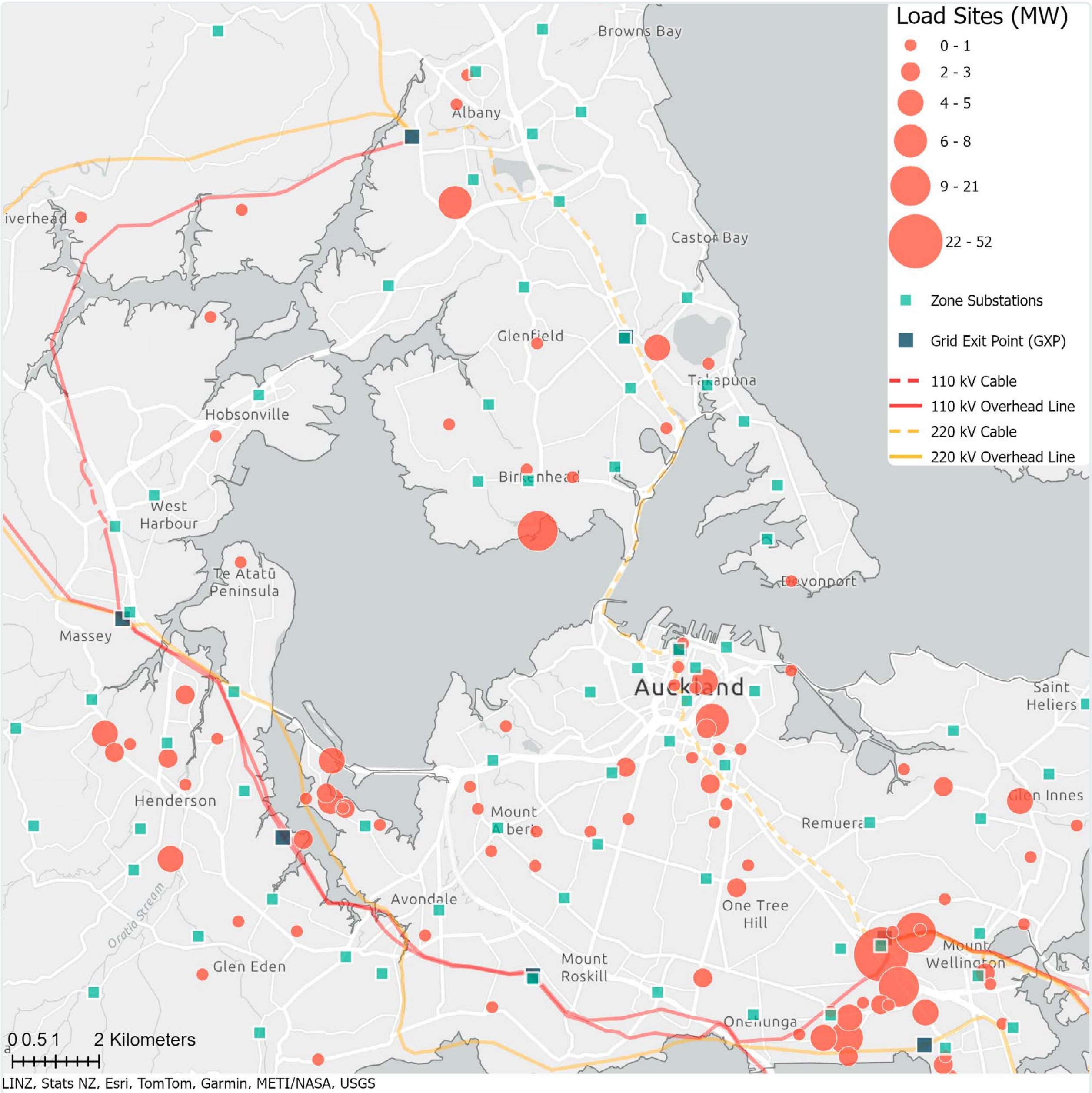
Photo credit: Tātaki Auckland Unlimited

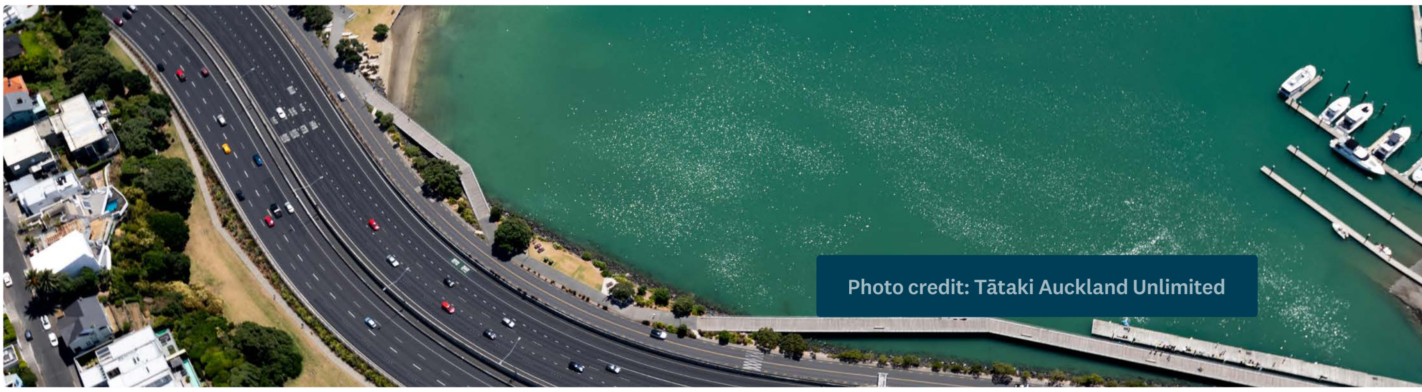
1 See https://www.mbie.govt.nz/about/news/gas-supply-reducing-faster-and-sooner-than-previously-forecast.

Figure 1 — Process heat demand sites in the Auckland region.
A — Overview of Auckland region

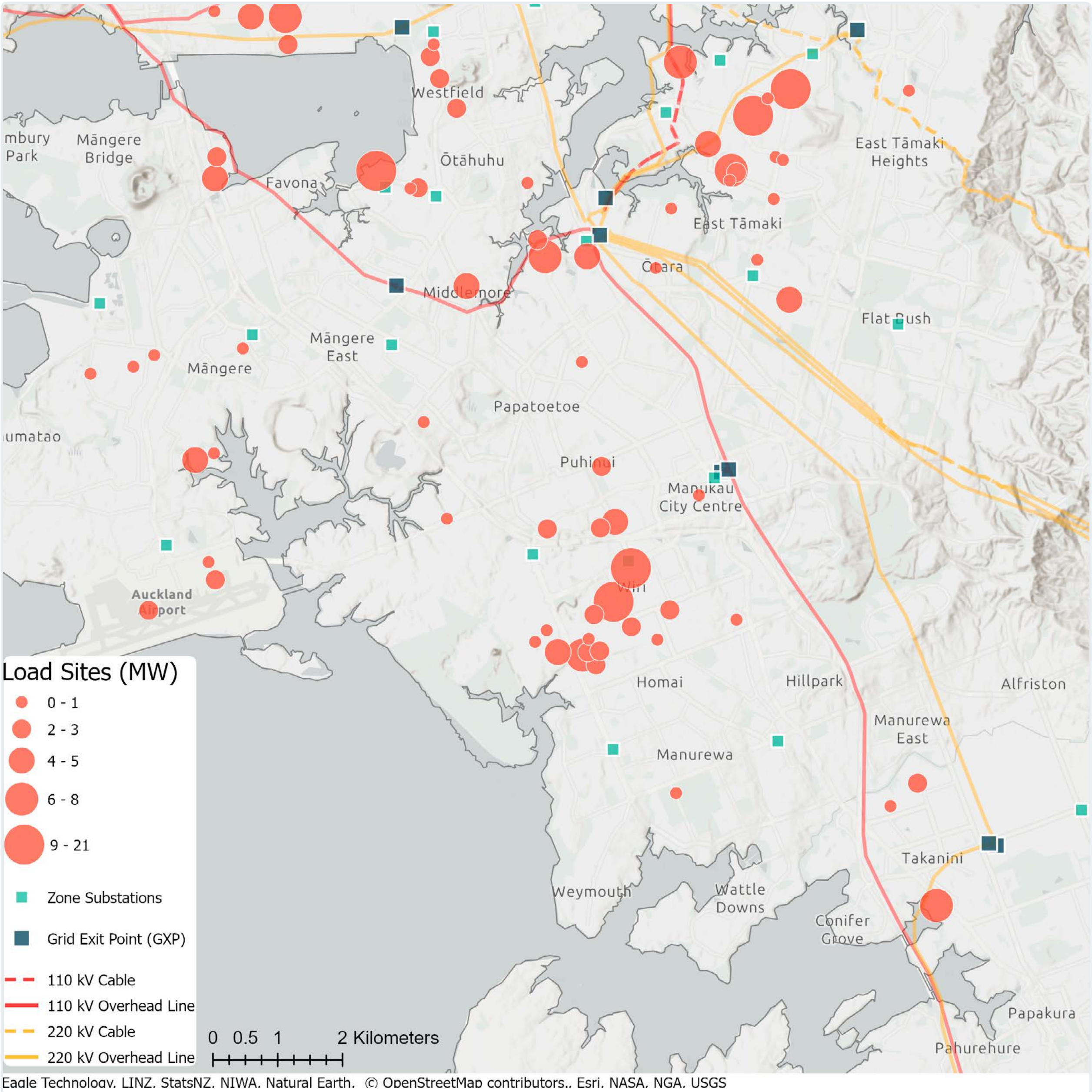


B — Detail showing process heat demand sites in central and west Auckland.





C — Detail showing process heat demand sites in south Auckland.



There are 195 sites covered in the report, spanning the 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 the maps in Figure 1 by location and size of their annual energy requirements, collectively consumed 10,557 TJ of process heat energy, predominantly in the form of fossil gas, and produced 570 kt per year of carbon dioxide equivalent (CO_2e) emissions.

[2] The industrial sectors include dairy, meat, food & beverage, and wood processors; the commercial sector (which predominantly require facility heating) 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.

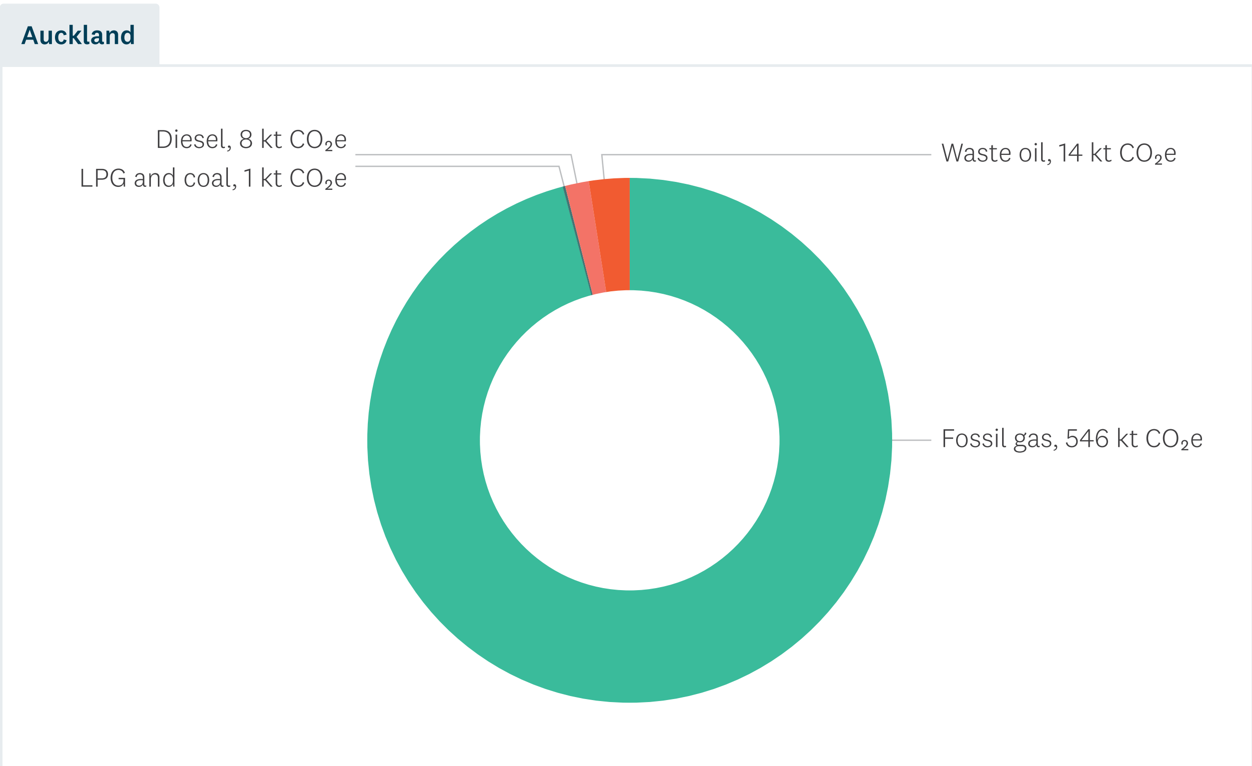
Table 1 shows that the industrial sector dominates emissions, with 124 industrial sites accounting for 89% of the fossil fuel demand. This is a different profile to many other regions where a few very large users dominated the demand. Auckland is also notable for having a relatively high proportion of sites (27 out of the 124 ‘other industrial’ sites in Table 1) that require very high temperature heat (>450°C). This includes metal and glass processing sites.

Table 1 — Summary of fossil fuel consumption and emissions from Auckland process heat sites, 2022.

Type	Sites	Thermal capacity (MW)	Thermal fuel consumption (GWh/yr)	Thermal fuel consumption (TJ/yr)	Thermal fuel emissions (kt CO_2e/yr)
Meat and dairy	3	21	73	264	14
Other industrial	124	656	2,600	9,359	505
Commercial	68	177	260	936	50
Total	**195***	**854**	**2,933**	**10,557**	**570**

**This includes three sites which have either closed or moved away from Auckland since 2022.*

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

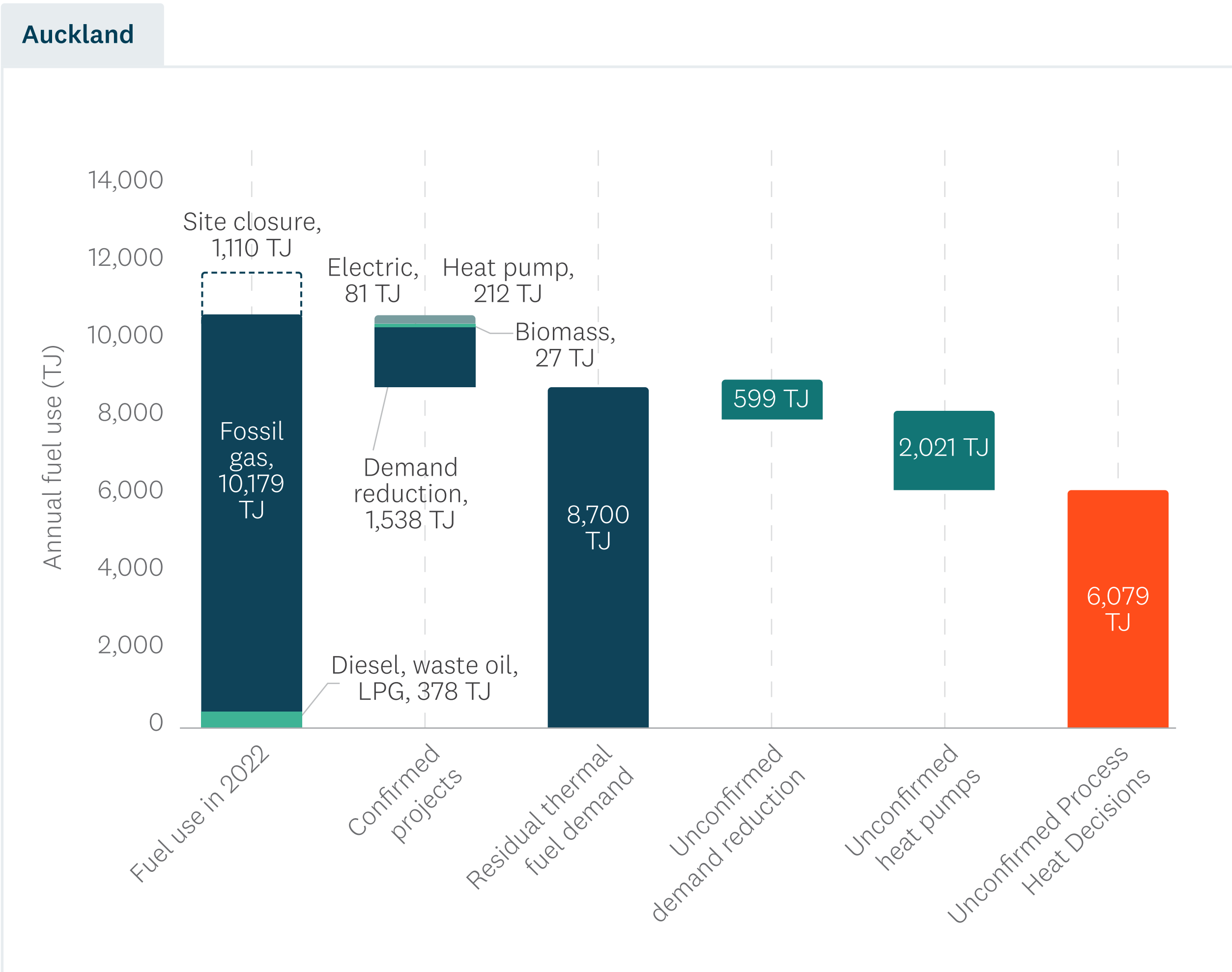


The objective of the Auckland RETA is to demonstrate pathways that eliminate fossil fuel use and process heat emissions as much as possible. It does this by supporting organisations in their consideration of:

- demand reduction (for example reducing heat demand through process optimisation)
- heat pumps (for heat requirements <100°C, 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 Auckland'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, 6,079 TJ of the residual fossil fuel thermal demand 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 Auckland 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.

The analysis in this report only considers fuel switching through electrification (particularly air-source heat pumps, electric boilers and electric furnaces) and biomass boilers, as detailed information is available to develop these pathways for every site. This is consistent with the approach taken throughout the RETA programme. However, there are other renewable fuel options, including biogas, geothermal heat and ground-source heat pumps that may be appropriate for individual sites or specific locations, and these should be explored further by process heat users.

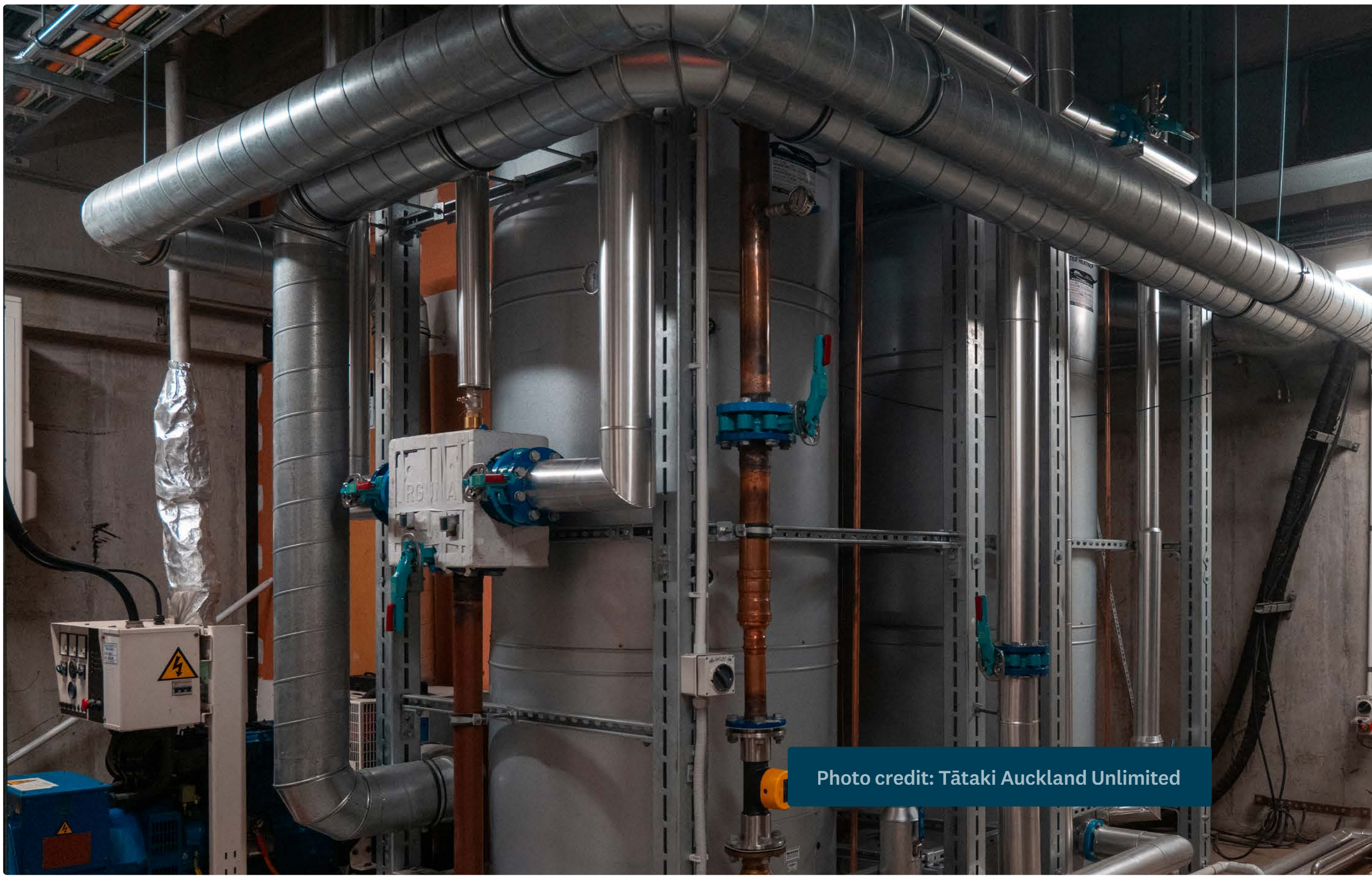


Photo credit: Tātaki Auckland Unlimited

4.1 RETA site summary

Across the 195 sites considered in this study, 410 individual projects were identified spanning the three categories discussed above — demand reduction, heat pumps and fuel-switching.[4]

Table 2 shows the current status of the Auckland RETA process heat projects. Twenty-one projects have been confirmed by the process heat organisation (i.e. the organisation has committed to the investment and funding allocated). The other 389 are unconfirmed (i.e. the process heat organisation is yet to commit to the final investment).

Table 2 — Number of projects in the Auckland region RETA by category. Source: Lumen, EECA.

Status	Demand reduction	Heat pump	Fuel switching	Total
Confirmed	12	6	3	21
Unconfirmed	173	121	95	389
Total	**185**	**127**	**98**	**410**

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.

Eight sites have already confirmed their fuel of choice (shaded in blue), representing a peak demand for 6.1 MW of electricity in seven sites, and 29 TJ of biomass at one site.

For unconfirmed projects, the fuel choice that has the lowest MAC value (described in Section 5) is shown in bold. Empty cells indicate where fuel choices are not applicable to that site.

The table shows that there are 90 sites (with unconfirmed projects) where demand could be met solely by heat pumps, and that for sites needing higher temperature process heat, biomass is the preferred fuel switching option for most of the sites, based on the economic analysis. The exceptions are those sites that require much higher temperatures, for which biomass is not a realistic fuel option. The table shows that electricity is the most realistic option for these sites.

[4] This is the number of projects once the optimal fuel switch decision has been determined for a given site (i.e. this is 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 505.

Table 3 — Summary of potential fuel-switching requirements for Auckland RETA sites.
Part A: Confirmed projects and unconfirmed fuel switch projects

Site name	Industry	Project status	Bioenergy required (TJ/yr)	Electricity peak demand, MVA
CORE Timber Services Papakura	Industrial	Confirmed	**29**	
Fletcher Steel Pacific Coil Coaters	Industrial	Confirmed		**3.0**
Health New Zealand Waitakere Hospital	Commercial	Confirmed		**0.4**
Auckland Council Moana Nui A kiwa - Mangere Pool	Commercial	Confirmed		**0.2**
Auckland Meat Processors Auckland	Industrial	Confirmed		**1.5**
Mt. Smart Stadium - HP Stage 1	Commercial	Confirmed		**0.2**
Van Lier Riverhead	Industrial	Confirmed		**0.3**
Rainbow Park Nurseries Drury	Industrial	Confirmed		**0.5**
Air New Zealand Manukau	Industrial	Unconfirmed	**9**	0.8
Alsco NZ Auckland	Industrial	Unconfirmed	**16**	2.0
Altus NZ Auckland	Industrial	Unconfirmed		**5.5**
Amcor Cartons Albany	Industrial	Unconfirmed	**123**	6.0
Ann Funeral Home	Industrial	Unconfirmed		**1.2**
ASCO Asphalt	Industrial	Unconfirmed	**178**	7.5
Auckland Council Manukau Memorial Gardens	Industrial	Unconfirmed		**0.6**
Auckland Council Waikumete Cemetery	Industrial	Unconfirmed		**0.6**
Autex Industries	Industrial	Unconfirmed	**14**	3.2
Bell Tea & Coffee Company Auckland	Industrial	Unconfirmed	**6**	0.5
Blue Scope Pacific Steel	Industrial	Unconfirmed		**10**
Blue Star Group Webstar Auckland	Industrial	Unconfirmed	**39**	1.9
Bluebird Foods	Industrial	Unconfirmed	**126**	10
Boundary Road Brewery	Industrial	Unconfirmed	**49**	5.0
Bremworth Auckland	Industrial	Unconfirmed	**15**	1.9
Cemix	Industrial	Unconfirmed	**21**	1.0

Site name	Industry	Project status	Bioenergy required (TJ/yr)	Electricity peak demand, MVA
Coca Cola Amatil The Oasis	Industrial	Unconfirmed	**17**	1.4
Coca Cola Amatil Keri Juice	Industrial	Unconfirmed	**72**	3.0
Davis Funeral Services Auckland	Industrial	Unconfirmed		**1.0**
DB Breweries Waitemata	Industrial	Unconfirmed	**30**	4.2
Delmaine Fine Foods Auckland	Industrial	Unconfirmed	**12**	0.6
Downer Auckland Asphalt	Industrial	Unconfirmed	**41**	11
East Tamaki Galvanising	Industrial	Unconfirmed		**0.5**
EnviroWaste ChemWaste	Industrial	Unconfirmed	**40**	1.7
Expol Auckland	Industrial	Unconfirmed	**44**	2.8
Fonterra Brands Takanini	Dairy	Unconfirmed	**66**	5.3
Frucor Suntory Plunket Avenue	Industrial	Unconfirmed	**17**	1.9
Frucor Suntory Orb Avenue	Industrial	Unconfirmed	**3.1**	1.0
Fulton Hogan Reliable Way	Industrial	Unconfirmed		**21**
Fulton Hogan North Harbour	Industrial	Unconfirmed		**7.7**
George Weston Foods Ōtāhuhu	Industrial	Unconfirmed	**39**	1.7
George Weston Foods Wiri	Industrial	Unconfirmed	**19**	1.1
George Weston Foods Silverdale	Industrial	Unconfirmed	**5.2**	0.5
Gerard Roofs Auckland	Industrial	Unconfirmed		**4.1**
Glucina Alloys Avondale	Industrial	Unconfirmed		**4.2**
Godfrey Hirst Auckland	Industrial	Unconfirmed	**15**	1.4
Goodman Fielder Quality Bakers Auckland	Industrial	Unconfirmed	**62**	5.0
Grain Corp NZ Meadow Lea Foods	Industrial	Unconfirmed	**220**	11
Griffins Wiri	Industrial	Unconfirmed	**72**	13
Griffins Papakura	Industrial	Unconfirmed	**65**	3.2
Hayes Metal Refinery	Industrial	Unconfirmed		**5.4**
Health NZ Auckland City Hospital	Commercial	Unconfirmed	**26**	3.9
Health NZ North Shore Hospital	Commercial	Unconfirmed	**7.8**	1.1

Site name	Industry	Project status	Bioenergy required (TJ/yr)	Electricity peak demand, MVA
Health NZ Greenlane Clinical Centre	Commercial	Unconfirmed	**18**	1.3
Health NZ Middlemore Hospital	Commercial	Unconfirmed	**13**	1.6
Health NZ Manukau Super Clinic	Commercial	Unconfirmed	**1.9**	0.2
Heinz Watties La Bonne Cuisine	Industrial	Unconfirmed	**2.7**	0.3
Hellers Auckland	Industrial	Unconfirmed	**5.0**	0.5
Higgins East Tamaki	Industrial	Unconfirmed	**30**	9.6
Higgins Silverdale	Industrial	Unconfirmed	**16**	7.3
Hubbards Foods	Industrial	Unconfirmed	**34**	2.8
Huhtamaki Moulder Fibre	Industrial	Unconfirmed	**68**	3.3
Huntsman Chemical Company Barnes Plastics	Industrial	Unconfirmed	**34**	1.9
Industrial Processors	Industrial	Unconfirmed		**2.0**
International Waste	Industrial	Unconfirmed	**12**	0.6
Jack Link's Mangere	Industrial	Unconfirmed	**24**	0.7
Kerry Ingredients	Industrial	Unconfirmed	**15**	1.2
Koppers Performance Chemicals NZ Wiri	Industrial	Unconfirmed	**3.8**	0.8
Lion The Pride	Industrial	Unconfirmed	**48**	3.7
Mainfeeds Manurewa	Industrial	Unconfirmed	**41**	2.0
Mercy Hospital	Commercial	Unconfirmed	**2.8**	0.8
Mr Chips	Industrial	Unconfirmed	**57**	3.5
Nestle Cambria Park	Industrial	Unconfirmed	**37**	1.6
NIG Nutritionals Pukekohe	Industrial	Unconfirmed	**43**	4.7
NZ Starch Auckland	Industrial	Unconfirmed	**130**	4.6
NZ Sugar Company Auckland - Stage 1	Industrial	Unconfirmed	90	**6**
NZ Sugar Company Auckland - Stage 2	Industrial	Unconfirmed	96	**6.5**
NZ Comfort Group	Industrial	Unconfirmed	**37**	1.8
NZ Nail Industries	Industrial	Unconfirmed		**0.7**

Site name	Industry	Project status	Bioenergy required (TJ/yr)	Electricity peak demand, MVA
NZ Panels East Tamaki	Industrial	Unconfirmed	**9.2**	1.2
NZ Steel Glenbrook Steel Mill - Stage 1	Industrial	Unconfirmed		**26**
NZ Steel Glenbrook Steel Mill - Stage 2	Industrial	Unconfirmed		**26**
Oji Fibre Solutions Packaging Northern	Industrial	Unconfirmed	**49**	2.0
Ottogi NZ Takanini	Industrial	Unconfirmed	**13**	1.8
Pact Reuse Avondale	Industrial	Unconfirmed		**1.8**
PALM McCallum Industries	Industrial	Unconfirmed	**91**	4.4
Perry Metal Protection Auckland	Industrial	Unconfirmed		**0.9**
Pets @ Rest	Industrial	Unconfirmed		**0.9**
Purewa Cemetery	Industrial	Unconfirmed		**1.9**
Salters Cartage	Industrial	Unconfirmed		**1.7**
Sanitarium Auckland	Industrial	Unconfirmed	**42**	1.6
Sealed Air	Industrial	Unconfirmed	**3.4**	1.1
Smart Foods	Industrial	Unconfirmed	**2.2**	0.3
Southern Cross Healthcare Gillies Hospital	Commercial	Unconfirmed	**0.3**	0.1
Steel Masters Auckland	Industrial	Unconfirmed		**0.5**
Supreme Steel Products	Industrial	Unconfirmed		**1.5**
Tasti Auckland	Industrial	Unconfirmed	**15**	0.8
Tegel Takanini Feedmill	Industrial	Unconfirmed	**21**	0.9
Tegel Henderson	Industrial	Unconfirmed	**130**	3.1
Valmont Coatings (CSP Galvanizing)	Industrial	Unconfirmed		**1.0**
VIP Steel Packaging NZ	Industrial	Unconfirmed		**1.7**
Visy Glass Auckland	Industrial	Unconfirmed		**30**
Visy Board	Industrial	Unconfirmed	**47**	2.8
Visy Beverage Can	Industrial	Unconfirmed	**36**	1.6
William Morrison Funeral Directors	Industrial	Unconfirmed		**1.9**

Part B: Sites where demand is assumed to be met by heat pumps (all are unconfirmed projects)

Site name	Industry	Electricity peak demand, MVA
AFFCO Wiri	Ind	0.17
Arxada (Arch Wood Protection)	Ind	0.19
Auckland Airport	Comm	1.7
Auckland Council		
West Wave Pool & Leisure Centre	Comm	0.62
Parnell Baths	Comm	0.18
Albany Stadium Pool	Comm	0.42
Lloyd Elsmore Park Pool & Leisure Centre	Comm	0.34
Manurewa Pool & Leisure Centre	Comm	0.28
Glenfield Pool & Leisure Centre	Comm	0.18
Tepid Baths	Comm	0.28
Takapuna Pool & Leisure Centre	Comm	0.11
Glen Innes Pool & Leisure Centre	Comm	0.17
Otara Pool & Leisure Centre	Comm	0.17
Birkenhead Pool & Leisure Centre	Comm	0.23
Papatoetoe Centennial Pool & Leisure Centre	Comm	0.11
Lagoon Pools	Comm	0.18
Mount Albert Aquatic Centre	Comm	0.28
AUT City Campus	Comm	0.97
AUT North Campus	Comm	0.40
Auckland Showgrounds	Comm	0.23
Ayyildiz Rose's Halloumi Cheese	Ind	0.26

Site name	Industry	Electricity peak demand, MVA
Bokay Flower Farms	Ind	0.38
Clevedon Valley Buffalo Company	Ind	0.26
Department of Corrections		
Mt. Eden Prison & Auckland Central Remand Prison	Comm	0.54
Auckland Regional Women's Correctional Facility	Comm	0.71
Auckland Prison	Comm	0.88
Dhindsa Farm	Ind	0.41
Epicurean Dairy	Ind	0.19
ESR Auckland	Comm	0.14
Everil Orr Care Centre	Comm	0.28
Gellerts Auckland	Ind	1.62
Grand Millennium Hotel	Comm	0.43
Green Harvest Pacific	Ind	0.19
Health NZ Mason Clinic	Comm	0.25
Heirloomacy Waimauku	Ind	0.21
Henkel NZ East Tamaki	Ind	0.18
Holiday Inn Auckland Airport Hotel	Comm	0.32
Homestead Produce	Ind	0.64
Karaka Park Produce Pukekohe	Ind	0.15
Ko Taku Reo Deaf Education, Auckland	Comm	0.14
KJ Flowers Drury	Ind	0.53
Lexham Gardens Rest Home	Comm	0.28
LSG Sky Chefs Auckland Airport	Ind	0.13

Site name	Industry	Electricity peak demand, MVA
Massey University Auckland	Comm	**0.37**
Massimo's Italian Cheeses	Ind	**0.51**
Methven Auckland	Ind	**0.01**
Ministry of Education		
Aorere College	Comm	**0.14**
Birkenhead College	Comm	**0.29**
Botany Downs Secondary College	Comm	**0.22**
Edmonton Primary School	Comm	**0.12**
Epsom Girls Grammar School	Comm	**0.22**
Fairburn School	Comm	**0.07**
Greenbay High School	Comm	**0.17**
Long Bay College	Comm	**0.43**
Lynfield College	Comm	**0.39**
Northcote College	Comm	**0.39**
Orewa College	Comm	**0.10**
Prospect School	Comm	**0.19**
Pukekohe High School	Comm	**0.23**
Sir Edmund Hillary Collegiate	Comm	**0.23**
Stanhope Road School	Comm	**0.20**
Waitakere College	Comm	**0.22**
Western Springs College	Comm	**0.14**
Mt. Smart Stadium - HP Stage 2	Comm	**0.14**
Much Moore Icecream East Tamaki	Ind	**0.18**
NZDF Devonport	Comm	**0.88**
NZ Gourmet Paprika	Ind	**2.7**

Site name	Industry	Electricity peak demand, MVA
NZ Gourmet Waiuku	Ind	**1.5**
NZ Hothouse Karaka	Ind	**2.5**
NZ Hothouse Bombay	Ind	**2.1**
Oceania Healthcare Meadowbank	Comm	**0.06**
Plant & Food Research Mt Albert	Comm	**0.26**
Rheem Auckland	Ind	**0.33**
Riverland Roses Riverland Nursery	Ind	**0.09**
Sky City Auckland	Comm	**1.0**
Southern Paprika Warkworth	Ind	**4.5**
Sunrise Healthcare West Harbour	Comm	**0.28**
Superb Herb Helensville	Ind	**0.21**
Tai Poutini Polytechnic Auckland Campus	Comm	**0.23**
The Olympic Pools & Fitness Centre Newmarket	Comm	**0.17**
Tip Top Auckland	Ind	**0.26**
University of Auckland City	Comm	**4.9**
University of Auckland Grafton	Comm	**1.7**
University of Auckland Newmarket	Comm	**0.37**
Van den Brink Poultry St Johns	Ind	**0.09**
Van den Brink Poultry Karaka	Ind	**0.31**
Waste Management Technical Services East Tamaki	Ind	**0.43**
Westfield Manukau City	Comm	**0.34**
Wicked Hot Waitakere	Ind	**0.14**
Wing Shing Farms Karaka	Ind	**0.16**

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 Auckland were using coal in 2022, the overwhelming majority 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

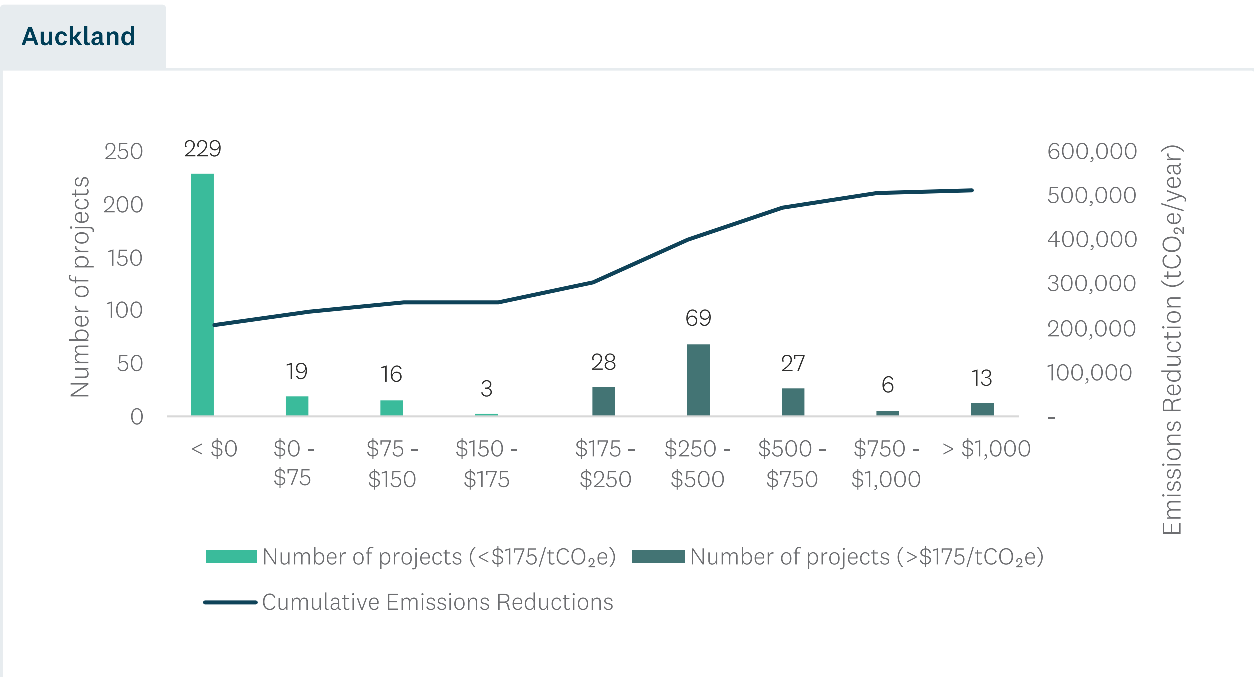
Table 4 — Fuel switching pathways used in the RETA analysis.

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.

5.1 Estimated MAC values for Auckland projects

Using the biomass and electricity costs outlined in Section 6 and Section 7, Figure 4 summarises the resulting MACs associated with each decision, and the potential emissions reduced by these projects.

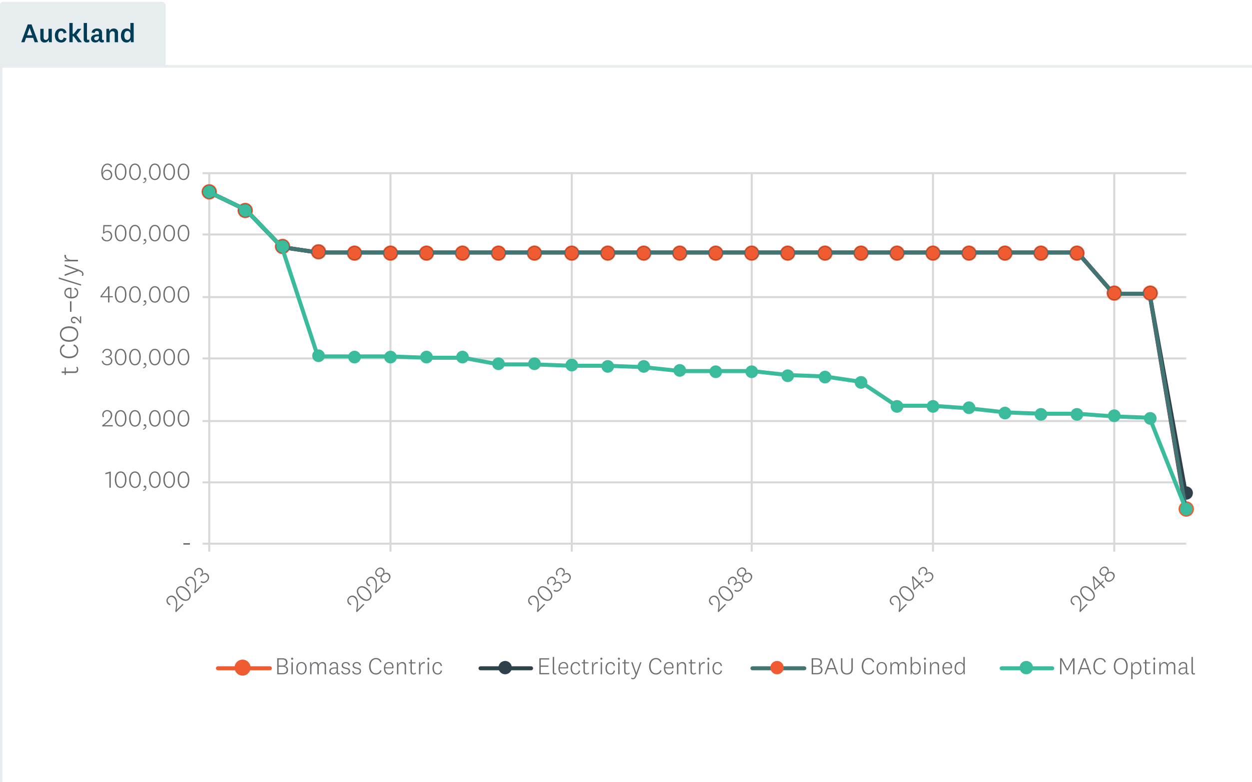
Figure 4 — Number of projects and cumulative emissions reductions by range of MAC value.



Out of 570 kt CO_2e of process heat emissions from Auckland RETA sites, 208 kt CO_2e (37%) have MACs less than zero, meaning they are economic now, even without a carbon price while a total of 260 kt (46%) have MACs less than $175/t$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 three years.

Compared to a scenario where each of these projects was executed based on the BAU pathway, the MAC Optimal scenario would accelerate fuel-switching, and reduce emissions by a cumulative 4,839 kt CO_2e over the period of the RETA analysis to 2050, as shown in Figure 5.

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.

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).

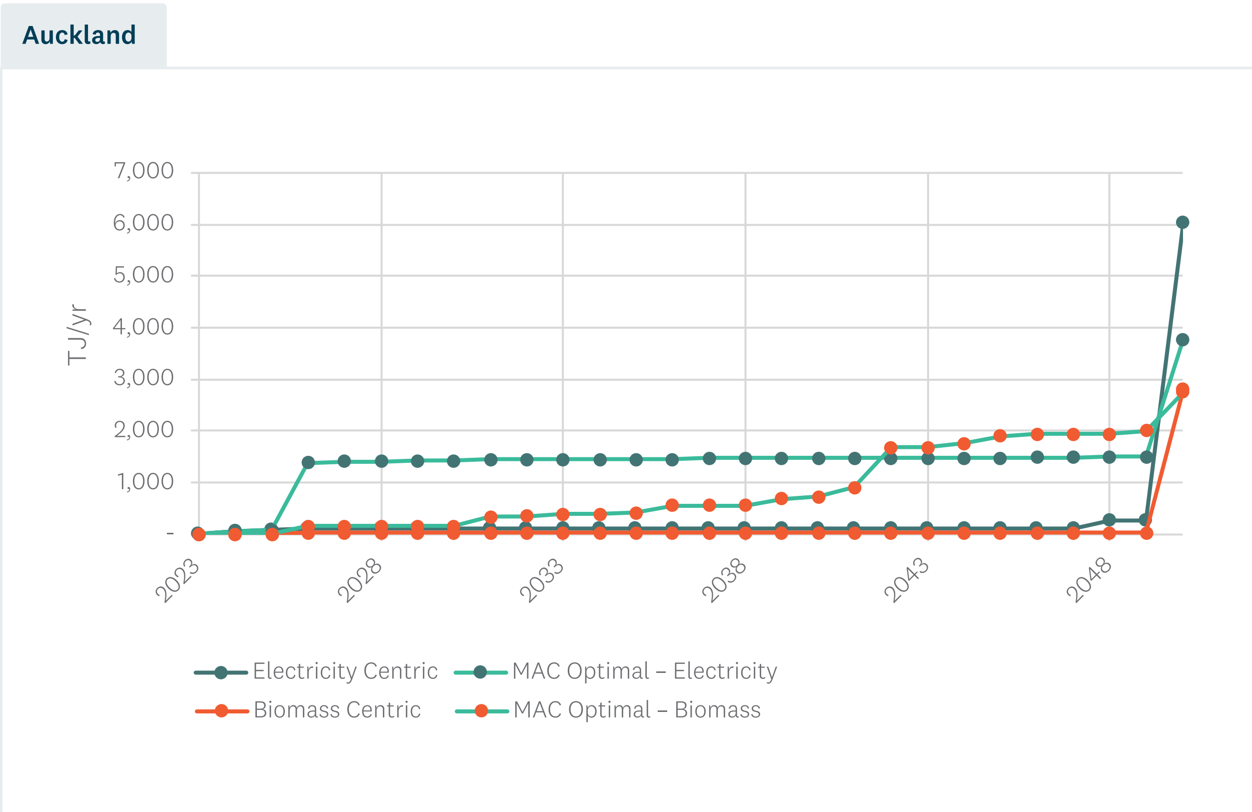
5.2 Pathway implications for electricity and biomass demands

The MAC Optimal pathway sees fuel decisions that result in 58% of the region's process heat needs in 2050 supplied by electricity, and 42% supplied by biomass (Figure 6).

A significant proportion of the electricity demand comes from heat pumps, reflecting the high number of sites in Auckland whose heating needs are less than 100°C. For sites requiring higher temperature heat, biomass is the favoured fuel reflecting its lower overall cost (compared to electrode boilers) however, the level of biomass available for fuel switching is well below what would be required in the MAC Optimal pathway, and there are other practical challenges to biomass use in Auckland. We also note that there are several metal and glass manufacturing sites in Auckland that require very high temperature heat (>450°C) for which biomass may not be a realistic fuel option. These are modelled as only having an electric pathway.

We expand further on these fuel-switching outcomes in the 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 Auckland region's process heat. As shown in Figure 3, investment in demand reduction would meet 7% of the unconfirmed process heat demands from Auckland 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 60 MW if these projects were completed.[7] We estimate that demand reduction would avoid investment of between $66m and $72m in electricity and biomass infrastructure.[8]

Note that while this analysis identifies that biomass is economically viable, and this is the only criterion used to select the fuel for the MAC Optimal pathway, Auckland's size and unique layout presents significant practical challenges to using biomass at many sites. These include the challenge of transporting biomass in the urban area, lack of on-site storage space and potential impacts on air quality. All organisations will need to evaluate all fuel options carefully, given their own unique set of circumstances. Demand reduction, flexibility and peak demand management will be important components of this evaluation.

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 Auckland and the current constraints in supply, additional analysis of the sensitivity to gas prices was undertaken.

The modelling assumed a base gas price of $19/GJ ($0.068/kWh) for industrial process heat users (based on the mid-point of 2024 MBIE estimates for commercial and industrial users). Note that, to be consistent with other inputs, this has been adjusted down by inflation to be in real $2022. As shown in Figure 7, we found that halving the annual escalator for natural gas from 3% to 1.5% resulted in 63 fuel-switching decisions being deferred and causing 733 kt CO_2e of additional emissions on a cumulative basis through to 2050. By contrast, doubling the escalator to 6% accelerated 100 projects, delivering 1,946 kt CO_2e of additional emissions reduction by 2050. A significant increase in the natural gas price to $45/GJ (excluding ETS charges) by 2035 (equivalent to escalators of 6% for commercial users and 10% for industrial users), accelerated 81 projects with a cumulative additional reduction of 3,365 kt CO_2e by 2050.

7 This assumes that both energy consumption and the peak thermal demand required from biomass or electric boilers are equally reduced by demand reduction projects.

8 On the assumption that the capital cost of electrode boilers is $1.1m/MW and biomass boilers is $1.2m/MW. The electrode boiler cost does not consider the connection costs, which average $0.2m/MW (for N security connections) for the Auckland region, but are very site specific.

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

Fonterra

6 Biomass — resources and costs

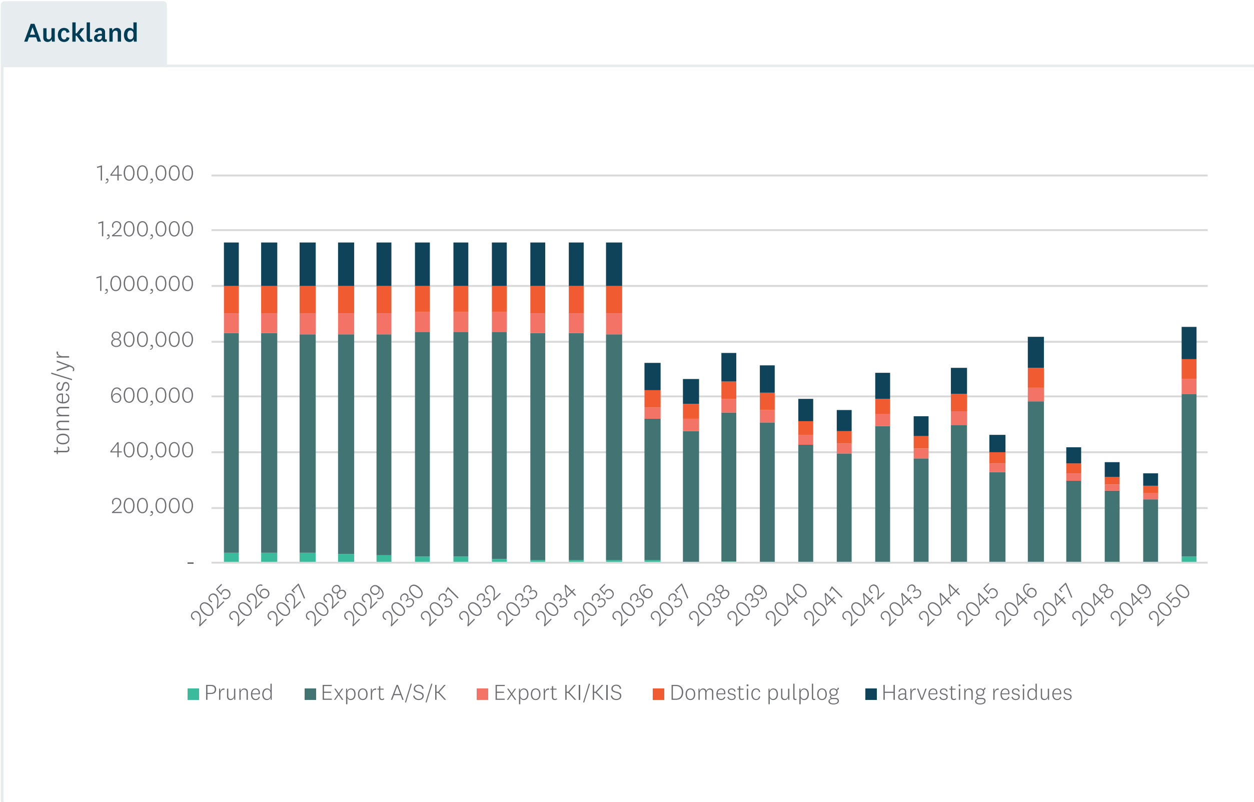
To assess the total availability of harvestable wood in the Auckland region, both a top-down and bottom-up analysis has been undertaken. The bottom-up analysis is based on interviews with major forest owners, as forest owners' actual intentions will often deviate from centralised forecasts due to changes 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 931 kt pa (6,686 TJ pa) of wood will be harvested in the Auckland 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.

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 Auckland wood availability, 2025-2050. Source: Forme.

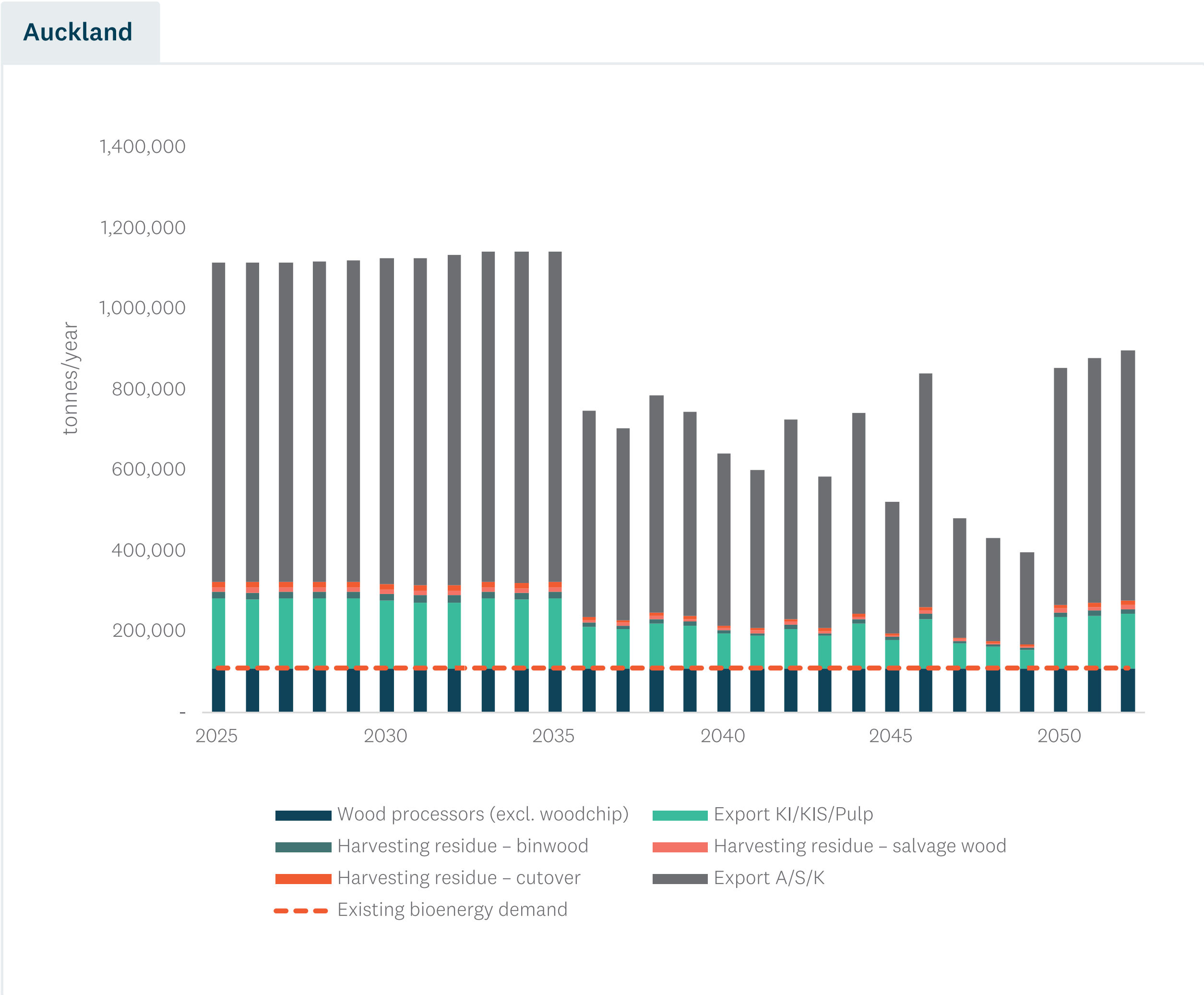


A more comprehensive view of resource availability, that combines the top-down and bottom-up analyses reveals:

- On average, 37 kt of harvest residues can be economically recovered. Around 26 kt (185 TJ) per year of roadside residues (binwood and salvage wood) is currently being recovered, while the rest is not currently utilised (mainly cutover residues).
- Interviews with sawmills suggested that around 313 kt (2,248 TJ) per year of processing residues are produced. Out of this, 203 kt (1,458 TJ) per year is woodchip sold to users to the south and southwest of Auckland, and 110 kt (790 TJ) per year is already used for bioenergy (mainly sawdust and shavings).
- On average through to 2038, K log resources are 81 kt (585 TJ) per year, the KI/KIS log resource is 66 kt (472 TJ) per year, and the total pulp resource is 87 kt (626 TJ) per year.

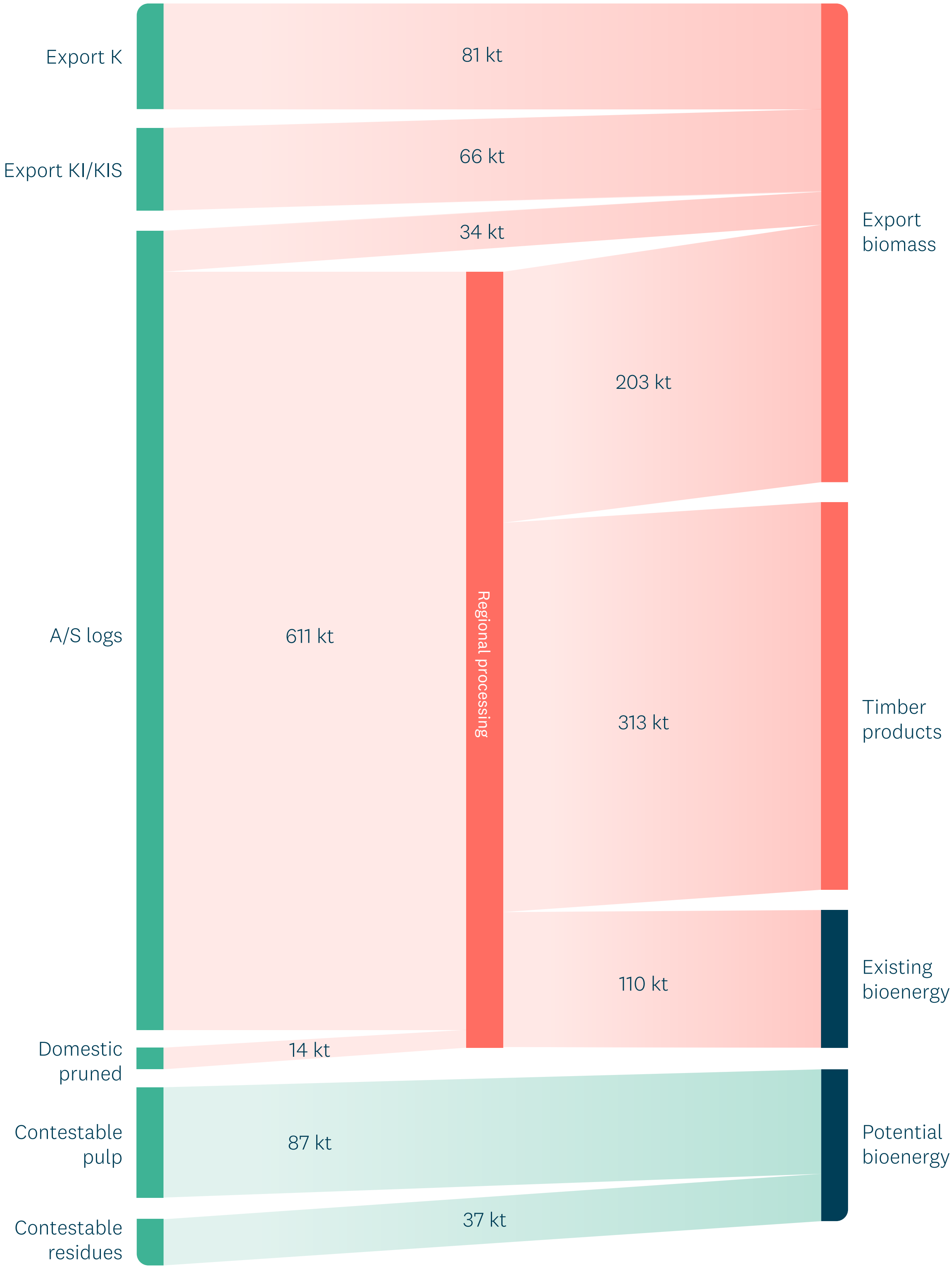
The resulting potential volume for bioenergy is shown in Figure 9.

Figure 9 — Woody biomass available for bioenergy in the Auckland region. Source: Forme.



The overall analysis of the Auckland region is summarised in Figure 10.

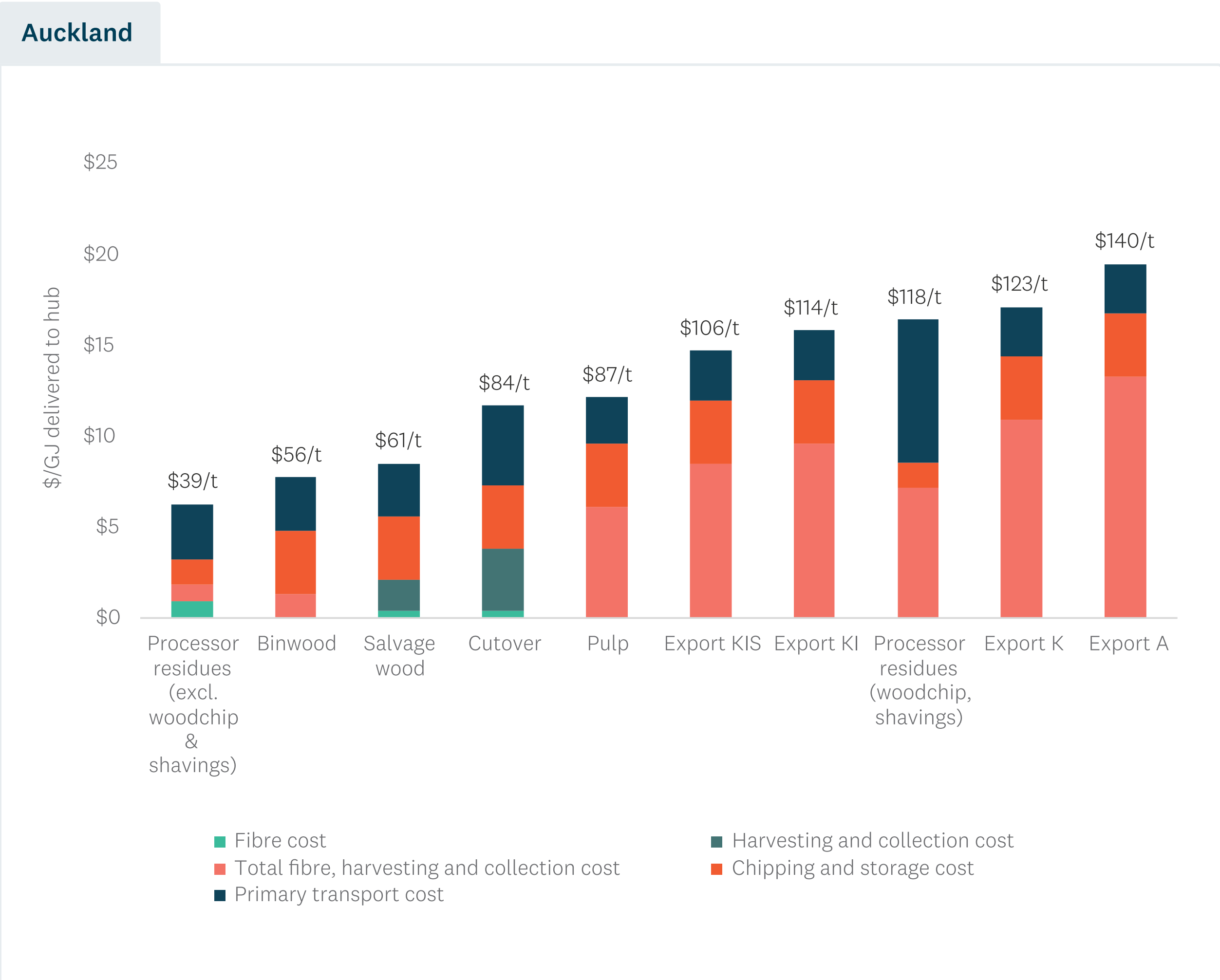
Figure 10 — Average wood flows in the Auckland region, 2025-2039. Source: Forme.



Overall, EECA estimates that, on average over the next 15 years, **approximately 125 kt per year (895 TJ per year) of woody biomass (forest 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 variance in annual availability shown in the previous analysis.

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

Figure 11 — Estimated delivered cost of potential bioenergy sources ($/GJ and $/green tonne). Source: Forme.



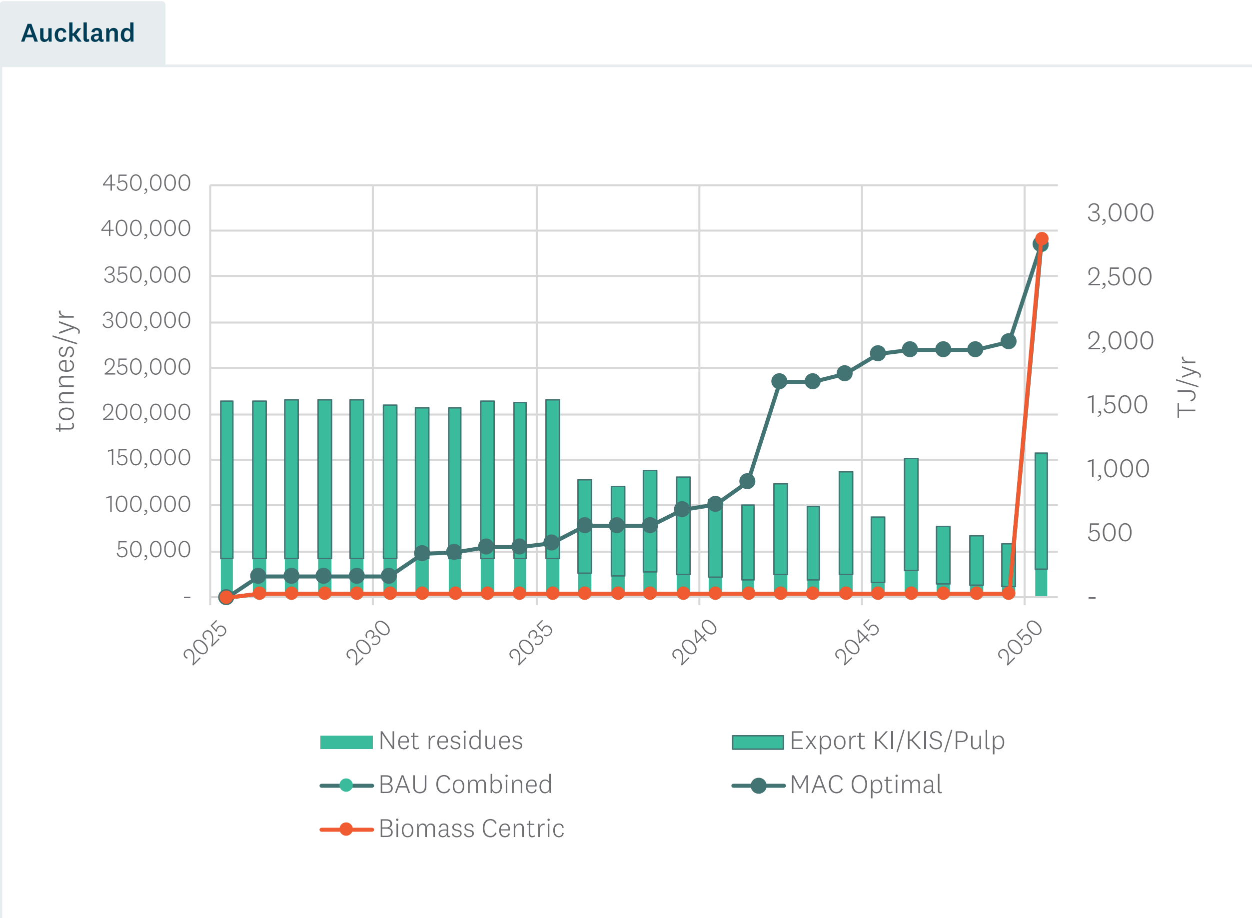
Export grade K and A logs have been retained in the analysis to represent 'scarcity values' if our scenario analysis indicates that other more plausible and sustainable sources of bioenergy are insufficient. However, we do not believe these are sustainable or practical sources of bioenergy.

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 from 2032. 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 two EDBs serving the Auckland region — Vector and Counties Energy.

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 10.4c/kWh in 2026 to 12.3c/kWh in 2040 under a 'central' scenario. However, different scenarios could see retail prices higher or lower than that level.

Photo credit: Counties Energy

Figure 13 — Forecast annual average electricity price for large commercial and industrial demand in the Auckland 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 2025/2026. 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 factored in increases over and above the prices in Table 5.

Table 5 — Estimated and normalised network charges for Auckland large industrial process heat consumers, by EDB for April 2025-March 2026 ($/MVA per year).

EDB	Approximate distribution charge $/MVA per year	Approximate transmission charge $/MVA per year	Total charge $/MVA per year
Counties Energy	$161,000	$19,000	$180,000
Vector	$101,000	$58,000	$159,000

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.

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

For most of the Auckland sites considering electrification, and where N level security (where a failure of one component may cause interruption of supply) is sufficient, the 'as designed' electrical system can likely connect the site with minor distribution level changes and without the need for substantial infrastructure upgrades. Our analysis suggests that most of these minor upgrades would have indicative connection costs under $300,000 and experience connection lead times of less than 6 months.

However for sites with larger loads, there can be a significant difference in the cost and complexity of connections that provide N security compared with options that provide extra redundancy in the network, referred to as N-1 security.

More substantial upgrades to the distribution network are required for 24 of the sites, with indicative costs for N security in the range of $1m-$10m, and for N-1 security in the range of $4m-$30m and longer lead times (up to 36 months).

Sixteen sites may require major distribution and transmission upgrades to provide N-1 security, with indicative costs in the order of $5m-$30m. These upgrades would take up to 48 months per stage to execute. However costs for N security upgrades for many of these sites are significantly less.

Indicative connection costs, expressed in $/MW, are summarised in Figure 14, which provides a comparison between connection options that provide N-1 security and options that provide N security. It shows that there are 22 sites which are likely to have connection costs that are very low.

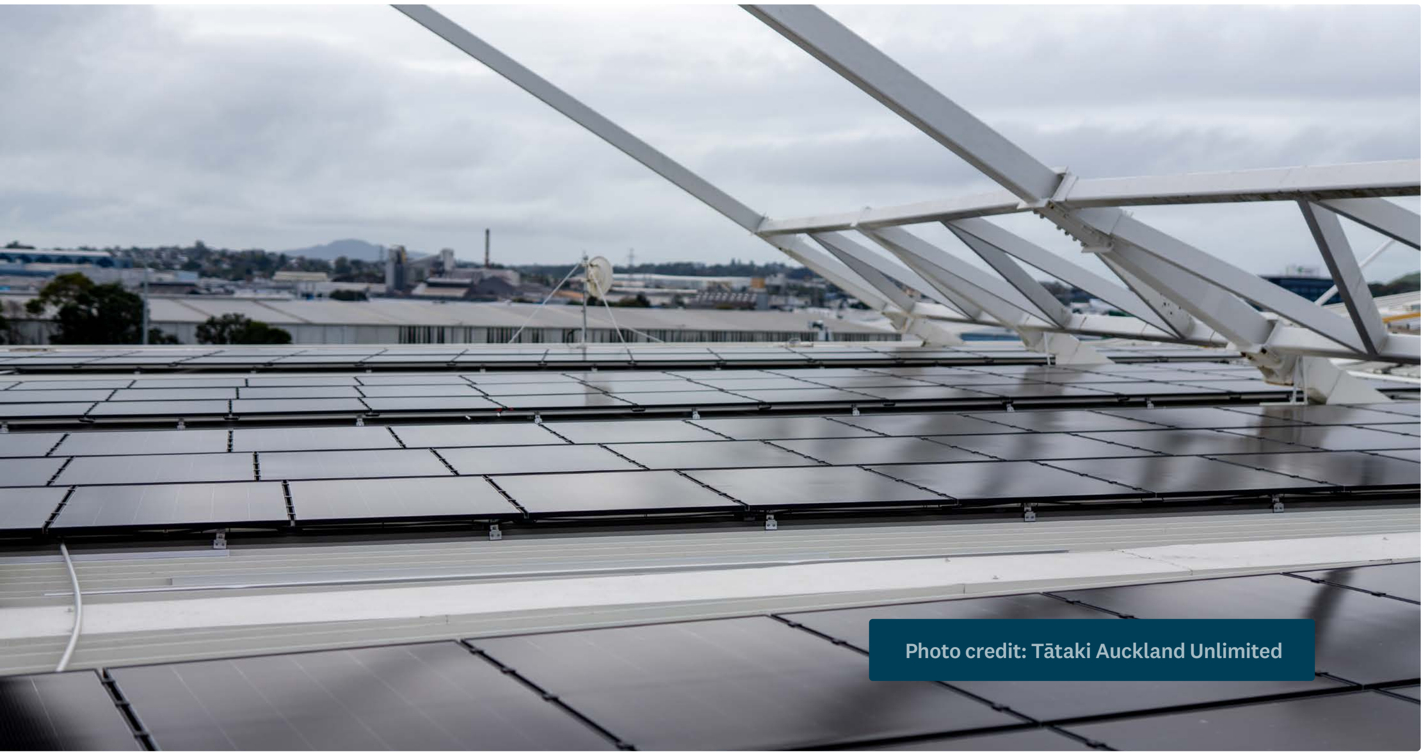
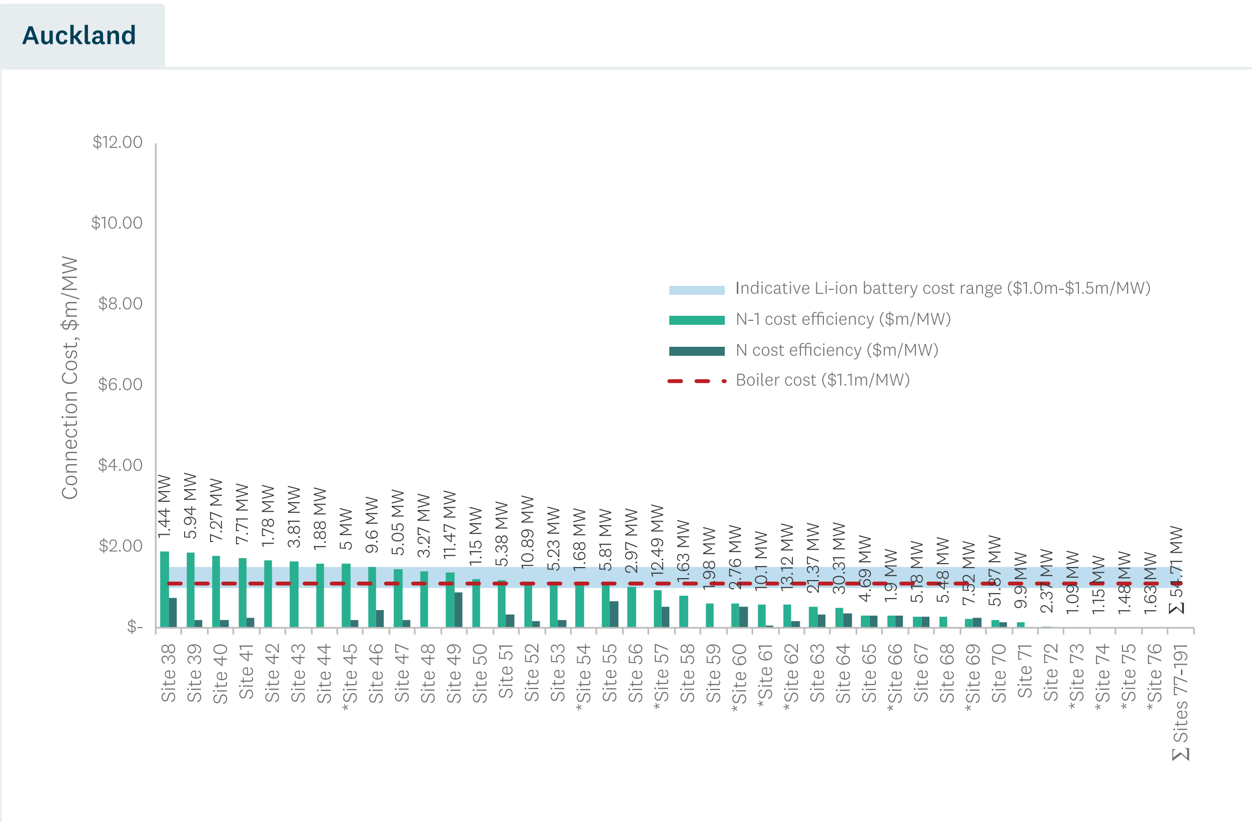


Photo credit: Tātaki Auckland Unlimited

Figure 14 — Normalised cost of network connection vs boiler cost, Auckland RETA sites. Source: Ergo, EECA.

Note: boiler capacity in MW shown in labels.



The red dashed line in Figure 14 compares the $/MW costs to the estimated cost of an electrode boiler ($1.1million per MW).

We note these costs represent indicative construction costs of the expected upgrades, suitable only for the screening level of analysis provided in this report. They do not take account of the portion of upgrade costs that may be funded by the EDB, rather than the process heat user, or how the costs may be shared across multiple sites that benefit from the upgrade. We recommend process heat users engage with their EDB to discuss options for connection, the costs and the level of capital contributions that EDBs may make, in order to develop more refined cost estimates.

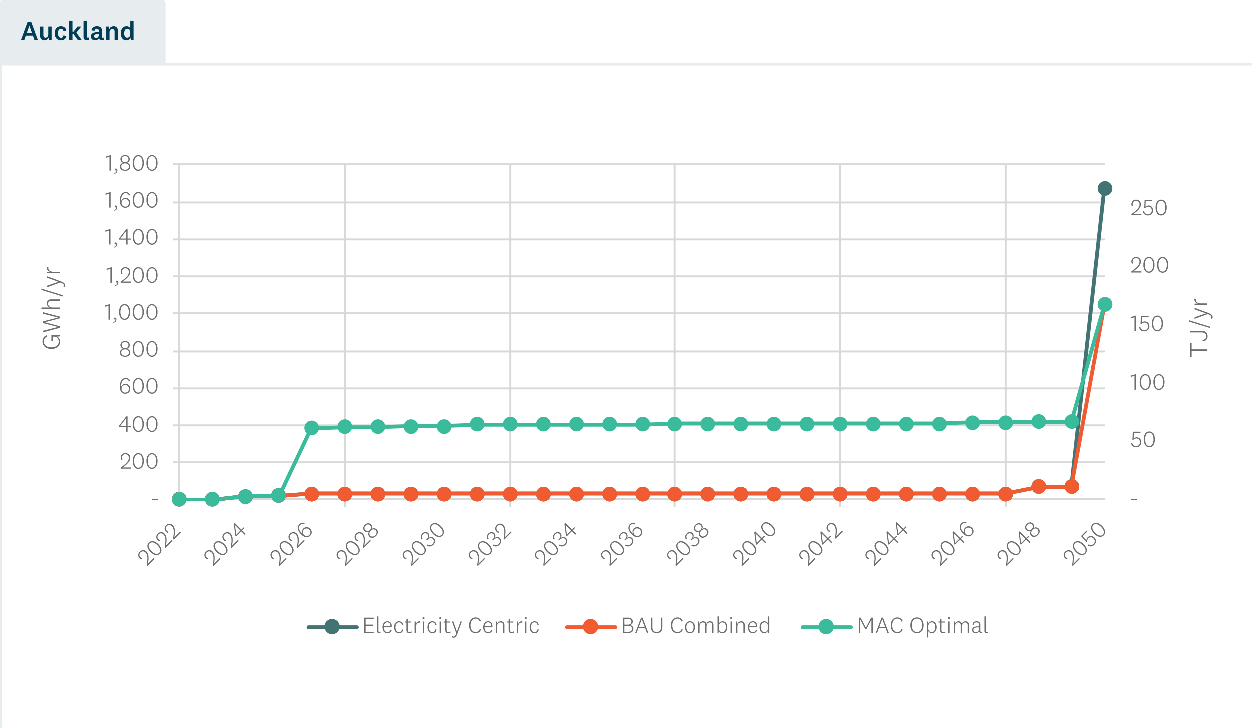
In addition, the indicative timeframes for connection assume these investments do not require Transpower or the relevant EDB to obtain regulatory approval. We note that if connections also rely on wider upgrades to the network, EDBs would have to seek regulatory approval for these investments, which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

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, additional investment in electricity occurs in 2026 with the remainder in 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.

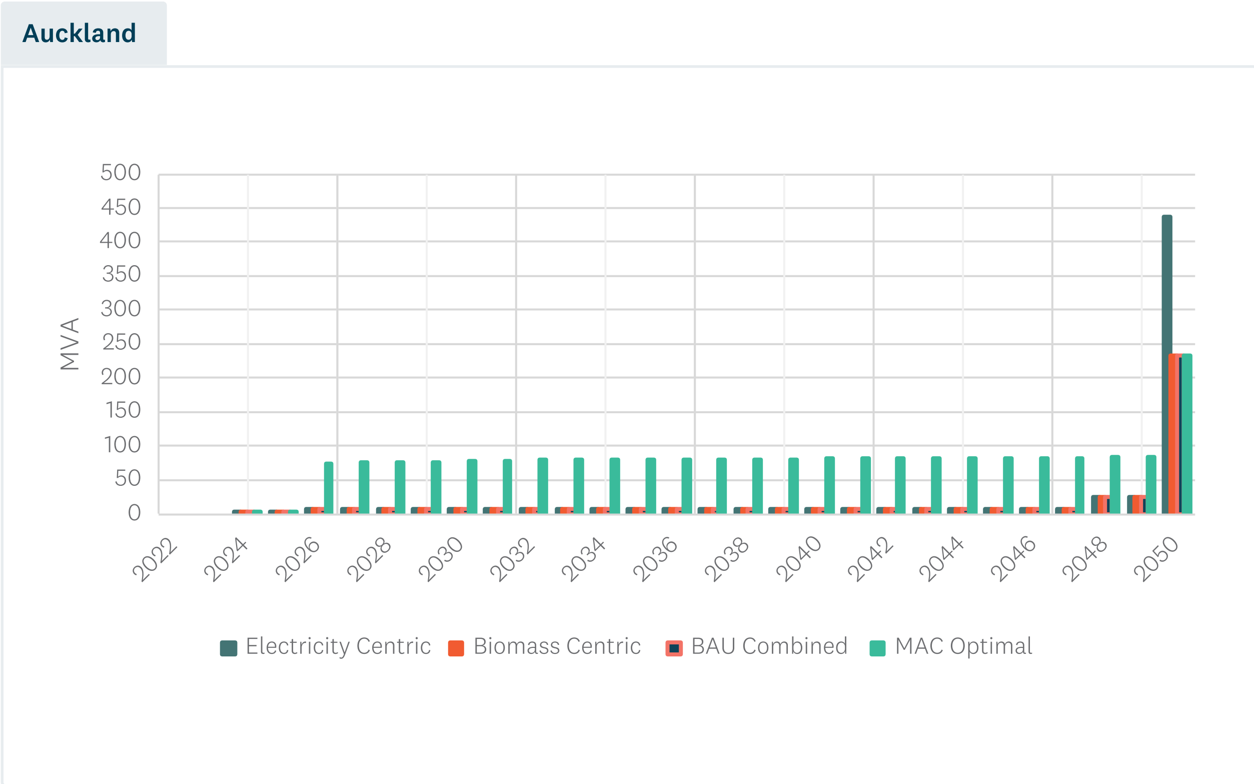


Figure 16 shows that should all unconfirmed process heat users in Auckland convert to electricity (the Electricity Centric pathway), the increase in demands could be significant — an increase in peak demand of 436 MVA by 2050 (an increase of 20% compared to today's peak demand) assuming all electricity projects are at peak usage at the same time.[10] However, in the MAC Optimal pathway, the increase would only be 236 MVA (11%), 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, but the costs may be shared between the EDB and user. For this analysis, we assumed that 100% of the capital costs of connection would be paid by the process heat user. In addition, Vector charge a development contribution of up to $252/kVA.[11] Table 6 shows the potential impact of the modelled peak demand on each EDB network by 2050 under two pathways, and the total potential cost of the connection upgrades, across all sites.

Table 6 — Potential new connections (MW) and customer-driven connection costs under Electricity Centric and MAC Optimal pathways, by 2050 (for all sites).

EDB	New connections — Electricity Centric pathway		New connections — MAC Optimal pathway	
	Connection capacity (MVA)	Connection cost ($m)	Connection capacity (MVA)	Connection cost ($m)
Vector	360.6	$218.3	173.5	$78.8
Counties Energy	75.7	$6.3	62.8	$3.7
Total	**436.3**	**$224.5**	**236.3**	**$82.5**

Up to $83m could be spent connecting new process heat plant to the local networks in the MAC Optimal pathway.

The costs presented in Table 6 are indicative total construction costs associated with network upgrade costs, based on the assumptions outlined in the full RETA report (assuming no capital connection cost sharing and including the full amount of Vector’s development contribution charge). These costs also exclude the ongoing network charges paid by each process heat user that electrifies their process heat.

Photo credit: Vector Ltd

[11] The development contribution varies depending on the complexity of installing and connecting the new load and would be determined by Vector when a connection application request is made by the customer. See https://www.vector.co.nz/developers/electricity/new-connection

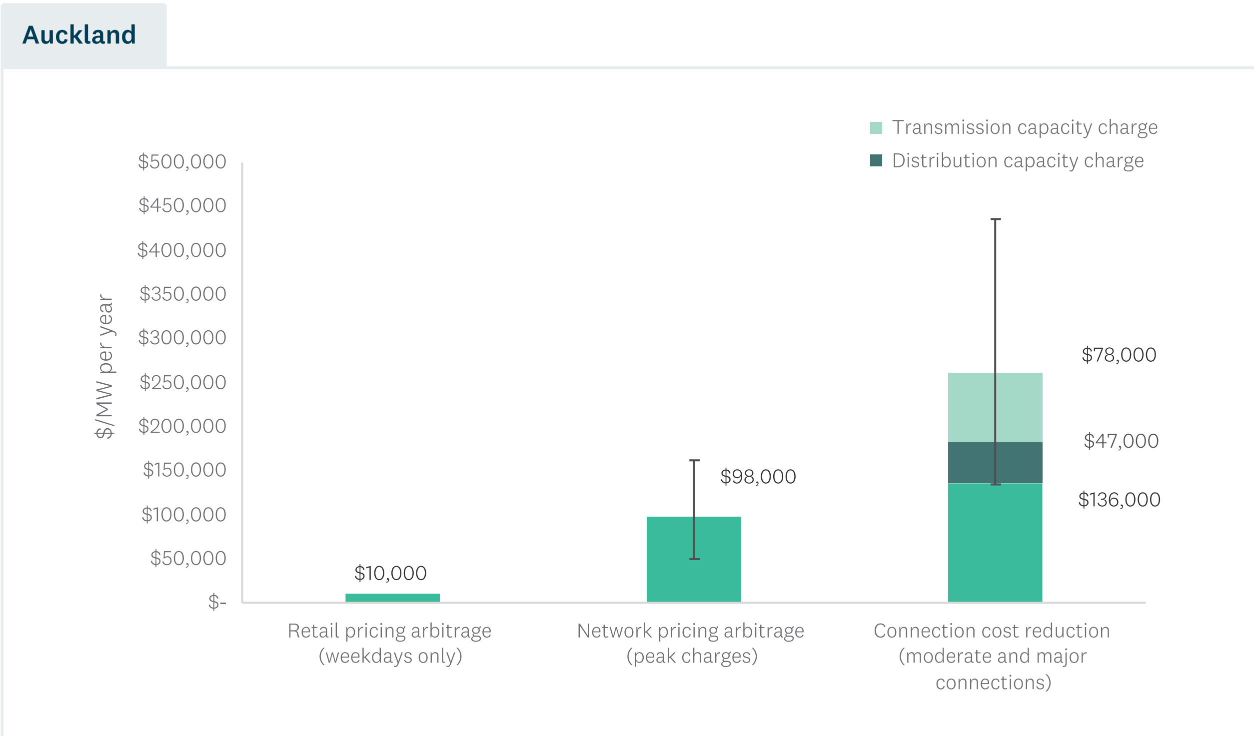
7.2 Opportunity to reduce electricity-related costs through flexibility

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, Auckland process heat users could potentially reduce their electricity procurement costs by up to $120,000 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 Auckland RETA.
Note: the error bars indicate the 10th and 90th percentile values calculated across different projects



Users are encouraged to contact their EDB to discuss options for flexibility. For example, Vector has recently announced a commercial distributed energy resource (DER) plan that benefits users through a reduced capacity charge by deferring load when required by Vector to manage load.

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.

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 Wiri and Wellsford GXPs 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.

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

- EECA should 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 ETS price assumptions for fiscal forecasting etc.

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Government Leadership

Regional Energy Transition Accelerator (RETA)

Auckland — Summary Report

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