5 July 2024

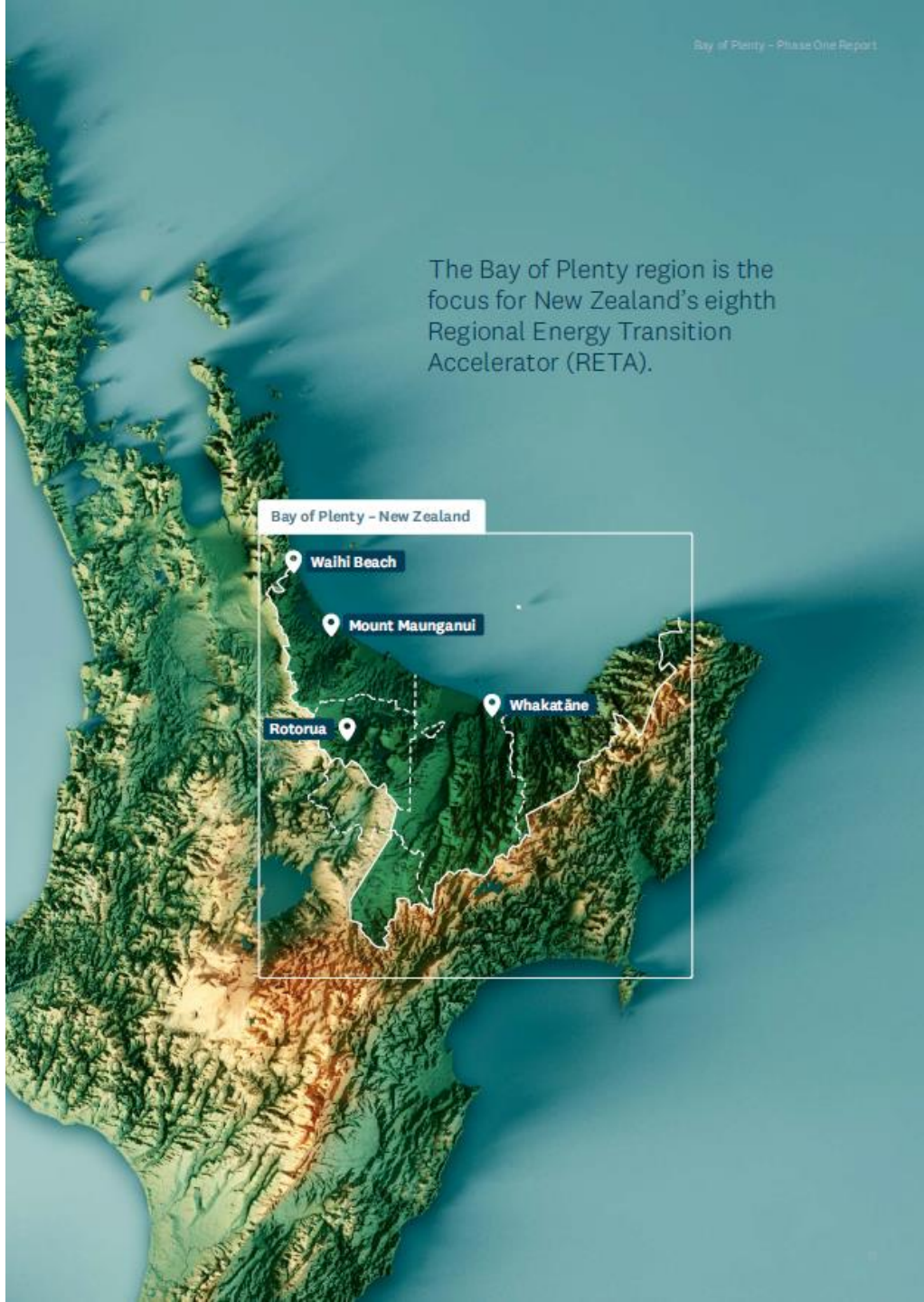
Regional Energy Transition Accelerator (RETA) Bay of Plenty

Geothermal Assessment

EECA
TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

Today

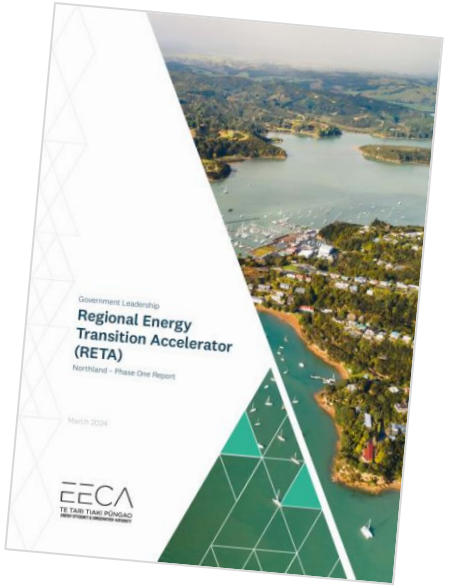
1. Regional Energy Transition Accelerator
2. RETA BoP
3. Geothermal Workstream
4. Opportunities to accalerate
5. Pātai



RETA: Regional Energy Transition Accelerator

We're working through the country

- ✓ Southland – Oct-22
- ✓ Mid-South Canterbury – Jun-23
- ✓ West Coast – Aug-23
- ✓ Otago – Sep-23
- ✓ North Canterbury – Nov-23
- ✓ Nelson, Marlborough, and Tasman – Dec-23
- ✓ Northland – Mar-24
- ✓ Bay of Plenty – May-24
- Tairawhiti – Jul-24
- *South Island combined – Jul-24*
- Taranaki – Jul-24 (estimate)
- Hawke's Bay – Aug-24 (estimate)
- Waikato – Sep-24 (estimate)
- Manawatu-Whanganui - Oct-24 (estimate)
- Auckland – early '25
- Wellington – early '25



EECA

What's involved in RETA

Demand side Assessment:

- List of significant process heat sites, project level detail
- Projected timing and fuel needed for transition

Electricity availability and price assessment

- Electrification infrastructure availability, costs and timing
- Electricity price path

Biomass availability and cost assessment

- Forecast of potential bioenergy availability and accounting for known demands for the resource
- Identify un-utilised bioenergy and costs

Integrated modelling and Report

- modelled decarbonisation scenarios:
  - 'Electricity centric', 'Biomass centric', 'MAC optimal'
- Actions needed and Recommendations

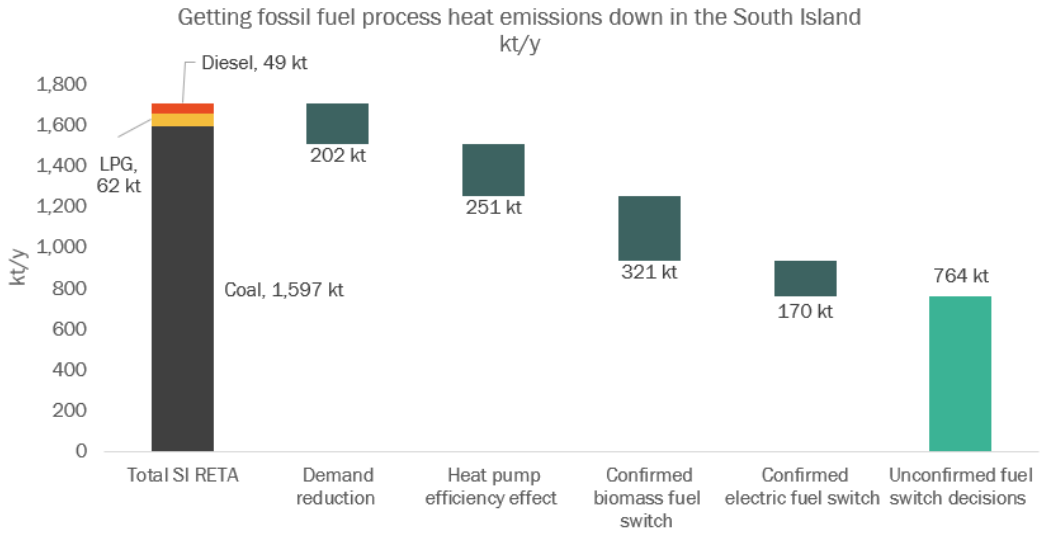
Stakeholder engagement and workshops

Implementation support

EECA

South Island insights

- **273 sites** included, with **nearly 600** different decarbonisation projects (demand reduction, heat pumps, electrode boilers, biomass boilers).
- Baseline (2022): 18 PJ p.a. total fossil fuel use (predominantly coal), producing 1.7 Mt p.a. scope 1 CO_2-e
- 1.5 GW total installed fossil fuelled thermal capacity
- South Island process heat sites account for nearly 80% of New Zealand's coal consumption



Demand Reduction

E.g. reducing heat demand through process optimisation

163

projects evaluated

Thermal Efficiency

E.g. highly efficient heat pumps for hot water demands; using heat recovery from refrigeration

144

projects evaluated

Fuel Switching

Switching away from fossil fuel to a low-emissions fuel (e.g. biomass and/or electricity)

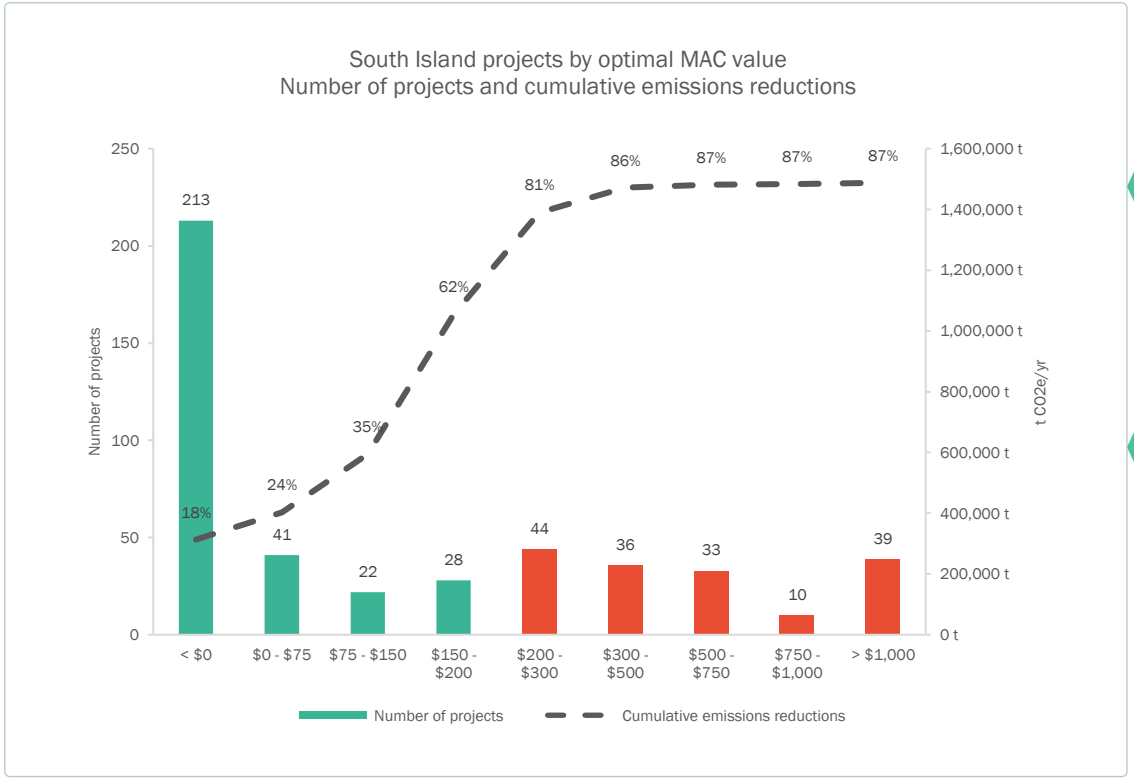
286

projects evaluated

EECA

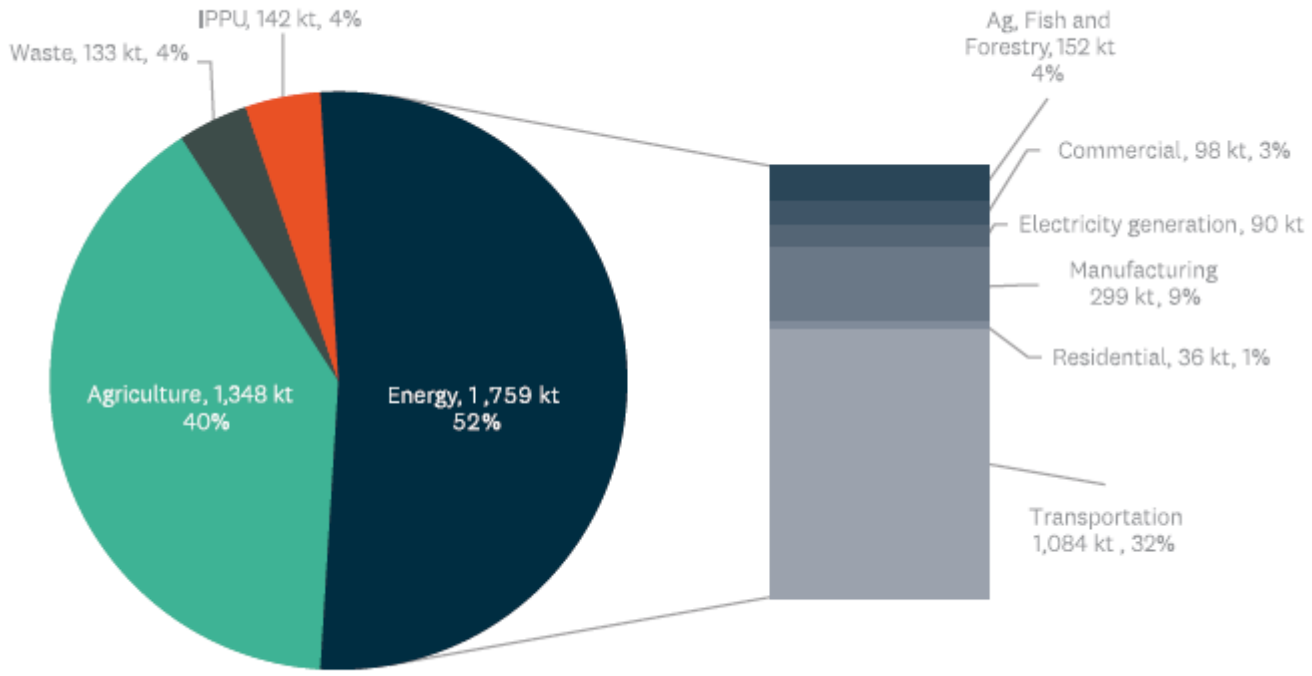
RETA South Island Insights

- 254 projects, 400kt of emissions will be ‘economic based on near term carbon price forecast.
- Demand reduction & HTHP projects could save $390m - $585m in capital costs
- Based on MAC Optimal Pathway:
  - Increase electricity consumption by 2,041GWh in 2037, requiring up to $3B investment
  - Require 1,100GWh p.a. additional SI generation over next 4 years (~300MW/$1B wind farm)
  - 8m tonnes new biomass demand (2x existing), $735m-$850m opportunity
- North Island RETA – Indicatively NI requirement / opportunity would be double South Island



Bay of Plenty RETA

Energy is 52% of Bay of Plenty GHG emissions

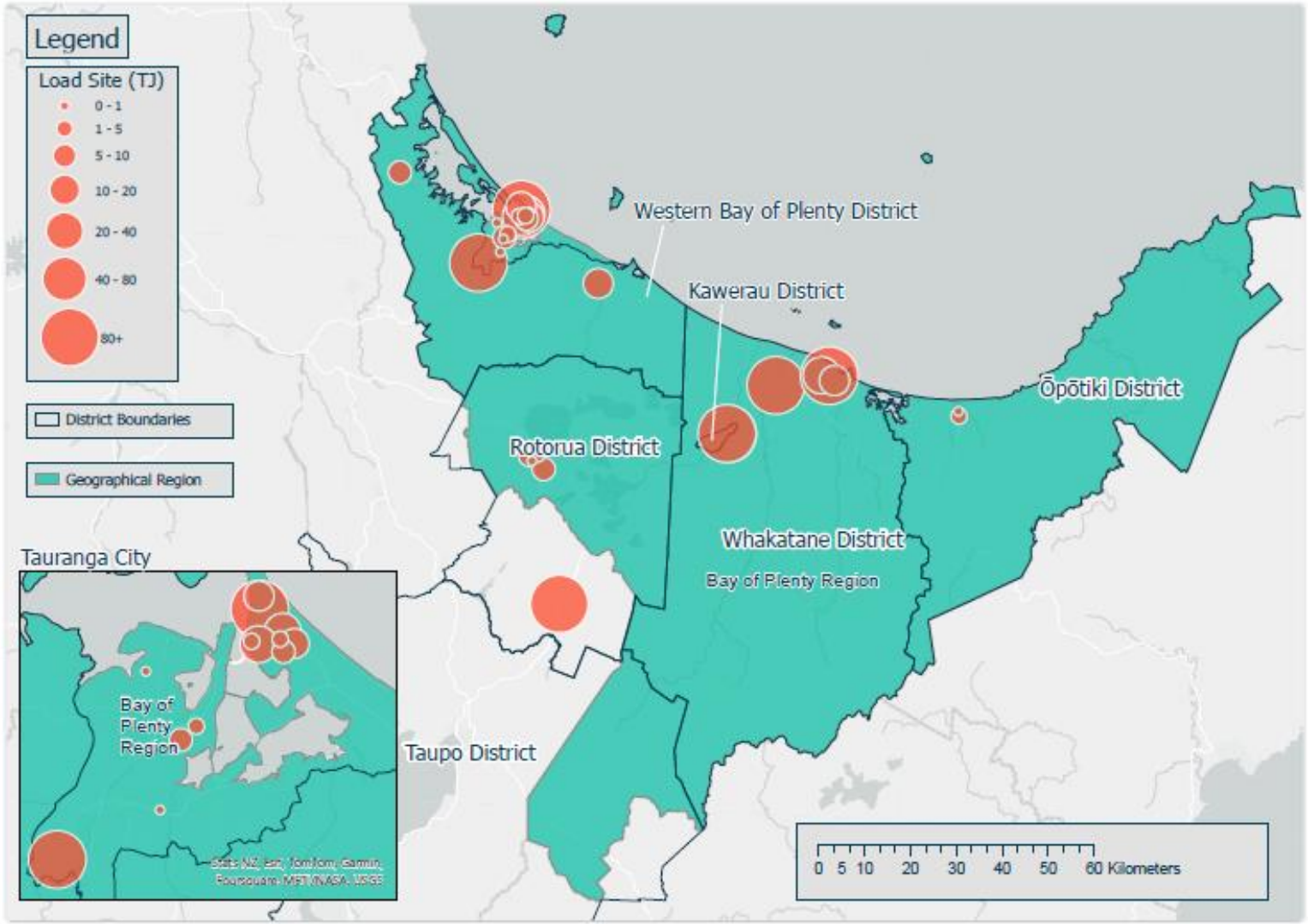


Approx 22% are from process heat

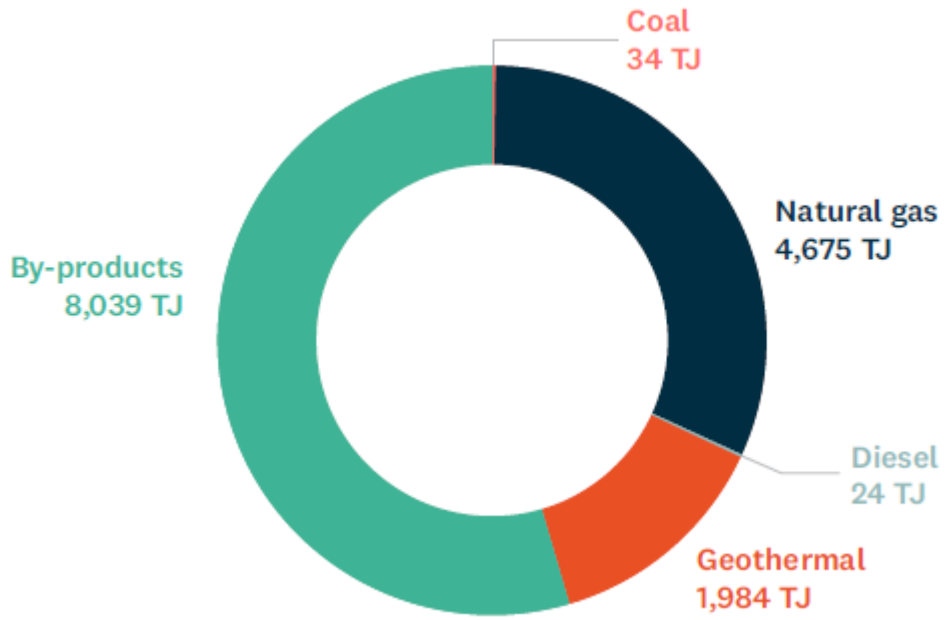
~310kt $CO_{2\text{-}e}$ emissions covered in BoP RETA sites

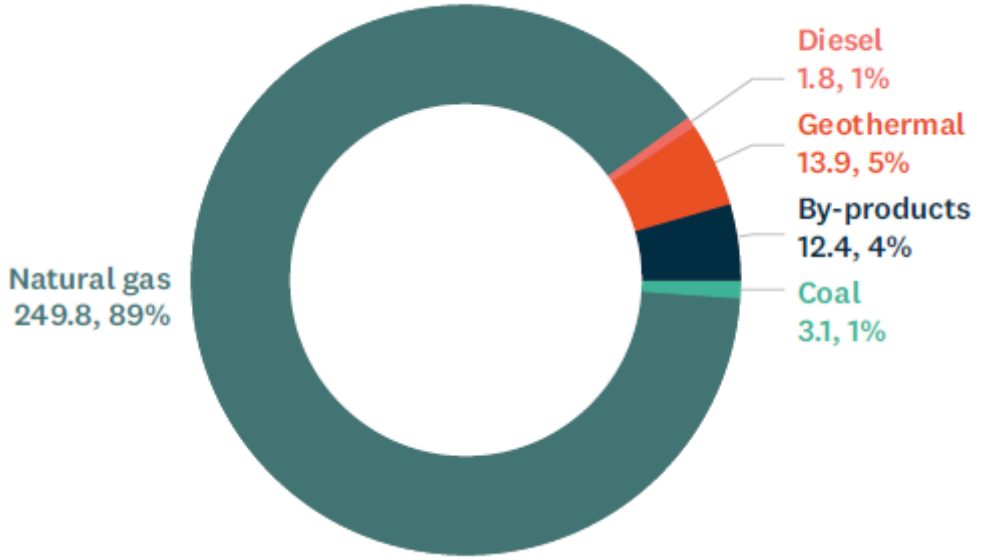
Source: Stats NZ, regional greenhouse gas emissions.

BoP RETA boundary and sites

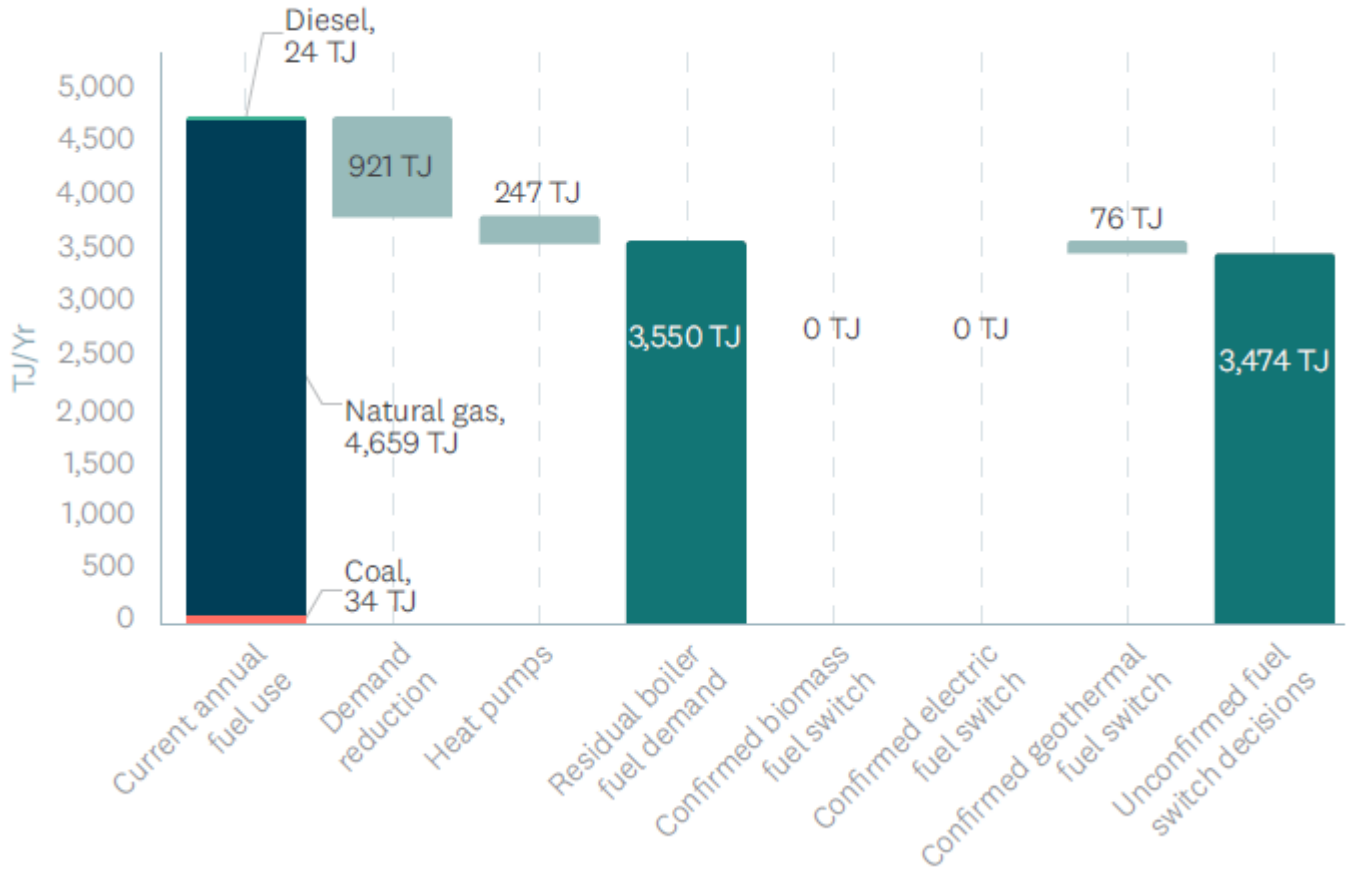


BoP RETA energy use and emissions



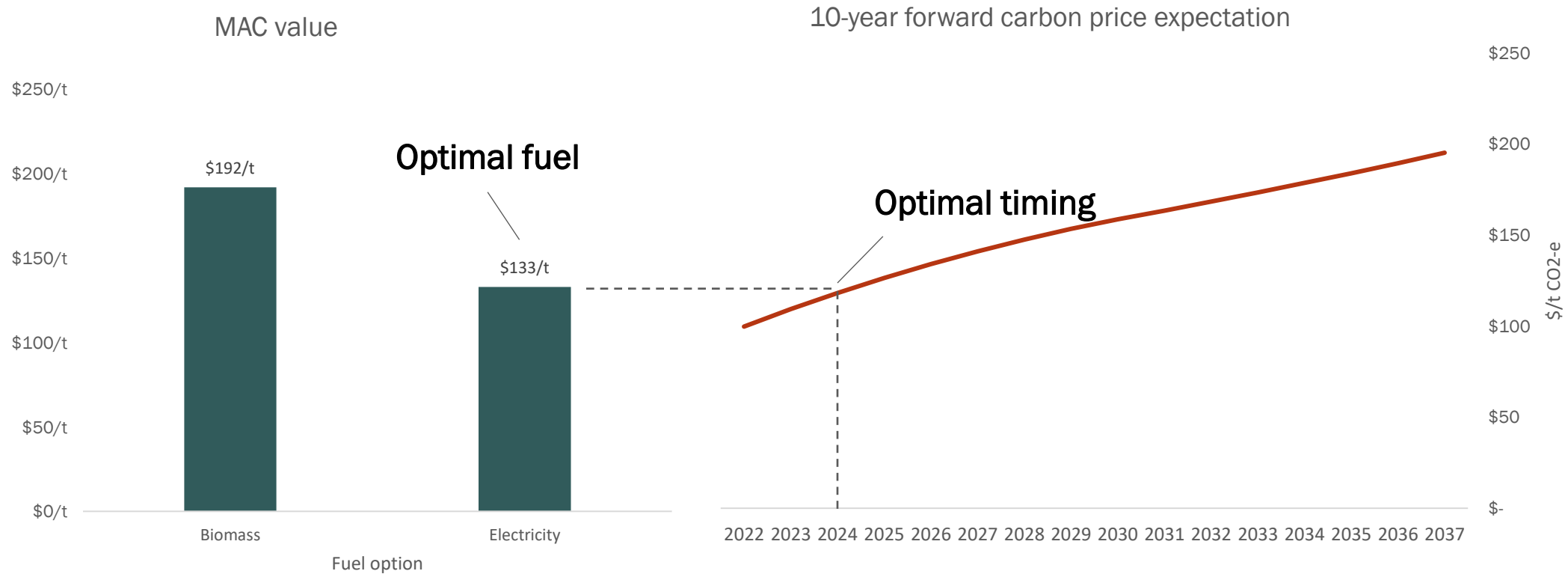


BoP RETA impact of identified demand reduction



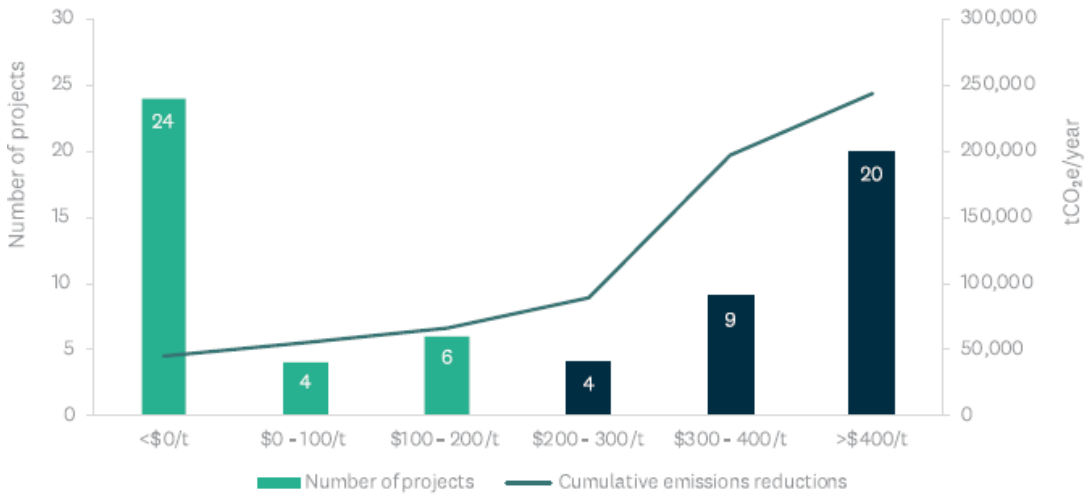
EECA

Carbon price-based decision making

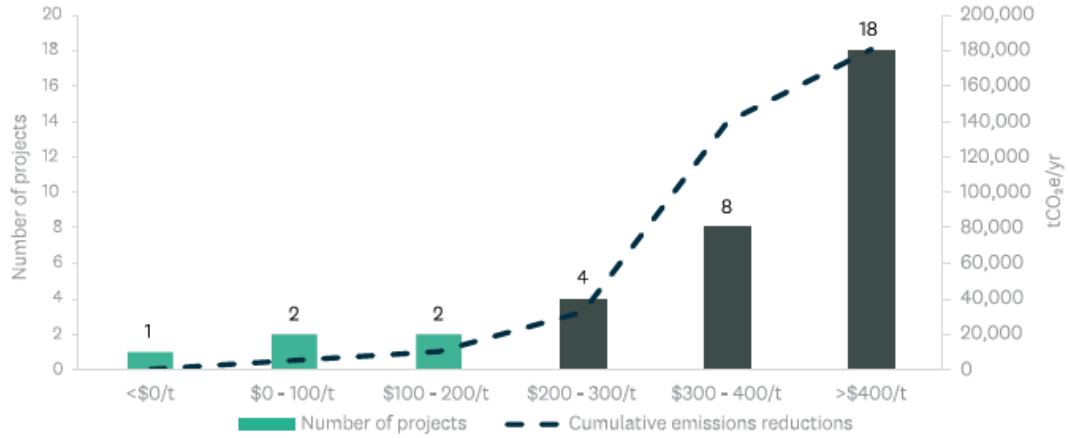


EECA

Project economics with MAC values



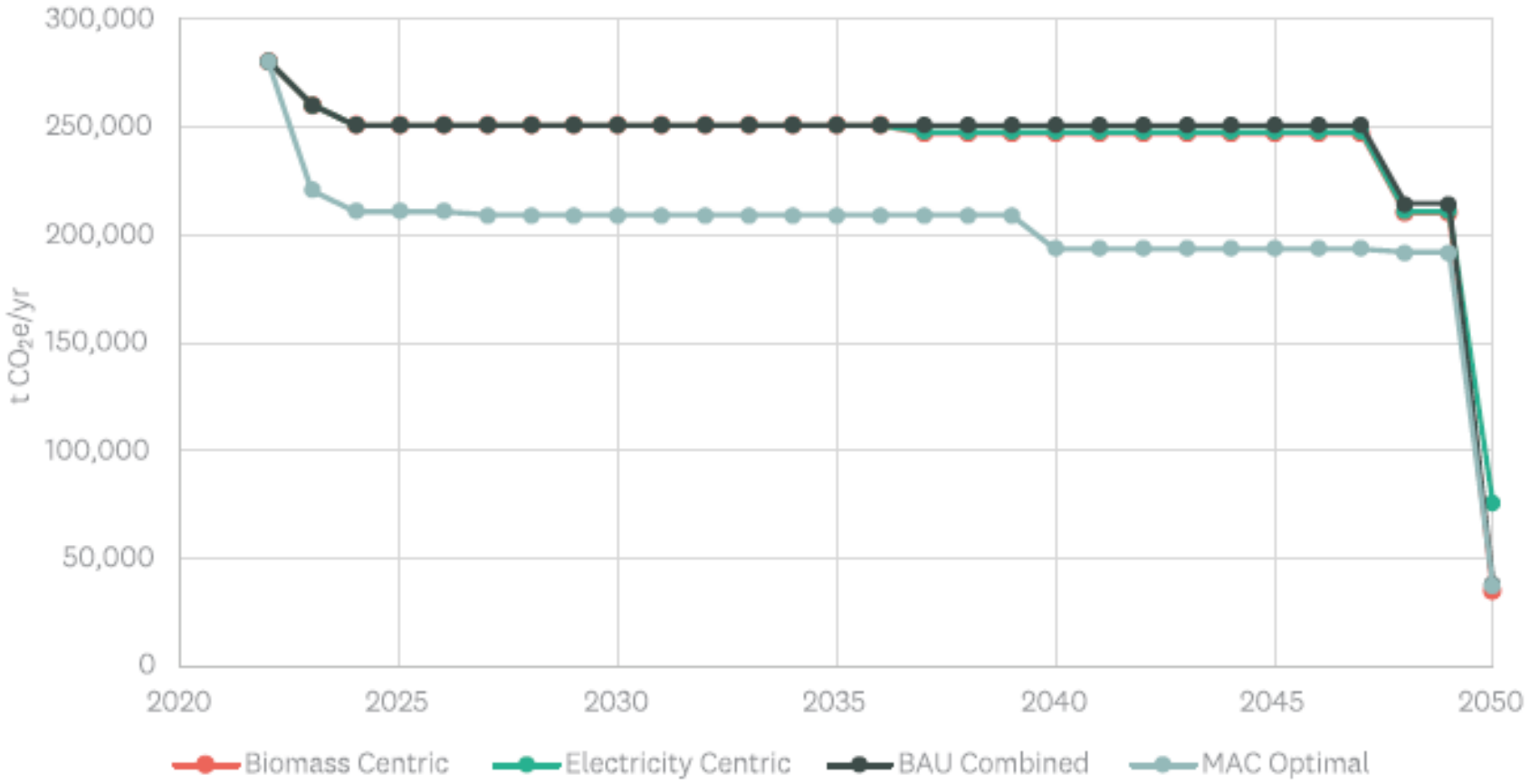
ALL PROJECTS



FUEL SWITCHING PROJECTS

EECA

Bay of Plenty emissions reduction pathway



BoP Geothermal Workstream

GNS Science

EECA

Acknowledgement

GNS Science Team

Brian Carey

Celia Wells

Samantha Alcaraz

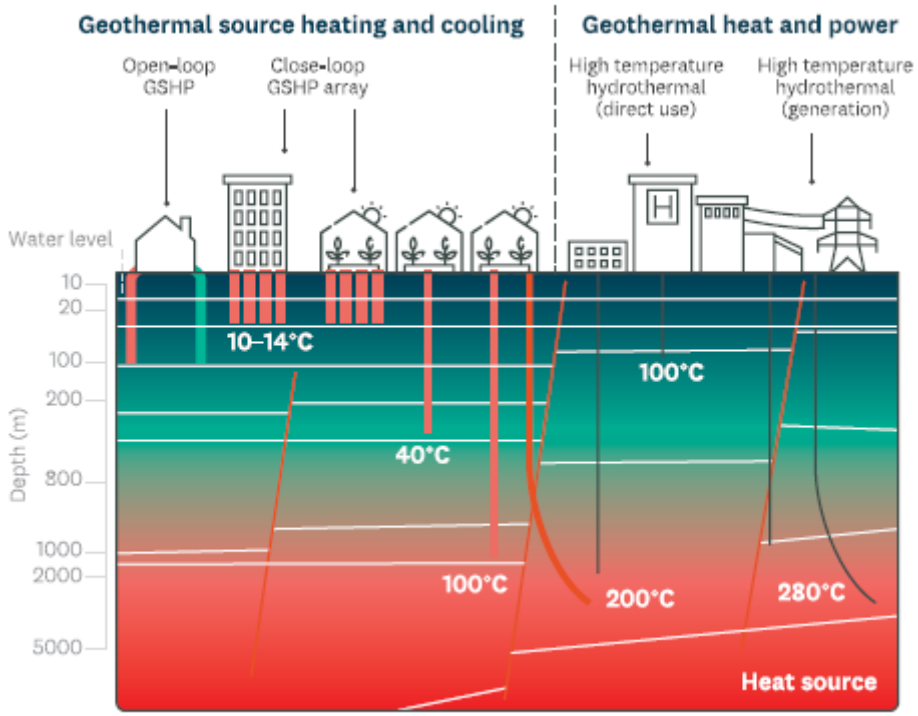
GNS Collaborators

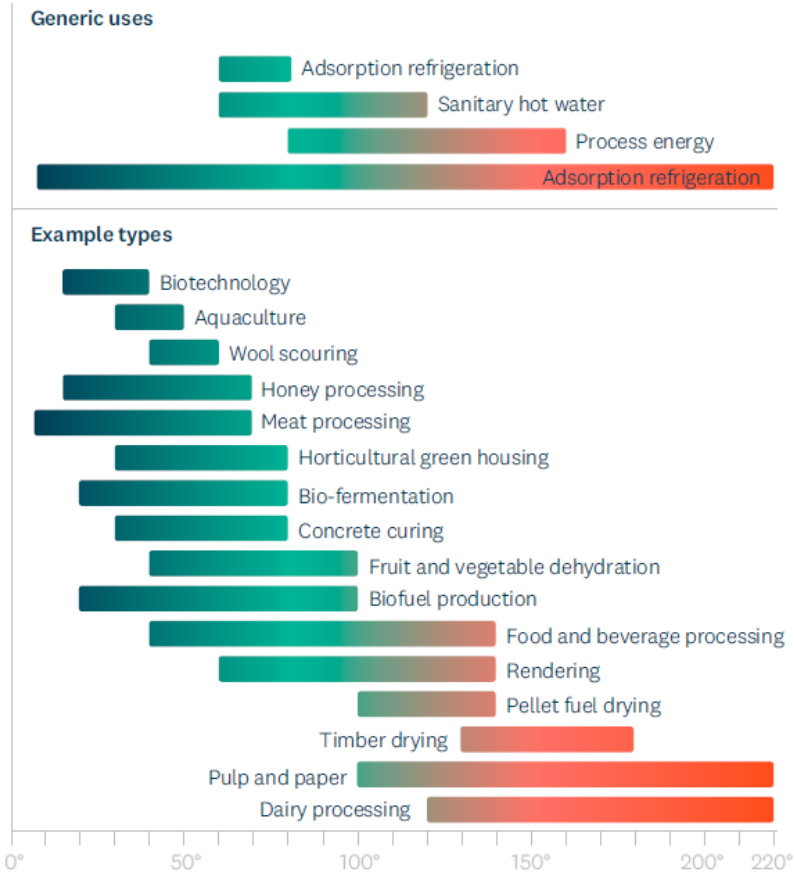
Yale Carden
GeoExchange Ltd

Greg Moore
Dobbie Engineers

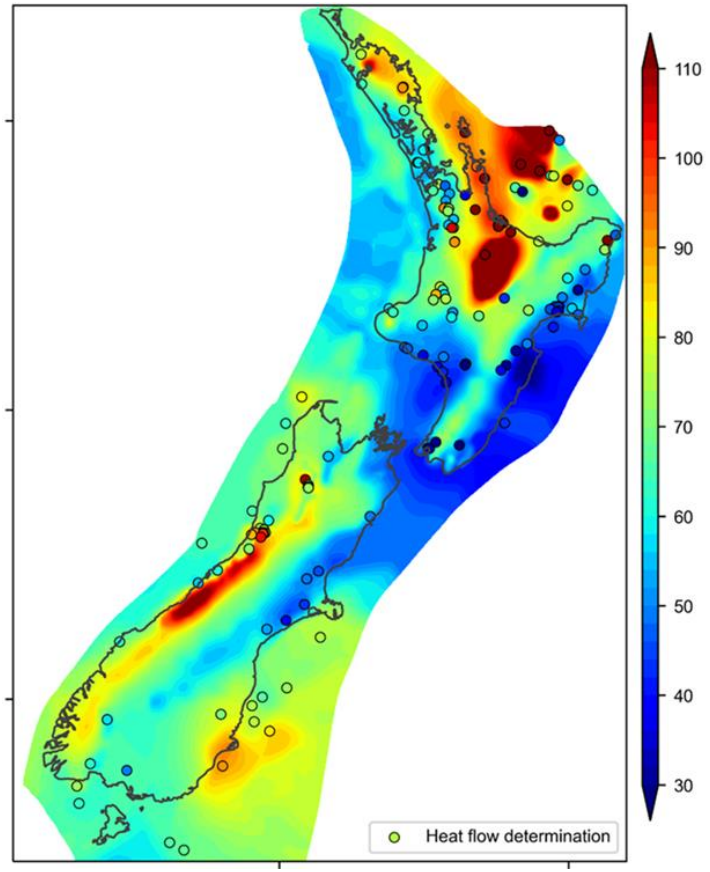
EECA

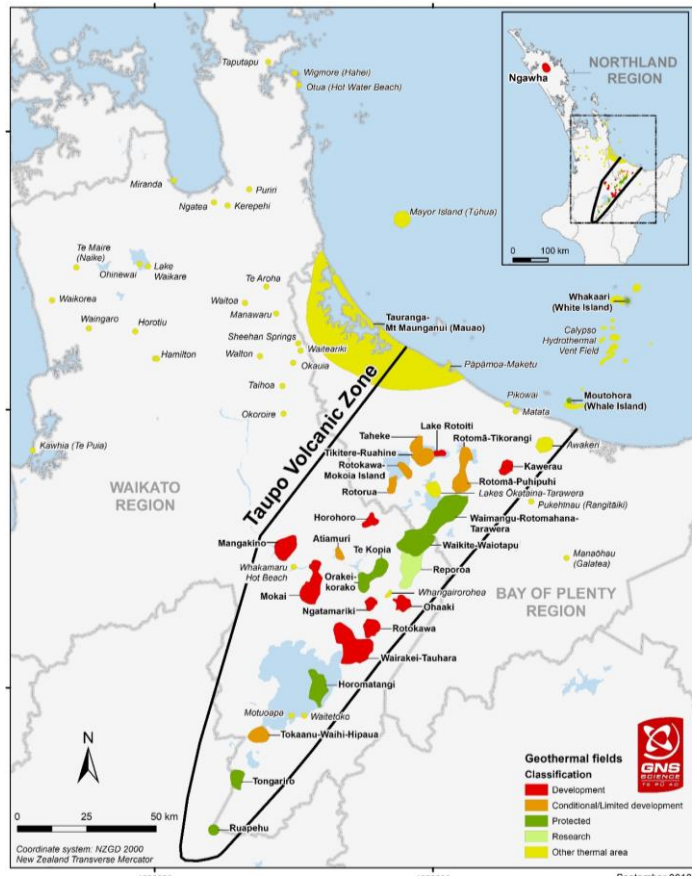
Geothermal for process heat

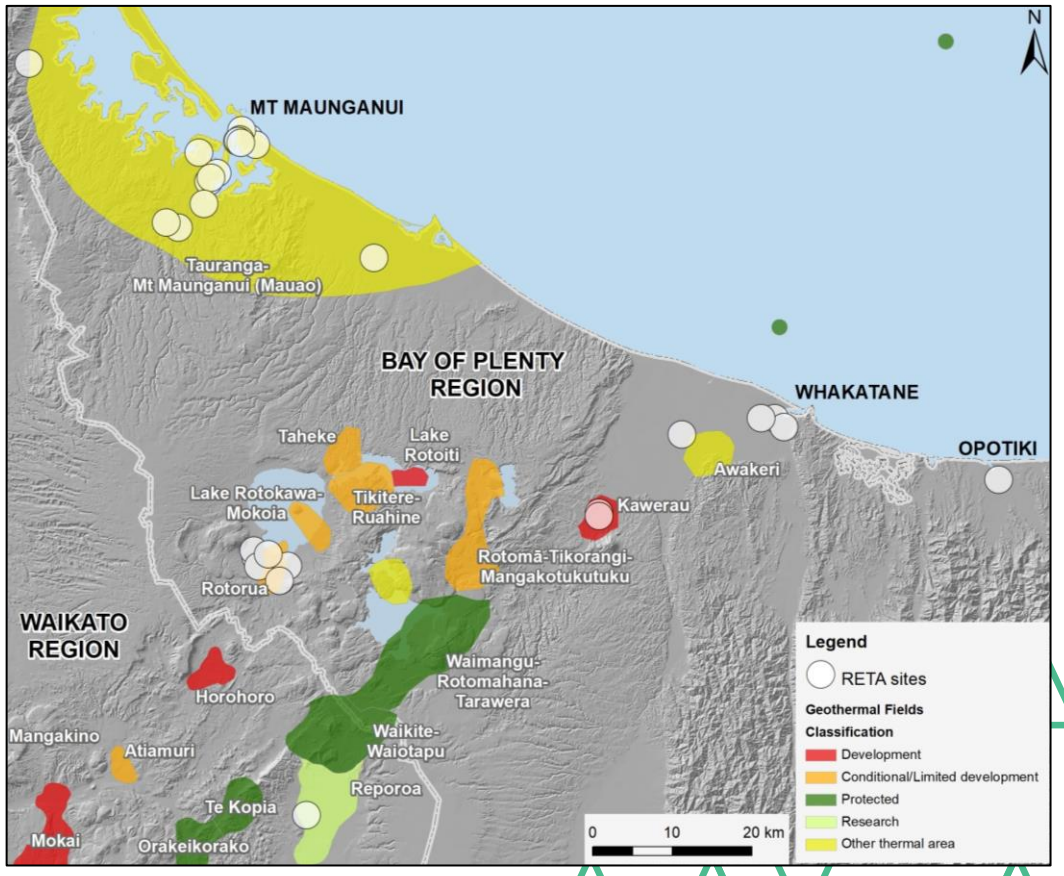




Mapping supply and demand







EECA

Key opportunities

Kawarau

- Already key contributor to low carbon process heat in BoP
- Still plenty available: 6PJ p.a. @ ~170°C

Reporoa

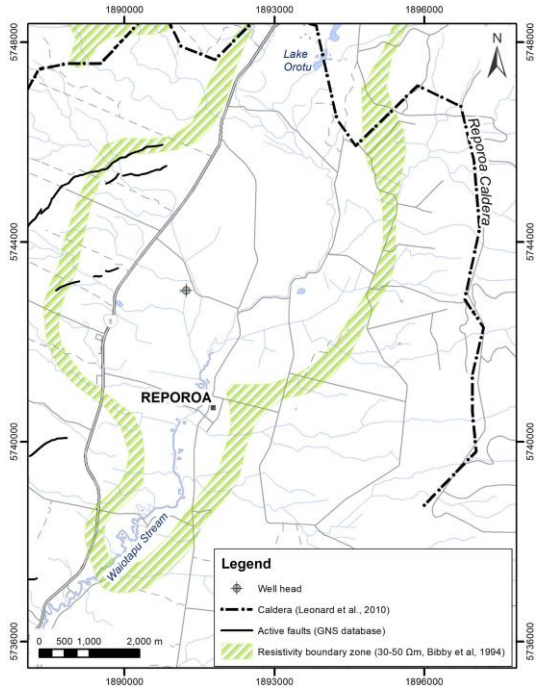
- Geothermal potential exists circa 260°C
- Exploratory activity required for development (est $18.5m)
- Plan change to facilitate extraction would be required

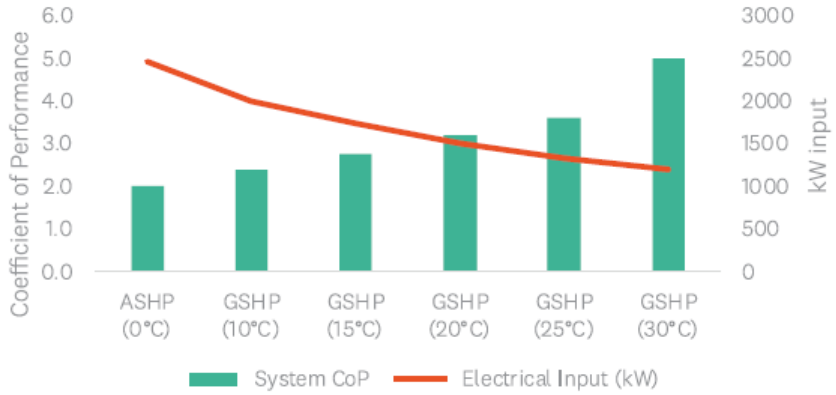
Mount Maunganui

- Geothermally enhanced aquifier
- Concentration of process heat demands – DES opportunity

Low temp Aquifers and GSHP's

- Increased efficiency over airsource, though increased capital
- 'Geothermally enhanced' enhances performance and options
- Significant number of examples in Christchurch





EECA

Four ‘case study’ sites

Whakatane Growers (heating)

- Low temp Matahina aquifers with GSHP
- Replace coal/gas boilers, abate ~3,700 t CO_2 p.a.
- 35.2 TJ/yr

Whakatane Hospital (Heatng and cooling)

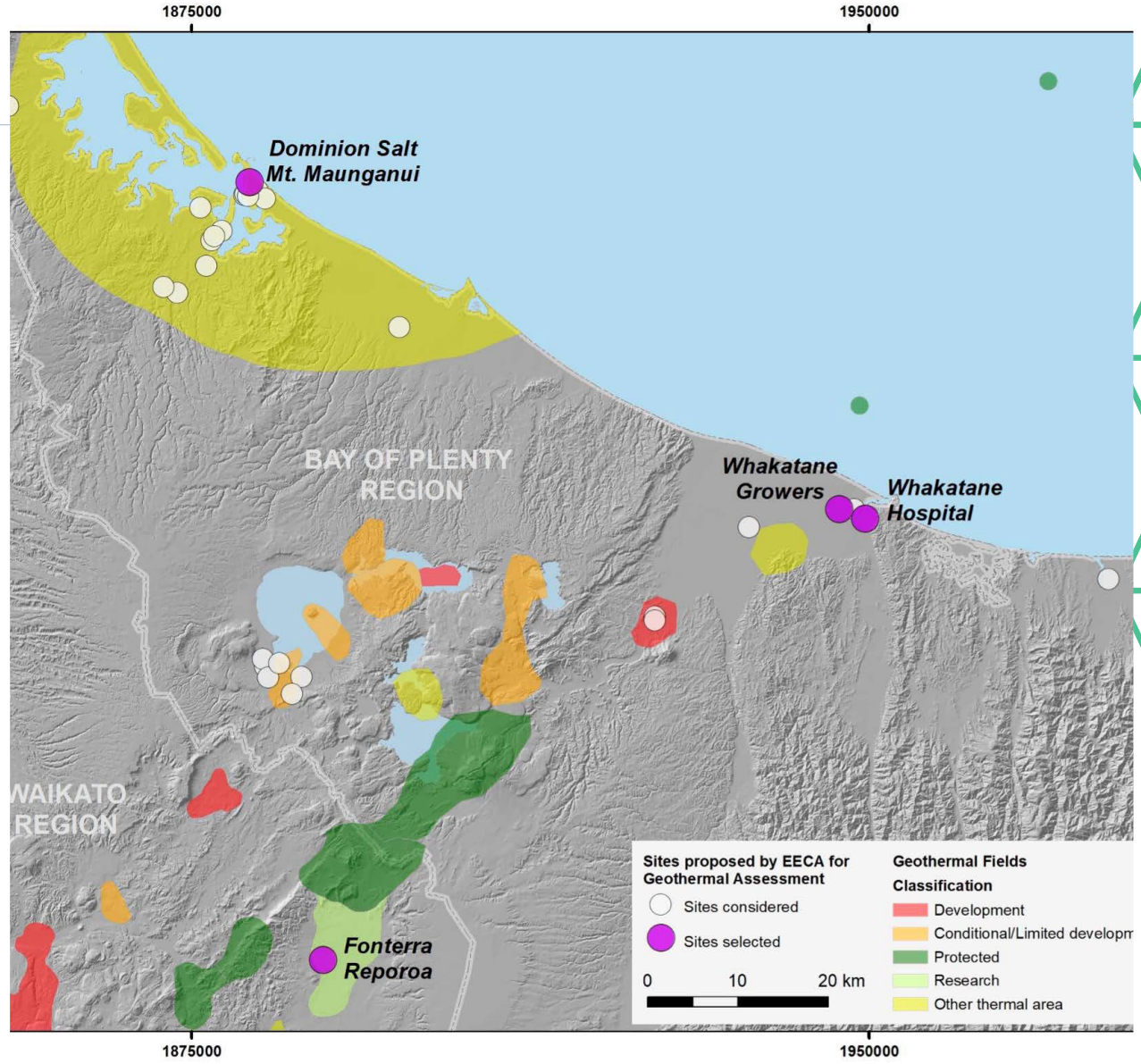
- Low temp Matahina aquifers with sync H&C GSHP
- Replace coal/gas boilers, abate ~210 t CO2 p.a.
- 17.1 TJ/yr

Dominion Salt (Mt Maunganui)

- Low temp Matahina aquifers with GSHP
- Replace coal/gas boilers, abate ~3,700 t CO2 p.a.
- 20.7 TJ/yr

Fonterra Reporoa

- Geothermal generated steam 14 barg (198ºC)
- Replace Significant portion of gas boiler demand
- 266.9 TJ/yr

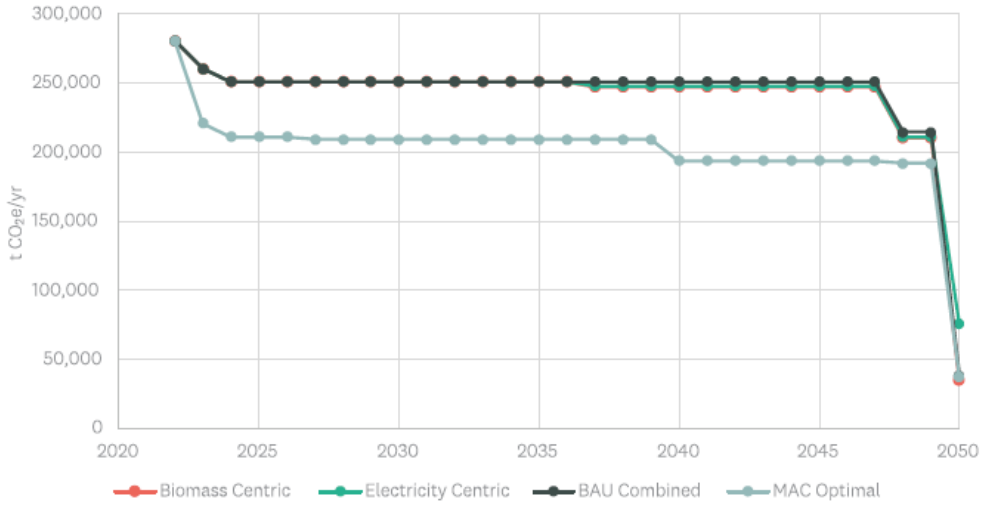


Geothermal Insights and Recommendations

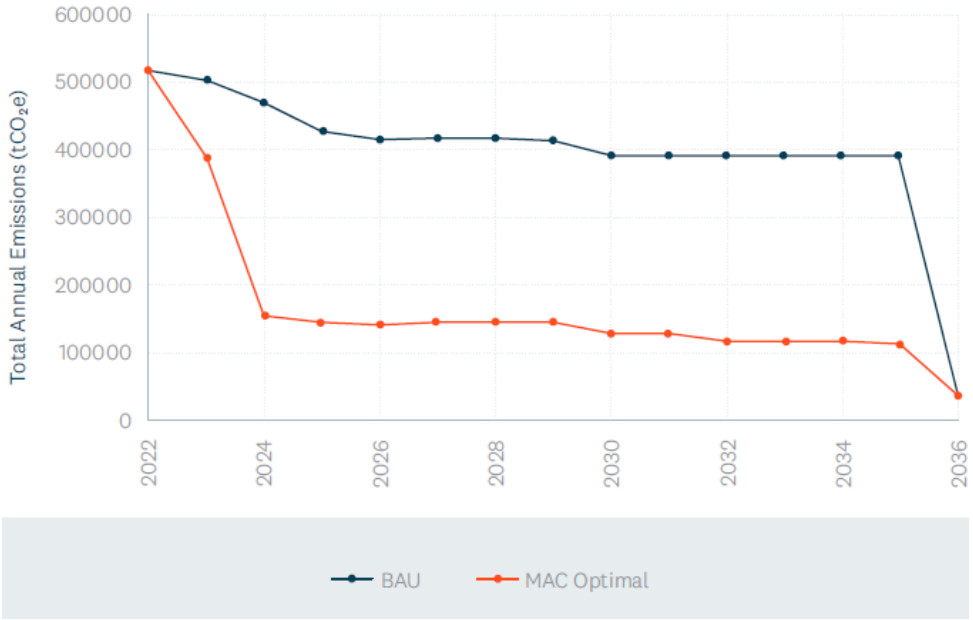
- **More case studies** should be conducted and evaluated to highlight opportunities for low temperature geothermal around the country.
- Pairing **ground-source heat pumps** (GSHP) and high temperature GSHP with low temperature resource should be included in regional economic strategies.
- Funding should be pursued for the exploratory activity necessary to **enable the Reporoa Geothermal Field** to be further investigated as an energy source for industrial use.
- **National guidance on consenting process and subsurface management** for GSHP low temperature geothermal technologies should be commissioned.
- **More economic analysis** should be undertaken on the opportunities for co-location or shared investment of geothermal deep wells, heat transportation over extended distances, and GSHP district infrastructure in New Zealand.
- **A drilling insurance scheme**, similar to the French model, should be investigated for New Zealand to de-risk geothermal applications and accelerate decarbonisation targets.

Bend the BoP curve?

Accelerate the optimal pathway



Bay of Plenty



Mid-South Canterbury

Gas is decreasing and increasingly uncertain

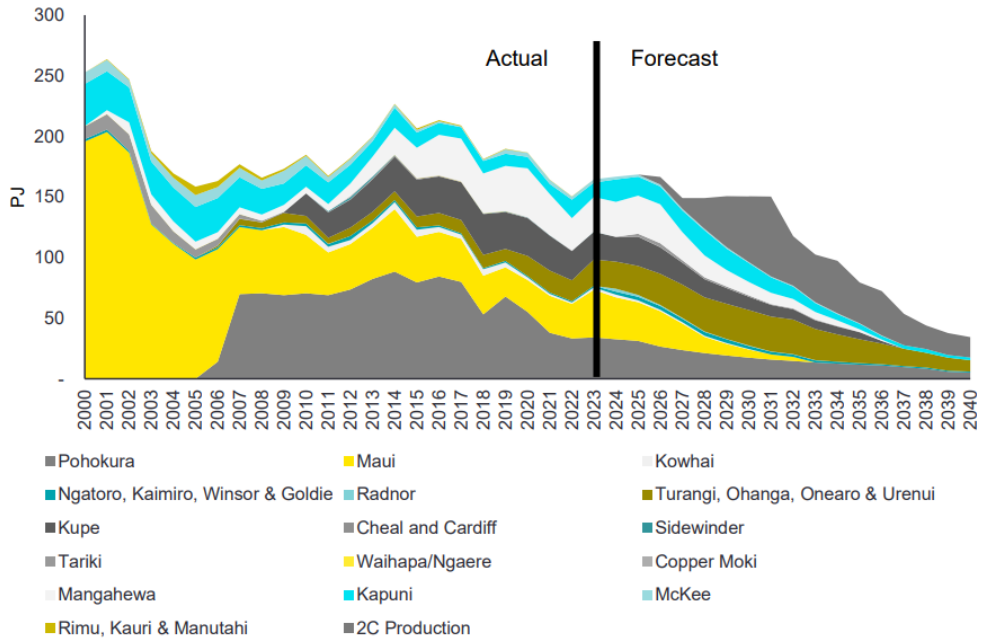
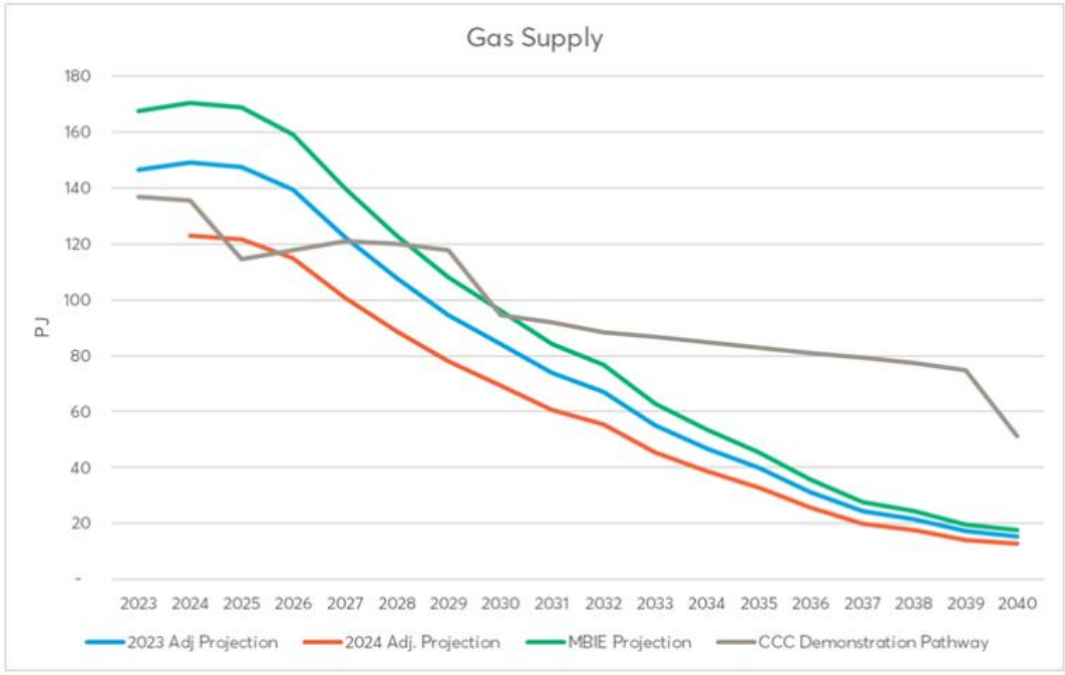


Figure 29: Unconstrained gas supply forecast

Source: Ernst & Young Gas Supply and Demand Study December 2023,



Source: Gas Industry Co Quarterly Update, April 2024

EECA

Alternative sources of gas will be more expensive

EY report modelled future gas prices under four different supply and demand scenarios.

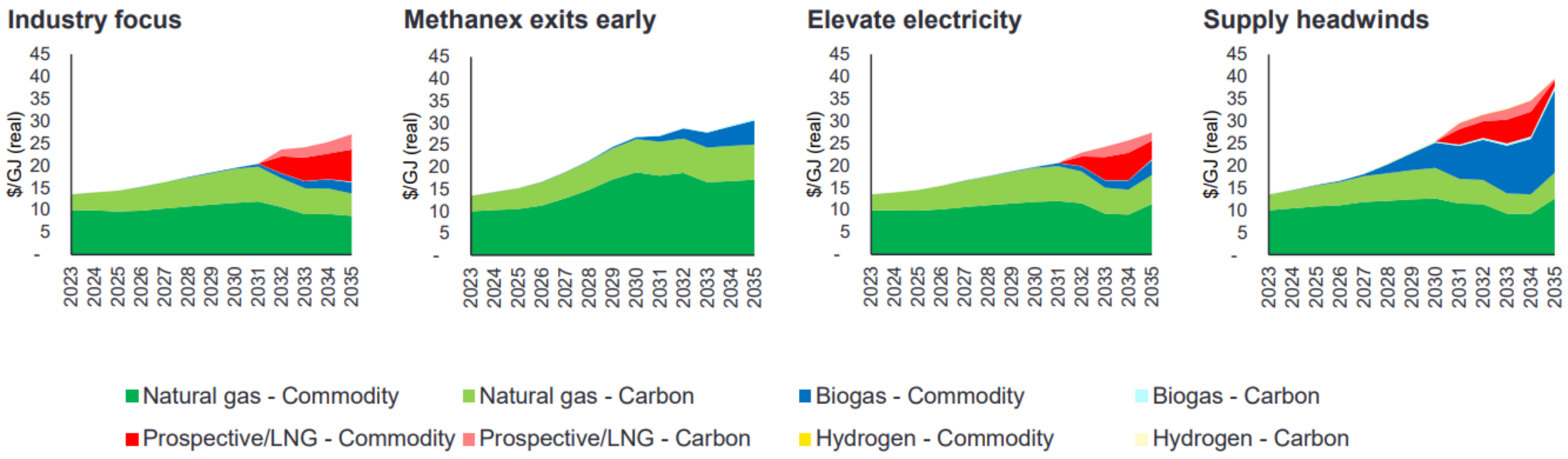


Figure 46: Fuel costs

Energy-weighted average price (bottom row) in each scenario

Figures source: Ernst & Young Gas Supply and Demand Study December 2023,

Opportunities to accelerate BoP

- Gas constraints and prices are starting to bite
- Other global drivers – foreign markets, overseas ownership
- Regulation – National direction on GHG emissions form industrial process heat
- Biomass industry development
    - scale and residue recovery optimisation
    - E-Grade (‘Energy Log”) opportunity
    - Geothermal biomass drying
- Demand flexibility and integrated solutions
    - Favourable energy pricing
    - Increased resilience
    - Other revenue streams
- Industry collaboration to progress geothermal opportunities
- EECA targeted support – de-risk first movers and promote replication:
    - Technology Demonstration Fund
    - Process heat demand flex pilots
    - Geothermally enhanced HTHP pilots

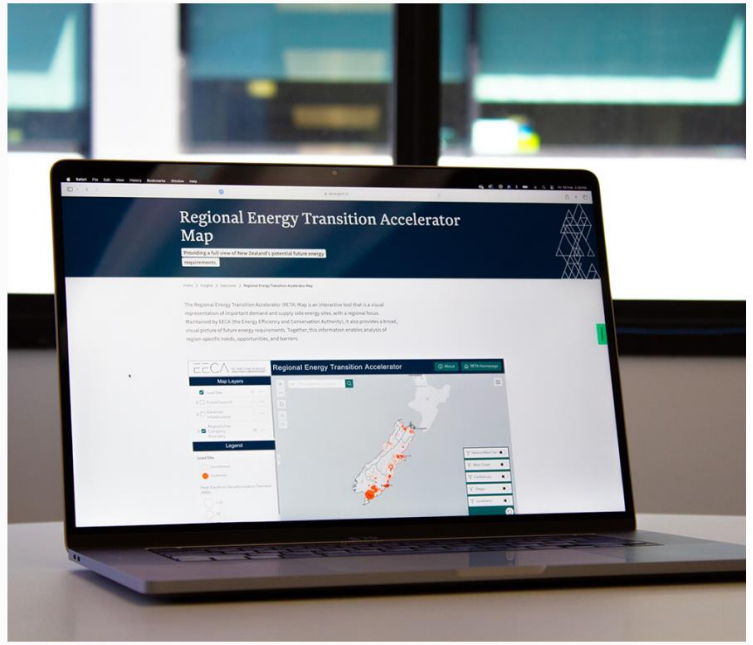
Reports and GIS maps

Read the report

Download the Bay of Plenty RETA report and discover the regional benefits of decarbonisation.

- Read the summary report [PDF 3.4 MB]
- Spare Electrical Capacity and Load Characteristics [PDF 17 MB]
- Supplementary Electricity Information [PDF 14 MB]
- Bay Of Plenty Geothermal Assessment [PDF 14 MB]

DOWNLOAD THE FULL REPORT [PDF 17 MB]



EECA

Glenn Wellington

Manager Market Partnerships, EECA

Em: Glenn.Wellington@eeca.govt.nz

Mb: 021 754 256

Oliver Howitt

RETA Programme Lead, EECA

Em: Oliver.howitt@eeca.govt.nz

Em: RETA@eeca.govt.nz

DDI: 04 470 2243

EECA

Questions/Pātai