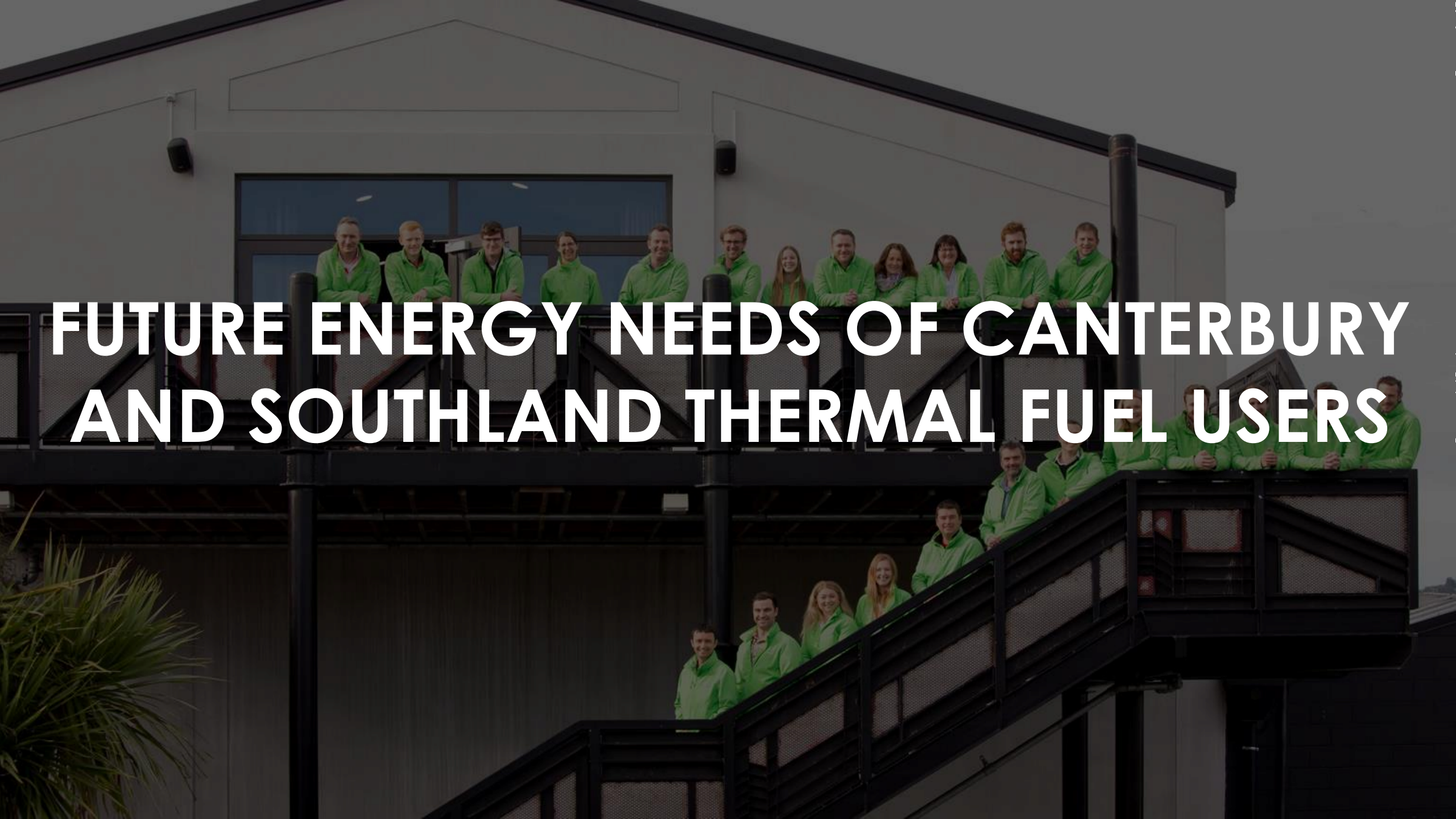


FUTURE ENERGY NEEDS OF CANTERBURY AND SOUTHLAND THERMAL FUEL USERS

Welcome and Introduction

- Andrew Caseley
- Energy Efficiency and Conservation Authority
- Chief Executive

Key learnings from research being undertaken
Where are we now? Where are we heading?
What are the barriers?

- Jonathan Pooch
- DETA Consulting
- Managing Director

Project Partners:

EECA
TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

TRANSPOWER

EA networks
connecting our community

Orion

PowerNet

Collaborating EDBs:

networktasman
Your consumer-owned electricity distributor

Aurora
ENERGY

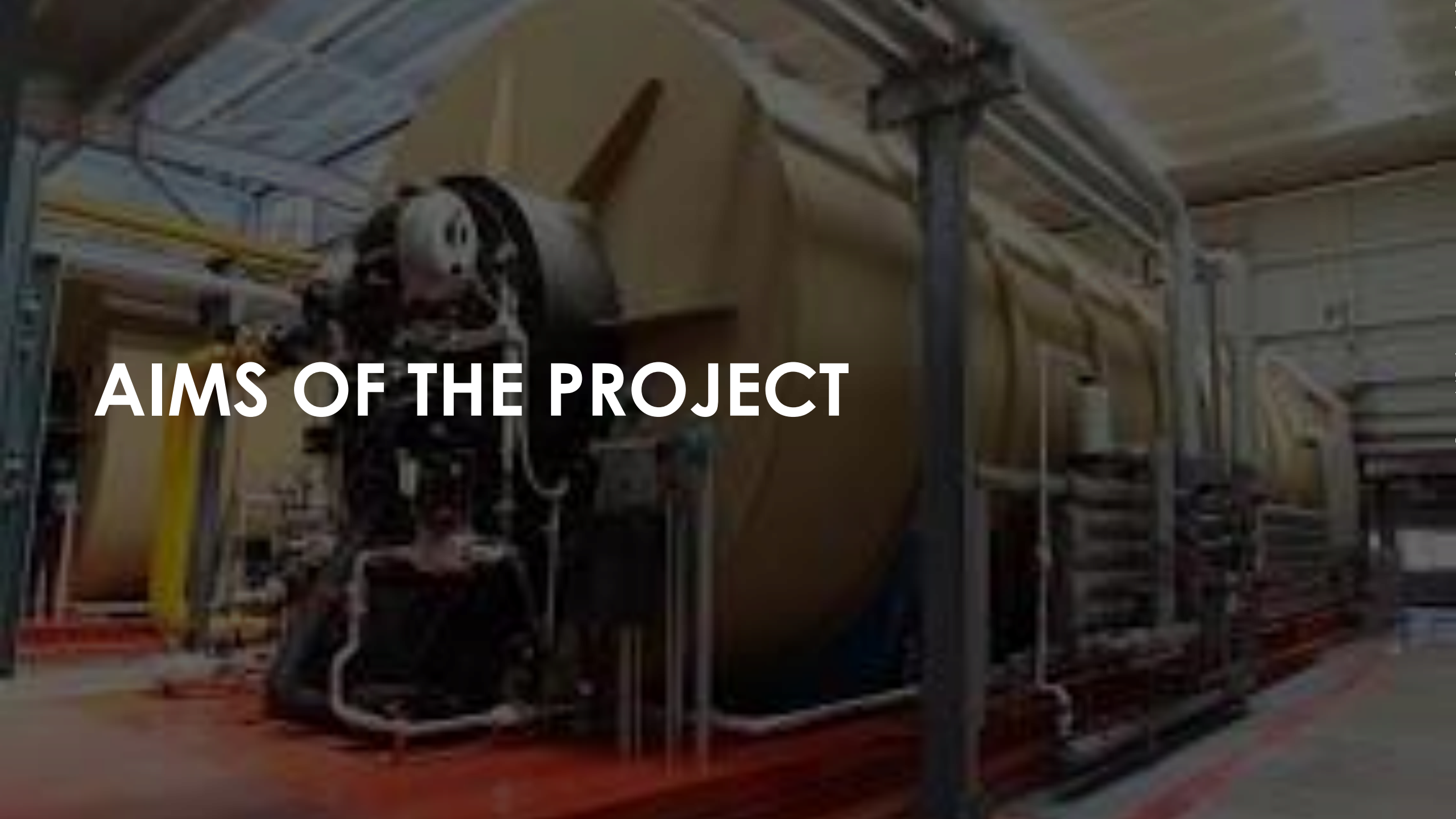
Alpine
ENERGY

Network
Waitaki

Consultants:

ahikā

emsol
Making Energy Saving Easy



AIMS OF THE PROJECT

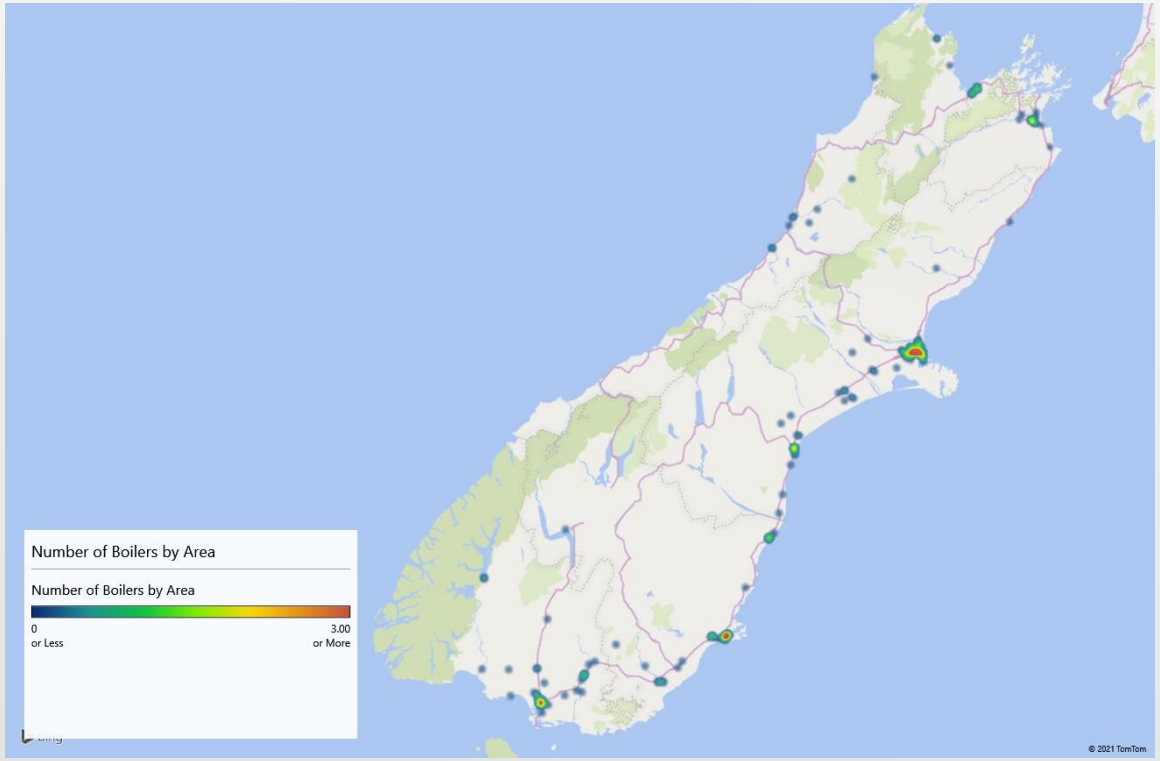
Aim:

- Better understand the likely decarbonisation technology solutions (with specific focus on fuel switching opportunities) at the sites of interest
- Better understand the current timeframe for decarbonisation (if applicable)
- Undertake a high-level assessment on possible implications on the future energy market
- Asses what incentives or assistance might be needed to increase the pace of decarbonisation

WHERE ARE WE STARTING FROM?

Selection Criteria:

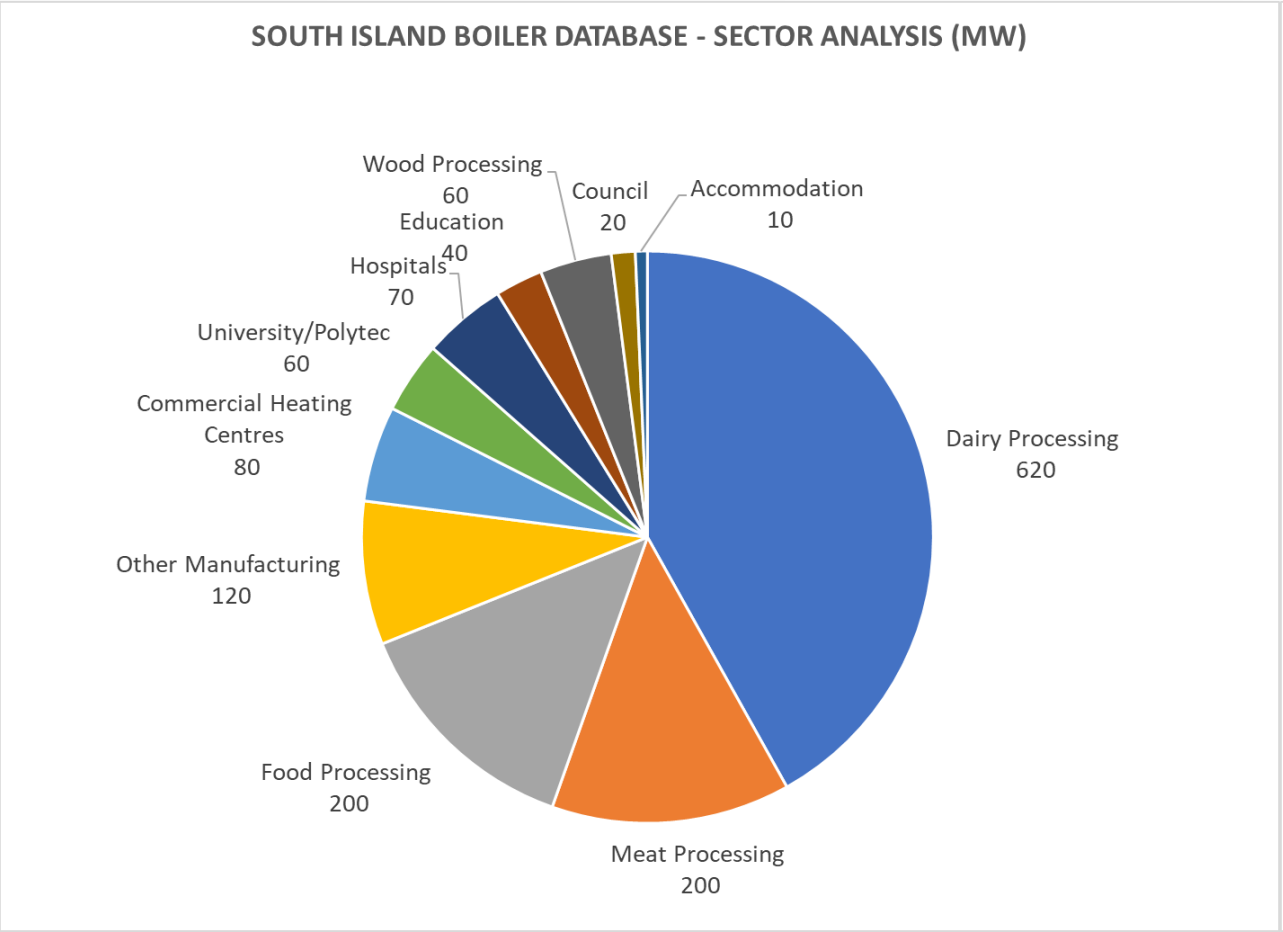
- System capacity of >500kW
- Includes renewable (wood and electricity) and non-renewable (coal, LPG, diesel, etc) fuels

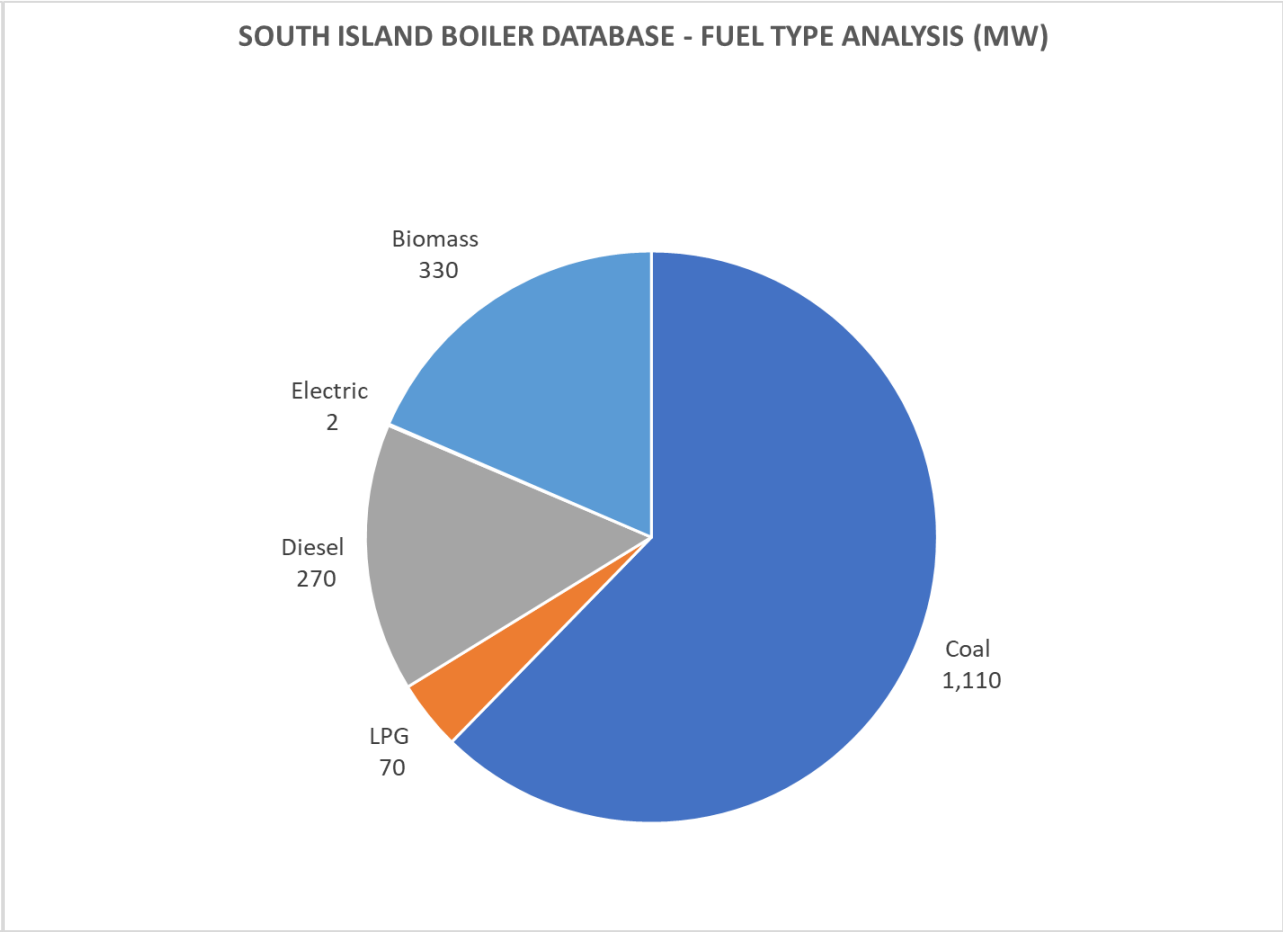


Boiler Database Summary:

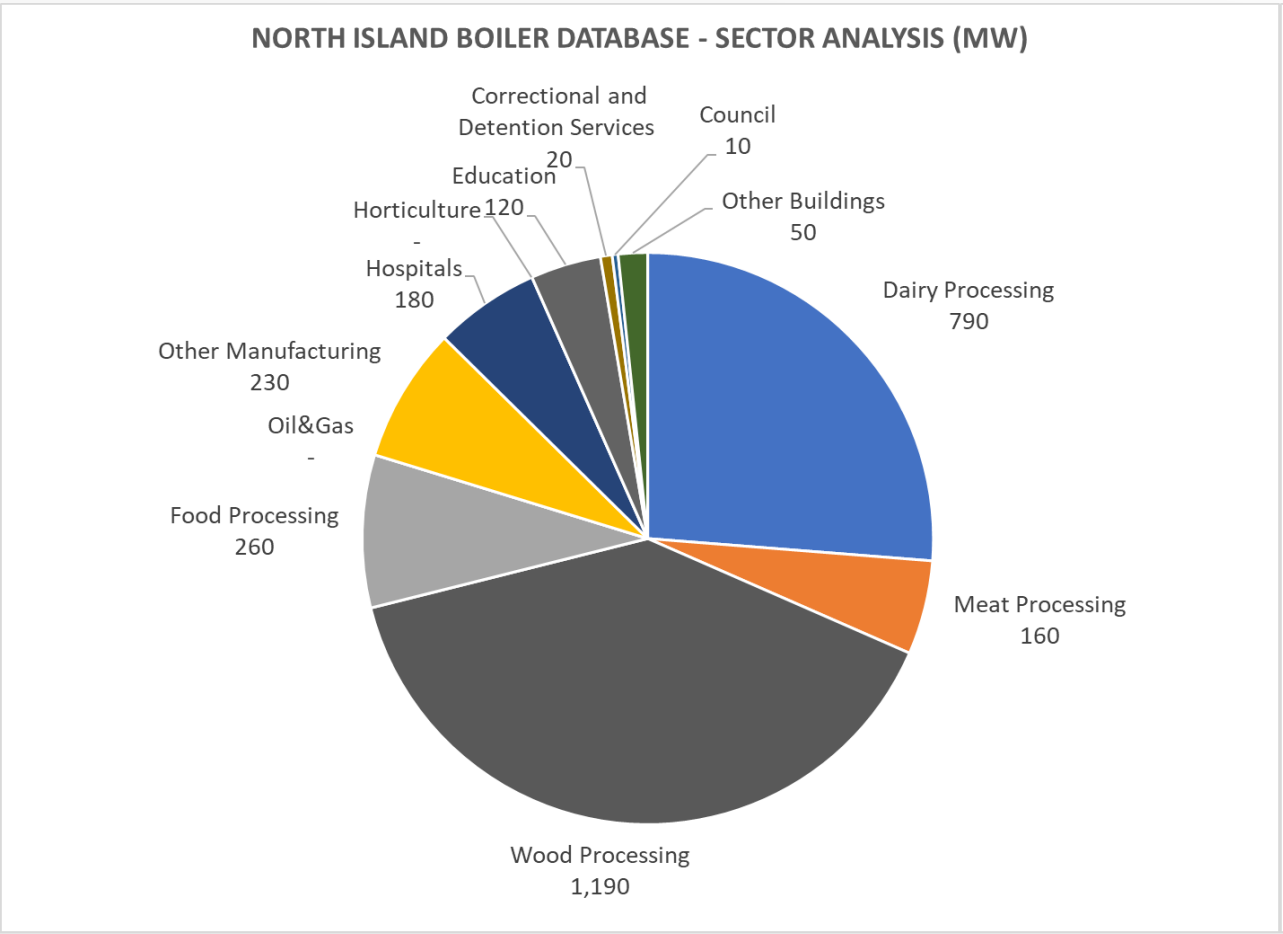
	South Island	North Island	TOTAL
# Systems Identified	437	735	1172
Discrete Sites	304	352	656
Discrete Organisations	226	183	409
TOTAL INSTALLED CAPACITY	**1,800 MW**	**3,025 MW**	**4,825 MW**
Renewable Systems	69	40	109
Renewable Capacity	343 MW	1,031 MW	1,374 MW
Non-Renewable Systems	368	695	1,063
NON-RENEWABLE CAPACITY	**1,460 MW**	**1,995 MW**	**3,455 MW**
INDICATIVE Annual CO_2 Emissions	**3,860 kT CO_2 p.a.**	**3,990 kT CO_2 p.a.**	**7,850 kT CO_2 p.a.**

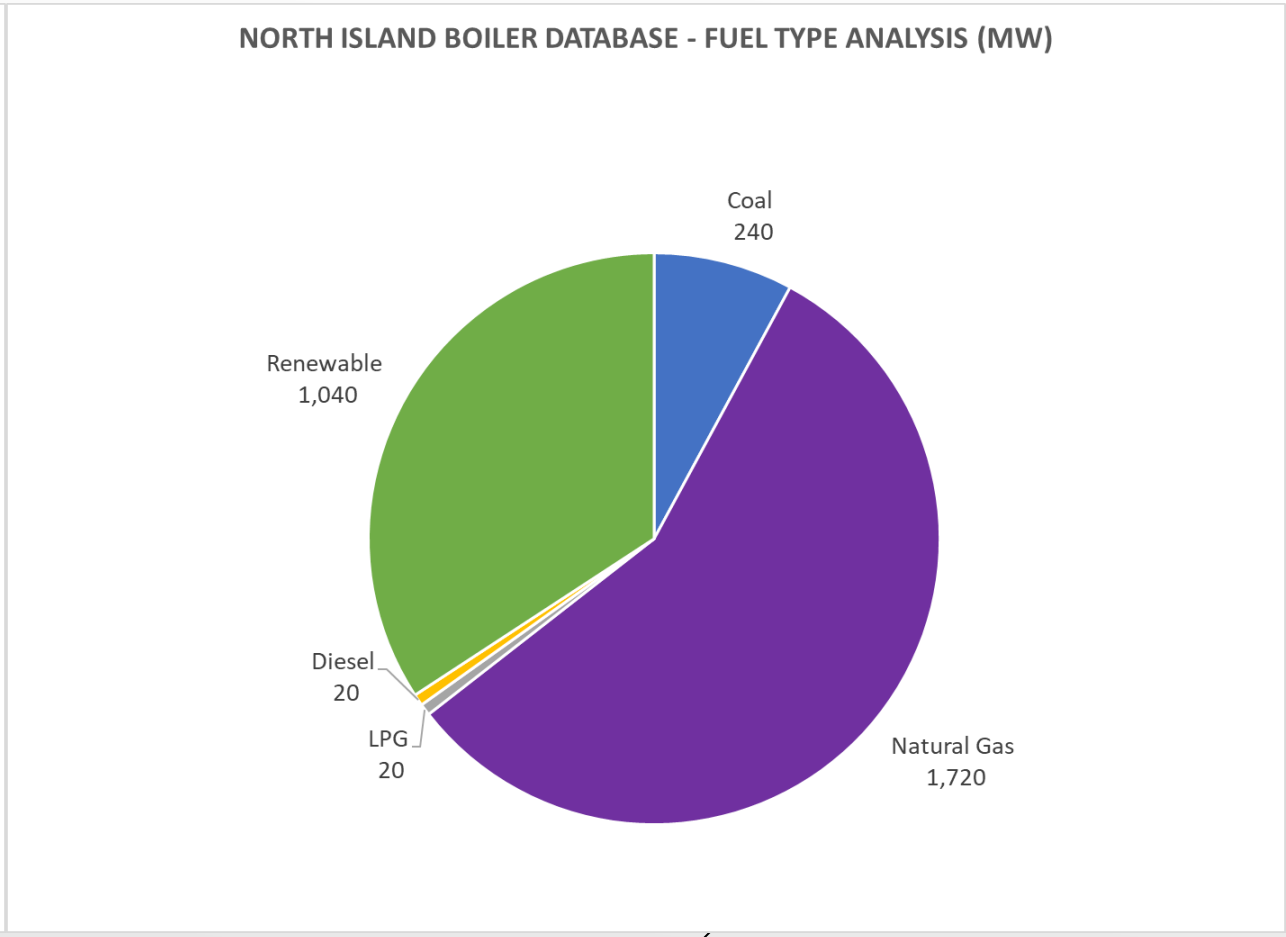
Breakdown of South Island sites:





Breakdown of North Island sites:





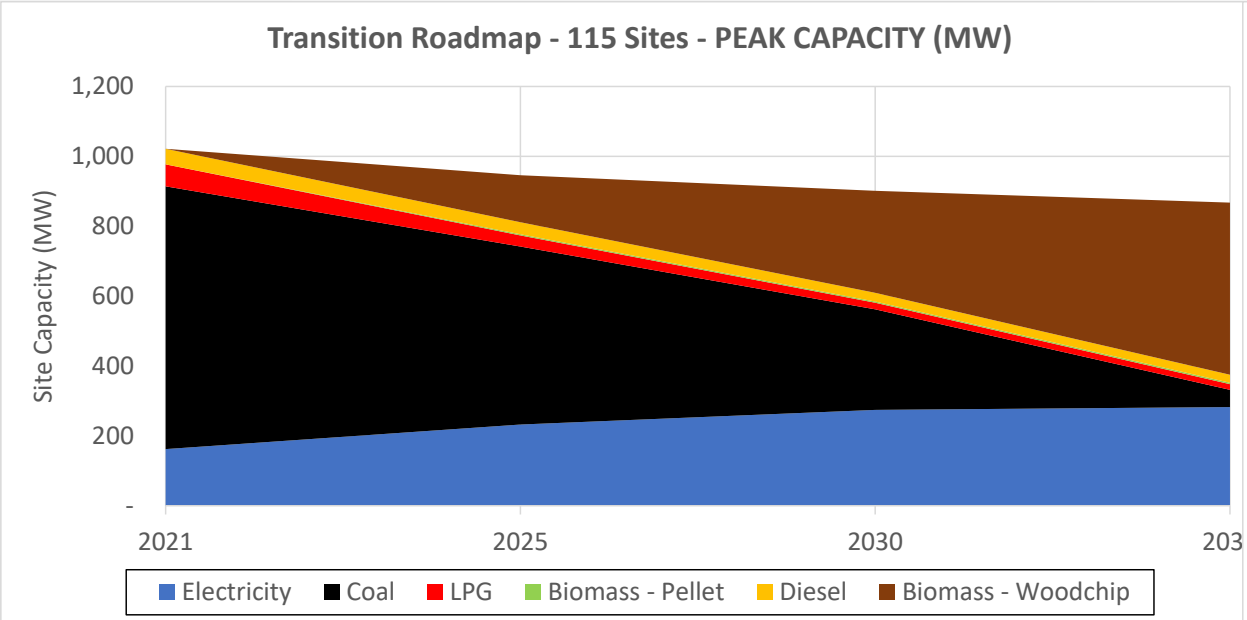
WHAT ARE END USERS PLANNING?

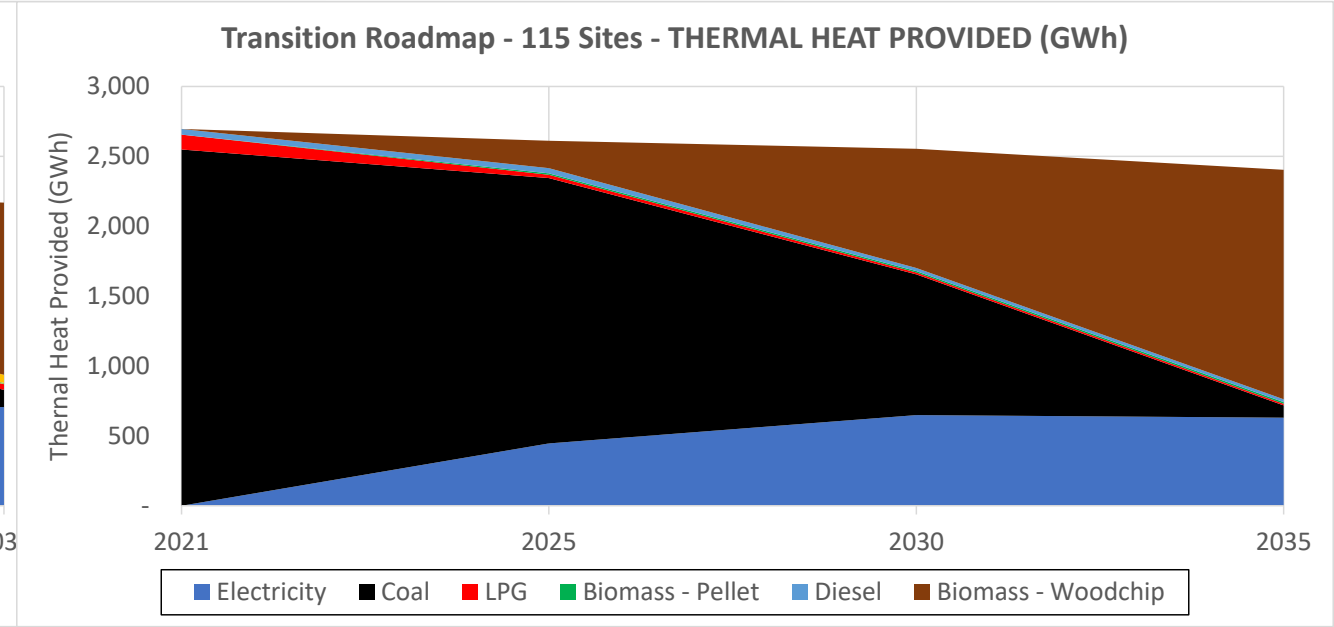
What are end users planning?

- Planning to undertake phone and site interviews with ALL end users
- Primary immediate focus has been:
  - PowerNet (Southland/Otago)
  - Alpine Energy (South Canterbury)
  - Electricity Ashburton (Canterbury)
  - Orion (Canterbury)
- Currently rolling out with:
  - Aurora (Dunedin/Otago)
  - Network Waitaki (North Otago)
  - Network Tasman (Nelson/Tasman)

THE BASELINE – What the 115 sites interviewed have told us they are planning…

- BIOMASS is the dominant renewable fuel of choice
- Electricity is less favoured due to supply/distribution costs and operating costs





- NOTE – this is a snapshot in time as at 10th September 2021.

THE BASELINE – End User Intentions:

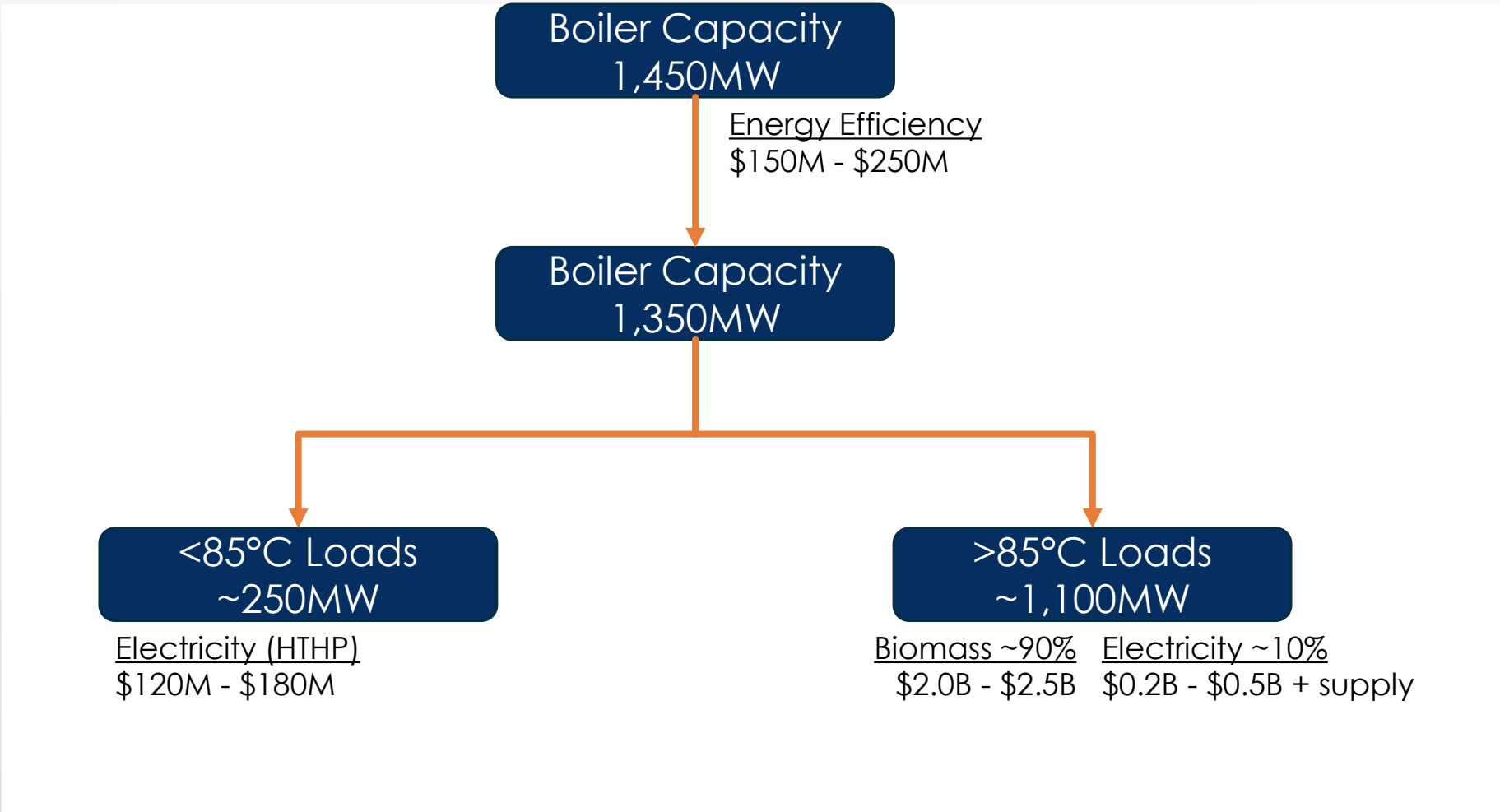
- The baseline transition in the next 15 years (what the sites have told us)…

	PowerNet	Orion	Alpine Energy
# Systems assessed	41	53	19
Electricity Input	+60MW Energy demand[1]: 227 GWh Delivered heat[1]: 340 GWh (~29% of peak load)	+53MW Energy demand[1]: 123 GWh Delivered heat[1]: 160 GWh (~8% of peak load)	+23MW Energy demand[1]: 60 GWh Delivered heat[1]: 150 GWh (~16% of peak load)
Biomass Capacity	+210MW Energy demand[1]: 1,070 GWh Delivered heat[1]: 850 GWh (~13% of Southland and Otago annual forest harvest)	+165MW Energy demand[1]: 740 GWh Delivered heat[1]: 590 GWh (~10% of Canterbury annual forest harvest)	+185 MW Energy demand[1]: 1,020 GWh Delivered heat[1]: 810 GWh (~14% of Canterbury annual forest harvest)
Overall Reduction	**>450 $ktCO_2$ p.a. ~87%**	**>290 $ktCO_2$ p.a. ~91%**	**>400 $ktCO_2$ p.a. ~90%**
% of NZ Manufacturing Emissions	**~9.5%**	**~6.0%**	**~8.6%**
% of NZ's TOTAL Carbon Emissions	**~1.2%**	**~0.8%**	**~1.1%**

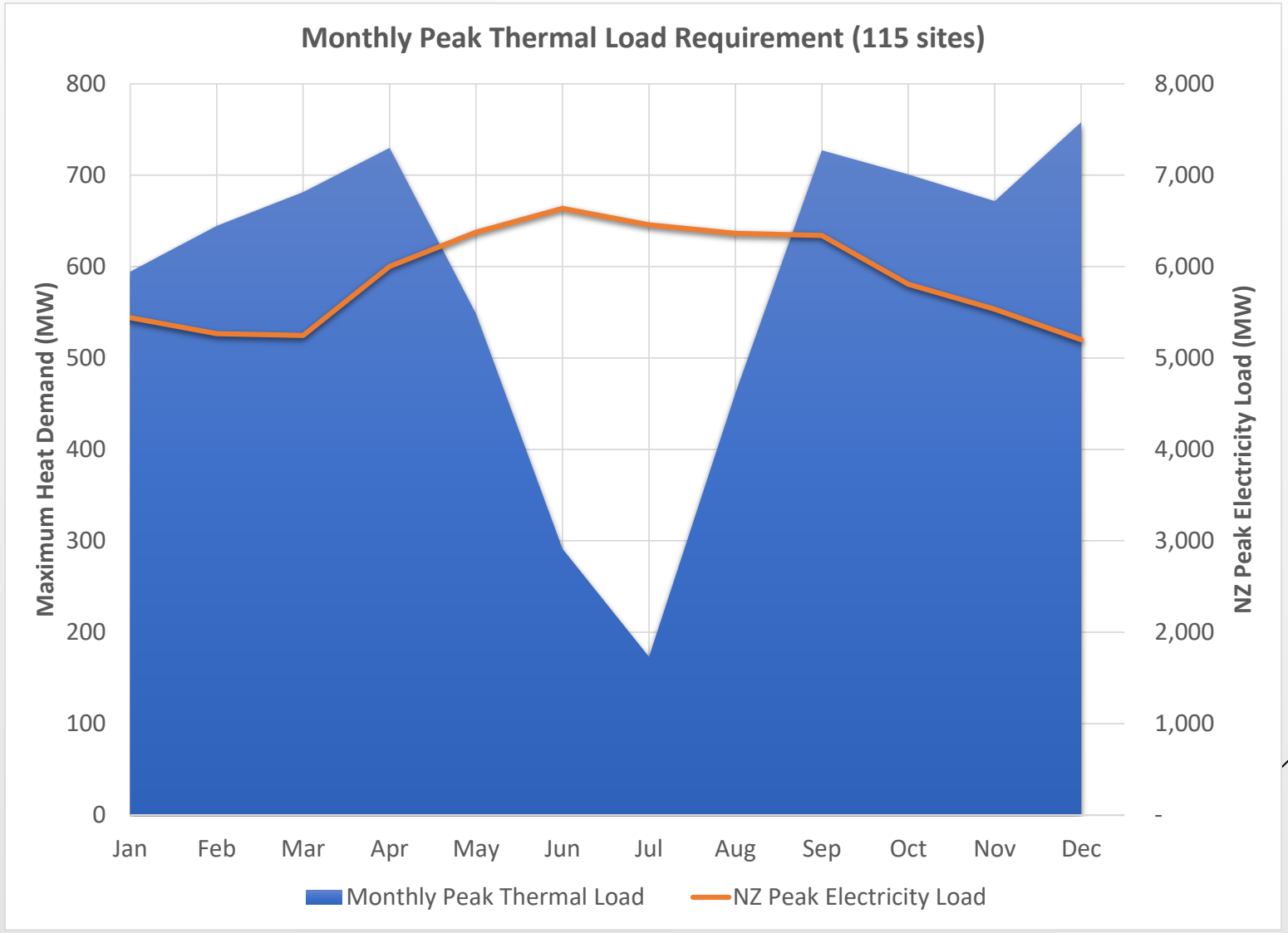
[1]**Note:** Energy demand and delivered energy are annual numbers. The difference between energy demand and delivered heat is due to coefficient of performance (i.e. efficiency) of each fuel.

THE BASELINE – End User Intentions:

- A high-level summary for the entire South Island…

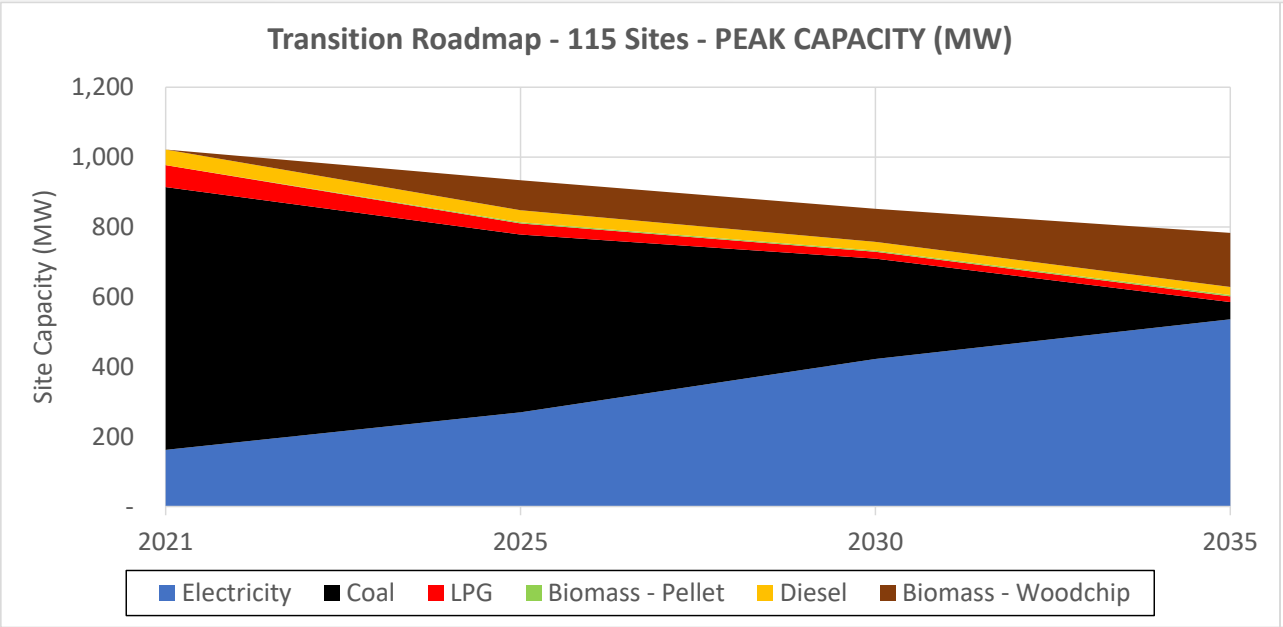


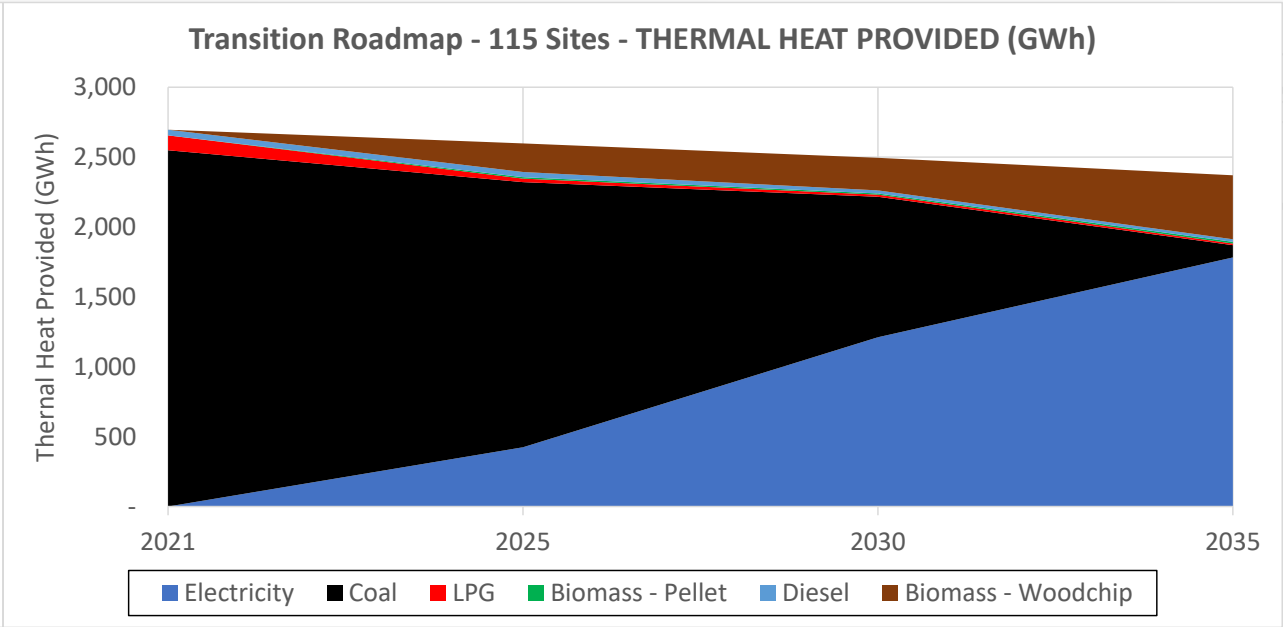
AN ALTERNATIVE SCENARIO… When is the energy required?



AN ALTERNATIVE SCENARIO – A more focused transition to electricity…

- ELECTRICITY is the dominant renewable fuel of choice
- Focussed transition of 5 key dairy processing sites to electricity





- NOTE – this is a snapshot in time as at 10th September 2021.

What we have learned…

- End users are keen to be involved and are happy to share information
- Most sites are planning to significantly decarbonise in the next 10 years
- Technology is not a major barrier…
- Biomass is the preferred fuel source for high temperature heat, BUT sites will use electricity if the market conditions are right
- The South Island sites are only thinking about electricity and biomass at the moment…
- End users are keen to collaborate more - with each other, with biomass suppliers, with EDBs, etc

BARRIERS TO TRANSITION

Barriers to transition:

1. Capital funding and funding allocation
2. Cost and availability of electricity
3. Cost and availability of biomass
4. NZ needs a coordinated energy strategy
5. People constraints

Barriers to transition:

3. Cost and availability of biomass

- Scale up of biomass market – can the required volume be delivered quickly enough?
- How much is available where? What type is needed/available?
- Competitive uses for fibre – the 'competition' for biomass
- Immature/developing market
- Innovation needed – more dynamic and engaging approach to customers needed

Innovation is coming…

- Looking at biomass differently…
  - Use pellets some of the time (peak season), but wood chip most of the time…
  - Vary moisture content (calorific value) requirements throughout the year…
- Looking at electricity differently…
  - Use electrode for peak loads & biomass for baseload
  - Use biomass in winter, electrode in summer
  - Use HTHP to reduce coal boiler load to allow boiler conversion to biomass
- Looking at coal differently…
  - Use coal to cover peak loads and provide redundancy to reduce transition risk

SUMMARY – WHAT NEXT?

Key takeaways…

1. End users want to do the right thing – but will change happen quickly enough?
2. There is enough biomass, but is it available at the right price?
3. Collaboration and innovation is needed to deliver cost effective solutions…

Next Steps for the Project…

- Testing the transition with more end users - what are they really planning?
- Going deeper with the South Island dairy processing sites – what are they really planning?
- Going deeper in the North Island
  - The transition away from natural gas is a bit more complicated…
  - Many more renewable options available (geothermal, biogas, biomass, electricity, etc.)
- Using this information to develop a regional

  Decarbonisation Plan for Canterbury and Southland