

Climate  
Connect  
Aotearoa



Sustainable  
action for a better  
tomorrow



# Decarbonising SME Operations – breakfast and networking event

13 March 2024



# Agenda



**Marlies Wilson**  
Tātaki Auckland Unlimited



**Sarah Anderson**  
Climate Connect Aotearoa

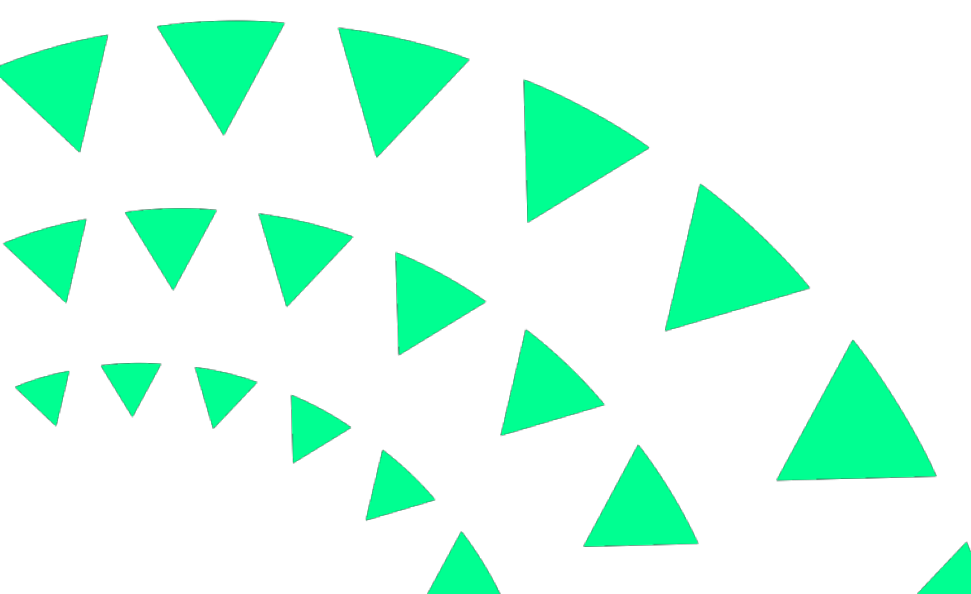


**Ben Pitt**  
EECA



**Jono Pooch**  
DETA Consulting

	Agenda Item	Speaker
	Karakia	Alex Norman
	Welcome / Housekeeping	Marlies Wilson
	Introduction - Climate Connect Aotearoa	Sarah Anderson
	EECA – Decarbonising - Funding and help available	Ben Pitt
	DETA Consulting	Jonathan Pooch
	Closing and questions	All / Audience
	Networking	All / Audience

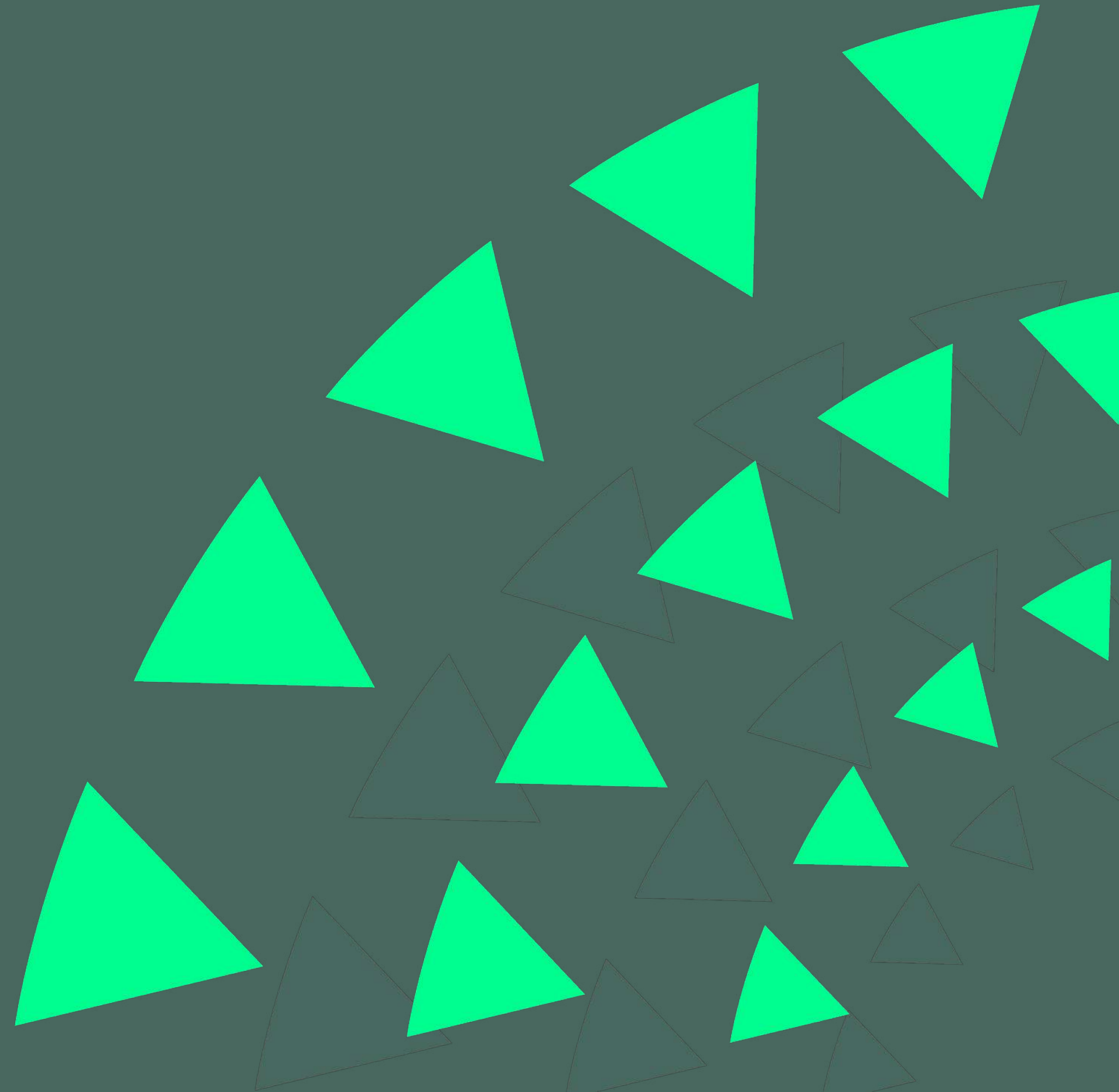




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# Who are we?

A collaborative innovation hub to connect people, build partnerships and deliver practical climate solutions

**1**  
Connect and grow the ecosystem

**2**  
Connect demand-led challenges to scalable solutions

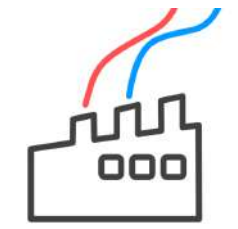
**3**  
Build system-wide knowledge and capacity

Climate Innovation Ecosystem

Expand your network. Explore the Ecosystem.

- Energy
- Built
- Food
- Transport

Helpful climate resources in one Knowledge Map



OPENPINCH

# Why are we here?

Taking forward research, this morning aims to support you to:

- Build knowledge
- Improve energy efficiency
- Transition to low carbon energy where possible
- Explore funding options

March 13 2024

# Helping New Zealand small and medium energy users with a clean and clever energy transition

Ben Pitt – Senior Account Manager, Business Portfolio, EECA



# Helping New Zealand small and medium energy users with the clean and clever energy transition

Today I will cover four areas:

1. Intro – who is EECA?
2. Why decarbonise?
3. EECA can help – *key message!*
4. Next steps – getting started



# 1. Who is EECA?





We are advocates for clean and clever energy use. Enablers. We approach our task with passion and enthusiasm

We're talking to everyone in New Zealand, across the generations. It will take all of us to make this work.

This is a journey of growth, to adopt new technologies, to use our power as consumers - necessary to sustain our future.

# Mobilise New Zealanders to be world leaders in clean and clever energy use.

We are a small, but nimble country. We have a role on the global stage to show what can be done – taking a leadership position, so others will follow suit.

Clean energy is renewable, low emissions energy. It balances human wellbeing with the needs of our ecosystem.

Anything that gives you more, while using less energy, is clever. We advocate for smart, adaptable, conscious, reliable ways to make and use energy.

Energy is in everything. If making, moving, using or throwing it away produces energy-related greenhouse gas emissions, then it's in our lane.



# EECA provides:



Targeted investment



Tools, insights,  
information and  
resources

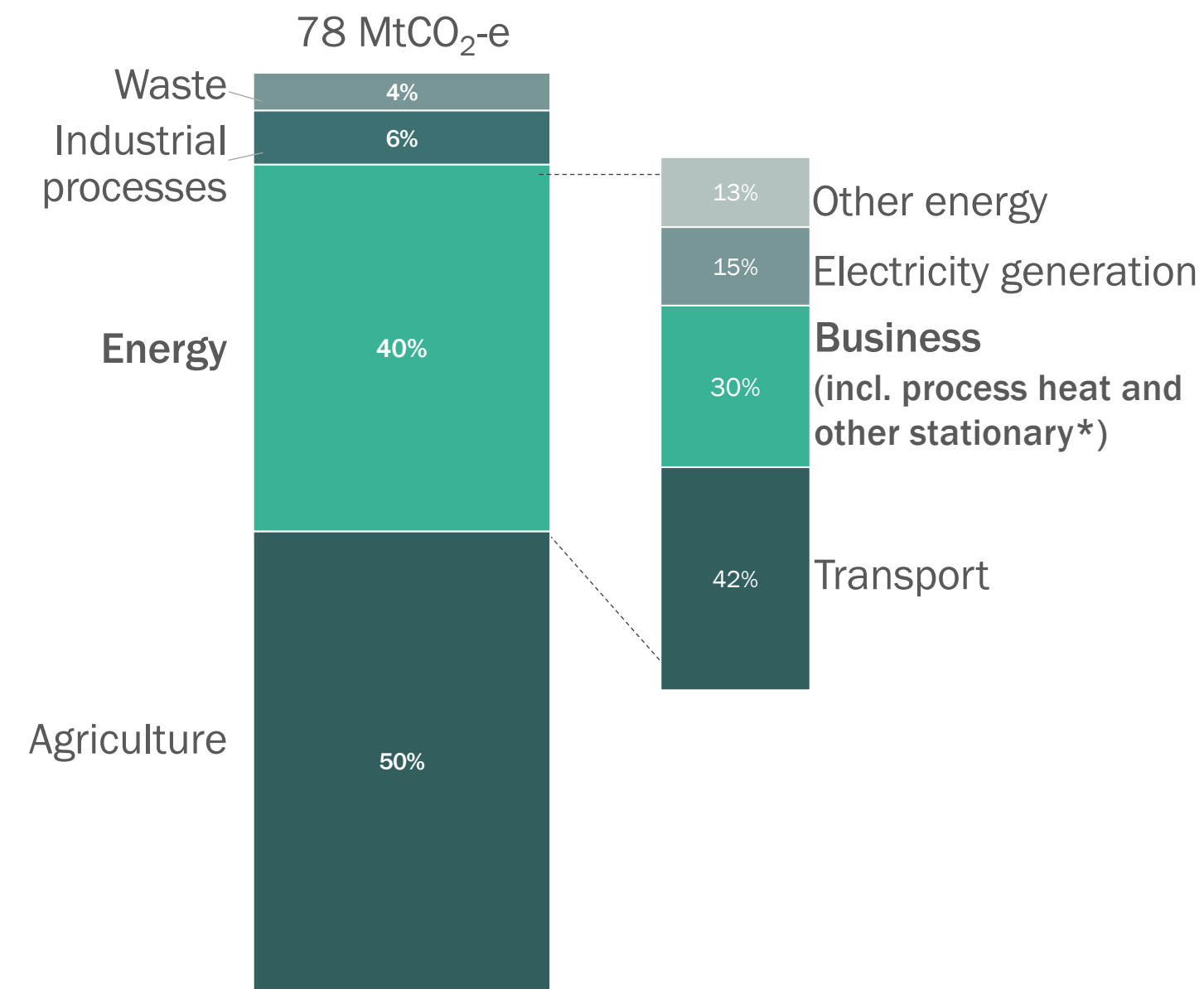


Standard setting and  
regulatory intervention

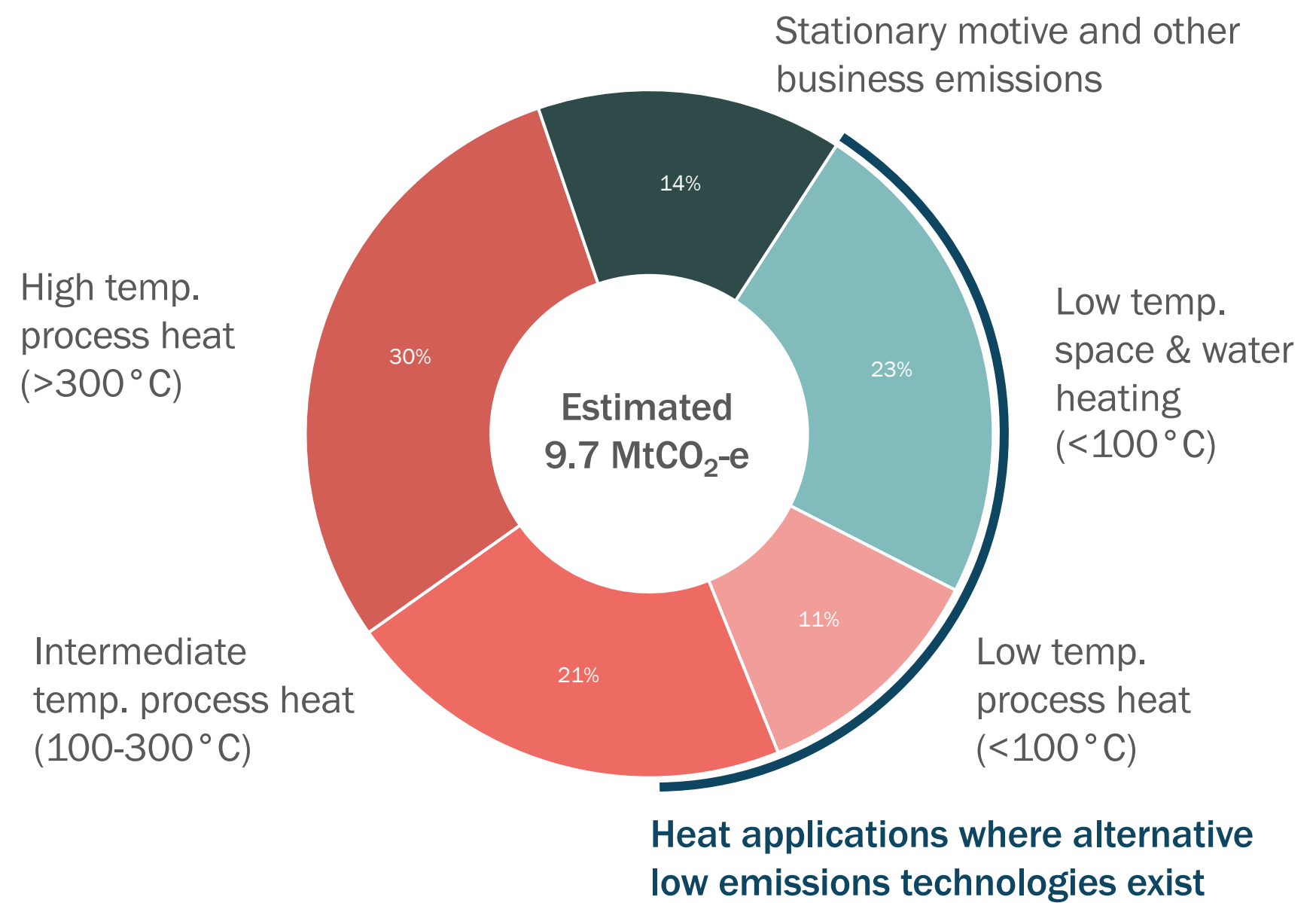


# For business, our focus is process heat and other stationary business emissions

New Zealand's Emissions Breakdown  
(2020)



Business Emissions Breakdown  
(2020 excl. Electricity)



## 2. Why decarbonise?



# Decarbonisation – there's a lot in it for business



Can reduce costs

+



Greater productivity

+



Future proof

+



Regulation



New markets

+



Health & safety

+



Brand value & reputation

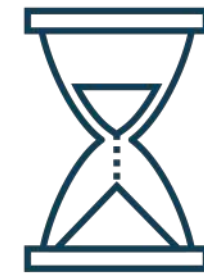


# But there can be some challenges for SMEs



Knowing where to start

+



Lack of time

+



Competing priorities



Business and process impact

+



Access to expertise

+



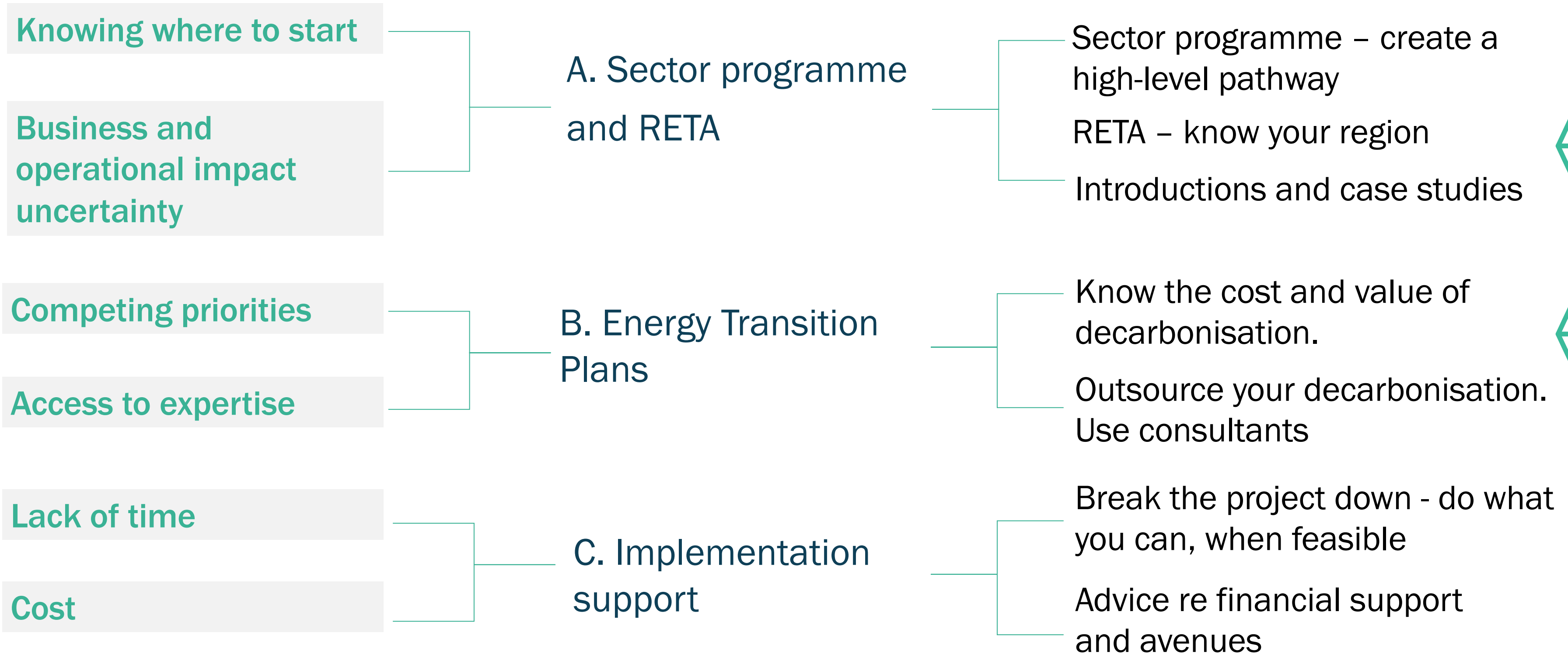
Access to capital



### 3. EECA can help



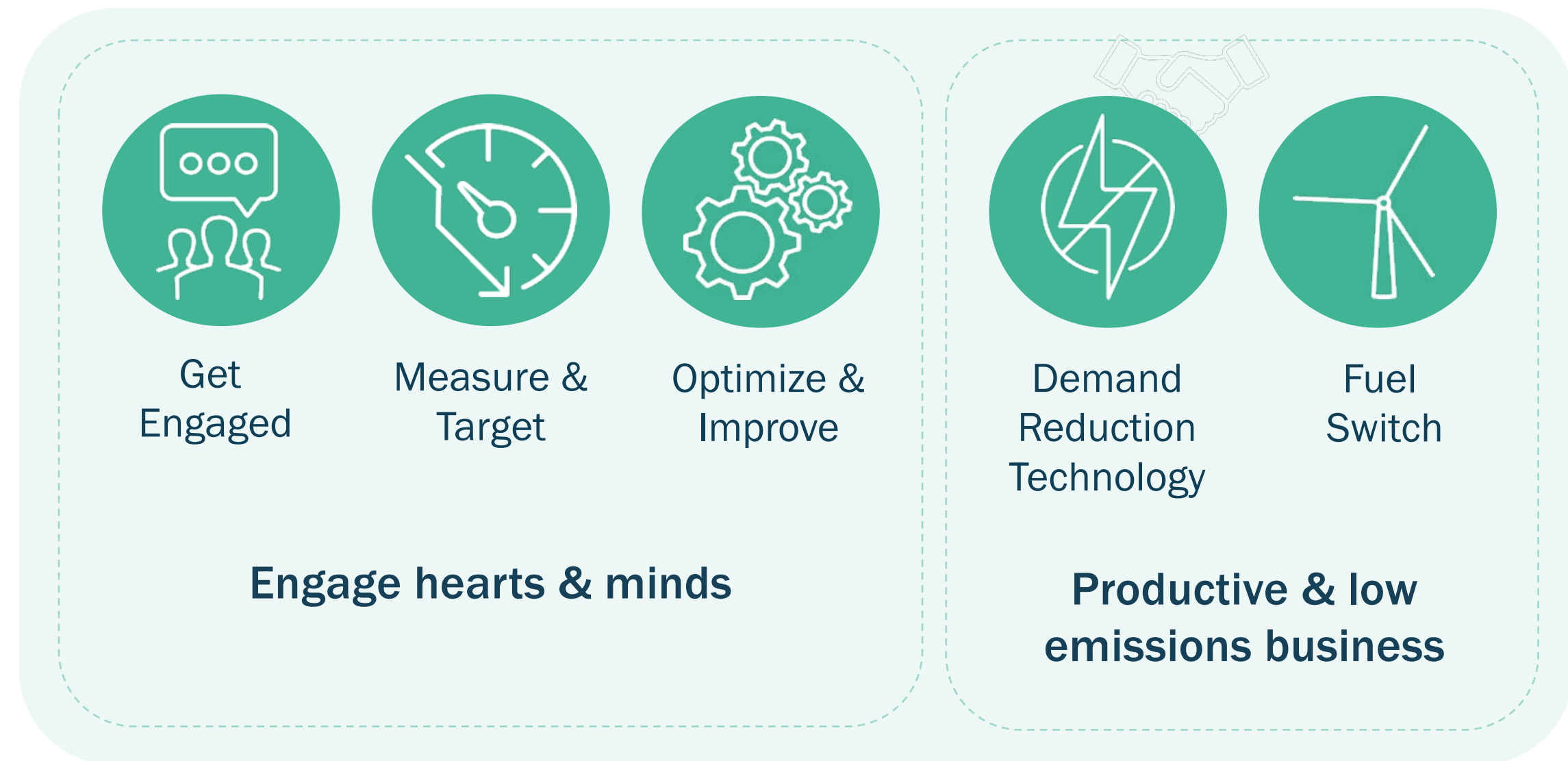
# How EECA can help





# Sector decarbonisation: tackling one sector at a time with a five-step approach

- Pathway developed in collaboration with sector associations and technical experts
- The five-step programme provides businesses with “how to start” & “where to start”
- Provides tailored resources for that sector to support energy efficiency and emissions reduction, and shared freely through an online hub, workshops, events, and email-CRM.



# Sectors we're working in



Coffee Decarbonisation Pathway



Commercial Buildings Decarbonisation Pathway



Covered Cropping Decarbonisation Pathway



Brewing Decarbonisation Pathway



Aged Care & Retirement Living Decarbonisation Pathway



EPS Plastics Decarbonisation Pathway



Wine Decarbonisation Pathway



Hotel Decarbonisation Pathway



# Regional Energy Transition Accelerator (RETA)

RETA – a programme designed to develop, and share, an understanding of what is needed to decarbonise process heat use in the region.

## The planning stage results in a report to:

- Provide process heat users with coordinated information specific to the region to make more informed decisions on fuel choice and timing;
- Improve fuel supplier confidence to invest on supply side infrastructure, and;
- Surface issues, opportunities and recommendations.



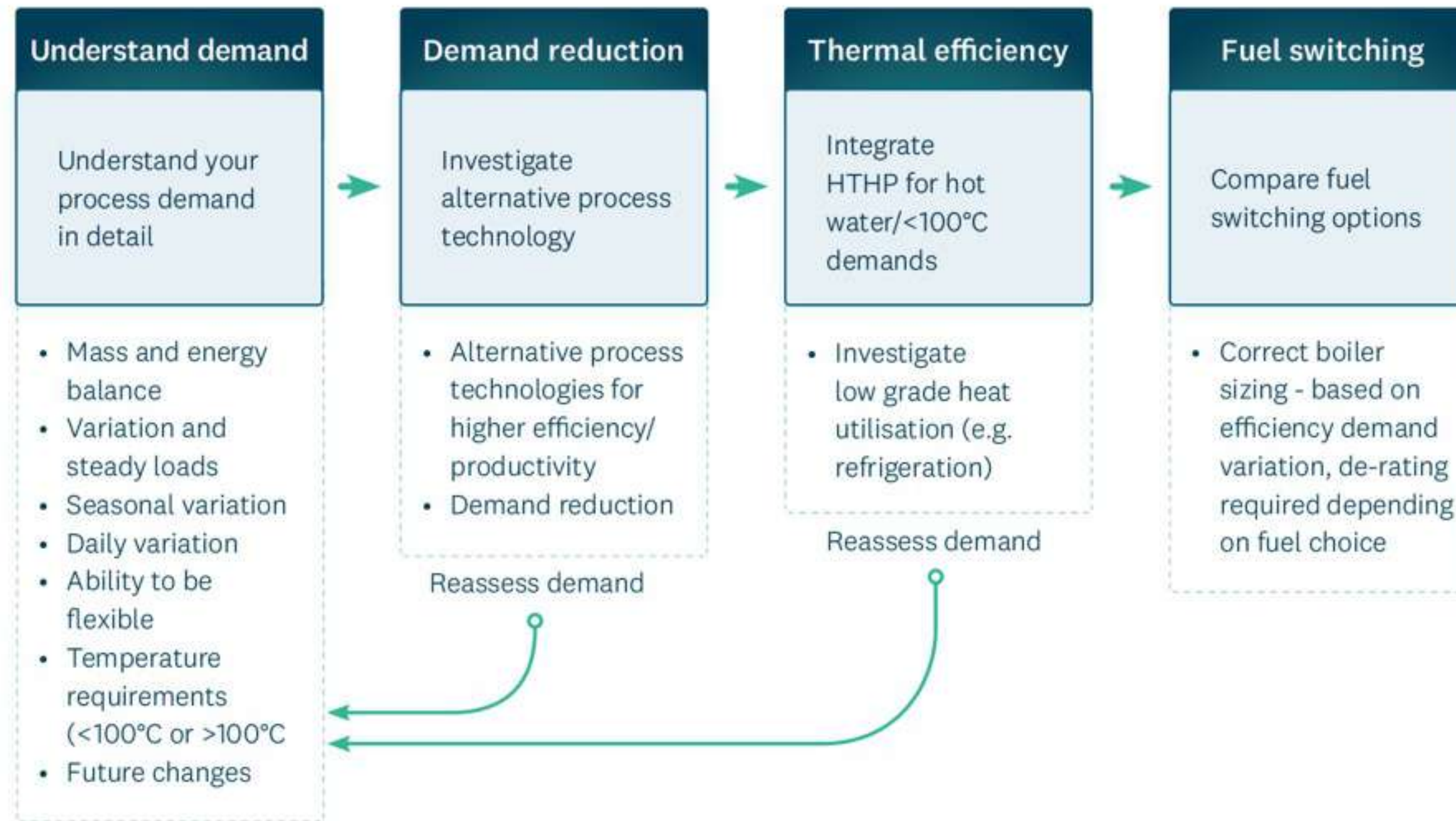
# Energy transition plans

For the right opportunity, we can provide a contribution towards the cost of developing an Energy Transition plan.

- EECA oversight and consultant technical support.
- Options analysis with deep dive into best options.
- Energy efficiency and sustainable fuel switch.
- Removes technical, commercial and financial uncertainty.
- Cost accuracy level suitable for decision making.



# Energy transition plans look at demand reduction and fuel switching



## Electricity

- Electrode boiler
- Network capacity increase required?
- Ability to flex demand to minimise cost
- Electricity tariff






## Biomass

- Age of boiler - conversion or new boiler?
- Fuel supply and price - pellets, chip, hog
- Operational requirements for different fuels
- Fuel storage requirements for different fuels



# A visual pathway enhances transparency and compliance

## Energy transition plan output example

Actions		Projected emissions reduction					
Energy demand reduction	Pulsed electric field	15%	85%				
	Blancher heat recovery	8%	77%				
	Fryer heat recovery <i>(Mechanical vapour recompression technology)</i>	12%	65%				
	Steam network heat recovery <i>(flash steam, blowdown...)</i>	5%	60%				
Fuel switching	Option A: Boiler conversion to biomass			50%		*	5%
	Option B: Switch to biogas + <i>(biogas/biomass/electricity)</i>			25%	 	*	5%
	B1: Full biogas <i>(waste import from external sources)</i>			50%		*	5%
	B2: Biogas with internal waste only completed by biomass			25%	 25%	*	5%
	B3: Biogas to cover fryer and peeler steam/high temperature demand. Heat pumps to cover the rest			30%	 18%	*	7%
	Option C: Electrification			39%		*	12%



# Help with energy transition plan implementation

- Fuel switch enabler
- Technology Demonstration Fund
- Monitoring and targeting
- Energy optimisation
- Design review and optimisation



# 4. Getting started





# Taking the next steps – Speak to us!

Stay in the loop of latest developments ([LinkedIn](#))

Contact us with any questions ([Business@eeca.govt.nz](mailto:Business@eeca.govt.nz))

Sign up to the EECA Newsletter

Visit EECA [www.eeca.govt.nz](http://www.eeca.govt.nz)

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# Sustainable **Action** for a Better Tomorrow

Project Delivery • Carbon Experts • Sustainability • Strategy

**“Manaaki whenua, Manaaki tangata, haere whakamua”**

*“Care for the land, care for the people, go forward”*

# DETA at a Glance

Our Mission  
**Remove**  
**2** million  
**tCO<sub>2</sub>**  
emissions  
EVERY YEAR  
BY **2030**

## DETA's 10 Year Goal

- To support the removal of **2MT CO<sub>2</sub>** annually of **carbon emissions**

## Focussed on four core offerings

- Sustainability strategy & development
- Decarbonisation pathways
- Project development and delivery
- Strategic Support

## Top 5 sectors

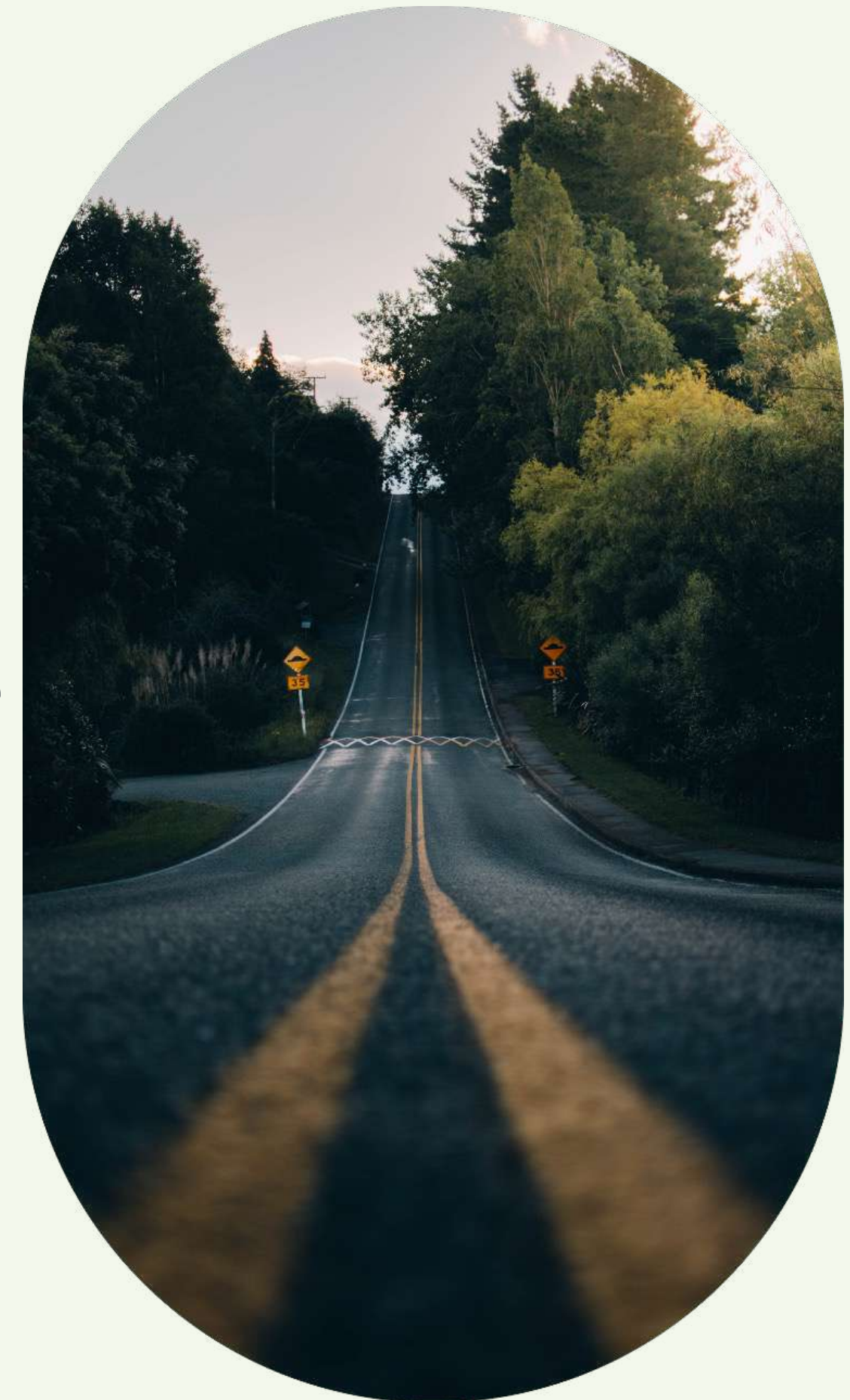
- Food & Beverage
- Brewing & Distilling
- Industrial Processors
- Government
- Buildings & Infrastructure

Locations – Australia, New Zealand, South Pacific

# HOW DO WE DO IT?

## The Decarbonisation Roadmap

- Coordinated and strategic plan to take us to 2050
- What does a 2050 operation look like? – WHAT are we aiming for?
- Step by step path to achieve this? – HOW we do it



# HOW DO WE DO IT?

## The Decarbonisation Roadmap

- **WHY** - Strategy and Leadership
- **HOW**
  1. Improving our process
  2. Reducing our energy demand
  3. Changing our energy source



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# Sustainability Strategy Development

- Phase 1 – Wow we spend a lot on energy!
  - Start to measure and track energy costs and consumption(?)
- Phase 2 – Sustainability is about more than energy isn't it?
  - Understanding grows that sustainability is about more than energy costs – packaging, water consumption, equality, etc.
- Phase 3 – This is really important, we need to do better!
  - Develop a Sustainability Strategy or Decarbonisation Roadmap
  - Appoint an Energy/Sustainability Manager
- Phase 4 – This is just how we do things around here...
  - Less immediate focus on sustainability – it is part of our DNA...

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# HOW DO WE DO IT?

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# A KEY CHALLENGE

## WHAT DO OUR PROCESSES LOOK LIKE IN THE FUTURE?

- Changing product preferences:
  - Are we going to be drying as much milk powder in 2050? What about UHT?
  - Impact of move towards plant based meats?
  - Reduced steel and concrete use for construction?
  - Move towards online learning rather than on campus?
  
- New technology/upgrades available:
  - Reverse Osmosis technology for milk concentration
  - Electric steriliser technology in the meat industry
  - Move towards 'Industry 4.0' and digitisation
  - Advanced heat recovery and pinch analysis for heat recovery optimisation





## Early Design Engagement in Efficiency...

### **Case Study:** New Dairy Factory

- Tetra Pak engaged support to assist with tender response:
  - Focus on enhancing design **beyond** base specification
  - Consider wider project scope to identify opportunities

# Case Study: New Dairy Factory

## GET THE DESIGN RIGHT

- Pasteurisers super regeneration:

**70%** (750 kW) reduction in peak heating and chilling

Heat recovery:

reduced kitchen heat demand

enhanced caustic

less conc. caustic required by CIP reuse

kitchen

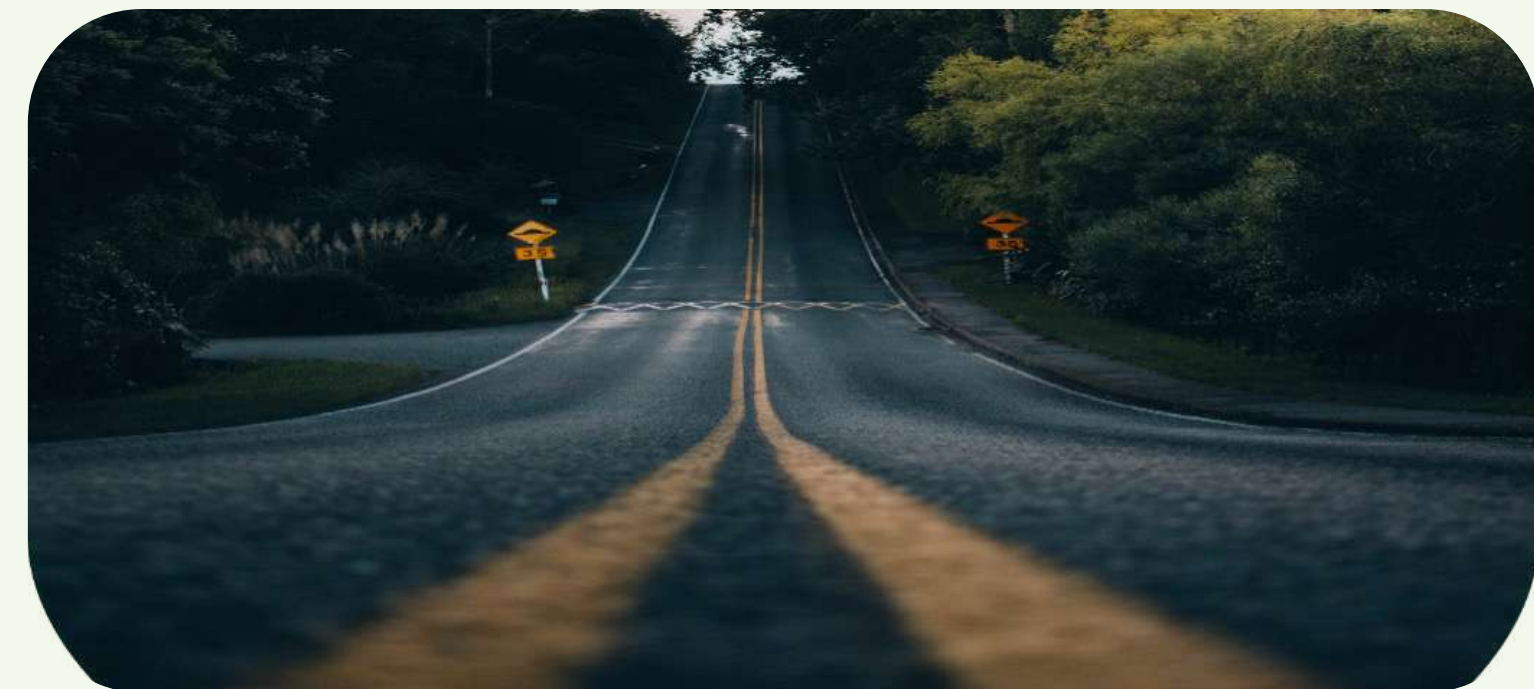
**30 t/y** less conc. sulphuric acid required at WWTP

If you don't ask  
then you don't get!  
(usually)

# HOW DO WE DO IT?

## The Decarbonisation Roadmap

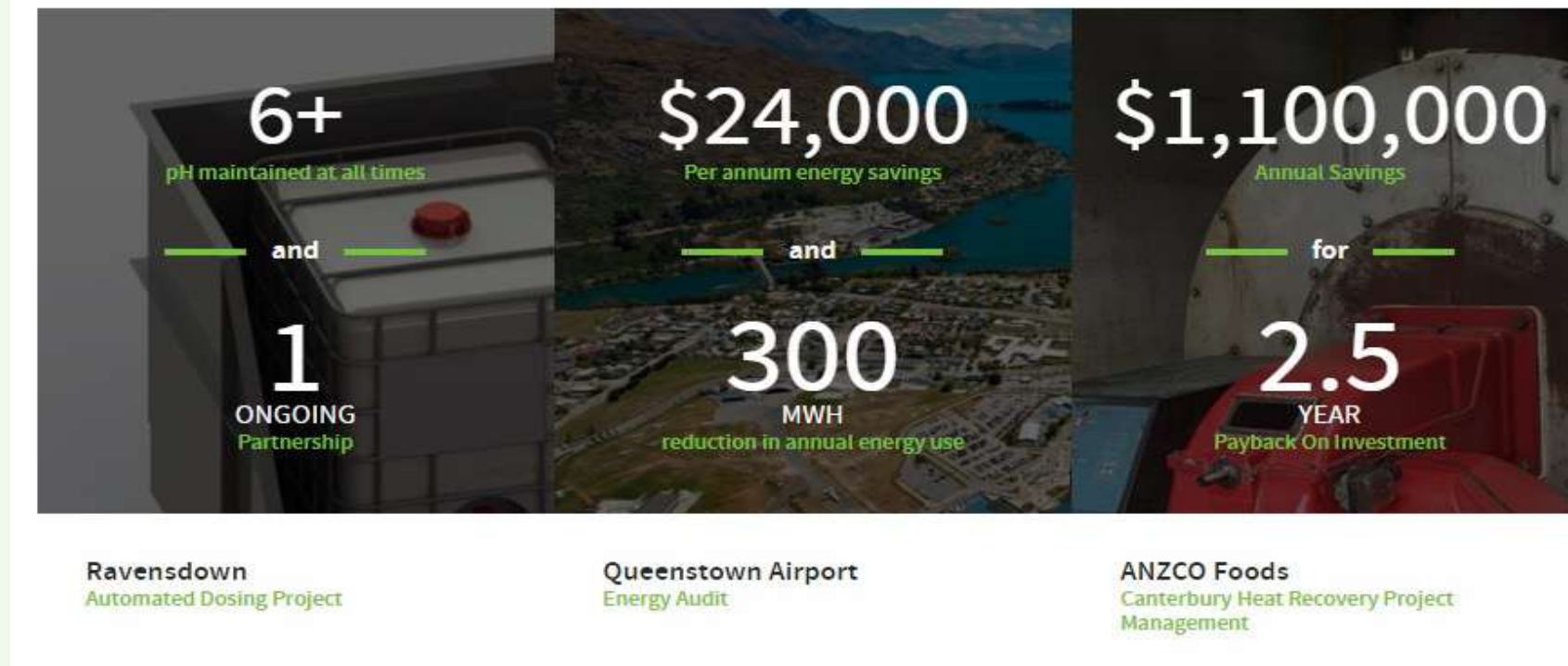
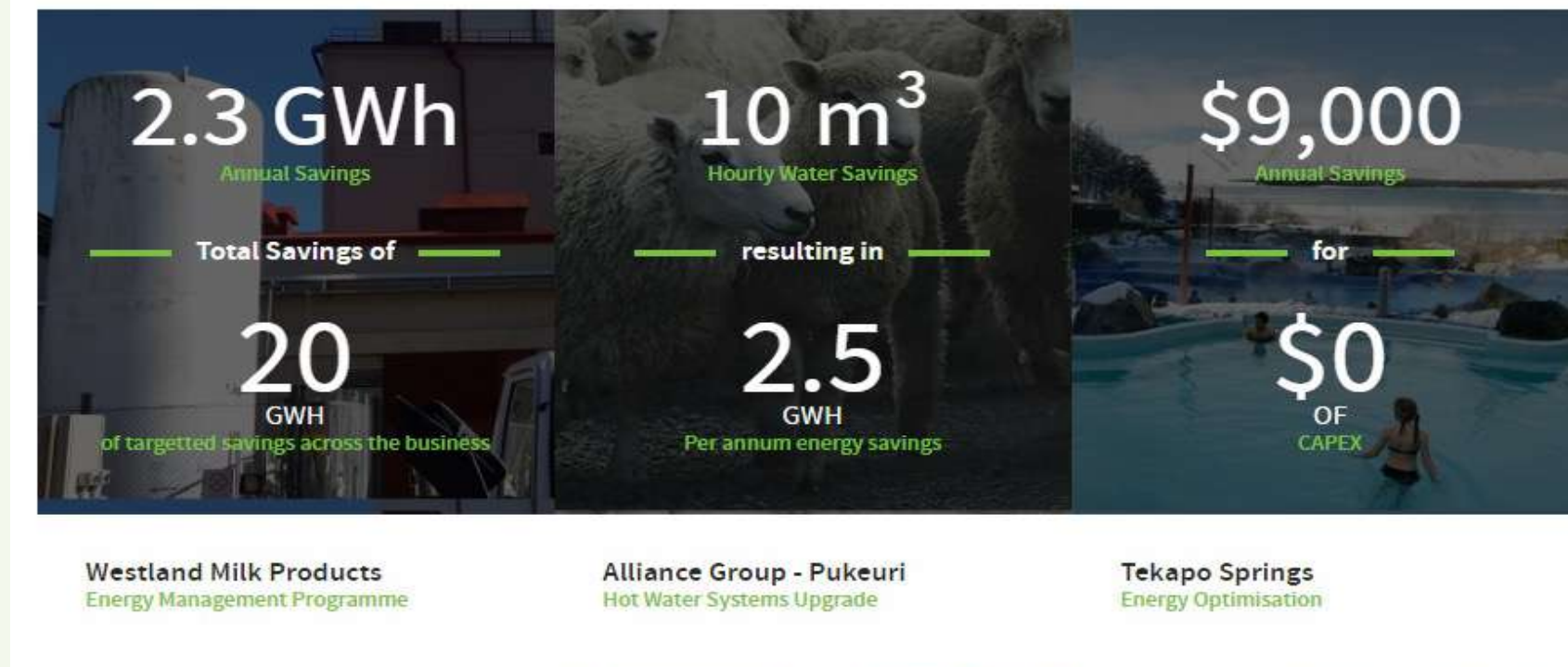
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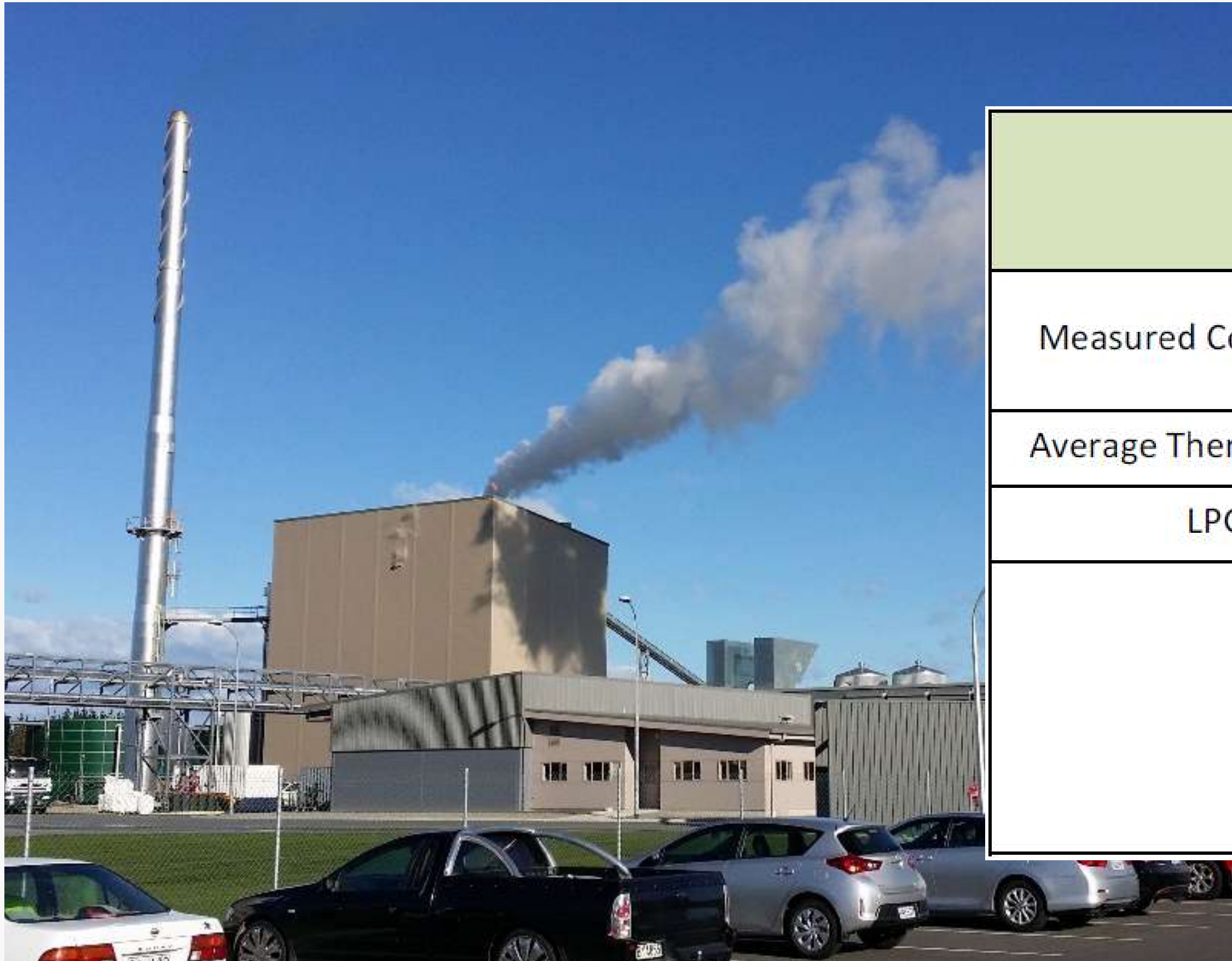
# So what sort of things might be on this roadmap:

Improvement opportunities:

- Getting the basics right – compressed air leaks, steam traps, switch it off, etc.
- System improvements – insulation, pump/fan sizing,
- Heat recovery – reuse waste heat
- Monitoring and targeting
- Minimise operational variation
- Still the best bang for buck (normally). Just do better with what you've got.
- Typically 5-10% improvements easily (1-2 yr payback)
- **SIGNIFICANTLY** cheaper than new generation



# EXAMPLES – Boiler Tuning



	Pre Implementation	Post Implementation
Measured Combustion Efficiency	75.3% (high fire) 76.4% (low fire)	90.5% (high fire) 92.8% (low fire)
Average Thermal Hot Water Load	406,500 L <sub>thermal</sub>	
LPG Input consumption	535,900 L <sub>LPG</sub> <sup>4</sup>	443,500 L <sub>LPG</sub>
<b>ENERGY SAVINGS</b>	92,400 L <sub>LPG</sub>	
	680,200 kWh	
	\$72,100 + GST <sup>5</sup>	
	17.2% reduction in consumption	

# EXAMPLES – Chilled Water Insulation

- Chilled water of refrigeration pipes at various cold temperatures
- Based on:
  - 2019 pricing aluminium foil cladding
  - Variable energy cost of 8.0 c/kWh
  - COP assumed to reduce from 5 to 3 as pipe temperature reduces from 0°C to -24°C

Annual Cost Savings (\$/m/yr)					
Diameter	Pipe Temperature				
mm	0	-6	-12	-18	-24
25	\$ 0.5	\$ 1.1	\$ 1.5	\$ 2.3	\$ 3.4
40	\$ 0.8	\$ 1.6	\$ 2.4	\$ 3.5	\$ 5.1
65	\$ 1.0	\$ 2.1	\$ 3.0	\$ 4.4	\$ 6.5
150	\$ 2.1	\$ 4.3	\$ 5.9	\$ 8.7	\$ 12.9

Implementation Cost (\$/m)					
Diameter	Pipe Temperature				
mm	0	-6	-12	-18	-24
25	\$ 30.0	\$ 30.0	\$ 30.0	\$ 30.0	\$ 30.0
40	\$ 33.0	\$ 33.0	\$ 33.0	\$ 33.0	\$ 33.0
65	\$ 45.0	\$ 45.0	\$ 45.0	\$ 45.0	\$ 45.0
150	\$ 58.0	\$ 58.0	\$ 58.0	\$ 58.0	\$ 58.0

Simple Payback (years)					
Diameter	Pipe Temperature				
mm	0	-6	-12	-18	-24
25	55.6	28.4	19.4	13.2	9.0
40	39.8	20.6	14.0	9.5	6.5
65	44.1	21.3	15.2	10.2	6.9
150	27.9	13.4	9.8	6.6	4.5





# EXAMPLES – Reducing condensing temperature

Pressure (kPa)		COP	Savings	
Suction	Discharge		kWh	\$
- 7	1,010	2.21	-	\$ -
- 7	950	2.29	82,800	\$ 10,400
- 7	900	2.36	116,900	\$ 14,700
- 7	850	2.43	138,400	\$ 17,400
- 7	800	2.52	193,700	\$ 24,400





## Case Study: J S Ewers

- Total installed boiler capacity - 30MW
- Actual load needed 20MW (in 2017)
- Made efficiency improvements
  - Thermal screens
  - Installed a ring main and buffer tank
- Reduced load to 9MW
- Now the next step (Biomass boiler) is much lower cost and easier to install!

# HOW DO WE DO IT?

## The Decarbonisation Roadmap

- **WHY** - Strategy and Leadership
- **HOW**
  1. Improving our process
  2. Reducing our energy demand
  3. **Changing our energy source**



## So what sort of things might be on this roadmap:

- Alternative Generation Tech
  - High Temperature Heat Pumps –  $<85^{\circ}\text{C}$  at the moment
  - Biomass Boilers – conversion or replacement
  - Electrode Boilers – great for peak demands
  - Waste to Energy – could have negative fuel costs
  - Geothermal – option in some areas
  - Energy Centres/Hubs – Some in existence already...

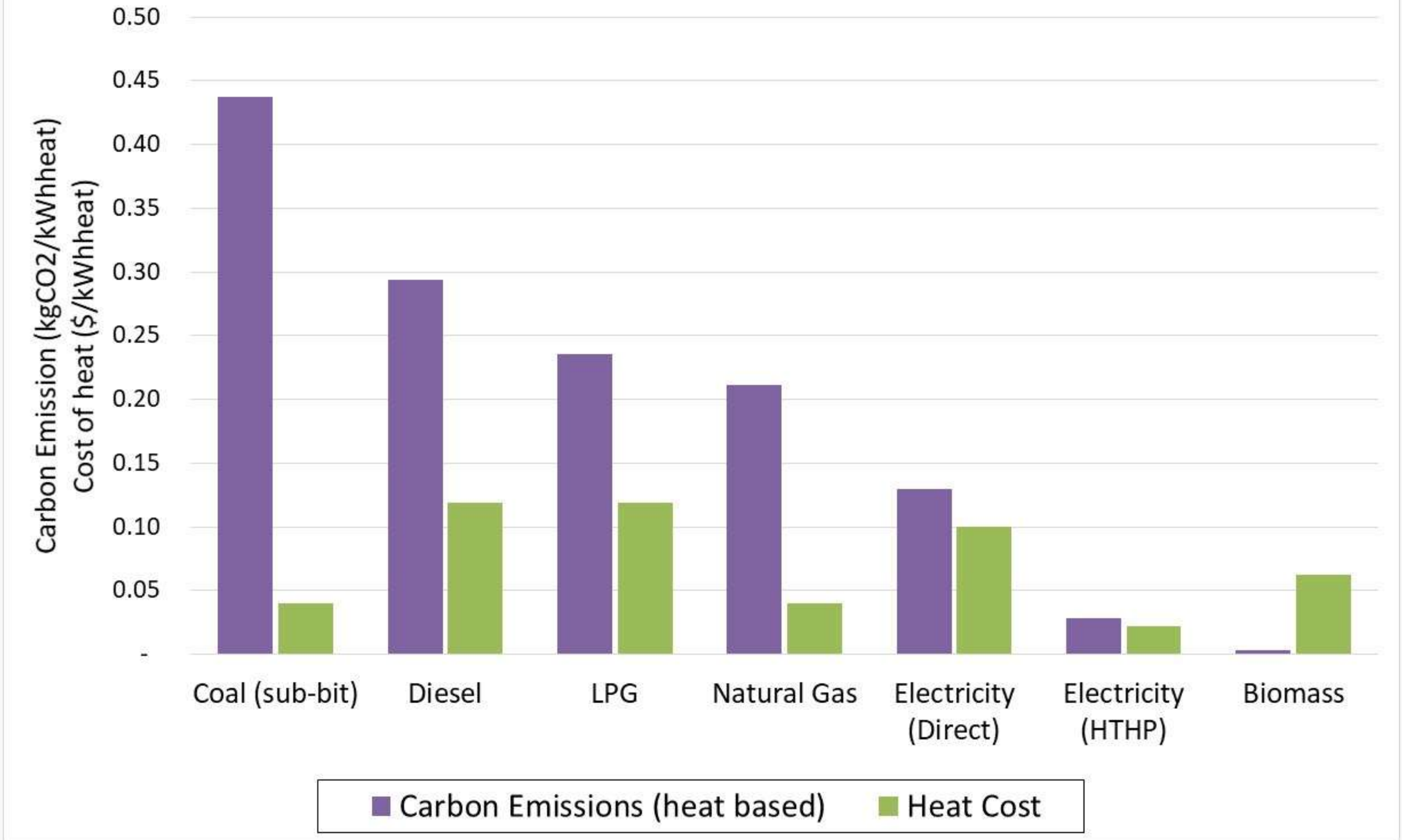


# The Right Energy Source

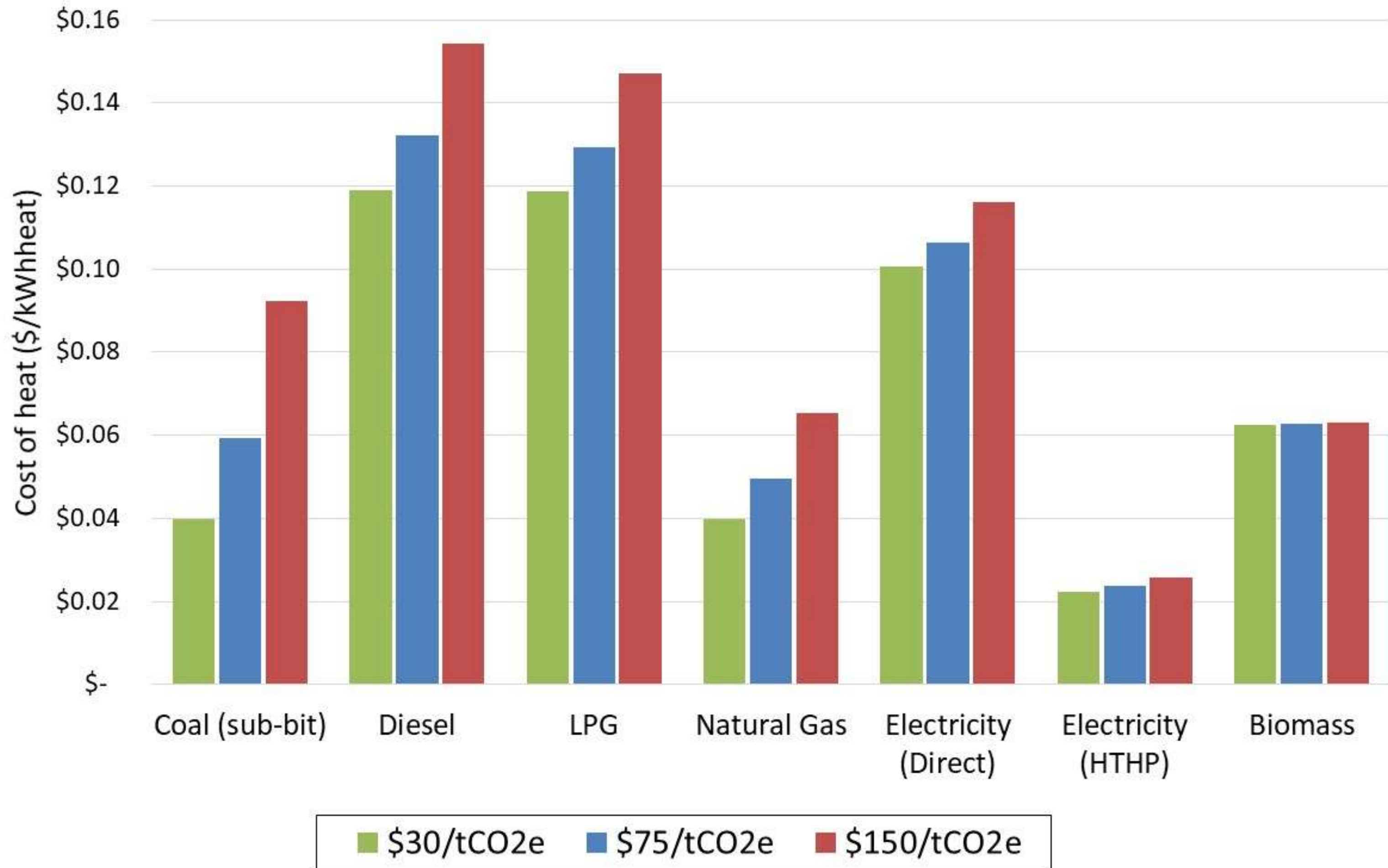
**Case Study:** Pulp and Paper site in the Bay of Plenty

- Existing steam from natural gas boiler
- Future steam demand increase of 20 t/h @ 5.5 bar<sub>g</sub>

### Carbon Emissions and Cost of Heat @ \$30/t CO2e



### Cost of Heat with Increasing Carbon Price



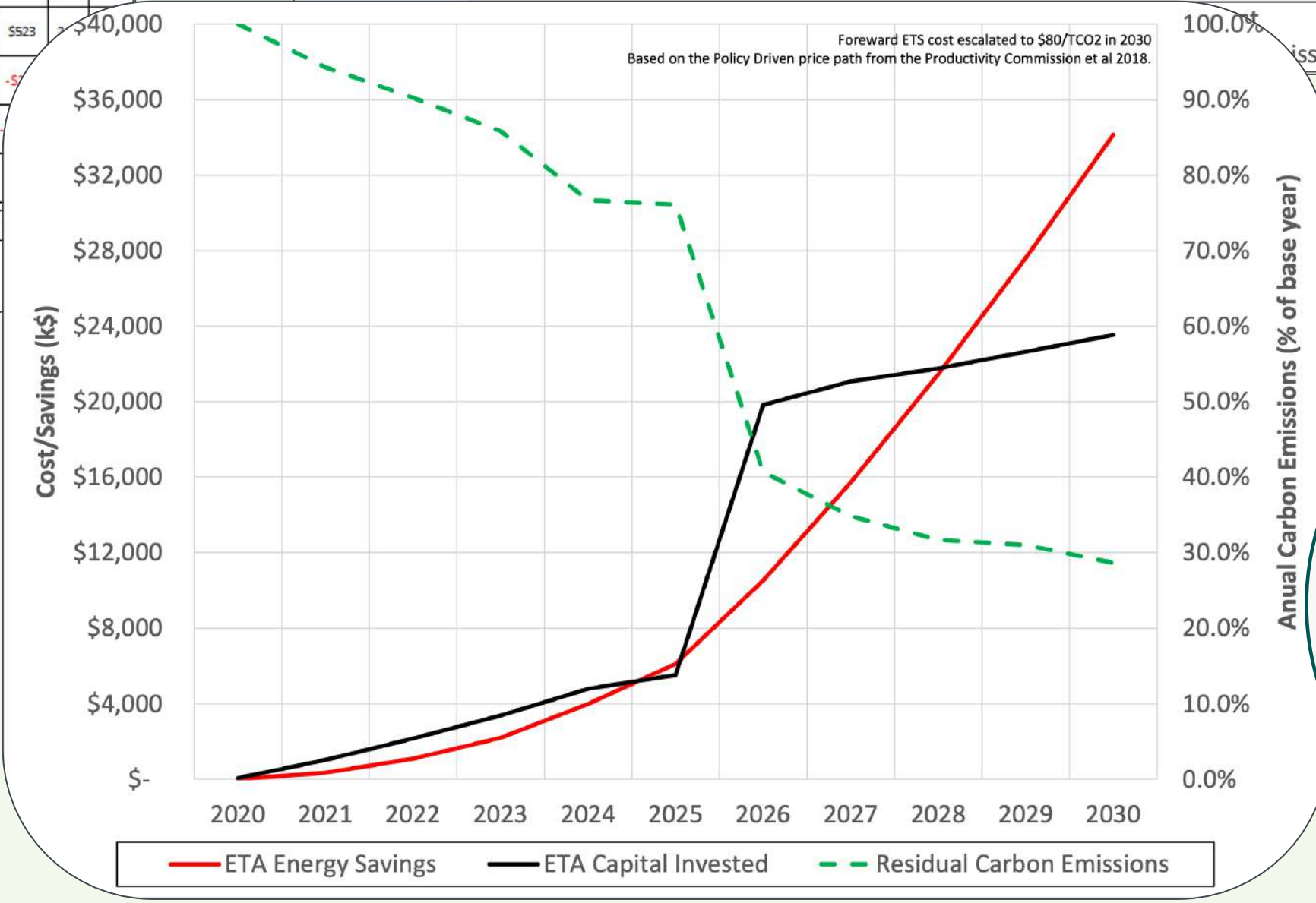
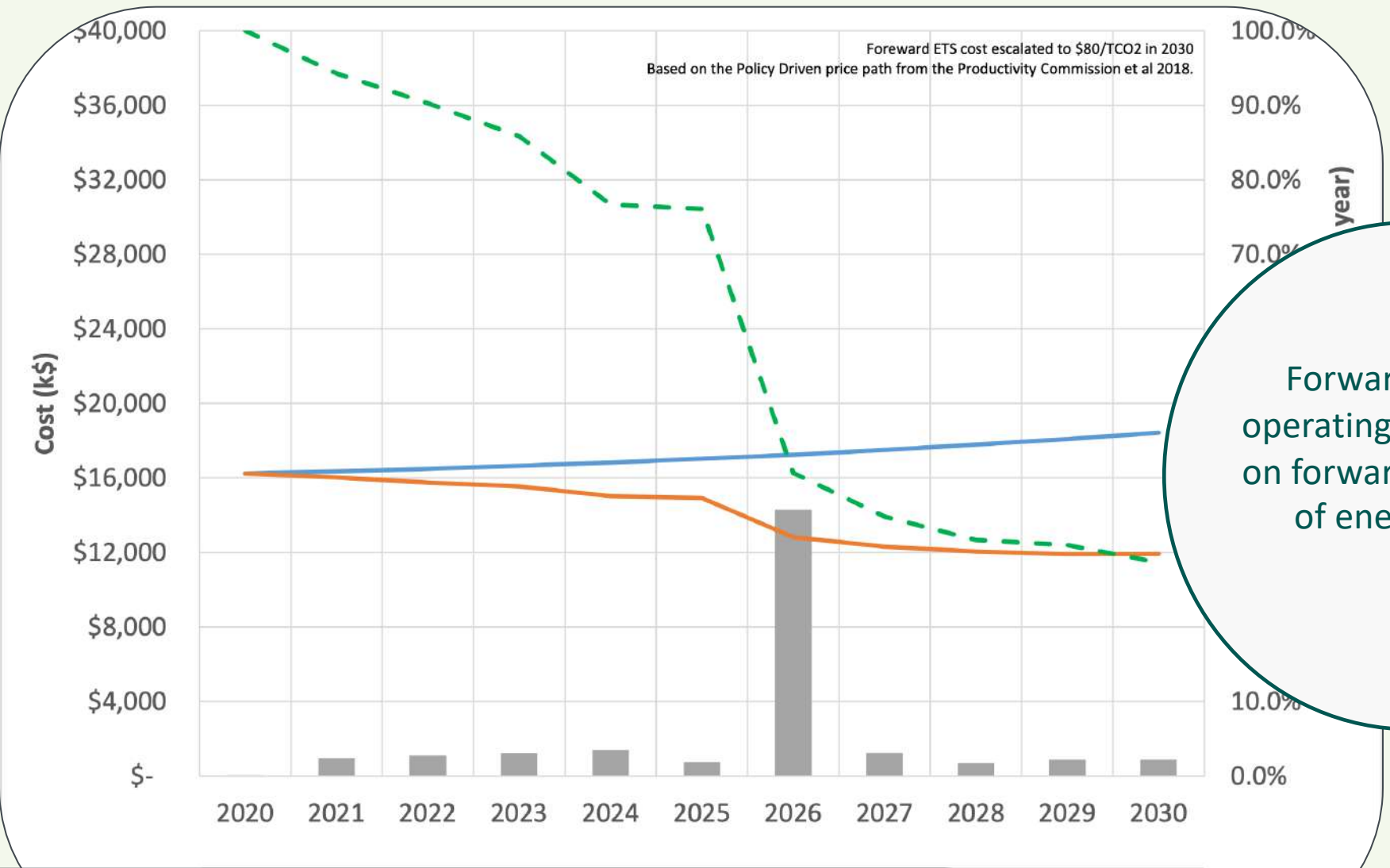
## HOW DO WE ENGAGE?

- How do we visualize the information?





	Year		CAPEX (k\$)	OPEX Savings (k\$/y)	NPV	
Current Emissions	2019	100%				
Steam & Cond Maintenance-Group	2021	98%	\$140	\$95	\$666	
Install Eye Sensors and Reduce Hose Flow Rates-KOK	2021	96%	\$62	\$54	\$400	88%
UV Sterilizers - Group	2022-2026	89%	\$797	\$399	\$2,603	370%
HHTP - MAN	2022	88%	\$900	\$145	\$332	15%
Medium Temperature HW Loop - CAN	2023	85%	\$806	\$156	\$522	19%
HHTP Effluent - CAN	2024	77%	\$1,320	\$312	\$1,336	23%
2 Stage Refrig - ELT	2024	76%	\$150	\$122	\$885	81%
Biomass in Existing Boiler - KOK	2025	70%	\$500	-\$173	-\$1,976	\$15
New Multifuel Boiler 60:30:10 - CAN	2026	42%	\$13,700	\$1,733	\$1,052	11%
Desuperheater - MAR	2026	41%	\$308	\$95	\$508	31%
HHTP - ELT	2027	37%	\$1,100	\$66	-\$541	2%
HHTP - MAR	2027	35%	\$520	\$336	\$2,339	65%
HHTP - RAN	2028	32%	\$910	\$203	\$815	22%
HHTP - RAK	2029	31%	\$500	\$120	\$523	
HHTP for HW - WAI	2030	31%	\$500	\$29	-\$5	
Electric Boiler - WAI	2030	30%	\$1,100	-\$310		
Electricity Grid Factor Improvement - Group	2030	27%				
Legend:			Final Costings			
Biomass			\$23,307	\$3,380		
Electricity						
Biogas						
Demand Side						
Supply side						



## SUMMARY

Getting senior buy in is important!

Set a goal – what are you trying to achieve?

How do we do it?

1. Improve the process
2. Reduce the demand
3. Changing the energy source



# Questions?



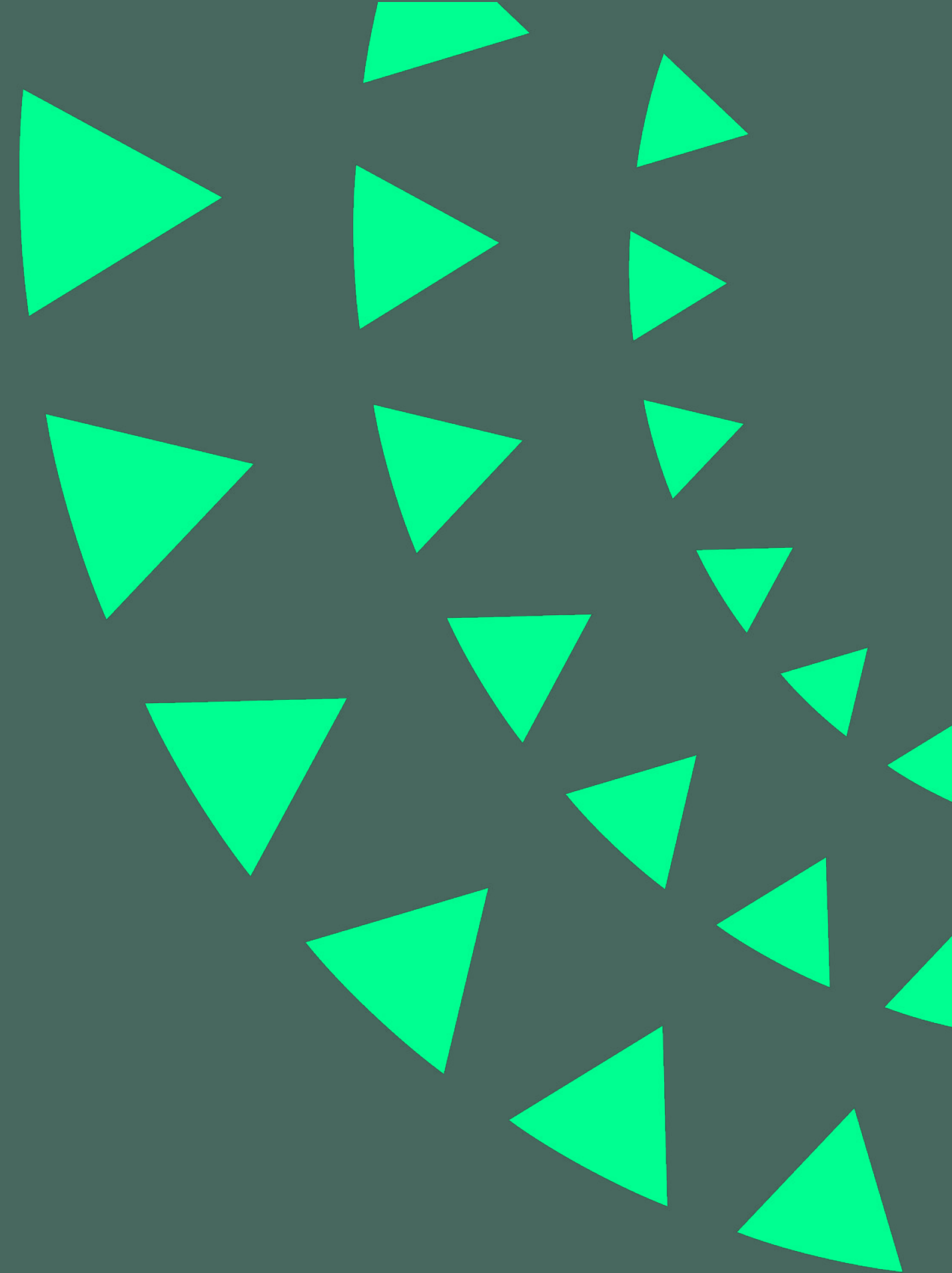
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