

11 August 2026, NZ Geothermal Week, Taupō

Unlocking the potential of geoheat

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EECA ENERGY EFFICIENCY &
CONSERVATION AUTHORITY
TE TARI TIAKI PŪNGAO



What we'll cover today

- Setting the scene (*EECA*)
 - Who's EECA and what we want to get out of today
 - The driver: NZ's gas situation
 - Geoheat 101
 - Business decision making
- Geoheat drilling (*Barham United Welldrillers*)
- Ground source heat pump technologies (*Excel Refrigeration*)
- Workshop!



What we want to get out of today

- Please use this slido to ask a question during presentations
- We want to provide an understanding of what businesses are facing with their energy supply, and the factors they consider in assessing their alternative options
- We'll hear more detail about two key components of geoheat projects – drilling and ground source heat pumps
- We want to explore the perspectives of all you wonderful experts in the room in the collaborative part later, through these prompts:
 1. What barrier might be hindering consideration or implementation of geoheat projects?
 2. What idea or insight might help those considering or implementing geoheat projects?



Scan the Slido QR code with your phone for access

EECA's strategy

Our mission

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

Our desired outcome

Energy users save energy, money and reduce emissions.

Energy productivity and resilience improves.



Energy efficiency first

Efficient energy use is the first option users adopt.



Empower energy users

Users are empowered to control their energy.



Accelerate renewable energy

Users transition to low emissions energy.

We've been here before...

- Geoheat has been discussed as an option for a long time.
- Outside of a few industrial cascade use cases (Mokai, Taupo, Kawerau), progress has been challenging to date.



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Prepared for

Energy Efficiency and Conservation Authority

June 2007

Assessment of Possible
Renewable Energy Targets

– Direct Use: Geothermal

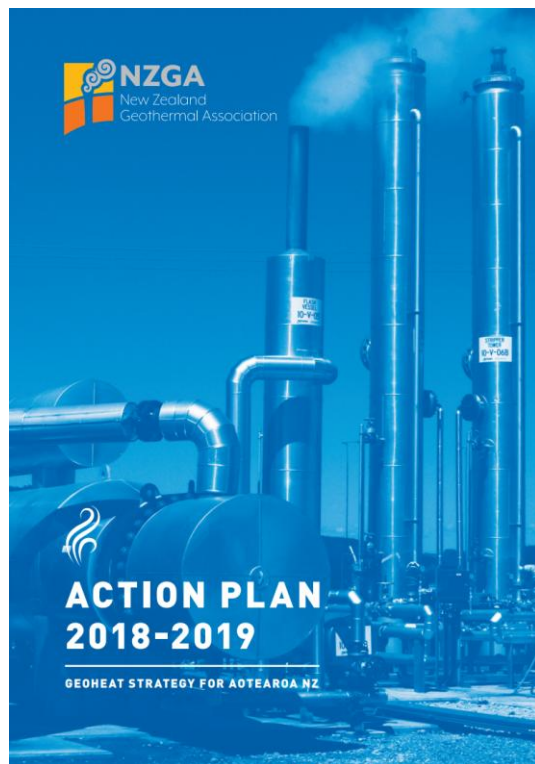
By

East Harbour Management Services

and

GNS Science

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Competing against piped gas has been tough

2007: 500 kW, \$50,000

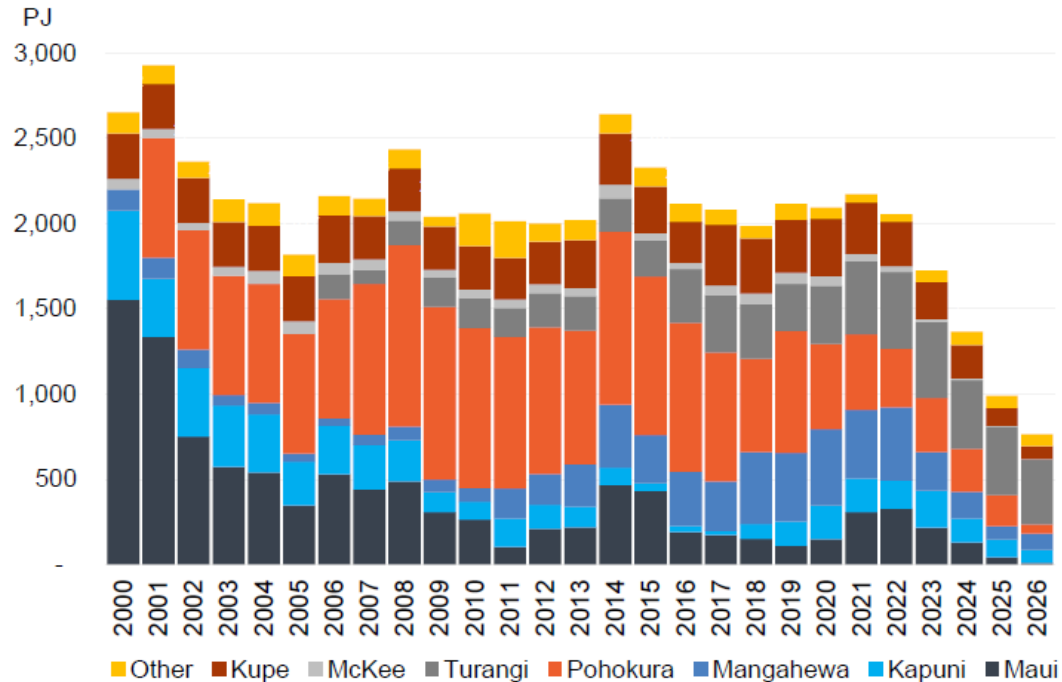


2007: \$8 to \$15 / GJ



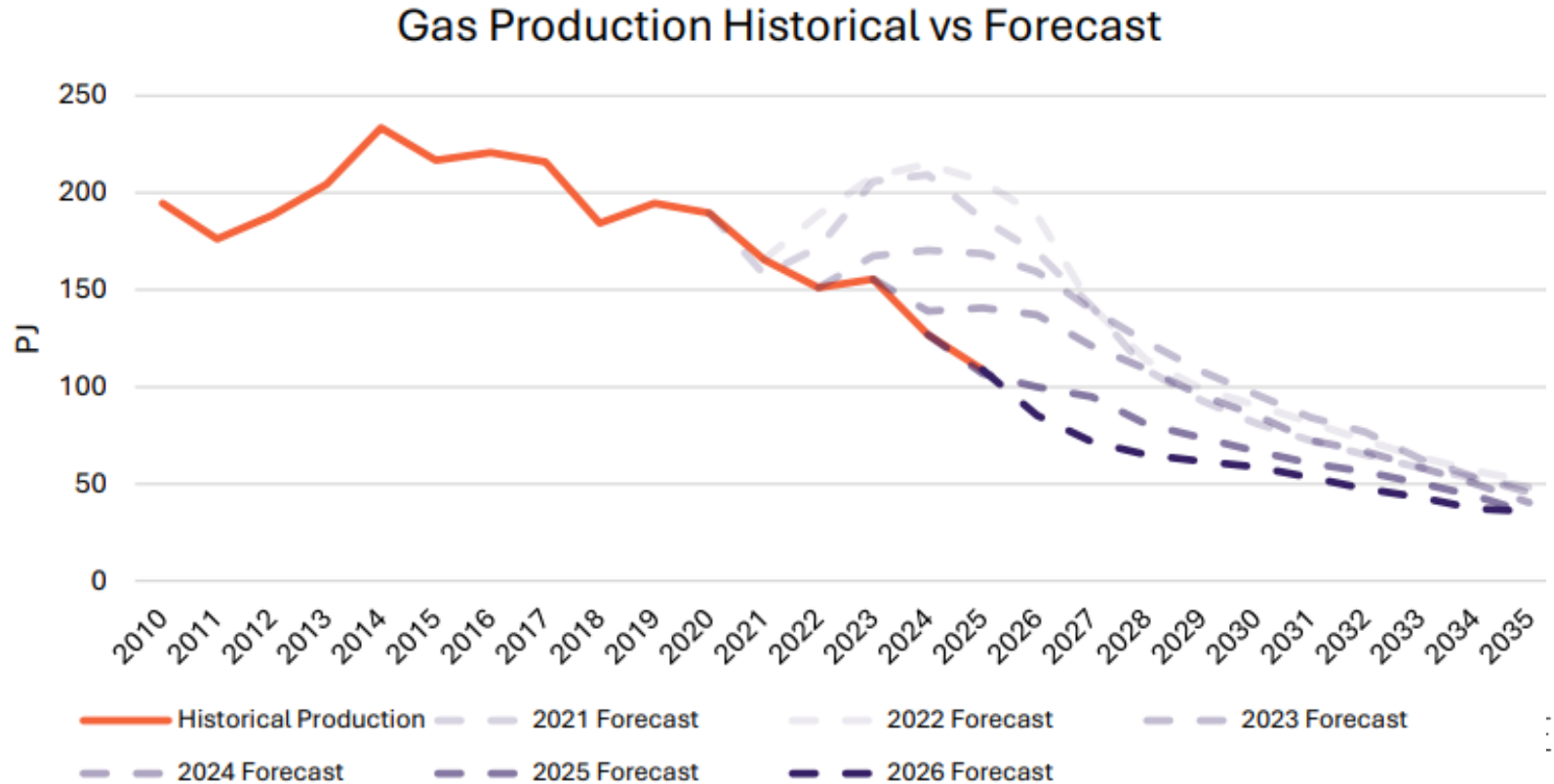
Fossil gas reserves have collapsed faster than expected

Figure 21: Gas+LPG, 2P remaining reserves, by field, 2000→2026

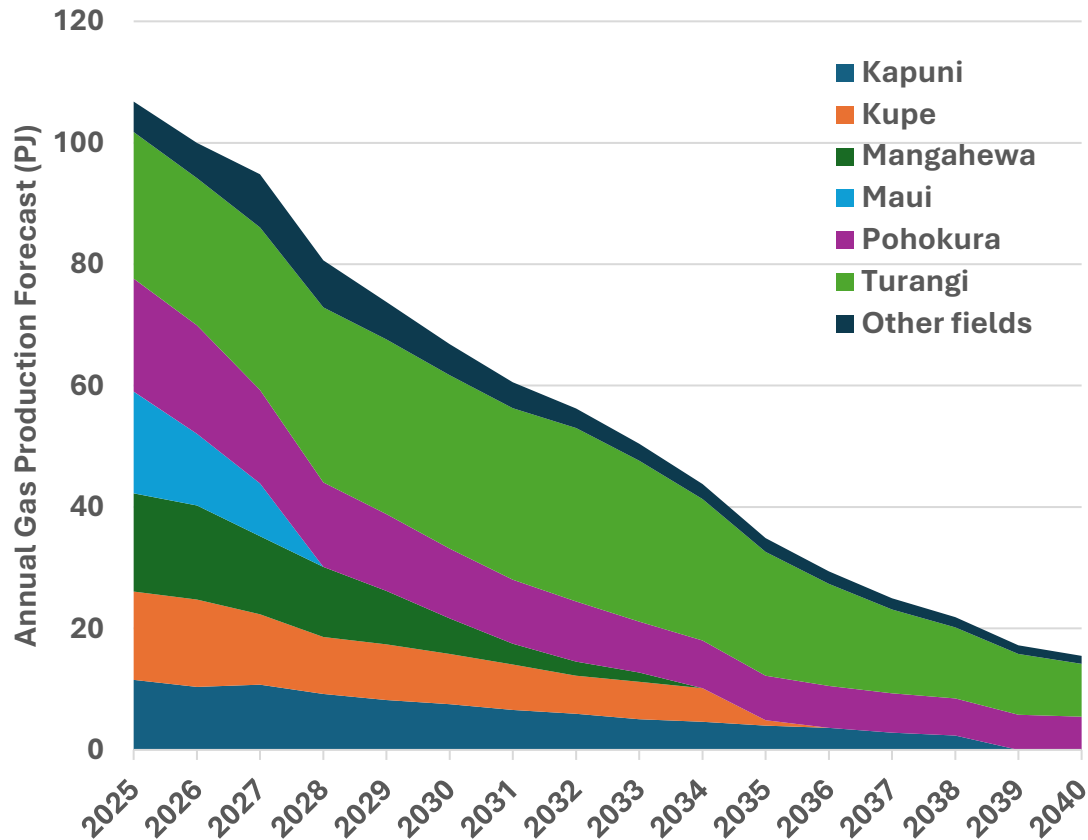
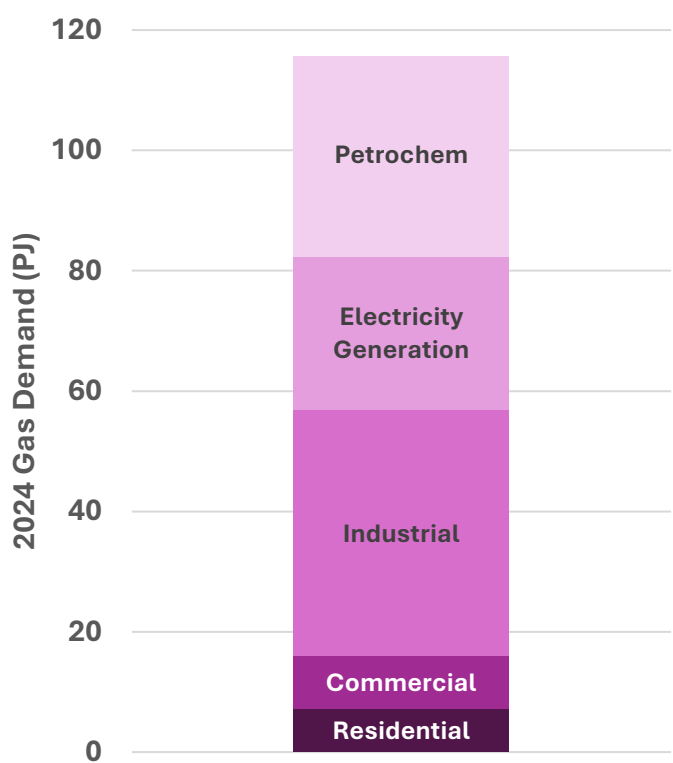


Source: MBIE data, Enerlytica

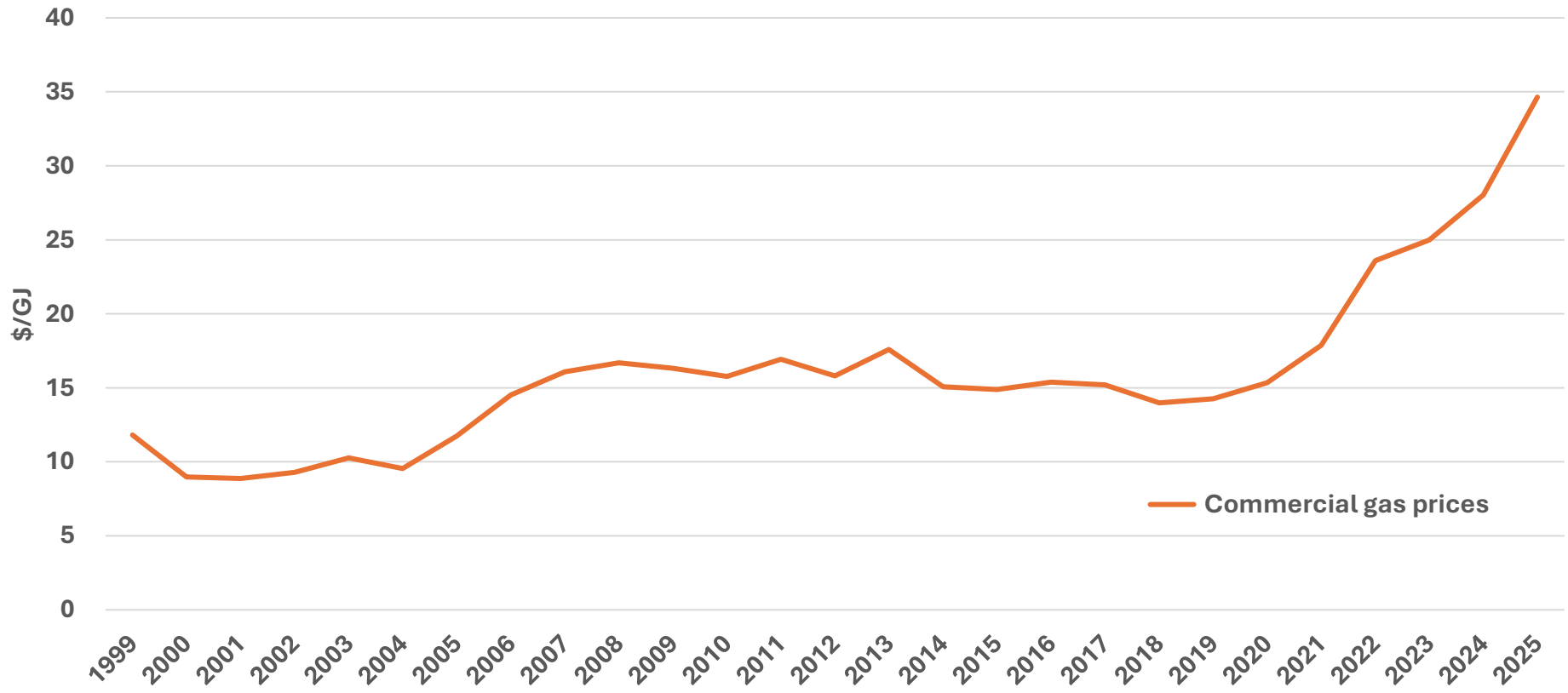
So annual supply will shrink



Won't be enough supply to meet historical demand



Gas prices have doubled in the last 5 years



Need to average one large industrial conversion a week over the next decade

800

Sites included in
RETA programme

4,800 MW

Fossil fuelled
installed
capacity

20 PJ

Baseline annual
coal use

40 PJ

Baseline annual
piped fossil gas use



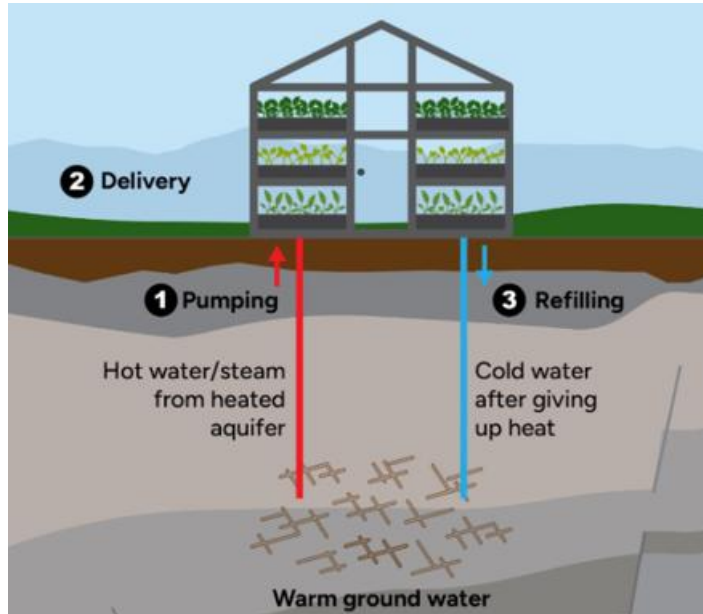
...and then there's the smaller sites

- A further 5,500 commercial / small industrial sites across the North Island, using 5.5 PJ p.a. piped gas.
- The main demand for these sites will be hot water (as opposed to process steam), and many may also require cooling, so could be good candidates for geoheat solutions.

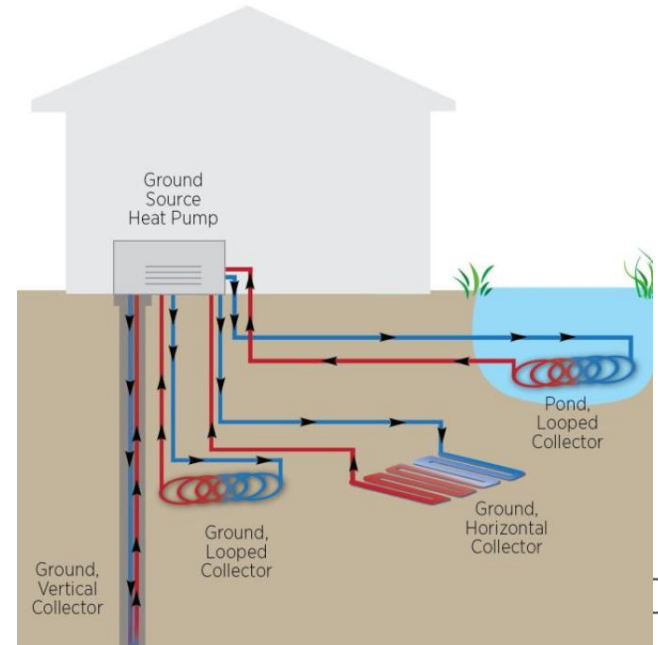


Geoheat 101: direct use or indirect / enhanced use

Direct use requires less infrastructure, but can the geothermal resource needs to match the temperature needed.



Indirect, or enhanced, use requires ground source heat pumps to increase temperature and can also be used for cooling.



EECA are here to help end users

- EECA support energy end users with feasibility studies, options assessments, and business case development.
- Success for EECA is businesses understanding what all their various options are, their costs, and operational considerations so that they can make their own informed decisions.

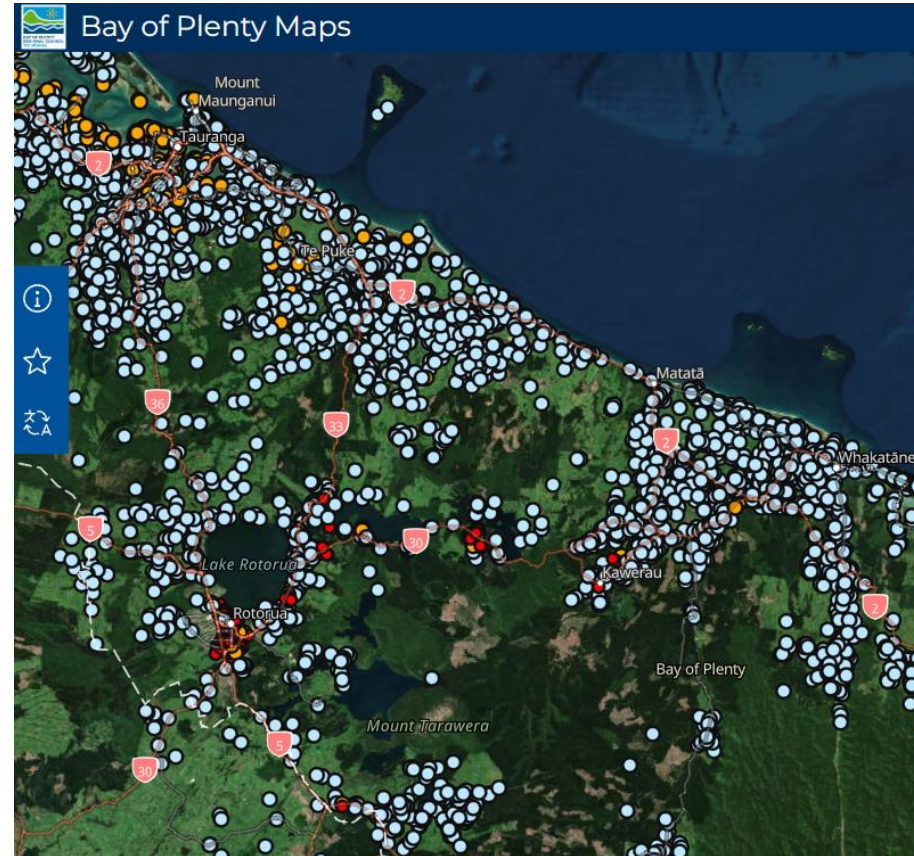
Support for gas users

Resources and funding options to help your business reduce reliance on piped natural gas, cut costs, and prepare for a more secure energy future.

Natural gas reduction

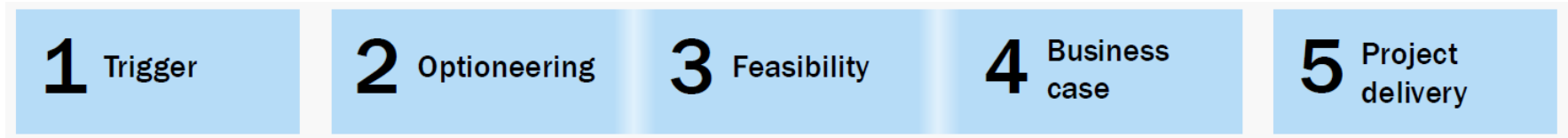
What ingredients might make geoheat viable?

- Existing bores: does the business have one that could be utilised? Is there one nearby that demonstrates the resource?
- End temperature requirements suitable for the resource
- Heating and cooling demands
- Larger energy requirements
- Project economics
- A customer centric approach to project development...



Keeping the customer in mind

Project development stages



Business owners need credible independent options assessments

EECA would like ground heat considered as an option

Every business' capabilities, motivations and decision making criteria are different

Businesses have different capabilities, motivations & decision criteria

Urgency and reason to act

Industry context

Timing and asset life cycles

Relative importance of energy costs

Risk appetite

Culture and mindset

Financing

Capability and resources

Customer expectations

Technology availability

These are often interrelated

Potential options for replacing natural gas

- Geothermal / ground source
 - without heat pump i.e. direct use
 - with heat pump (GSHP)
- Resistive electric e.g. electric boilers
- Heat pumps
 - Air source heat pumps (ASHP)
 - Integrated or waste heat source
- Wood fuels, biogas
- LPG, diesel
- Process change
- ?

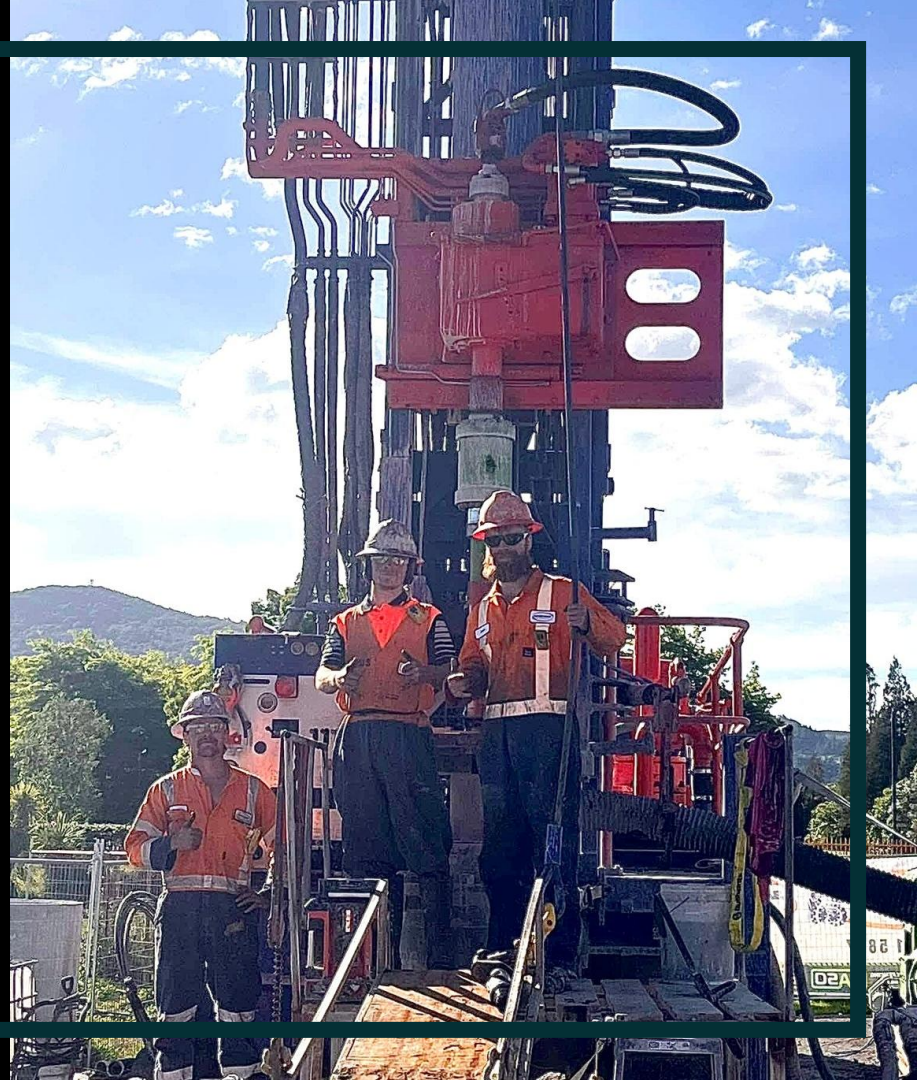
and factors affecting their feasibility

- 
- Business decision making criteria
 - Process requirements
 - Utilisation
 - Compatibility with existing equipment
 - Asset life, asset replacement timing
 - Fuel availability and pricing
 - Financing (ROI, capital cost limits, ...)
 - Risk and uncertainty
 - Alternative options
 - Capital costs
 - Industry outlook
 - Consenting
 - ...

BARHAM UNITED
WELLDRILLERS 2021



110 Jack Russell Drive, Te Awamutu
www.buwelldrillers.co.nz
enquiries@buwelldrillers.co.nz



Introduction

Dirk & Ryk Hermesen from Barham United Welldrillers

- **BUW has been around since 1936 – 90 years!**
- **Based in the Waikato and BOP**
- **Have 6 Drill Rigs and support Ancillary Equipment**
- **Capable of drilling domestic water well through to high-capacity production and reinjection wells.**
- **Drill on average 80 to 90 wells per year.**

Company History

1936

E. Barham & Co Ltd

Around 1975

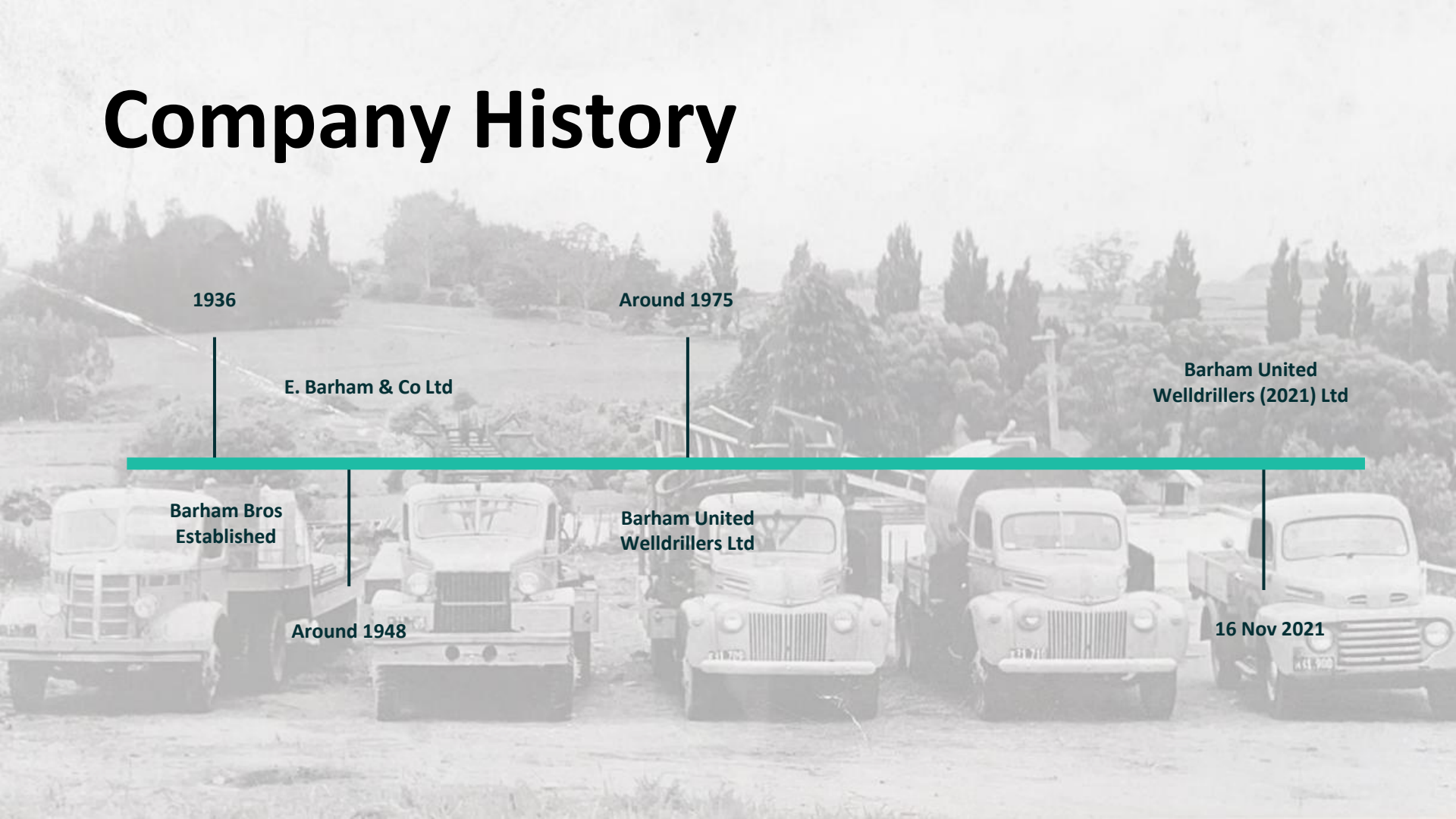
Barham United
Welldrillers (2021) Ltd

Barham Bros
Established

Around 1948

Barham United
Welldrillers Ltd

16 Nov 2021



Drillers Perspective

Overview of Process:

Beneficial to the project if Driller is engaged early. There are key factors with well design and project timeframes that contributes to successful project delivery and realistic costings / budget.

- Understanding ground conditions, local geology, practicalities of bore design from a construction perspective
- Start Mobilisation timeframes – casing delivery restraints / availability. Rig availability
- Drill Cuttings – Disposal \$\$



Completion sizes relevant to output requirements – cost effective.

- Pumped wells
- Free flowing artesian wells
- Reinjection capacity



Pad Requirements – variables include

- Rig size required
- Ancillary Equipment Needed
- Well size
- Available space
- Typical sized footprint – 25x25 and 50x50



Scope of works post drilling

- Pump testing,
- Output testing,
- Temperature runs etc.



Understanding Regulatory Requirements

Drillers Standards

Owner Obligations to Regulations

Understanding that Geothermal Wells need to be designed and constructed to the standard applicable.





Reservoir Determines the Opportunity

– is it commercially viable

Well Design Determines the Cost

– over designed or under designed

Drilling determines whether the design can be delivered successfully

- this is where theory meets reality – experience and quality make all the difference

Completion determines long term performance and reliability

- a poor completion can reduce production, shorten the well's life, increase maintenance, and lead to premature failure—even if the reservoir is excellent and the drilling was flawless.







Geothermal Industrial Heat Pumps

Decarbonising industrial process heat

Presented by:

Dylan Wedding and Mathew Parnell





NZ's Industrial Heat Landscape is Changing



Declining gas & coal supply



Increasing fossil fuel costs



Stable electricity costs

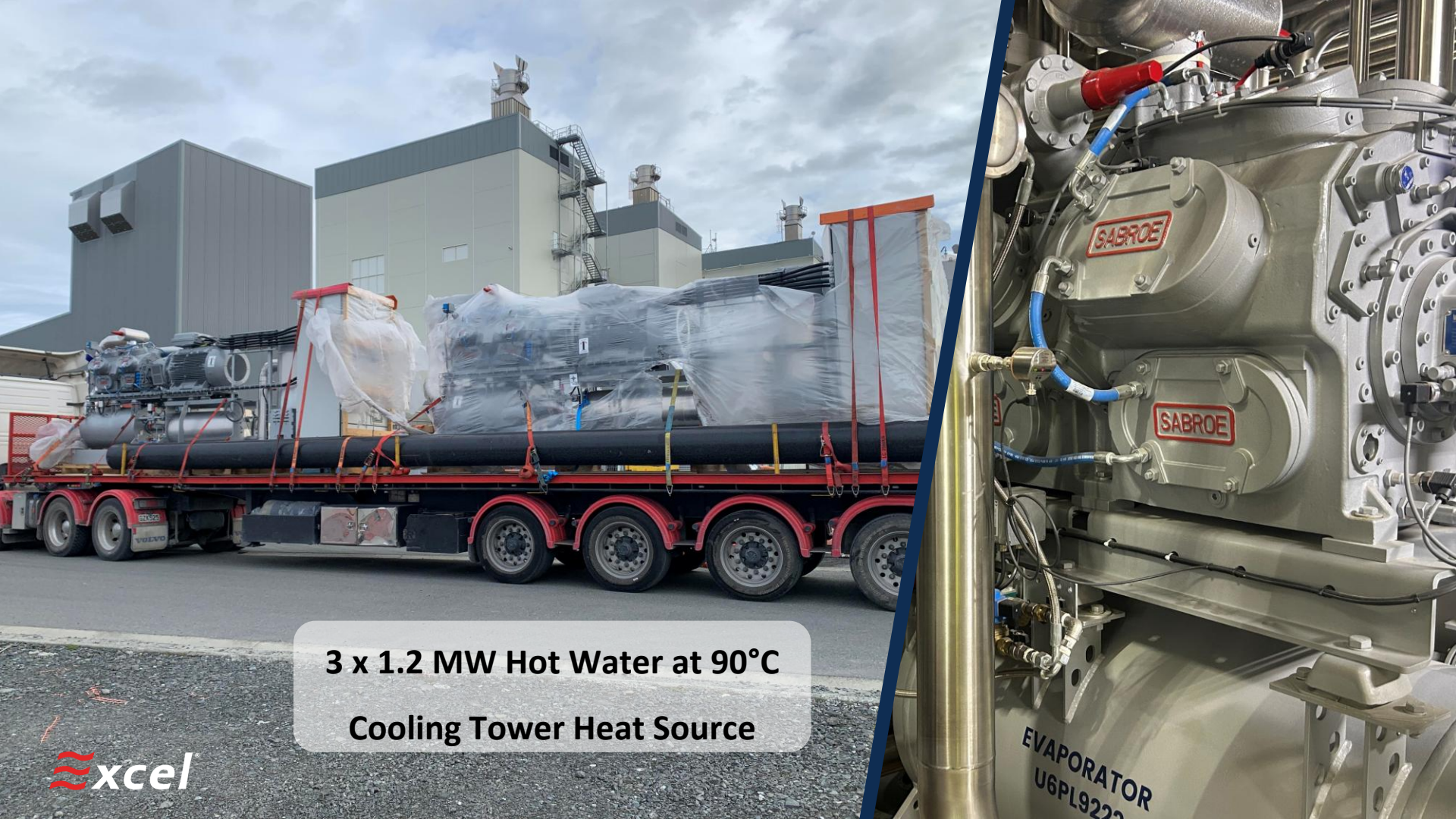


Decarbonisation



7.5 MW Hot Water at 70°C
Chilled Water Heat Source

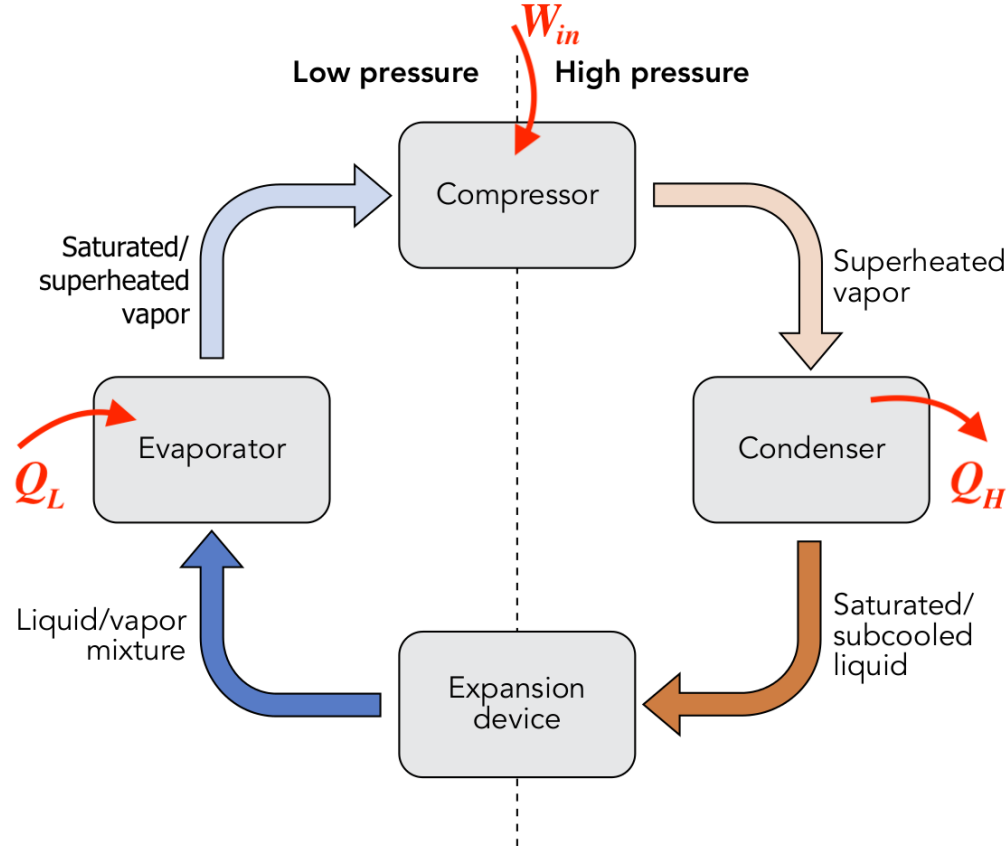




3 x 1.2 MW Hot Water at 90°C

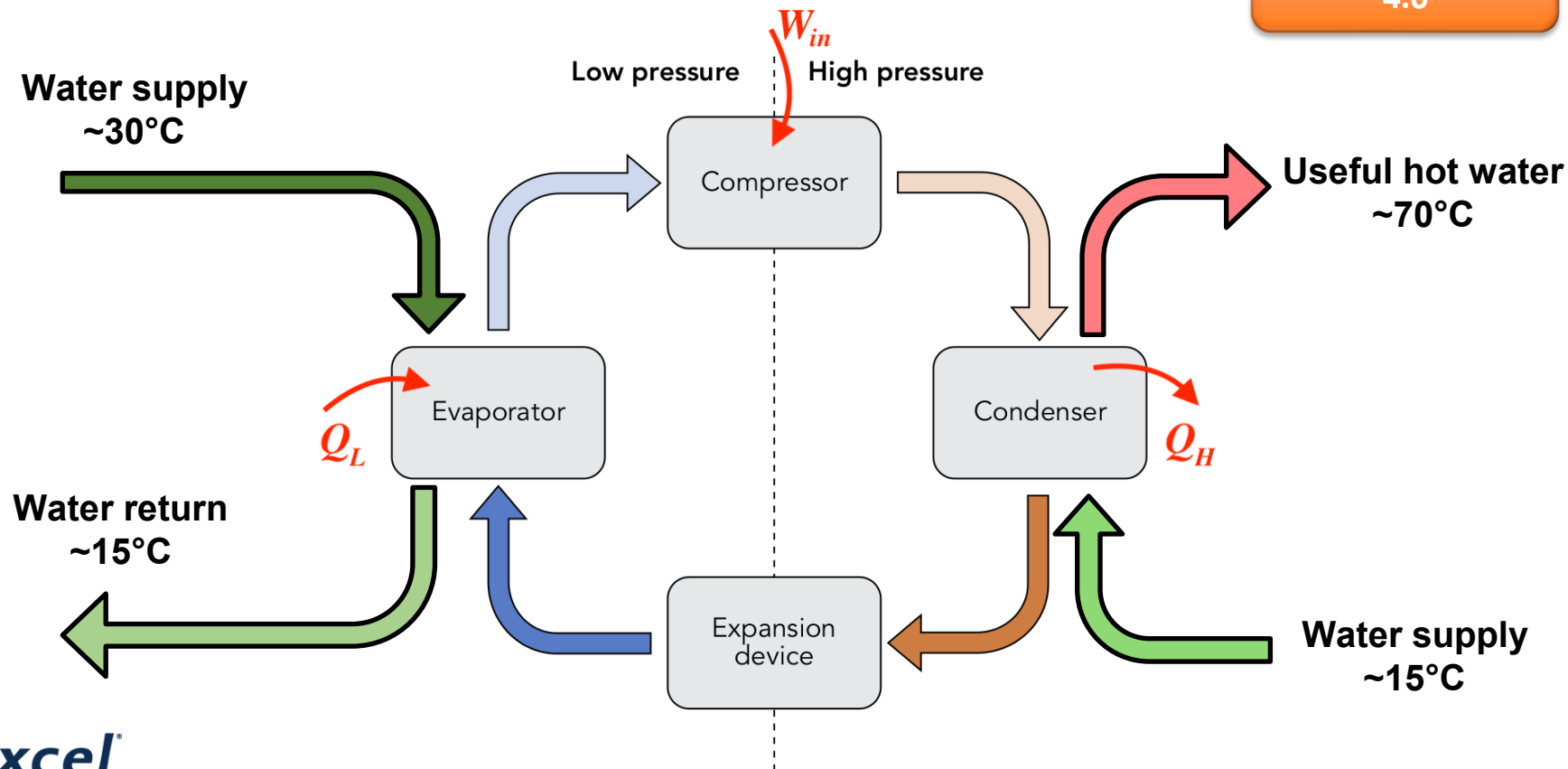
Cooling Tower Heat Source

How Does a Heat Pump Work?

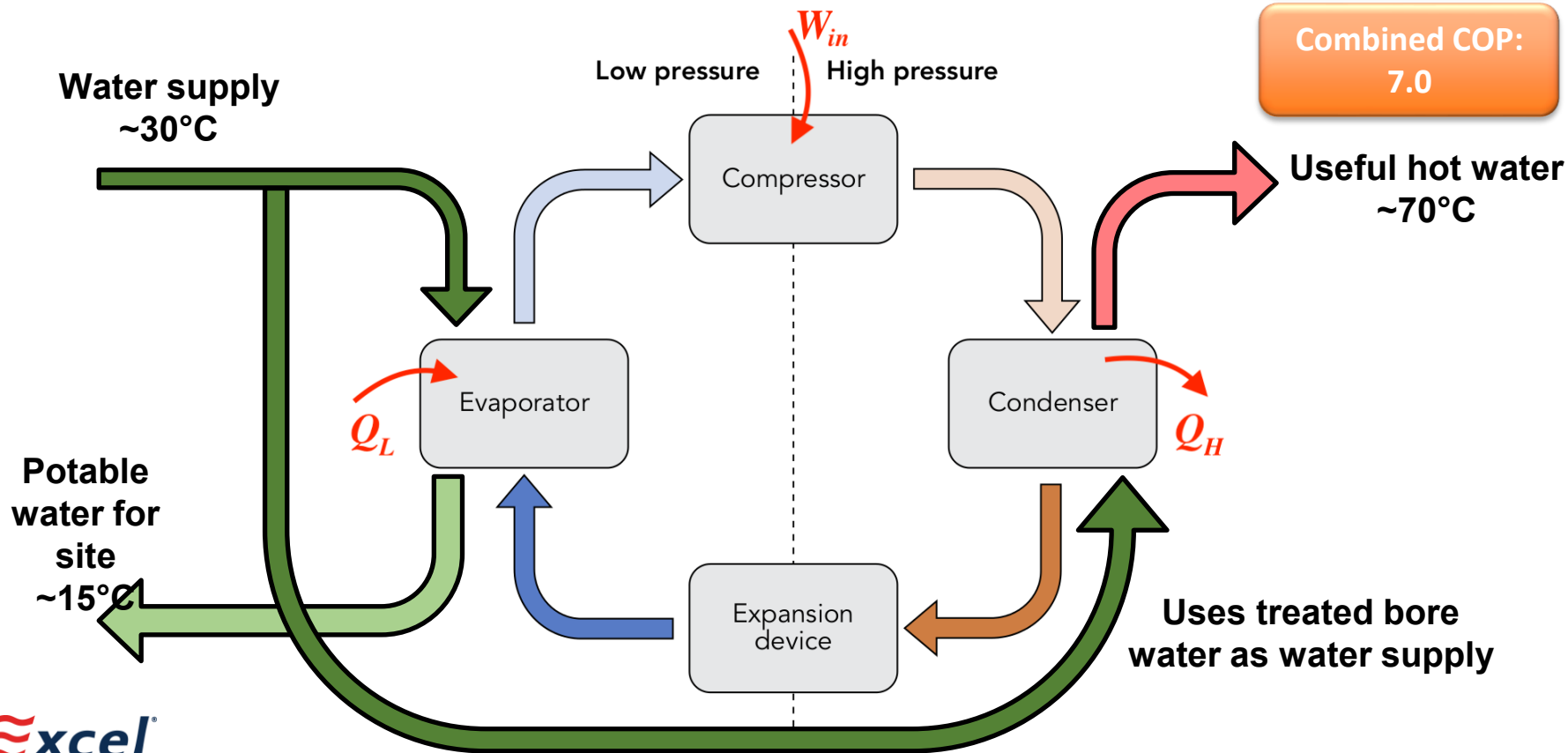


Typical Industrial Heat Pump

Heating COP:
4.0

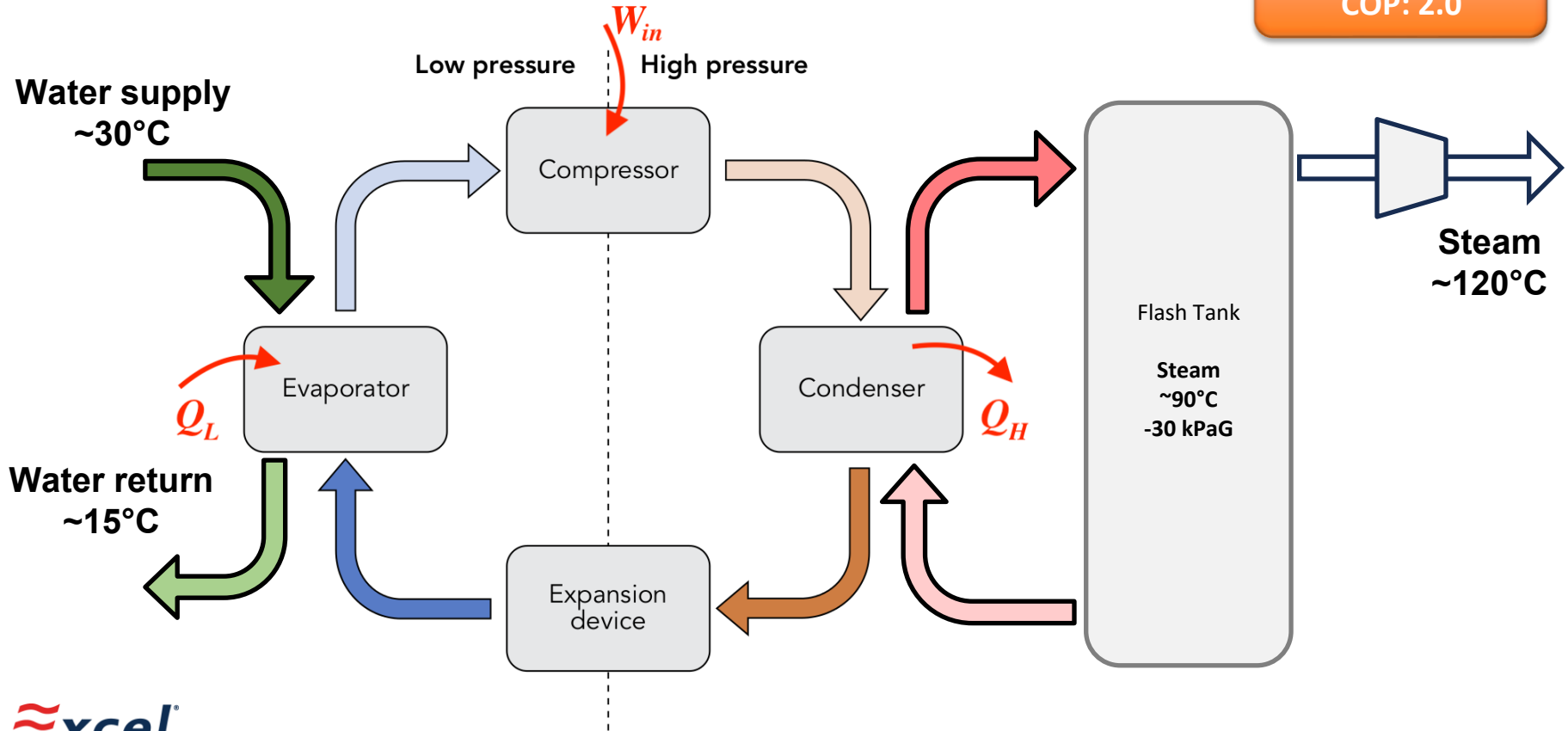


Example Geothermal Heat Pump

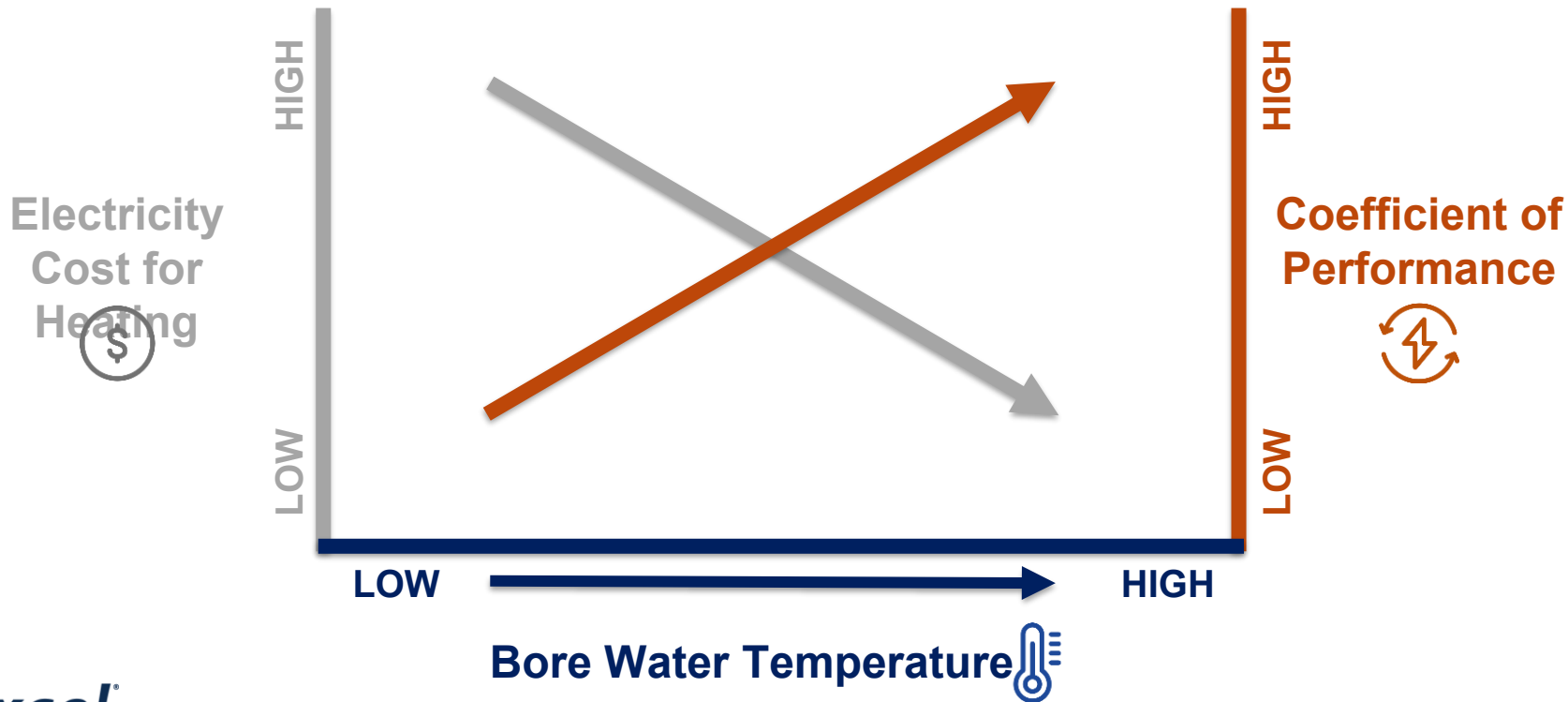


Potential Industrial Steam Heat Pump

Overall Heating
COP: 2.0

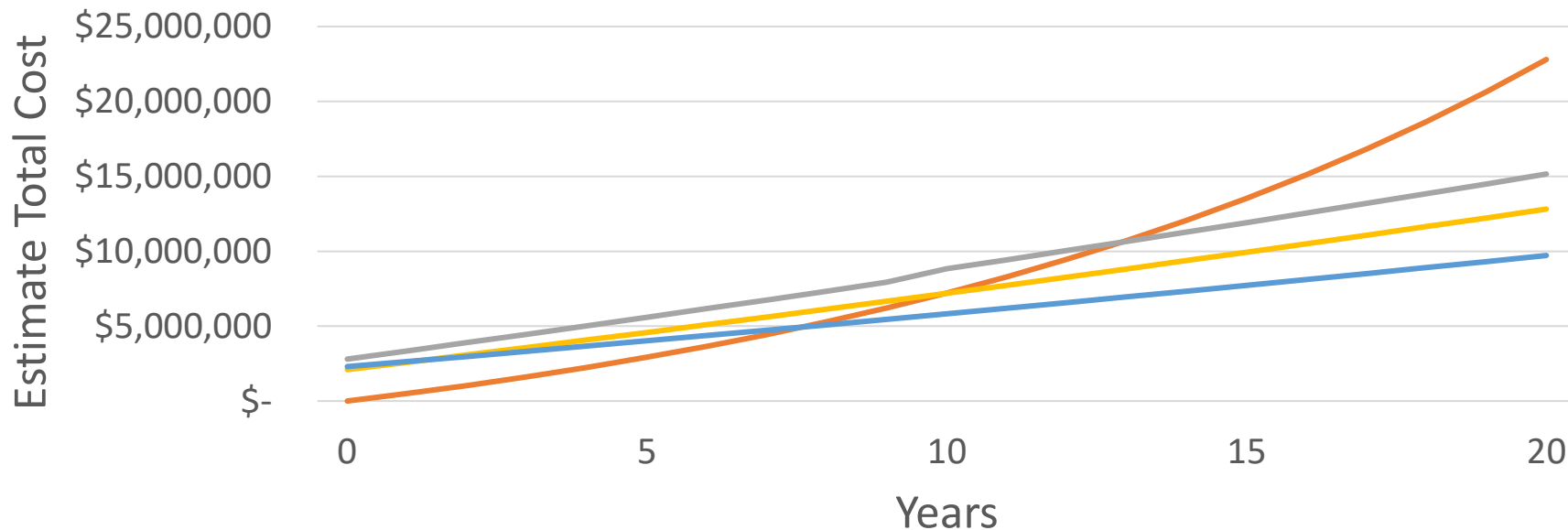


Impact of Bore Water Temperature



Heat Source Cost Comparison

Heat Source Option vs Cumulative Cost Over Time (1000kW average load)



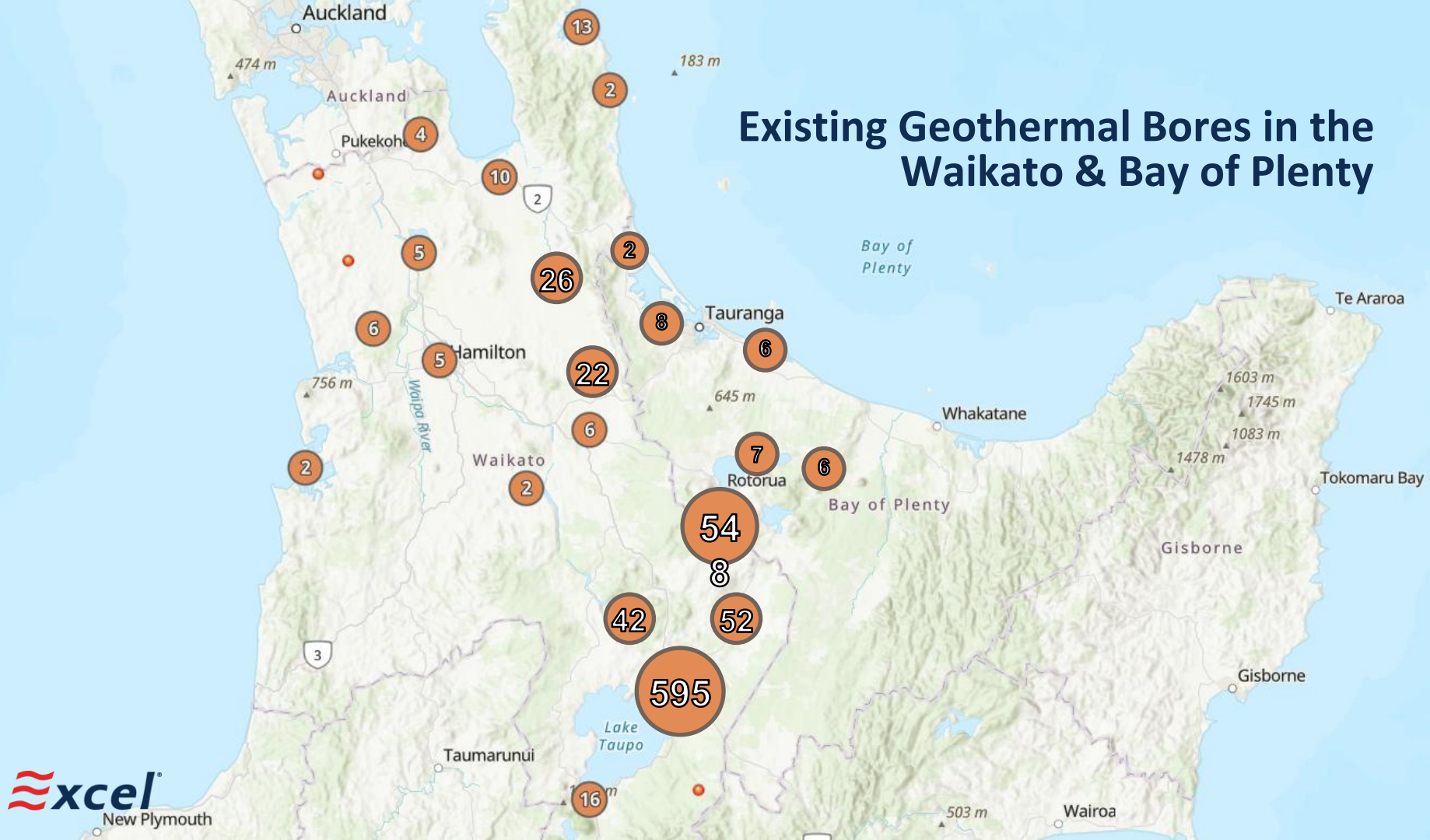
Boiler

Air Source

15°C Ground Source

30°C Ground Source

Existing Geothermal Bores in the Waikato & Bay of Plenty



Benefits

- ✓ Abundant low grade heat source
- ✓ Energy efficient
- ✓ Energy security & resilience
- ✓ Decarbonisation that makes financial sense



Challenges

- ⚠ Higher upfront costs
- ⚠ Resource consenting
- ⚠ Water treatment



Opportunities



Food & beverage processing



Dairy processing



Meat processing



Agriculture





Thank you



Workshop outline

Objective: Learn insights and ideas to help progress more geoheat projects.

- Discuss the questions at your table and put idea(s) in the slido poll
 - Vote on the ideas you would like the room to discuss
 - After a few minutes we can dig further into what people want to discuss the most
1. What barrier might be hindering consideration or implementation of geoheat projects?
 2. What idea or insight might help those considering or implementing geoheat projects?



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Question 1

What barrier might be hindering consideration or implementation of geoheat projects?

- Discuss the questions at your table and put idea(s) in the slido poll
- Vote on the ideas you would like the room to discuss



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Question 2

What idea or insight might help those considering or implementing geoheat projects?

- Discuss the questions at your table and put idea(s) in the slido poll
- Vote on the ideas you would like the room to discuss



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Get in touch!

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Ngā mihi

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E E C A ENERGY EFFICIENCY &
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<https://app.sli.do/event/do5FbvaK9huWkyFGJBCTrH>