

# NZ Geothermal Week

1-6 July 2024 | Taupo

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# Geothermal energy, what is our potential?

**Tēnā koutou**

**GNS Science Geothermal Week 2024 Workshop**

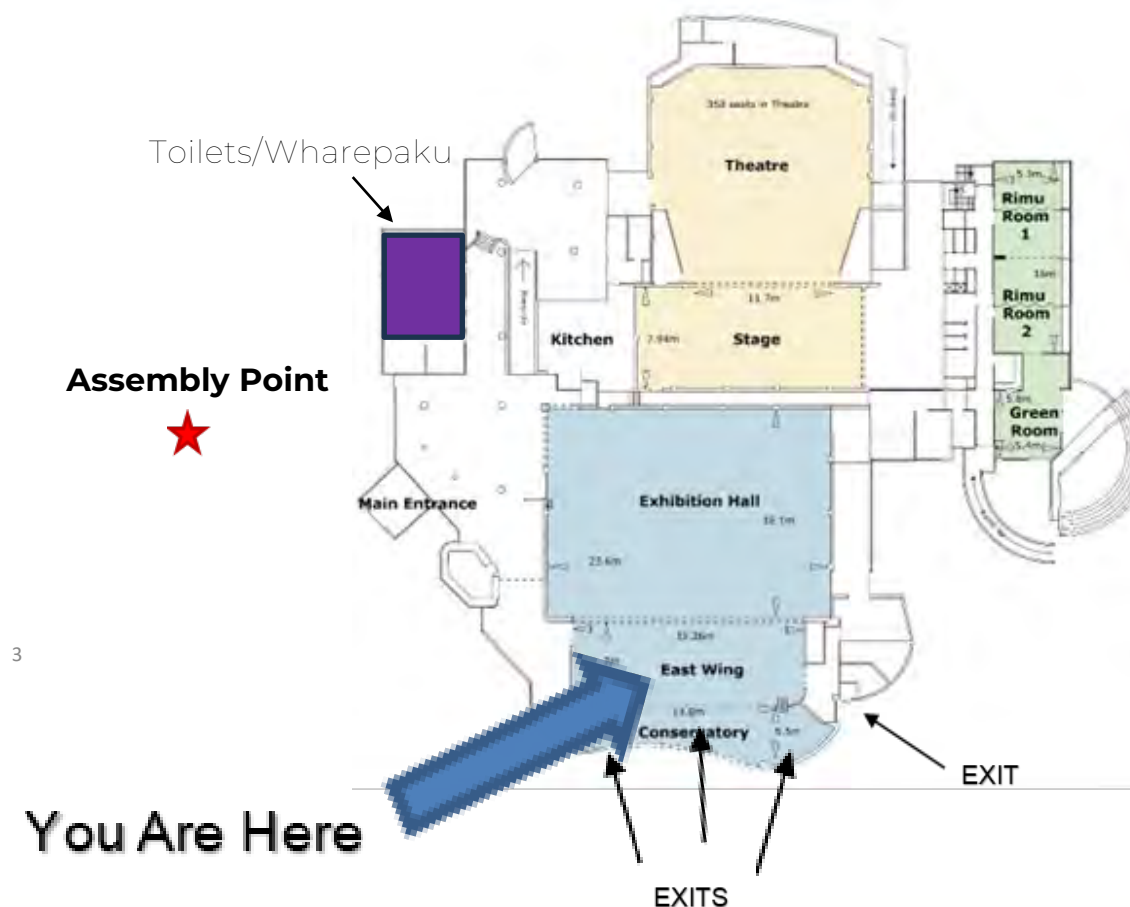


# In case of emergency

Please leave the building by the nearest exit.

Assembly point is out past the coffee cart on the grass.

If there is an earthquake:



3

## Outline

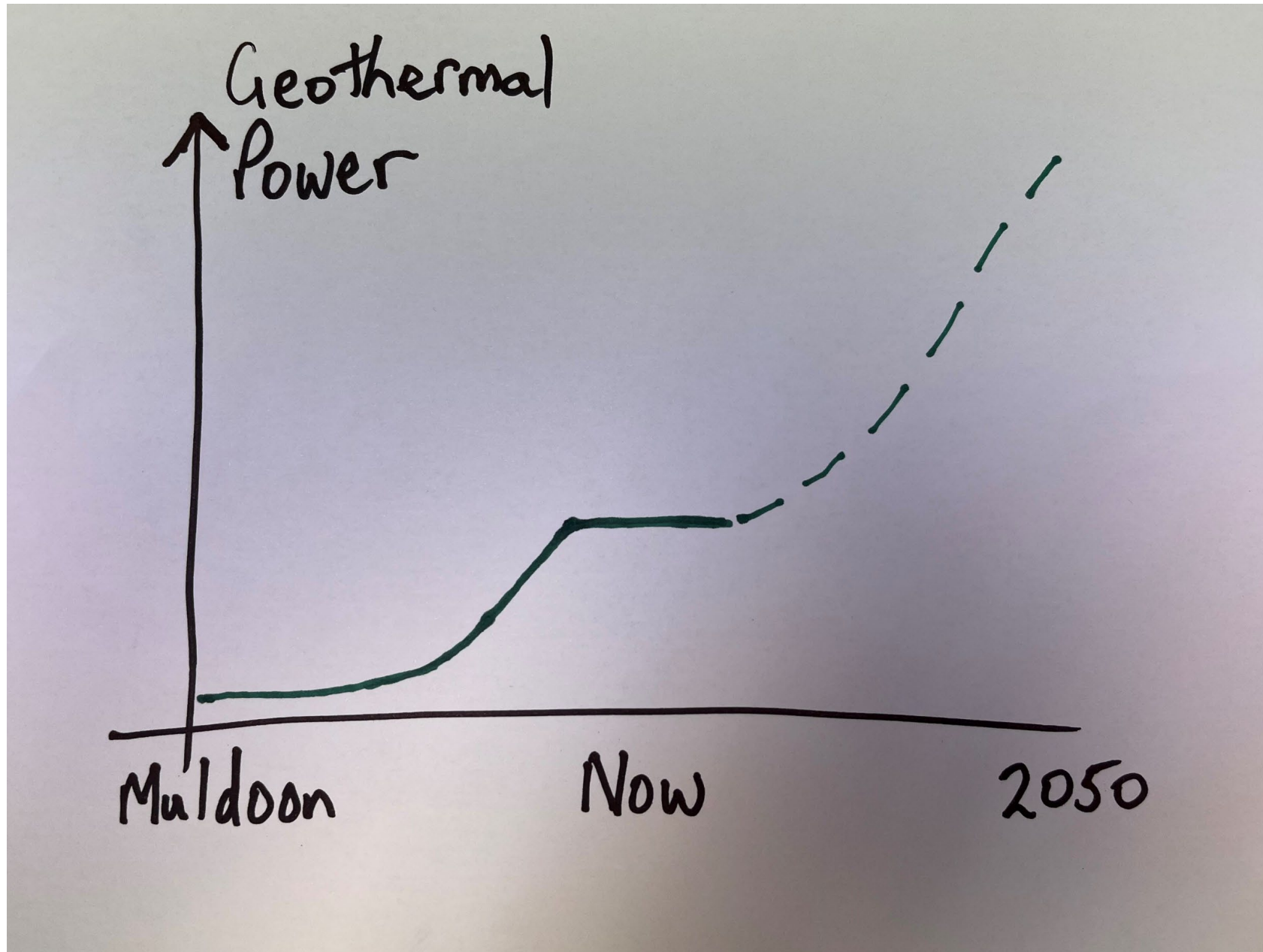
### **Part A Introduction set the scene**

#### **Speakers**

- **Yale Carden – Geoheat Future**
- **Katie Mclean - Conventional Future**
- **Andreas Heuser - Economic Value of Supercritical Geothermal**
- **Chris Bromley - Inventory update**
- **Lauren Boyd - Enhanced Geothermal Systems Global**
- **Samantha Alcaraz – Underground Thermal Energy Storage**

### **Part B: Full participation workshop**

- **Facilitated discussion and feedback**
- **Summary**



# Introduction

## Yale Carden

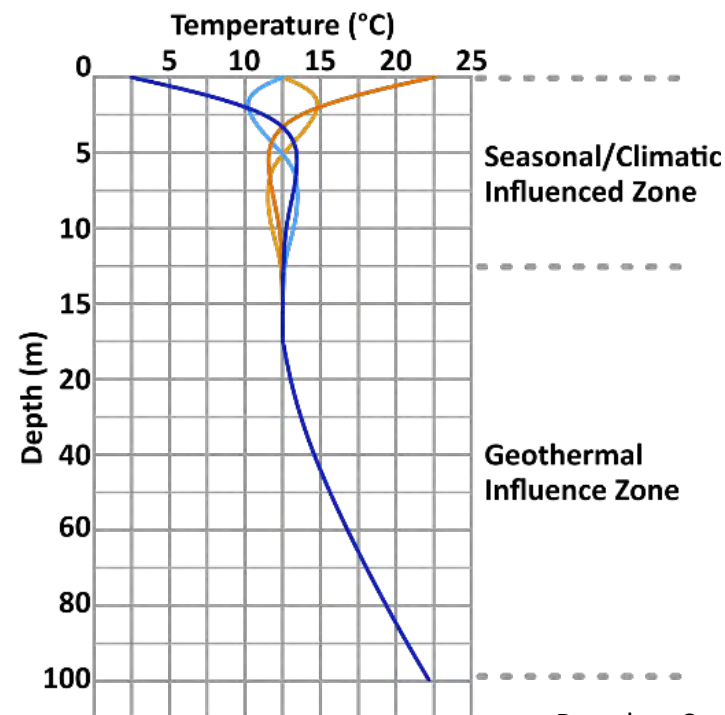
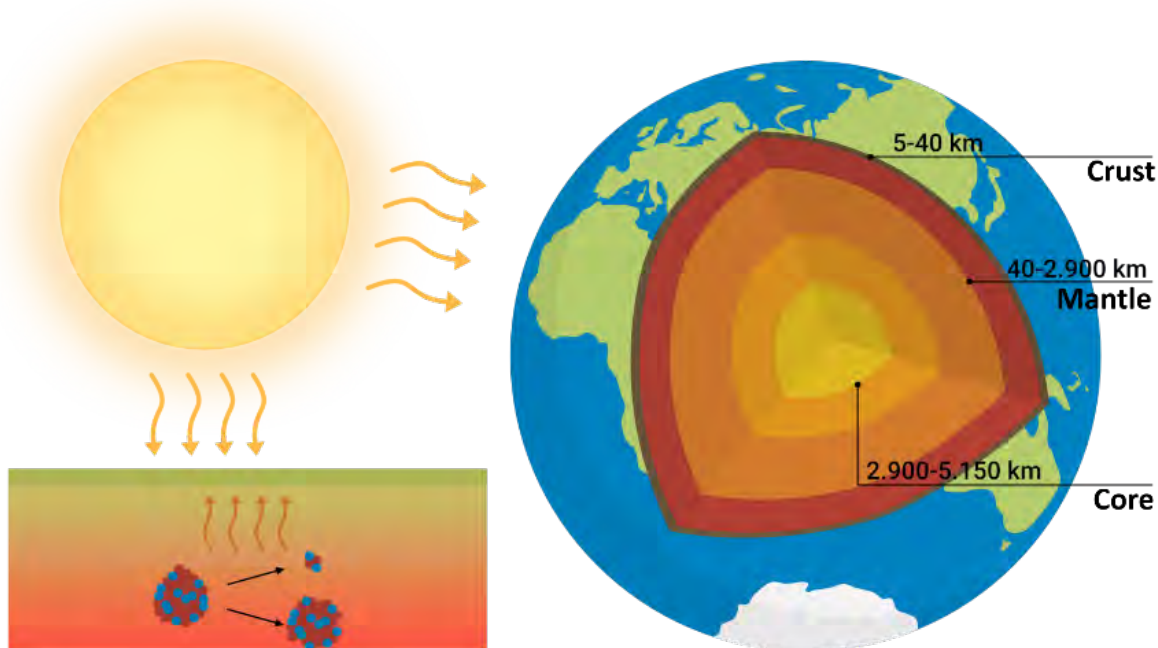
- Started in geoheat in 2006
- Projects in Australia, New Zealand, India, Japan, UK, EU
- Numerous industry firsts and award winning projects for research and sustainability



1. Ambient and Low Temperature Geothermal
2. Recent New Zealand Studies
3. Why Geoheat?
4. Technology Readiness Level
5. Ambient Temperature Geothermal is New Zealand Wide
6. My vision for ambient / low temperature geothermal for Aotearoa New Zealand



- Application of geothermal for heating purposes NOT electricity generation
- RMA definition for Geothermal Energy is at ANY temperature
  - Geothermal water defined being  $> 30^{\circ}\text{C}$
- Ambient to low temperature division - No strict definition but generally:
  - $< 30^{\circ}\text{C}$  Ambient (???) geothermal
  - $30\text{--}150^{\circ}\text{C}$  Low temperature geothermal



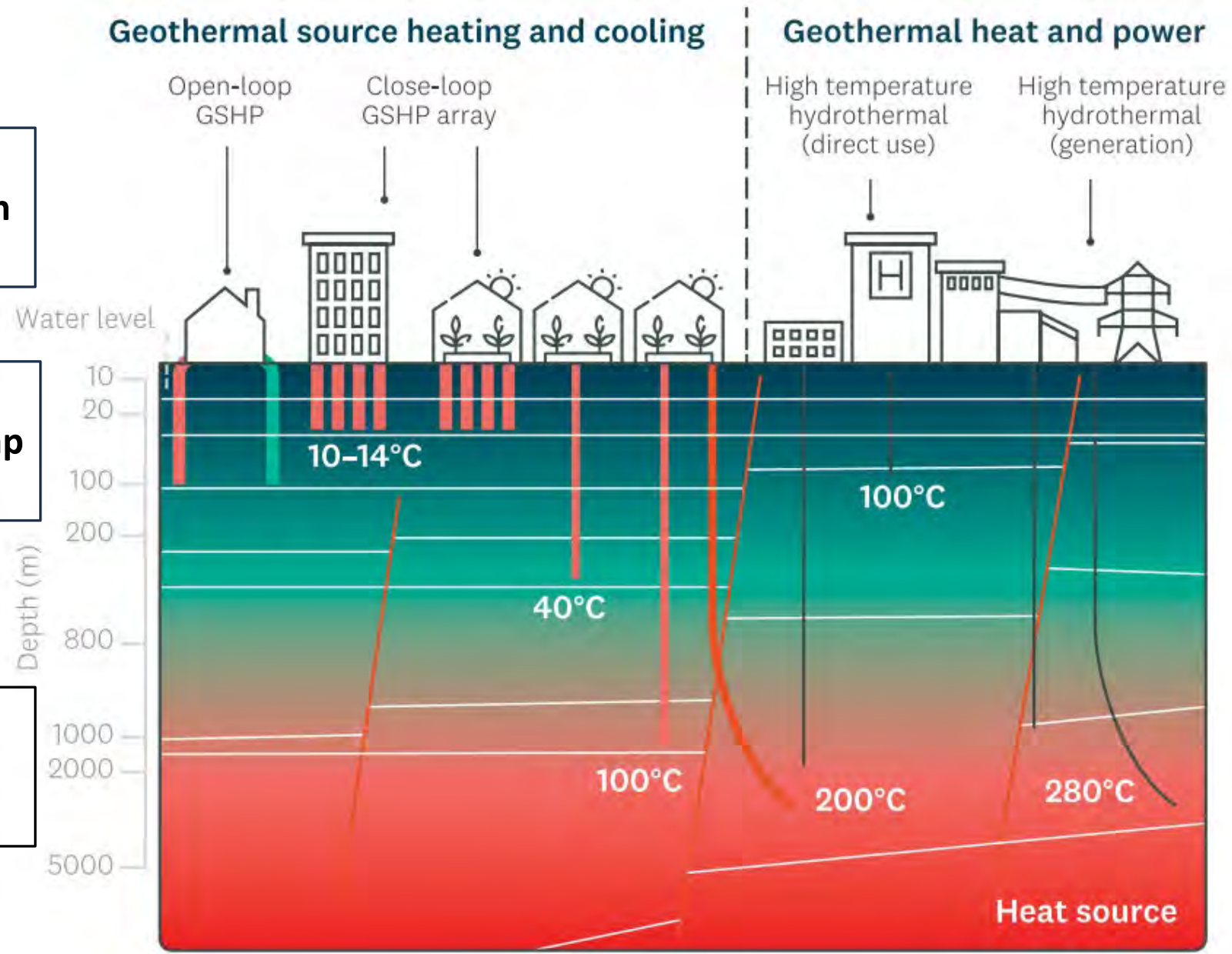
Based on Stober and Bucher (2014)



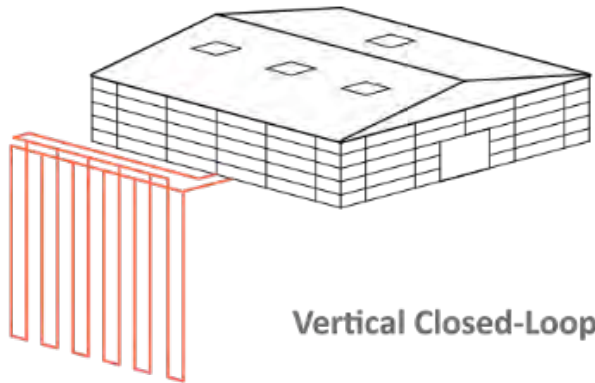
A guide only as  
there is always an  
exception

Indirect Use  
Needs a heat pump  
<30C

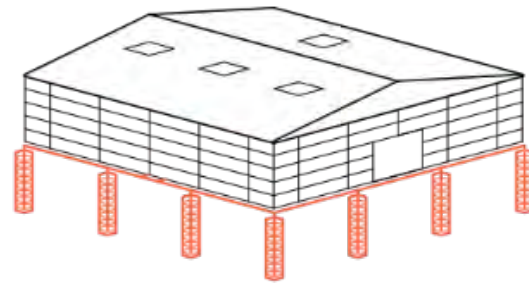
Direct Use  
NO heat pump  
>30C



## Closed Loop Systems

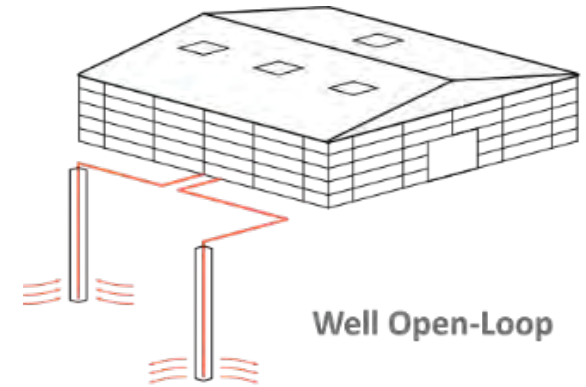


Vertical Closed-Loop



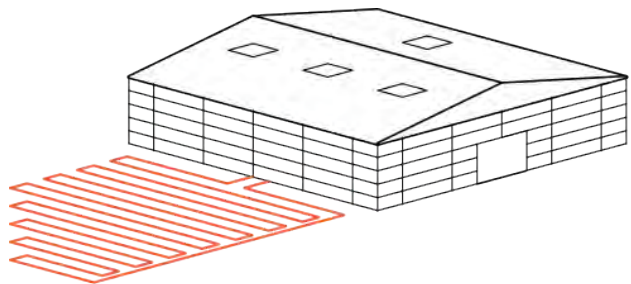
Closed Loop Building Piles

## Open Loop Systems

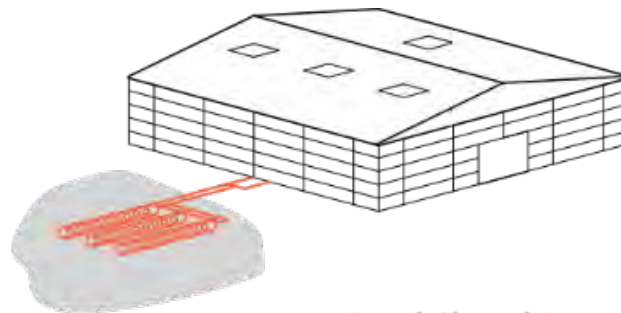


Well Open-Loop

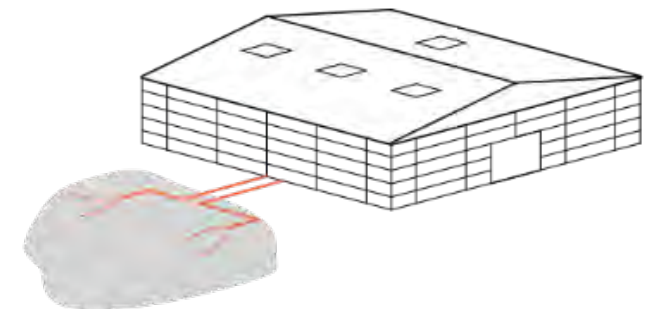
**It is everywhere - almost**



Horizontal Closed-Loop



Pond Closed-Loop



Surface Water

- GeoExchange NZ (2024): **Geoheat Potential of the Tauranga Geothermal System**. Prepared for Bay of Plenty Regional Council (in DRAFT)
- EECA (2024): **Renewable Energy Transition Accelerator: Bay of Plenty Region**
- GNS Science (2024): **Energy Transition Accelerator – Bay of Plenty – Geothermal Energy Assessment**, GNS Science Report 2024/02.
- NZGA (2024): Action Plan 2024-2025 – **Geoheat Strategy for Aotearoa NZ**
- Seward, A., Wells, C., and Peters E. (2023). Low-Temperature geothermal – **a decarbonising solution for covered crop growers** in New Zealand? Proceedings 45<sup>th</sup> New Zealand Geothermal Workshop, 15-17 November, 2023. Auckland, New Zealand
- BOPRC (2023): **Tauranga Geothermal System Science Summary Report**, Environmental Summary Report December 2023.
- GeoExchange Australia (2022): Feasibility for **District Heating and Cooling System, Taupo** East Urban Lands