

Geoheat



22nd September 2022
RMLA Conference
Rotorua Energy Events Centre



Tēnā koe e hoa

- **Brian Carey**
 - GNS Science – Geothermal Specialist
 - IEA Geothermal – Executive Secretary
 - Life member of the New Zealand Geothermal Association
 - Been involved with Geoheat work since its inception

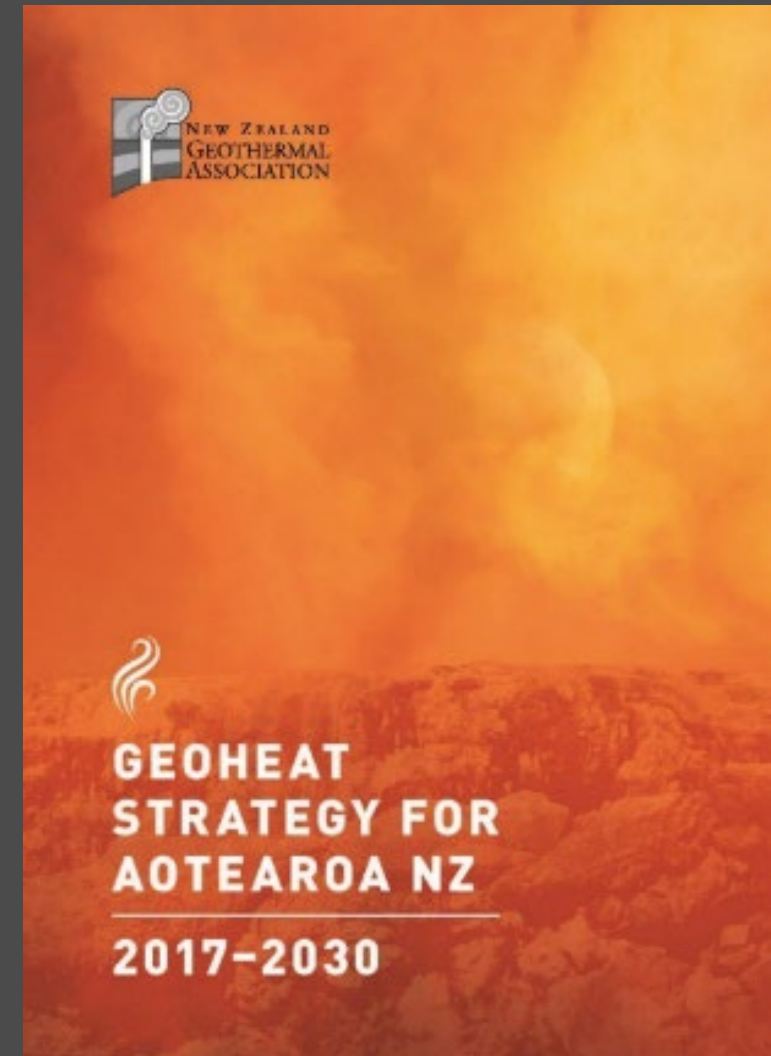


IEA Geothermal



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Geoheat – New Zealand Geothermal Association Initiative

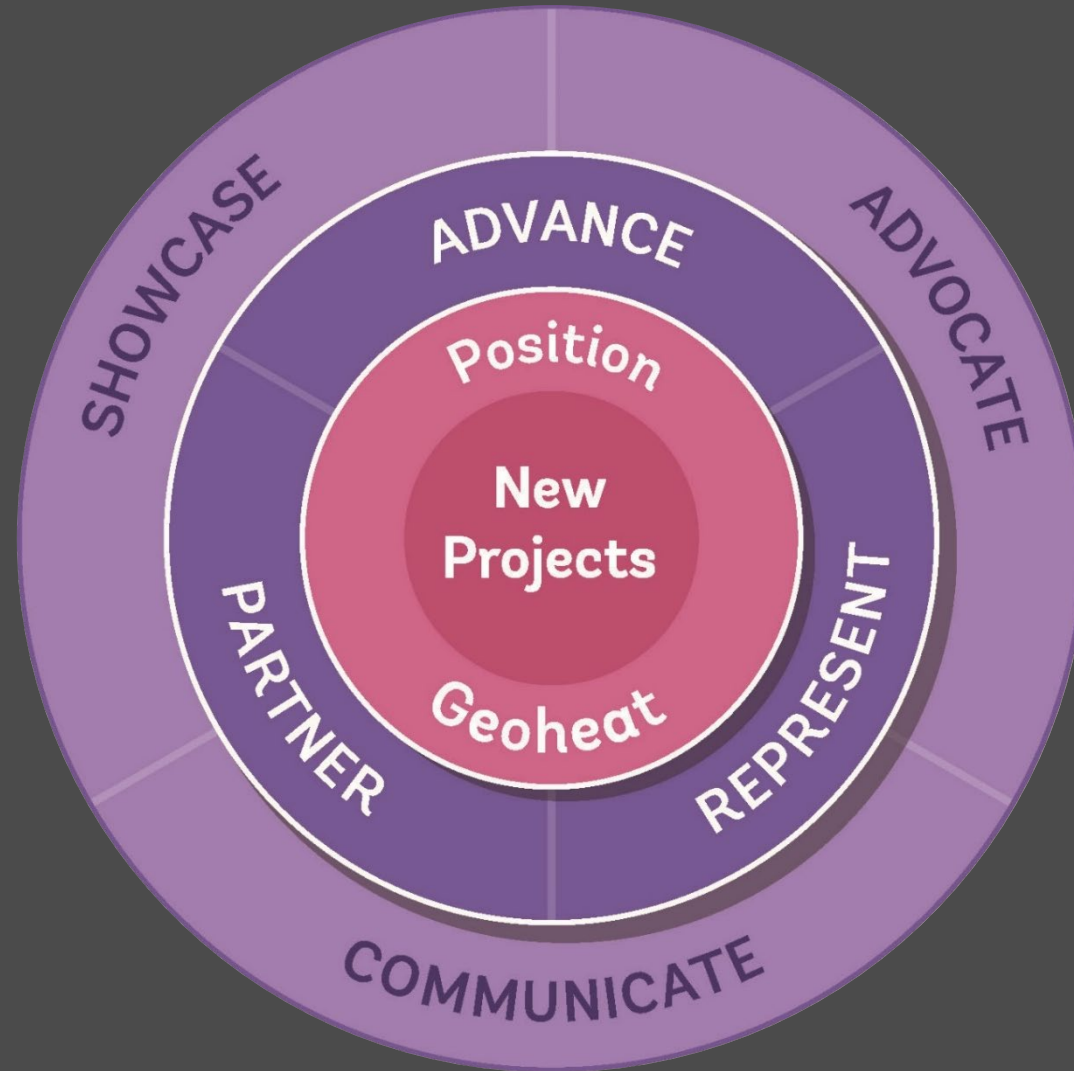


Working Together



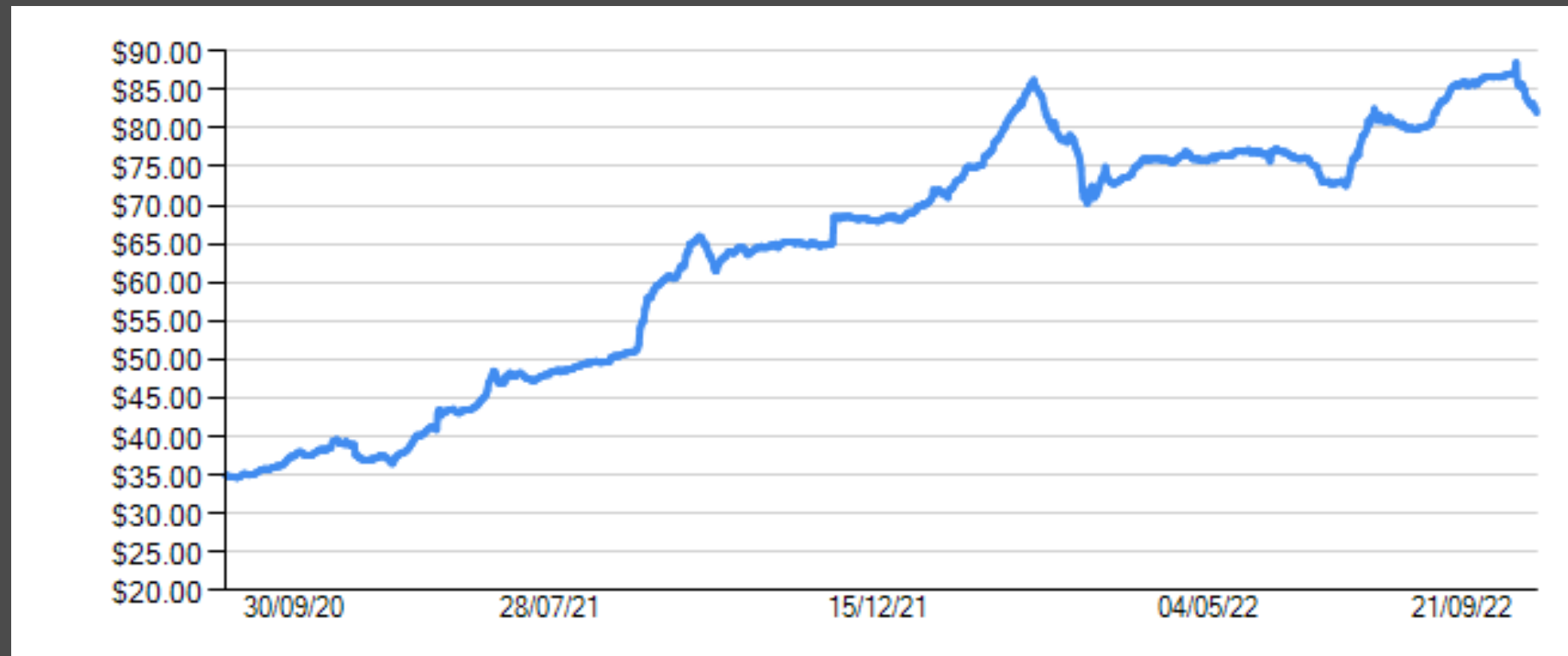
Action Group Seeking to achieve more

- Advocate
- Communicate
- Showcase
- Advance
- Partner
- Represent



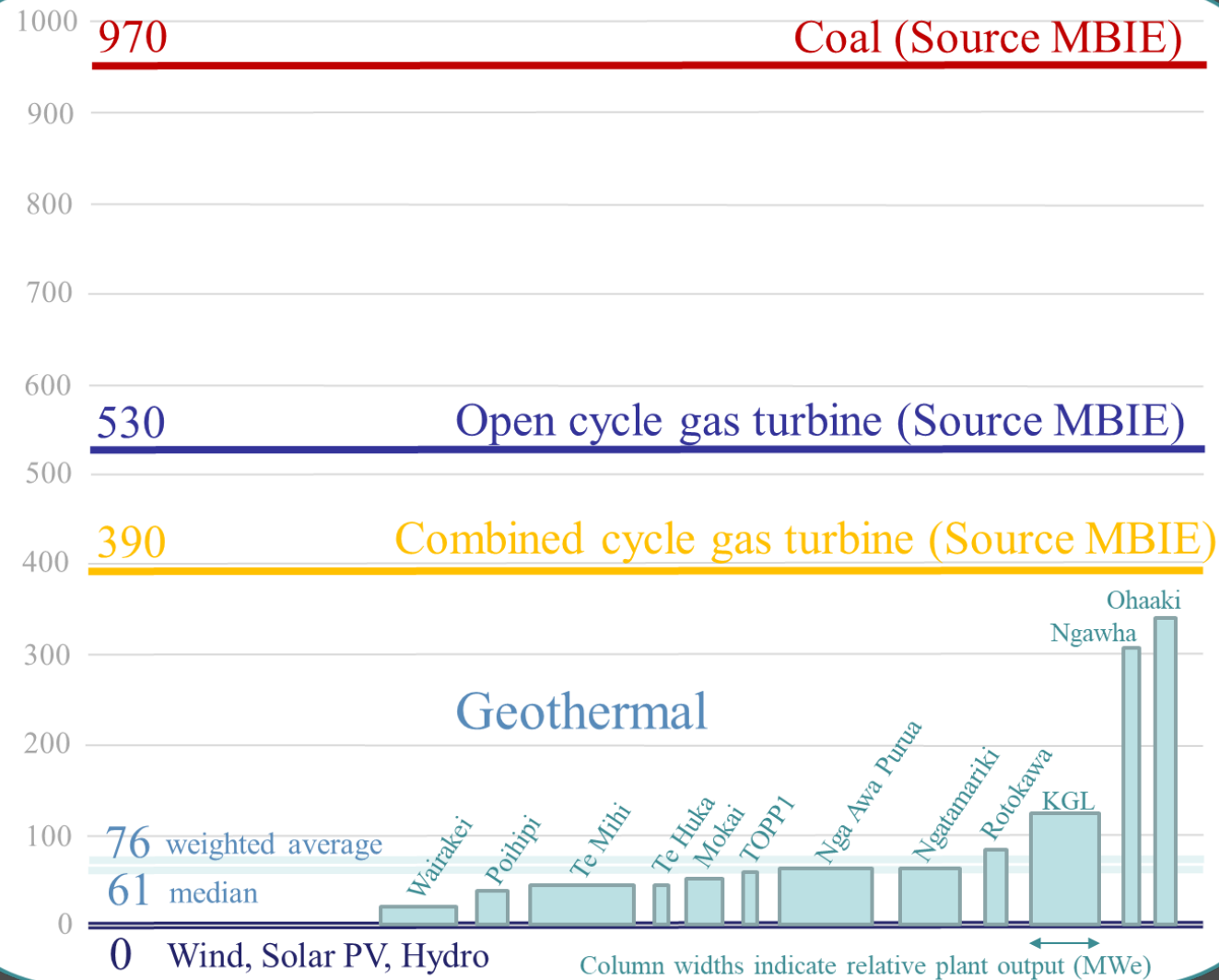
Carbon Unit Pricing

- Carbon now ~\$82 / tonne
- Offers and Bids for 2027 > \$105 / tonne



Operational Carbon and Geothermal Electricity

gCO₂e/kWh



McLean and Richardson, 2019. Greenhouse gas emissions from New Zealand geothermal power generation in context. Proceedings 41st New Zealand Geothermal Workshop, Auckland, 25-27 November, 2019.

Changes coming to operational carbon emissions

- **Following Power Plants will likely return carbon back to the reservoir within a few years**
 - Ngawha
 - Rotokawa
 - Ngatamariki
 - TOPP1
 - Mokai
 - Te Huka
- **Others will follow but the complexity is greater**

Geoheat

- **Geothermal heat for process industries is**
 - **Low carbon**
 - **Cost effective**
 - **Renewable**
 - **Available**
 - **Proven at scale**
 - **Low risk**



Geoheat is MORE

- **Attracts investment into the regions**
- **Contributes to regional economic growth**
- **Value-adds - Builds on natural strengths and sits downstream of primary industries in the region**
- **Presents opportunities for Māori investment and asset ownership**
- **Typically involves industries with above average economic productivity**
- **Creates jobs lifting skills and incomes**

Geoheat – Effective cost by fuel type – Carbon \$77 / tonne

Type	\$/GJ	Carbon Factor tCO ₂ e/GJ	Carbon costs	Conversion Factor	Total Cost \$ / GJ Delivered
Geothermal - Direct	8	0.0070	\$0.54	0.83	\$10.29
Biomass	8	0	\$0.00	0.64	\$12.50
Electricity - Heat Pump	45	0.0265	\$2.04	3.5	\$12.86
Gas	9	0.054	\$4.16	0.85	\$15.48
Coal	6	0.0944	\$7.27	0.81	\$16.38
Wood Pellets	14	0	\$0.00	0.81	\$17.28
Electricity - Heat Pump	45	0.0265	\$2.04	2.5	\$18.00
Electricity - Resistive	45	0.0265	\$2.04	1	\$45.00

Data sources and assumptions in the 2022 / 2023 Action Plan

Four Geoheat examples

- **Kawerau**
 - Oji Fibre Solutions – power boiler project
 - Essity – paper drying drum and hood conversion
- **Tauhara**
 - Natures Flame - biofuel
 - He Ahi – Eco-Energy Park

Oji Fibre Solutions Kawerau



- 2020 mill used 7.77 PJ
- ~20% (1.64 PJ) supplied from geothermal energy
- 2019-20 Power Boiler Project
 - Process steam generated from geothermal replaces the boiler
 - CO_{2-e} emissions reduced by 10,000 tonnes per annum
 - Operational savings of \$4 Million per annum
 - A further 10,000 tonnes per annum of CO_{2-e} emissions reduced with wood residues no longer required at Kawerau being transported to Tokoroa for use as biofuel in fuel substitution



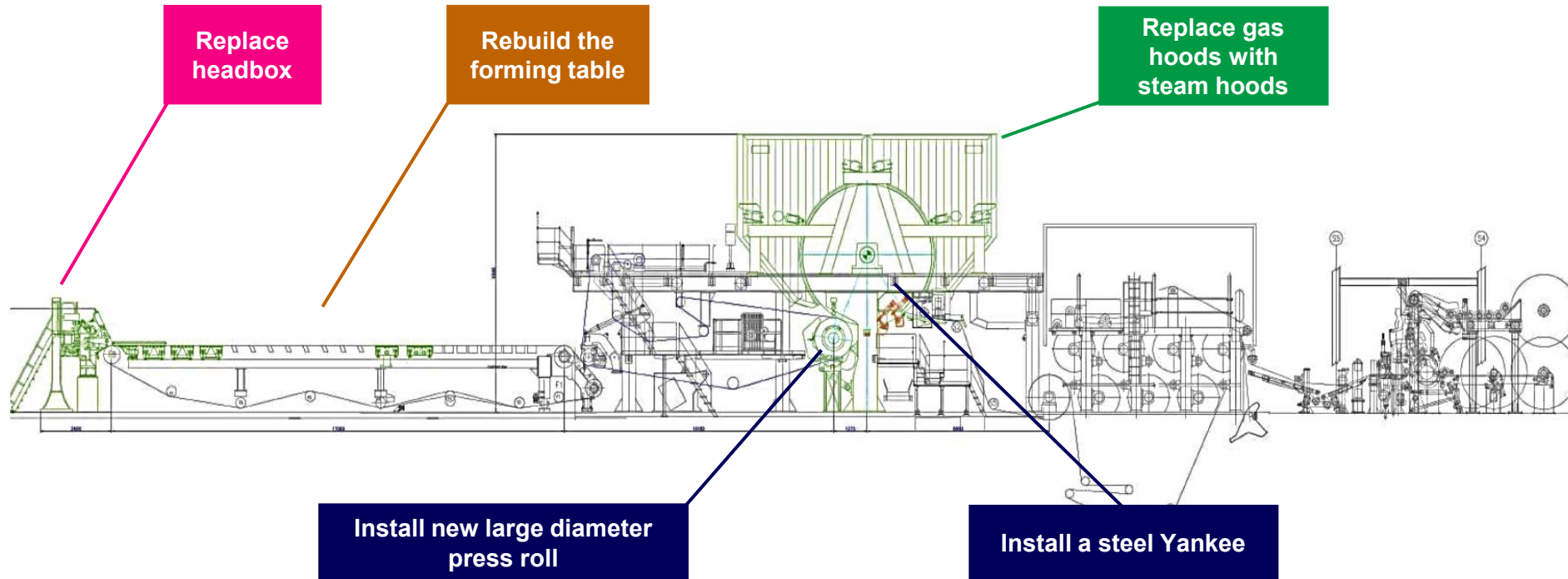
Essity – Been using geothermal energy since 2010

- **2010 phased out a natural gas boiler**
 - moved to a geothermal supply
 - reduced their carbon emissions by 37%.
- **Now converting one of two large tissue drum dryers to use geothermal energy instead of natural gas**
 - First paper machine in the world to use geothermal to power the hood and drying drum.



PM3 Rebuild - Project Overview

The project scope covers replacement of the Headbox, Hoods with Steam Hoods, Yankee and Suction Press Roll



- Hood temperatures drop from 350 to 180 °C

Pulp

Saving 1,300 tons of pulp per annum through optimised paper weight while enhancing the machine's unique capabilities.

Energy

Switching fuel source and making the production process more energy efficient.

CO₂e

Protecting our future and the environment by pioneering the use of geothermal steam sourced from local Iwi.

Waste

Modernizing the machine reduces our waste which improves the machine's capacity and profitability.

Kawerau Paper Machine 3 Rebuild Geothermal Steam Powered Hoods

The EECA GIDI grant made this project happen

Investment

15.5

NZDm

GIDI Grant

1.65

NZDm

tCO₂

6,500

pa reduction

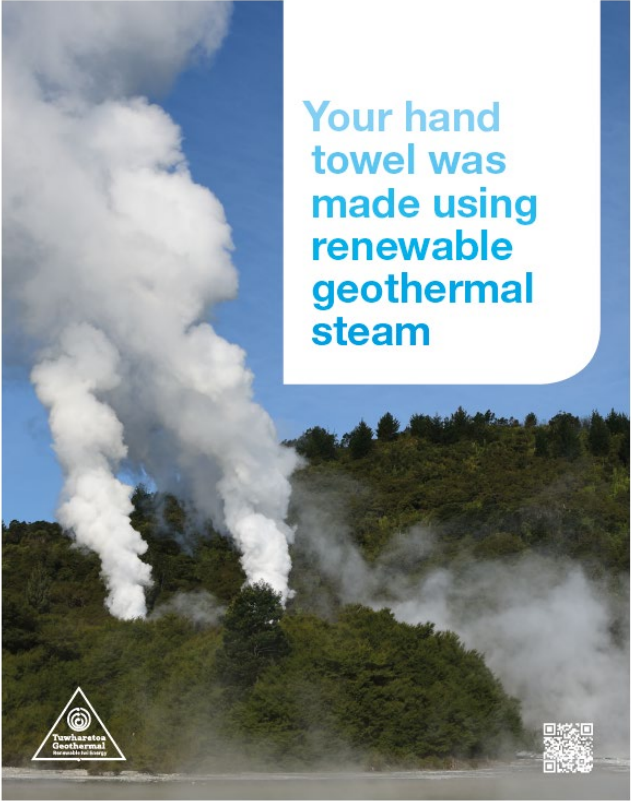
EECA TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY



Geoheat At Essity

Essity proudly communicate our Geothermal story to our customers and consumers

Front of Pack Call outs & stickers



EPDs show high-renewable energy content



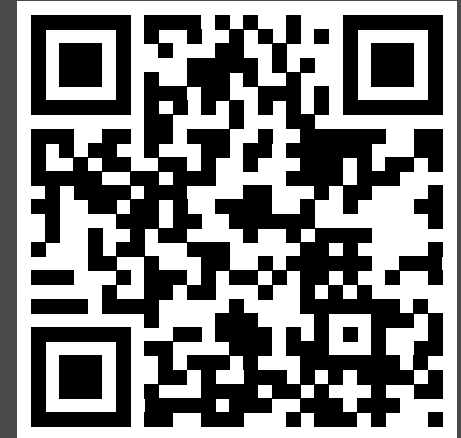
Resulting in a 46% reduction in greenhouse gas emissions at the production site

Nature's Flame – Geothermal Lowering Carbon Footprints

- **Taupō Biofuel pellet manufacturer**
- **Embraced geothermal energy in late 2019**
 - Installed 20 MW_{th} geothermal process heat supply from Contact Energy
- **Pellets supplied to the Te Awamutu Dairy Factory**
 - Phased out a 43 MW_{th} coal-fired boiler
 - \$11 Million capital for the boiler conversion to biofuel
 - Reduced carbon emissions by ~90,000 tonnes / annum



Video



A Change that Matters

TE PAE O
WAIMIHIA



HE AHI

Eco-Energy Park

The time for Clean Energy use and Eco-Industrial practices is - now

The place is – Taupō

He Ahi, Eco-Energy Park - Rakaunui Road Taupō

- Preparing ~40 sites
- Geothermal energy to be available
- Gets over the capital hurdle for smaller / medium sized geoheat users



You to can be involved in Geoheat

Buy for your business or for your home



Kia Ora

