Geoheat

28th July 2022 Towards Net Zero: Building a Sustainable Future New Zealand Geothermal Association Seminar Great Lake Centre Taupo



GNS BCIENCE TE PŪ AO

Today



- What, Why and How Geoheat
- Comparative Energy Costs
- Activity
 - Oji Fibre Solutions
 - Essity
 - Natures Flame
 - He Ahi
- What you might do!

Tēnā koe e hoa

- Brian Carey
 - Mechanical Engineer
 - GNS Science Geothermal Specialist
 - IEA Geothermal Executive Secretary





- Privileged to be a
- Life member of the New Zealand Geothermal Association
 - Been involved with Geoheat Strategy work since its inception

Andy Bloomer NZGA President at Geoheat Strategy launch in 2017

• His call today is as strong now



The Good Bottom lines

People Purpose Planet Profit

2017 Geoheat launch put it this way



www.nzgeoheat.nz

Geoheat is ...







PROVEN AT SCALE

\$ COST EFFECTIVE 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



RENEWABLE – Geothermal energy is renewable energy, recognised as such in New Zealand law (RMA 1991).



LOW CARBON – on par with the life cycle carbon intensity of other renewables available in Aotearoa New Zealand.



COST EFFECTIVE – Geoheat is supplying delivered energy at about \$10 / GJ (including the cost of carbon).

Cost Effective



Cost of Natural Gas – \$ per Gigajoule



2001 to 2021 – MBIE data

Cost of Electricity –\$ per Gigajoule



2000 to 2021 – MBIE data

Cost of Carbon – Emissions Trading Scheme



Comparative Energy cost table - Assumptions

- Cost of carbon accounted for
 - Carbon factors from the Climate Change Act Regulations (2009)
 - Carbon at \$77 / tonne
- Focussed on heat production (not electricity)
 - Conversion factors are for heat
 - Two heat pump examples
 - CoP of 2.5 and 3.5
 - these will supply heat up to ~100C only
- The assumptions behind the table are in the 2022 23 Action Plan

Geoheat – Cost Effective

Туре	\$/GJ	Carbon Factor tCO2e/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

Geoheat



AVAILABLE – Commercial and industrial energy can be delivered with lead times as short as 12 months.



PROVEN AT SCALE – individual supply capacities up to 100 MWth, supplying ~3PJ of energy per annum.



LOW RISK – Geoheat has been used in New Zealand for over 60 years.

Relevant – look at the uses



Four to showcase

- Kawerau
 - Oji Fibre Solutions power boiler project
 - Essity 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
 - 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 through wood residues no longer required at Kawerau being transported to Tokoroa for use as biofuel in fuel substitution
- Finalist in the EECA Large Energy User Initiative of the Year Awards 2021



Essity – Been using geothermal energy since 2010

- The first phase reduced their carbon emissions by 37%.
- Next phase of geothermal is the conversion of one of two large tissue drum dryers to use geothermal energy.
 - First paper machine in the world to use geothermal to power the hood and drying drum.
- Geothermal replaces natural gas
- Reduction in carbon emissions of 136,610 tonnes over the life of this project.





PM3 Rebuild - Project Overview

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



improves the machine's capacity and profitability.

• Hood temperatures drop from 350 to 180 °C

essity

Kawerau Paper Machine 3 Rebuild Geothermal Steam Powered Hoods

The GIDI grant made this project happen









Nature's Flame – Geothermal Lowering Carbon Footprints

Biofuel pellet manufacturer



- Embraced geothermal energy in late 2019
 - Installed 20 MW_{th} geothermal process heat supply from Contact
- Pellets supplied to the Te Awamutu Dairy Factory
 - Phased out a 43 MWth 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

HE AHI

WAIMIHI

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 Taupo

- Preparing ~40 sites geothermal energy available
- Gets over the capital hurdle for smaller geoheat users
- Tnue signed up



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What are we waiting for !

Get Involved Invest Spread the word

What are you waiting for?

www.nzgeoheat.nz

Geoheat Action Group





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Action Group Seeking to achieve more influence beyond the geothermal sector

- Six Actions
 - Advocate
 - Communicate
 - Showcase
 - Advance
 - Partner
 - Represent



Action Group are quietly looking for some \$



Looking to assemble funds for shared industry-good resource and activities

Buy Geoheat products

The Essity Kawerau site makes essential products under iconic New Zealand brands.















Geoheat At Essity

We proudly communicate our Geothermal story to our customers and consumers



HARNESSING GEOTHERMAL STEAM



geothermal





Sorbent is proudly made in NZ using geothermal steam.





helping lower ou carbon footprint









EPDs show high-renewable energy content



ENVIRONMENTAL PRODUCT DECLARATION









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



Spread the Geoheat word ...

- Large enterprises
 - Talk to Contact or Ngati Tuwharetoa Geothermal Assets
- Small and Medium Enterprises / Innovation
 - It is coming at He Ahi
- And Incubation
 - Geothermal sector needs to go and talk





Some emails for you





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