



ACTION PLAN 2020-2021

GEOHEAT STRATEGY FOR AOTEAROA NZ



FOREWORD

On behalf of the New Zealand Geothermal Association, it is with pleasure that I introduce you to the Geoheat Strategy Action Plan 2020 – 2021; the second Action Plan to be produced under the Geoheat Strategy for Aotearoa NZ 2017– 2030.

The Association is proud to be taking a lead role in delivery of the Geoheat Strategy. We are encouraged by the continued support for the Strategy, and particularly acknowledge the work undertaken through the Bay of Connections and the work of the funded Geothermal Business Development Lead.

The Geoheat Strategy seeks real gains in the short to medium term by assisting the energy sector to move to a low-carbon future through increased use of geothermal energy and, importantly, jobs that come with that use. The Strategy is designed to be directive, yet flexible, evolving through Action Plan activity as effort reveals the best next steps.

Significant 2018 – 2019 accomplishments are reported in this Action Plan, including the creation of more than 150 fulltime jobs in new businesses using geothermal energy. We are now looking to build on that success.

One of the critical components for continued achievement is to secure ongoing funding for strategy coordination. Dedicated resources for connecting businesses with direct geothermal use opportunities are vital to move this important work forward.

Working with our partners, we will continue to drive the Strategy forward for the benefit of all New Zealanders. Please join with the New Zealand Geothermal Association, share the vision, and help us to realise a geothermal future for New Zealand by actively growing direct geothermal use.

Stephen Daysh

Chair – Geoheat Strategy Governance Group

President – New Zealand Geothermal Association

REALISING GEOTHERMAL POTENTIAL



EXECUTIVE SUMMARY

This is the second Action Plan developed to focus and drive outcomes in the implementation of the Geoheat Strategy for Aotearoa NZ, 2017 – 2030.

The objectives of the first Action Plan (2018 – 2019) were exceeded; more than three new businesses have established, with more than 150 full time jobs associated with these businesses that are either now using or setting up to use geothermal energy.

This second Action Plan (2020 – 2021) identifies two new objectives:

Objective 1:

New direct geothermal projects, generating at least 80 new FTE jobs, are committed to and in development by the end of December 2021.

Objective 2:

Secure funding to continue to drive Strategy implementation for the next two years (ca. NZD 300,000).

Four Priority Actions will be driven by the Strategy coordinator:

Priority Action 1: Deliver Funding Strategy

Priority Action 2: Partner with Māori Organisations

Priority Action 3: Partner with Central Government

Priority Action 4: Deliver Business Cases

In support of these priority tasks, the New Zealand Geothermal Association (NZGA) Geoheat Action Group will also advance a range of other complementary activities.

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PURPOSE

This 2020 – 2021 Action Plan, prepared to advance the Geoheat Strategy for Aotearoa NZ, 2017 – 2030, reviews the effectiveness of activity through 2018 – 2019 and sets future actions for 2020 – 2021 to further advance Strategy goals.

Regular Action Plan updating seeks to ensure that Strategy implementation is effective and nimble, responding to changing circumstances and new opportunities.

OVERVIEW: GEOHEAT STRATEGY FOR AOTEAROA NZ, 2017–2030

The Geoheat Strategy for Aotearoa NZ, 2017 – 2030 was launched in 2017 as an NZGA initiative, with support from GNS Science.

The Strategy sets two overarching goals for geothermal direct use in New Zealand:

1. Annual direct primary geothermal energy use is increased by 7.5 PJ in new projects in the period 2017-2030; and
2. Geothermal direct use business operations are employing (directly and indirectly) an additional 500 people associated with new projects in the period 2017-2030.

By assisting the New Zealand energy sector to transition to a low-carbon energy future, the Strategy is firmly aligned with the direction set by the Climate Change Response (Zero Carbon) Amendment Act 2019. The Act provides a framework for New Zealand to develop and implement climate change policies that contribute to the global effort under the Paris Agreement and allows New Zealand to prepare for, and adapt to, the effects of climate change.

The Strategy document and associated resources can be accessed via the links below:

GEOHEAT STRATEGY FOR AOTEAROA NZ, 2017 – 2030

[CLICK HERE](#)

GEOHEAT ACTION PLAN, 2018 – 2019

[CLICK HERE](#)

GEOHEAT STRATEGY LAUNCH VIDEO, 2017

[CLICK HERE](#)

¹ Refer to Glossary on page 15 of this Action Plan for references and website addresses

EFFECTIVENESS REVIEW: 2018-2019

The first Action Plan, released in March 2018, identified priorities and focussed activity for a two year period with an overarching objective and priority actions (see green box below).

A Geothermal Business Development Lead (BDL) was contracted for a two year period from December 2017. Funded by the Bay of Connections (BoC), MBIE, NZGA and industry, the BDL was tasked with identifying, contacting and engaging with potential geothermal heat users domestically and abroad. The BDL leveraged key networks to identify industries, investors and potential partners of organisations that could potentially use geothermal resources as part of their business. The aim was to attract businesses and create significant job opportunities.

Achievement exceeded the targets set in the 2018 – 2019 Action Plan. The overarching objective was achieved, and substantially exceeded.

2018 - 2019 OBJECTIVE

STATUS

ACHIEVED

OBJECTIVE:

Three new medium to large scale (minimum 30 jobs) direct geothermal projects are committed and in development by December 2019.

Status Report: At least seven businesses have adopted geothermal resource use, with more than 150 FTE's involved in those businesses (see Table 1, page 8).

2018-2019 ACTION PLAN - PRIORITY ACTIONS

PRIORITY ACTION 1:

Action: Develop a stocktake of supply side assets, infrastructure and geothermal resources to create a communicable picture of geothermal opportunities in New Zealand.

PRIORITY ACTION 2:

Action: Target commercial and industrial scale projects on brownfield sites where geothermal capacity exists in association with an existing project and/or a resource consent for the extraction of geothermal heat.

PRIORITY ACTION 3:

Action: Undertake domestic and international market analysis for large heat users capacity exists.

PRIORITY ACTION 4:

Action: Develop market value propositions for geothermal heat suppliers.

TABLE 1 Summary of New Direct Use Geothermal Projects 2018 – 2019

Business	Type	Location	Activity	Capital Investment NZD Million	FTEs ¹
Rogue Bore Brewery	New	Wairakei	Brewing	5	-24
Waiu Diary ²	New	Kawerau	Milk processing	33	-40
Nature's Flame ²	Conversion	Tauhara	Bio-fuel wood pellet production	2010 investment of 34 Million. 2019 conversion cost not known	-50
GEO40 ²	New	Ohaaki	Silica sol production	15	-30
Wai Ariki ³	New	Rotorua	Balneology / Spa	30	n/a
Pink and White Gin	New	Rotorua	Distilling	unkown	-10
Oji	Conversion	Kaweau	Pulp Production	unkown	n/a

¹FTEs - Full Time Equivalents. These are estimated by the businesses involved, and include people working onsite at the facility using geothermal fluid / energy, but exclude the geothermal fluid supplier, contractor and other indirect FTE's created.

²From Climo et al (2020)

³From Stuff (2017)

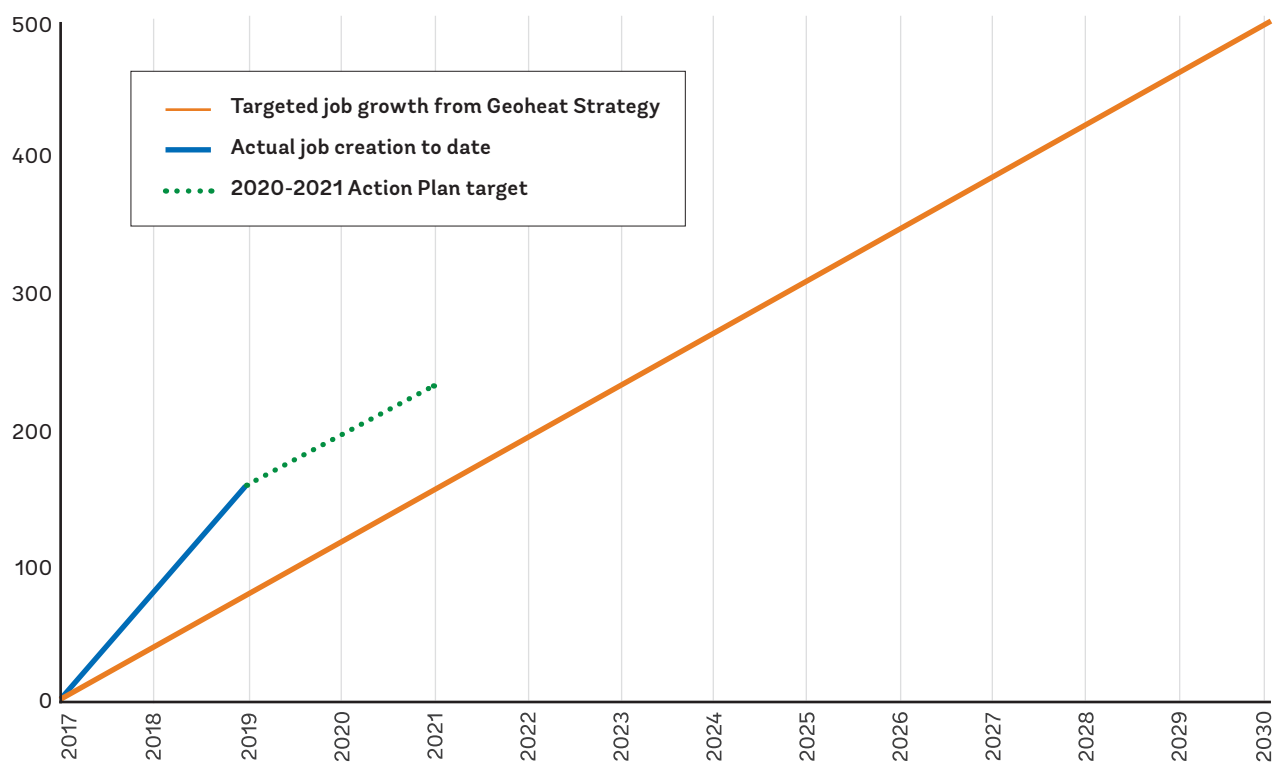


FIGURE 1 plots actual FTE generation since strategy inception and compares this with a linear projection of job growth out to the Strategy target of 500 new FTE's created by 2030. Figure 1 shows that actual FTE's are tracking ahead of the linear projection.

2018 - 2019 PRIORITY ACTIONS PROGRESS REPORT

PRIORITY ACTION 1:

STATUS	PARTIAL
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Action: STOCKTAKE OF RESOURCES

Description: Develop a stocktake of supply side assets, infrastructure and geothermal resources to create a communicable picture of geothermal opportunities in New Zealand.

Status Report: Stocktake commenced and preliminary information compiled. Focus shifted to specific opportunities and solutions, which was considered more effective.

PRIORITY ACTION 2:

STATUS	ACHIEVED
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Action: TARGETED PROJECTS

Description: Target industrial and commercial scale projects on brownfield sites where geothermal capacity exists in association with an existing project and/or a resource consent for the extraction of geothermal heat.

Status Report: Significant new projects committed and in development, with at least seven businesses adopting geothermal use with more than 150 FTE's recorded (Table 1).

PRIORITY ACTION 3:

STATUS	PARTIAL
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Action: MARKET ANALYSIS

Description: Undertake domestic and international market analysis for large heat users.

Status Report: Collaboration was strengthened between geothermal fluid/heat suppliers, NZTE and MBIE to identify and connect with high potential domestic and international investment targets. Connections were made with target industry groups (e.g. wood processing) to promote the benefits of geothermal use. This work moved from broad market analysis to a tactical approach, whereby an opportunity was identified by a heat supplier and support was provided, which included market insight, information and connections.

PRIORITY ACTION 4:

STATUS	ACHIEVED
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Action: CONNECT SUPPLIERS AND TARGETS

Description: Develop market value propositions for geothermal heat suppliers.

Status Report: Significant progress made in establishing connections between heat users, heat suppliers, funding sources, investors and information. Confidentiality requirements prevent full reporting, however large-scale new projects are in development through connections made. Assistance provided in writing Provincial Growth Fund² applications (worth > NZD 60M)

OTHER 2018 - 2019 HIGHLIGHTS

- An engaged Strategy Action Group, meeting regularly with approximately 20 active members from multiple sectors / professions;
- Supportive Minister of Energy and Resources (Hon Megan Woods) who understands the industry, especially the multiplier effect of direct heat and other opportunities (e.g. hydrogen);
- The potential for geothermal mineral extraction is now on the central government radar;
- Increased engagement with and awareness within other industries and businesses outside of the geothermal sector;
- Wider New Zealand interest (outside of the Taupō Volcanic Zone) in direct use geothermal is growing, including Northland and the West Coast;
- Increased data and information is available in the public arena for use in wider discussions. This includes eight conference papers, five external industry presentations, and three international geothermal industry presentations (Mexico, Iceland, USA);
- Key groups are starting to pull together; moving in the direction aligned around the geothermal direct use vision. Groups include BoC, central government, geothermal operators, NZGA and economic development agencies.

²The Provincial Growth Fund is the three billion dollar New Zealand Government investment fund for regional economic development over the three-year period 2018-2020. (<https://www.growregions.govt.nz/about-us/the-provincial-growth-fund/>)

2020-2021 ACTIONS TO GROW DIRECT GEOTHERMAL USE

The primary focus for activity under the 2020 - 2021 Action Plan is to continue the momentum of converting business connections into tangible projects.

A critical element to achieving this is to secure adequately funded resources to implement Strategy initiatives, most importantly the work of the Strategy Coordinator.

The focus for the 2020 - 2021 Action Plan continues to be on the utilisation of geothermal resources in the Taupō Volcanic Zone (Figure 2).

ACTION PLAN OBJECTIVES

OBJECTIVE 1

New direct geothermal projects, generating at least 80 FTE jobs, are committed to and in development by end of December 2021.

The creation of at least 80 full time equivalent (FTE) jobs more than doubles the target set by the 2018-2019 Action Plan. However, this goal is considered realistic given the results achieved in 2018-2019 (Figure 1 and Table 1). In a continuation of the current approach, activity will focus on energy and fluid capacity available at existing geothermal sites (brownfield), where geothermal resources can be readily accessed and new opportunities created.

OBJECTIVE 2

Secure funding to drive Strategy implementation for the next two years (ca. NZD 300,000).

Without dedicated resources, Strategy implementation will falter.

The successes to date have been realised through the creation of the BoC funded Geothermal BDL role.

As a truly independent role, funded by multiple funding sources, matters such as project confidentiality, intellectual property and proprietary technologies have been able to be effectively managed. This has allowed greater project support and close relationships to be developed.

A minimum of NZD 300,000 has been identified as the lowest level of investment required to maintain current

momentum. This is based on salary and associated project costs for engaging a person with the necessary experience to deliver on targeted outcomes. Experienced individuals with dedicated time to drive implementation are limited.

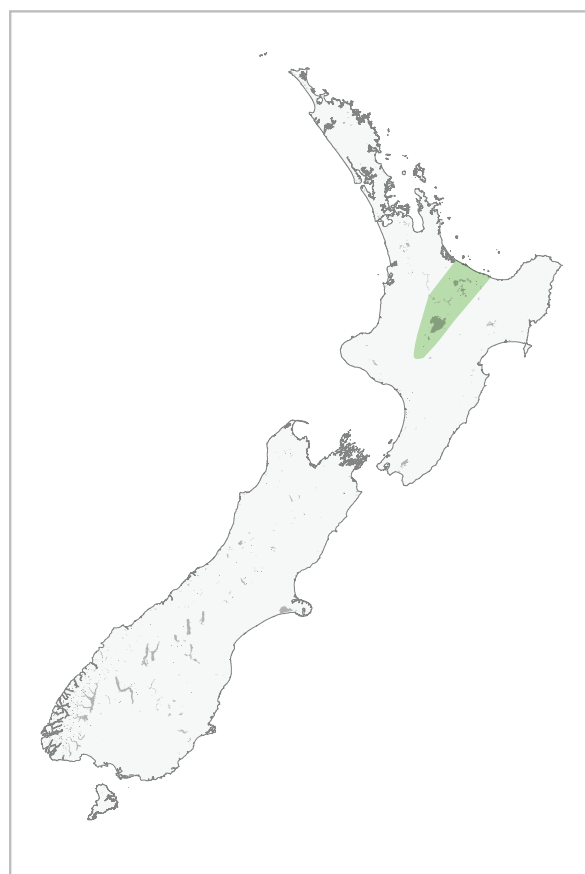


FIGURE 2 Taupō Volcanic Zone: The focus area for the 2020-2021 Action Plan

PRIORITY ACTIONS

The four priority actions aim to provide building blocks for achieving the two 2020 – 2021 objectives. Flexibility is retained to pursue avenues of greater impact, if identified during implementation.

PRIORITY ACTION 1: FUNDING STRATEGY

Description: Develop and implement a funding strategy to secure funding for 2020 -2021 and beyond.

Rationale: Multiple funding sources are important for independence and role functioning of the Geothermal BDL / Strategy Coordinator. Rapid implementation of the funding strategy is crucial, as the current contract funding for the Geothermal BDL concludes in mid 2020.

Approach: We will target central government, industry, NZGA, regional economic development agencies and Māori organisations. Outcomes sought by funders will need to be clearly identified, and a business case for funding from each source developed.

PRIORITY ACTION 2: PARTNER WITH MĀORI ORGANISATIONS

Description: Establish / develop productive working partnerships with willing Māori organisations to assist in the achievement of aspirations for geothermal energy use and development.

Rationale: Specific geothermal expertise is not always available to assist in the realisation of geothermal developments, however there is significant potential for Māori organisations, who are geothermal developers, and/or owners of geothermal resources / land, to actively lead aspects of geothermal utilisation in New Zealand.

Approach: A partnership approach will be taken to explore, develop, and ultimately realise geothermal development potential by piloting two specific activities:

(a) Support for Toi Kai Rawa – The Strategy Coordinator will provide support for the direct geothermal use initiatives that Toi Kai Rawa develop through 2020 - 2021. The Strategy coordinator will seek expertise and advice from the Geoheat Action group as may best fit the initiatives.

(b) Direct support to one Māori organisation each year to organise a targeted tactical workshop (as opposed to strategic). The criteria for choosing the organisation will be developed as an early phase workstream.

PRIORITY ACTION 3: PARTNER WITH CENTRAL GOVERNMENT

Description: Partner with central government agencies to find geothermal solutions to support greenhouse gas emission targets and job creation strategies.

Rationale: Multiple emissions reductions and increased employment outcomes can be achieved from geothermal energy use projects.

Approach: We will take a solution-oriented approach, combining expertise provided through and under the Geoheat Strategy with resources available through central government.

PRIORITY ACTION 4: DELIVER BUSINESS CASES

Description: Produce at least 10 funded business cases for geothermal conversion for targeted existing business and for new business opportunities.

Rationale: Choosing to use geothermal energy over another energy source becomes a question of economics and feasibility. Access to tools, information, and assistance to answer feasibility questions is expected to encourage more businesses to go geothermal, especially where conventional energy sources may be simpler to pursue. Business cases will be particularly valuable for small to medium enterprises, who are likely not to have this expertise in-house.

Approach: A group of geothermal business case writers will be assembled to assist in business case development for targeted companies / organisations considering new start-up enterprises or the conversion of existing business to geothermal energy. Business cases will be confidential to each business in question and will not be made public, allowing a full exploration of the benefits of geothermal energy for each particular project. Development of the business case will be at no cost to the particular business, however co-funded opportunities will be explored.

GEOHEAT ACTION GROUP ACTIVITIES

Activity in supporting work streams can be initiated and progress made at any time, should a champion/group step forward who is willing to drive that action area.

ONCE OFF ACTIVITY - 2020

Activity		Description
1	Strategy Consultation	Given the high level of engagement in Strategy implementation and the successes achieved to date, the approach is to seek continued engagement, interest, input and involvement, rather than a full Strategy review. Through various opportunities provided for industry interaction (e.g. New Zealand Geothermal Workshop), this Action Plan and the Strategy will be discussed for feedback.

ONGOING ACTIVITY - 2020 - 2021

These tasks are business as usual, or need to be maintained to continue implementation momentum.

Activity		Description
2	Action Group	Continue to maintain and grow clusters of 'like minds' to assist with growth of geothermal energy use. Strive for connected and cooperative industry to affect far greater change than individual efforts.
3	Network & Connect	Maintain and grow connections and networks to raise the geothermal profile. Establish services and mechanisms to provide interaction between potential geothermal heat users and heat suppliers. Develop broader targeted engagement with identified Māori organisations.
4	Process Heat in NZ	Actively participate in the MBIE / EECA Process Heat in New Zealand and Accelerating Renewable Energy and Energy Efficiency initiatives through 2020 - 2021.
5	Showcase	Actively showcase existing success stories in geothermal energy use to increase awareness and stimulate further development. Share information. By sharing lessons learned, future projects can learn from and build on past successes. Success breeds success. Collect data that enables effective monitoring of the Strategy goals.
6	Education and Training / Skills Shortages	There is a strong focus on job creation under this Strategy; skilled workers are required for those jobs. Look for opportunities to create skills / learning programs for new professionals entering the geothermal industry. Look for opportunities to create cadetships within existing companies / organisations, develop, as appropriate, specific courses (including developing scholarship opportunities for those courses) in partnership with university or other training organisations.
7	How-to Guides	Develop 'how-to' reference guides. At the smaller scale, the complexity of developing a geothermal use can be a barrier. Plain language advice and information on regulatory requirements, technology and resource information could assist to reduce barriers and enhance connections.

BEYOND 2021

Lower priority tasks, possibly more complex and/or requiring substantial funding, or currently beyond the mandate and interest of organisations and individuals involved.

Activity		Description
8	Greenfield Development	Link greenfield site developers with potential energy users. Greenfield resources offer potential future energy supplies in support of economic development, but are further from business, infrastructure and market realisation.
9	Logistics and Infrastructure	Advocate for improved infrastructure. Direct use geothermal energy is not transportable over large distances (i.e. more than 30 km); strategic transportation connections for products to reach markets for areas rich in geothermal energy opportunities will boost the competitiveness of businesses seeking to utilise this resource.
10	Policy Alignment	Improve policy alignment in regards to geothermal energy use. Regulatory barriers, particularly for small- to medium-scale developments, can be reduced through improved Policy Statements, Regional Plans, and to some extent, District Plans. A National Policy Statement on renewable energy would show Central Government intent. There is also more potential for enabling non-regulatory documents, such as Energy Strategies.

SUCCESS STORIES

Asaleo Care - Kawerau

In 2010, Asaleo Care converted from a natural gas fired boiler to geothermally produced process steam supplied by Ngāti Tūwharetoa Geothermal Assets, reducing their annual carbon footprint by 39% (~ 22,000 tonnes per year).

Commended in the 2012 EECA Business Awards (EECA 2012), the judges commented that the conversion achieved "An impressive reduction in CO₂ emissions. It shows a good partnership model with iwi and ongoing leadership and intent as part of their sustainability commitment."

Geothermal energy is an enabler for Asaleo Care, significantly reducing their carbon footprint (as of 2019 the reduction is 46% annually (Asaleo Care 2019)) and providing them with a competitive advantage from low carbon renewable energy.

Asaleo Care is continuing to actively invest in upgrades to their Kawerau facility, confident in the benefits of geothermal process heat in a low-carbon future. An NZD 60 million state of the art tissue converter line expansion was installed in 2014 (TVNZ 2014) and in late 2019 Asaleo Care completed installation of an NZD 23 million Forte converter line that enables product enhancements, improves packaging, reduces waste, and increases functionality.

Sid Takla, Asaleo Care's Managing Director, says that the company has invested in the future of the manufacturing sector, in the economy and in jobs in Kawerau and the Bay of Plenty. "New Zealand is an attractive and compelling country to invest in, and with our well-established site, our hard-working and dedicated team, our strong, long-standing partnership with the Ngāti Tūwharetoa iwi, there is no doubt – this is the right place to be for [our] next phase of growth." (Asaleo Care 2019).





Nature's Flame - Taupō

The largest wood pellet plant in the Southern Hemisphere was opened by Nature's Flame in 2010. Located at Taupō in the heart of the New Zealand timber industry, Nature's Flame manufactures premium wood pellet fuel for New Zealand and international consumption.

The pellet fuel is a carbon neutral fuel alternative to coal. Wood fibre in the form of sawdust and shavings is obtained from sawmilling operations; the fibre is dried, resized and then compacted to form a dense fuel which burns efficiently and cleanly.

In 2019, Nature's Flame replaced an aging undersized biomass boiler used for drying the wood fibre with a geothermal heat supply. The geothermal heat is supplied by Contact Energy.

John Goodwin, Nature's Flame Operations Manager said "We are thrilled by the outcome of this deal with Contact. With our new energy supply system getting to operational

status, we are able to increase to 100% of capacity (pellet manufacturing capacity), creating new jobs in the Taupō region. We are now receiving 18MW of heat continuously, which is fuelled by a low carbon renewable source." (Contact 2019).

James Kilty, Chief Generation and Development Officer for Contact Energy said, "Partnerships like this one with Nature's Flame are at the core of our ambition to lead the energy sector to a low-carbon future. We believe climate change is real and the greatest challenge of our time, but also our greatest opportunity. We want to be working with other commercial and industrial customers to form partnerships that help to reduce emissions for New Zealand." (Contact 2019).

GLOSSARY

BDL: Geothermal Business Development Lead for the Bay of Connections.

BoC: Bay of Connections, Regional Development Agency for the Bay of Plenty Region and the Taupō District.

Direct Use: Refers to the use of geothermal energy / fluid directly. Essentially this is any application of geothermal energy use other than converting geothermal energy to electricity.

EECA: Energy Efficiency and Conservation Authority.

Geothermal energy: Energy sourced from the ground.

Greenfield Site: Site considered to be prospective for geothermal resources that has limited information available or is unproven and no resource consents are in place to allow the take of geothermal fluid.

MBIE: Ministry of Business, Innovation and Employment.

NZTE: New Zealand Trade and Enterprise.

NZGA: New Zealand Geothermal Association.

PJ: Peta Joule, a unit of energy equal to 10^{15} Joules. A larger scale glasshouse (approx. 12 ha) might use less than 0.3 PJ / annum.

Primary Geothermal Energy: The total amount of geothermal energy supplied to a process. This will be greater than the actual amount of energy consumed in the process.

Strategy Coordinator: Role established under the Geoheat Strategy for Aotearoa NZ, 2017 – 2030 to drive strategy implementation. This role for 2018 – 2019 was delivered by the BoC Geothermal Business Development Lead.

Toi Kai Rawa: Māori development agency promoting Māori economic development within the wider Bay of Plenty. (<http://www.toikairawa.co.nz/>).

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