

Attn: Submissions Analysis Team Ministry for Primary Industries Charles Fergusson Building, 34-38 Bowen Street Wellington 6011

Submission on Te Ara Whakahou – Ahumahi Ngahere – Draft Industry Transformation Plan

The New Zealand Geothermal Association (NZGA) would like to thank the Ministry for Primary Industries for the opportunity to comment on Te Ara Whakahou – Ahumahi Ngahere – Draft Industry Transformation Plan (the "ITP") for creating a high-value and resilient forestry and wood processing sector to underpin our low emissions future.

We would be happy to discuss this submission further.

NEW ZEALAND GEOTHERMAL ASSOCIATION

The NZGA, incorporated in 1992, is a non-political, non-government and not-for-profit organisation, with a focus on fostering a sustainable future for Aotearoa New Zealand through use, development, and protection of geothermal resources. The NZGA is an affiliated member of the International Geothermal Association and the Royal Society of New Zealand. The NZGA connects with global geothermal communities and is well positioned to positively influence geothermal initiatives on the domestic and international stage.

NZGA membership comprises ca. 500 individuals, as well as corporate members, representing geothermal electricity generation, research organisations, regional economic development agencies, engineering consultants, service providers, technology companies, planning consultants and lwi/Māori trusts. This diverse and skilled association works, embraces and lives with geothermal resources in Aotearoa.

OUR RECOMMENDATIONS:

 Advance: Identify nurture and support businesses to explore and commit to new geoheat projects. The use of geothermal energy for wood processing is a well-established practice in New Zealand and offers the sector material competitive advantages by providing low cost, reliable, sustainable and low carbon energy. The NZGA would like to see continued and additional government investment in Research Science &Technology into both value-add and wider (greenfield) geoheat potential (MBIE / Callaghan / MPI SFF), shared geoheat infrastructure / reducing barriers for SMEs (EECA, RSPF), improving supply chain infrastructure e.g. proximity to port and connectivity with downstream industries (e.g. Waka Kotahi), attracting investment into the regions (RSPF), and promotion of geoheat as an energy option (EECA & MPI SFF: GeoHeat strategy).



- Partner: Partner with stakeholders across industries, sectors, government, investors and Māori entities with a focus on regional and local economic development organisations. Synergy with geothermal: geoheat / decarbonisation / sustainable industry / value add / regional development / co-location with primary production (forestry) in Waikato (Taupo), Bay of Plenty and Northland. Proven complementarity with wood / timber products and adding value, e.g. Tenon, Essity, Nature's Flame.
- Showcase: Success breeds success. Existing and expanding capacity for geoheat, e.g. existing Kawerau industrial park, Tauhara, He Ahi. Potential greenfield opportunities in wider Bay of Plenty (shallow / lower temperature geothermal).

THE IMPORTANCE OF MEETING OUR NATIONALLY DETERMINED CONTRIBUTIONS

Ambitious and accelerated actions are required for the pace of change to deliver the Emissions Reduction Plan

1. NZGA supports the set of actions outlined in the Emissions Reduction Plan recently released by the Government, especially accelerate actions in Budget Period 1. Aotearoa must step up as a climate leader (we should not be followers in this space), strengthen our emissions reduction and place Tiriti o Waitangi and equity at the heart of our climate response. The tools to achieve internationally significant change are within our borders, we must be brave and embrace them to ensure that we can meet our net-zero targets.

Working with our Tiriti partners

2. As guardians of the gifted geothermal resources, engaging with tangata whenua is central to NZGA's work. Tangata whenua have a special relationship with the natural resources that we rely on. To have deep and meaningful partnerships, the government and NZGA need to interact with various iwi, hapu, and ahu whenua trusts around operational sites where geothermal resources present. For example, in Taupō, Contact Energy have continued to work constructively and transparently with Tauhara hapū, to understand hapū interests in relation to their development plans for Tauhara. Their commercial partnership with local Māori Lands Trust Tauhara Moana has been constructive in relation to geothermal access rights.

Geothermal enables Māori socio-economic development

3. The principles of Te Tiriti o Waitangi, including self-governance, kaitiakitanga and resource ownership, are demonstrated by Māori land-owners, Māori-owned enterprises (e.g. ahu whenua trusts) and other partners in geothermal developments and enterprises. There is scope to



enhance this relationship by further embedding tikanga and Mātauranga Māori in geothermal management.

- 4. Geothermal is Aotearoa's indigenous renewable energy solution, and it creates genuine, active, and enduring partnerships with iwi/Māori. Māori are driven by principles of investing in projects that provide intergenerational prosperity and sustainability of natural resources. This philosophical view (combining kaitiaki and Māori economic development) aligns with geothermal resource developments, with the long-term project life of geothermal power plants i.e., 30+ years.
- 5. Most geothermal fields that have operating power stations, have some form of commercial or other beneficial arrangement (i.e., ownership, fluid supply, royalties, land lease etc.), with a Māori-owned enterprise. Geothermal energy developments have enabled true partnership and participation for Māori in the energy industry, as owners, developers, or co-owners and co-developers of geothermal fields (e.g. energy ecosystem owned by Tuaropaki Trust at Mokai; Ngāti Tūwharetoa Geothermal Assets at Kawerau; Tauhara North No. 2 Trust at Rotokawa). At Ngāwhā, a community geothermal energy solution addresses a lack of regional renewable power generation and high energy transmission costs.
- 6. Māori groups have led and grown successful businesses by leveraging their geothermal assets, people, and resources in other sectors. Māori innovation is driving new approaches to geothermal developments: collectives such as Waiū Dairy (a group of eleven Māori groups processing dairy products using geothermal heat) and whole ecosystem approaches, like Tuaropaki Trust (building a business cluster that combines electricity, horticulture, green hydrogen, dairy processing, composting and more).
- 7. Significant revenues/profits from geothermal enterprises create opportunities for Māori shareholders to further development aspirations, and funds are reinvested in their people through financial, health, wellbeing, educational, cultural, and sporting endowments.

UNDERINVESTMENT IN RENEWABLE ENERGY AND FRAGMENTED ENVIRONMENT RESEARCH FUND UNABLE TO DELIVER NATIONAL GEOTHERMAL PRIORITIES

- The Productivity Commission's report found that New Zealand's labour productivity is significantly lower than in other small, advanced economies (SAEs)¹ and New Zealand is lagging behind on CleanTech. For example, in the Global CleanTech Innovation Index 2017, New Zealand was ranked <u>22nd overall</u> and was the lower scoring small advanced economy.
- 9. Independent research ² commissioned by Callaghan Innovation suggests that New Zealand's CleanTech innovators are raising <u>95% less funding</u> than those in other small advanced

¹ New Zealand firms: Reaching for the frontier, Productivity Commission, 2021

² New Zealand Climate Tech for the World, Cleantech Group, 2021.



economies. In addition, the number of New Zealand CleanTech innovators raising funds is less than that in other small advanced economies.³

- 10. There is a widespread view that there is <u>a disconnect</u> between many government documents emphasising the strategic importance of environmental research and the actual research investments that are made. It is not that such investments are unable to be related to the various strategies at some level, they are simply too broad and open-ended. Rather, the way resources are allocated engenders little confidence in our ability to maintain a comprehensive portfolio of environmental research that addresses national priorities over time. Furthermore, these mechanisms do not appear to meet and understand the nation's environmental research needs.
- 11. These concerns are in part a reflection of the fragmented funding machinery that is being used. Multiple models of investment have been developed over the years, which makes a joined-up view of the environmental research landscape almost impossible to achieve.⁴ This disjointed nature and approach has left the research landscape behind in terms of energy solutions and the drive towards net-carbon zero.

Our recommendation:

Advance: Identify nurture and support businesses to explore and commit to new geoheat projects. The geothermal industry would like to see continued / new government investment in RS&T into both value-add and wider (greenfield) geoheat potential (MBIE / Callaghan / MPI SFF), shared geoheat infrastructure / reducing barriers for SMEs (EECA, RSPF), improving supply chain infrastructure e.g. proximity to port and connectivity with downstream industries (e.g Waka Kotahi), attracting investment into the regions (RSPF), and promotion of geoheat as an energy option (EECA & MPI SFF: GeoHeat strategy).

CO-BENEFITS: GEOTHERMAL AND BIOENERGY USE CATALYSE REGIONAL GROWTH

- 21. Geothermal is an abundant energy resource in Aotearoa that the word looks to with envy. We have the <u>second highest installed geothermal energy profile per capita in the world</u> (second only to Iceland) and are part of the elite group of countries who have more than 1000 MWe of installed geothermal electrical capacity.
- 22. Aotearoa currently has more than 500 MWe additional geothermal electricity generation ready to be tapped with low-carbon emission profiles. The current construction of Tauhara II near Taupō will bring some 168 MWe online. Expansion near Rotorua is being explored at Taheke with proposals for 25MWe+, expansion at Ngawha 25 MWe+ and growth at Kawerau are the shovel-ready geothermal areas ready to contribute to our renewable energy supply.
- 23. Several other areas such as Tikitere, Tokaanu, Mangakino, Reporoa, Atiamuri, Ngatamariki, Rotoma, etc. are candidates to make further contributions to the energy profile of Aotearoa.

³ https://www.callaghaninnovation.govt.nz/sites/all/files/CleanTech-Making_it_happen_for_NZ.docx.pdf

⁴ <u>https://www.pce.parliament.nz/media/197111/report-environmental-research-funding-review-pdf-32mb.pdf</u>



These areas all have potential for growth and expansion of geothermal resources with the additional benefit of bringing opportunities for additional industrial installation and job growth.

24. High-temperature geothermal resources are a competitive regional advantage, catalysing decentralisation of high energy businesses and promoting regional tourism. Without conversion to electricity or biomass, geothermal heat energy (direct use) is typically used locally due to the costs of long (in excess of several kilometres) pipeline systems. This necessitates high energy users across a range of sectors (e.g. food and beverage, horticulture, tourism, wood processing) locating their businesses in these regions. Clusters of business parks can be (and are) created around geothermal (e.g. Kawerau and Tauhara).

Example: Bay of Plenty, Waikato and Northland regions

25. For the Bay of Plenty, Waikato and Northland, high-temperature geothermal resources are a part of regional identity beyond electricity generation and industrial heat applications, supporting geothermal tourist parks, cultural experiences, and spa and wellness facilities. There is scope to not only grow electricity and industrial and commercial ventures, but also to pair geothermal tourism more closely with outreach, education, and industrial energy use into the future. Sustainable resource management frameworks (e.g. develop/protect classifications for geothermal fields) ensure these different uses for geothermal can be effectively supported.

Example: Taupō district region

26. Overall, the Energy & Utilities Sector (Geothermal sits within this) is the most productive sector in the Taupo District in terms of GDP contribution. Energy & [Utilities] is one of our smallest sectors (400 employees) but generates over \$670K / employee, versus our largest industry, Tourism, which comprises about 35% of jobs, but only generates about \$50K / employee.





Example: Rotorua region

27. Geothermal energy benefits regional economies by providing employment and stimulating economic activity (by attracting businesses into geothermal regions), while providing affordable and reliable energy. Geothermal energy developments can improve social outcomes as they are significant employers. For example, recent funding towards geothermal developments in Rotorua will potentially support 460 jobs in the new Wai Ariki Hot Springs and Spa, and potentially 190 jobs (during construction phase) in the proposed for Taheke Geothermal Power Station development for which exploratory drilling is currently taking place⁵.

Example: Industrial Symbiosis at Kawerau (ISK)

28. Kawerau has the unique advantages of being a well-established wood processing centre and home to the world's largest application of geothermal energy for direct industrial use. Further, it is strategically located having proximity to well-established road and rail transport infrastructure and the Port of Tauranga. ISK aims to capitalise on this unique combination of factors by adopting progressive practices that embrace change, leading to a new industrial evolution of smarter, cleaner business. Members of ISK are varied and include wood/fibre processing; geothermal energy, industrial engineering, service businesses, Māori business groups and the Kawerau District Council. Kawerau is on the cusp of significant economic growth along with the rest of the Eastern Bay of Plenty. Kawerau's main growth project - the Kawerau Putauaki Industrial Development (KPID) - is one of the four key "catalytic" Eastern Bay of Plenty infrastructure projects identified in the Eastern Bay of Plenty Regional Development Project report completed in 2018. These four projects are viewed as being "… critical to unlocking other transformative

⁵ www.beehive.govt.nz/release/rotorua-benefits-over-62-million-boost



projects" across the region. Specifically, KPID is expected to unlock significant benefits including generating an estimated 1,460 jobs and \$183 million in local GDP by 2030.⁶

Our recommendation:

Partner: Partner with stakeholders across industries, sectors, government, investors and Māori entities with a focus on regional and local economic development organisations. Synergy with geothermal: geoheat / decarbonisation / sustainable industry / value add / regional development / co-location with primary production (forestry) in Waikato (Taupo), BOP and Northland. Proven complementarity with wood / timber products and adding value, e.g. Tenon, Essity, Nature's Flame.

EXPANDING GEOTHERMAL VALUE CHAIN

29. There is room for more however, and this is not just in industrial-scale electricity installations. The maps below show the Taupo Volcanic Zone as the focus of high-temperature (high energy potential) for geothermal resources but all of Aotearoa has a high subsurface geothermal potential. The advent of industrial heat-pump technology means that an existing heat source can be upgraded with the addition of a minor amount of energy, and geothermal is a perfect heat source for such applications. The maps below illustrate just how high-quality a geothermal resource exists in Aotearoa, it is simply needing the application of pilot studies, innovation, and desire to realise; the climate change emergency demands that we explore all options on the table and geothermal for all Aotearoa is one avenue to do this

⁶ <u>https://www.climatecommission.govt.nz/our-work/advice-to-government-topic/inaia-tonu-nei-a-low-emissions-future-for-aotearoa/submissions/organisation-submissions/</u>



Aotearoa geothermal heat map (North Island):



Location of production forestry:⁷



⁷ <u>https://www.mpi.govt.nz/dmsdocument/52669-Draft-Industry-Transformation-Plan-web</u>



New Zealand Geothermal Value Chain



Expanding on each category of geothermal potential:

a. Ground source heat:

30. Ground Source Heat Pumps (GHANZ) must be considered when discussing the impact of heating in the Aotearoa New Zealand emission scheme. The installation of geothermal heat pumps can dramatically reduce electricity demand for industrial, commercial, and residential installations through efficient heat exchange with the ambient conditions at point of extraction found throughout Aotearoa New Zealand. The massive roll-out of these proven technologies can significantly reduce the need for additional electricity generation for space heating and further curtail carbon emissions.

b. Geoheat: direct heat use and industrial process heat: off-grid, co-locate, complementarity

31. In 2017, the Association published the Geo-heat Strategy⁸ which is the primary geothermal programme in Aotearoa New Zealand focussed on increasing the use of direct geothermal energy through industrial and commercial scale applications (e.g., glasshouses, timber processing, dairy processing). The importance of this strategy is that it provides guidance and drive towards increasing uptake of geothermal direct use which can in turn displace heat sources that rely on carbon emissions. It also reduces demand on the national electricity grid, as it is off-grid. Examples such as Nature's Flame and Te Awamutu dairy which demonstrate complementarity with other renewables. This configuration of geothermal proves as an efficient production of biomass pellets.

Figure 2 below shows a schematic diagram of different applications from direct heat use.

⁸ https://nzgeothermal.org.nz/app/uploads/2017/06/Geoheat_Strategy_2017-2030_Web_Res_.pdf





Figure 2: A schematic diagram of different applications from direct heat use.⁹

- 32. The Strategy's primary focus is to develop such resources in Northland, Waikato and Bay of Plenty regions with the goal of additional 7.5 PJ of geothermal utilisation. The secondary focus is to further push development of direct use of geothermal resources for residential scale use as well as the industrial use in other regions.
- 33. Every two years, we publish the bi-annual Action Plan where we celebrate our achievements and report on progress and details for the next two years. We have launched our 2022-2023 Action plan in Feb 2022.

Our recommendations:

Showcase: Success breeds success. Existing and expanding capacity for geoheat, e.g. existing Kawerau industrial park, Tauhara, He Ahi. Potential greenfield opportunities in wider Bay Of Plenty (shallow / lower temperature geothermal).

⁹ <u>https://www.nzgeothermal.org.nz/downloads/2022-23-GEOHEAT_ACTION_PLAN-Spread-with-Bookmarks-1.pdf</u>



Congruence of government policies to ensure no perverse outcomes

- 34. An effective legislative framework for Aotearoa New Zealand requires a holistic overview and interconnectivity to guide decision-making and policy choices. There is a real risk that siloed thinking will place unnecessary obstacles in implementation of climate actions.
- 35. While the purpose of the Climate Change Response (Zero Carbon) Amendment Act provides a framework to implement clear and stable climate policies, achieve carbon emission reductions and allow Aotearoa New Zealand to meet its international obligations, other reforms such as Resource Management Reform, Water Reform, Research, Science and Innovation Reform and Health Reform could have the perverse outcome of preventing projects that could significantly benefit New Zealand's effort to achieving low carbon emissions objectives.

An inclusive and equity transition needs careful considerations by policy implications for businesses and households

- 36. Increasing the ambition of the emissions reduction plan will foster significant changes in business environment in Aotearoa in the coming years. Industrial transformation in advancing emissions reduction technologies will create winners and losers, as government operationalises our climate pledge will favour new industries and innovation in low-carbon sectors. Some industries will be left behind. Some regions will decline.
- 37. Therefore, transitioning to a low carbon Aotearoa needs careful consideration which government agencies work together to clarify how they expect their policies to evolve. This is valuable for businesses to factor climate-related policies into their planning.
- 38. The Government also needs to consider how the price of renewable energy and heating relative to fossil fuels will prevent a rise in costs to households to balance energy trilemma. The currently consultation Energy Hardship initiative supports to improve New Zealanders on their wellbeing.
- 39. About 60% of process heat demand in Aotearoa New Zealand is supplied from fossil fuels, mainly coal or natural gas (MBIE 2019). Opportunities exist to decrease carbon emissions in existing process industries by conversion to renewable sources. Table 1 ¹⁰shows that geothermal direct heat, electricity heat pump, and biomass solutions are more cost-effective than fossil fuels.

¹⁰ https://www.nzgeothermal.org.nz/downloads/2022-23-GEOHEAT_ACTION_PLAN-Spread-with-Bookmarks-1.pdf



Туре	\$/GJ	Carbon Factor tCO2e/GJ	Carbon Costs \$/ GJ ¹	Conversion Factor ⁹	Total Cost \$ / GJ Heat Delivered
Geothermal Direct	8	0.0070 ²	\$0.46	0.83 ³	\$10.19
Electricity Heat Pump	30	0.02654	\$1.72 ⁵	2.5	\$12.00
Biomass	8	0	\$0.00	0.64	\$12.50
Coal	6	0.09446	\$6.14	0.81	\$14.98
Gas	10	0.0547	\$3.51	0.85	\$15.89
Wood Pellets	14	0	\$0.00	0.818	\$17.28
Electricity Resistive	30	0.02654	\$1.72 ⁵	1	\$30.00

TABLE 1 2021 Estimated cost of heat energy including carbon charges at \$65 / tonne for different fuel types.

CONCLUSION

Reaching net carbon zero is an enormous task that requires deep systemic change with authentic purposes.

Geothermal is a domestic energy source that will unlock net zero solutions, improve wellbeing, and improve economic standing throughout the regions.

We would be happy to answer any further queries.

Nāku noa, nā

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Kennie Tsui Chief Executive, NZGA On behalf of the Geoheat Strategy Group

Acknowledgements

The Geoheat Action Group members, enthusiastic supporters of geothermal process heat use in Aotearoa New Zealand, for their ongoing efforts and actions to deliver the Geoheat Strategy outcomes.

