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Submission on EECA 2022/23 levy consultation

The New Zealand Geothermal Association (NZGA) would like to thank Te Tari Tiaki Pūngao Energy Efficiency and Conservation Authority (EECA) for the opportunity to comment on 2022/23 levy consultation

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. 400 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 Māori trusts. This diverse and skilled association works, embraces and lives with geothermal resources in Aotearoa.

NZGA has developed the Geoheat Strategy for Aotearoa NZ 2017-2030 and Action Plans that work to implement the Strategy. Through these NZGA is working particularly to foster the uptake of Geoheat in industrial and commercial process heat applications.

OUR KEY MESSAGES:

- **1.** We recommend increasing funding of Industry Development Programme from the proposed \$596,170 to match previous funding level.
- 2. We recommend expanding the funding of Industry Development Programme to fund other associations (New Zealand Geothermal Association) and industry bodies to support activity that is aligned and working in connection EECA's purpose and objectives. NZGA specifically request that \$200,000 be allocated by EECA for the 2022 2023 years to partially fund the Geothermal Business Development Lead role that is crucial in delivery of the 2022-2023 Action Plan Activity to deliver the Geoheat Strategy for Aotearoa NZ 2017-2030 discussed above.
- **3.** We welcome the increased funding of the Technology demonstration programme. This programme could benefit from the inclusion of Ground source -Geothermal Heat Pumps in the demonstration programme.
- 4. We welcome the increased funding of Technology demonstration programme. This programme could benefit the trialling, development, and deployment of emissions reduction technologies in Aotearoa, including Ground-source /Geothermal Heat Pumps.



- 5. We welcome the increased funding of Large Energy Users Direct Programme. This programme could benefit the Geoheat Strategy and the actions agreed for 2022/23 under the Action Plan.
- 6. We welcome the increased funding of Low Emission Transport Fund. This programme could benefit the trialling, development, and deployment of low emission fuel for transportation by using geothermal energy in Aotearoa for electricity generation.
- 7. We welcome the initial funding of Sector Decarbonisation Programme. This programme could benefit the feasibility study and business case preparation for the establishment of Geothermal Cluster in Aotearoa.

THE IMPORTANCE OF MEETING OUR NATIONALLY DETERMINED CONTRIBUTIONS

The greatest danger to our planet is the belief that someone else will do it for us. EECA needs to demonstrate government leadership to reduce domestic emissions.

1. There have been many consultations over the past few years, recommendations that result in small actions. Our domestic emissions are still on the upward trajectory. We stepped up our Nationally Determined Contribution (NDC) before COP26 but tax-payers will pay a hefty price to meet our NDC target by relying on international carbon credits. By 2030, New Zealand needs to reduce 150 million tonnes of CO₂e and Minister Shaw announced that 2/3 of the emissions reduction (100 million tonnes) will be from purchasing international carbon units that costs \$6.5 billion tax-payers money (\$65 per unit) but this price is likely to double in a short space of time and only 50 million tonnes come from domestic actions. EECA needs to demonstrate government leadership to reduce domestic emissions.

The pace of change and the three emissions budgets are lagging our net-zero target

2. The time lost due to the COVID-19 pandemic and the delay in announcing the emissions reduction plan until end of May 2022 amplify the urgency to curb our emissions. We no longer have the luxury of time to allow for a weak response 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

3. As guardians of the gifted geothermal resources, engaging with tangata whenua is central to NZGA's members 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 through its members 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 resources need protection

- 4. New Zealand's geothermal policy and regulatory regime is internationally recognised as global best practice. Currently, environmental protection occurs *alongside* geothermal development, through a thoroughly consulted, clearly spatially based allocation that ensures geothermal systems with important intrinsic or cultural values are protected whilst development of other systems is enabled under the Resource Management Act.
- 5. Understanding the health of the geothermal resource and impacts on hau kāinga can provide insight into desired outcomes. These include, for example, protection of the rights of hau kāinga to restore and maintain access to the geothermal resources and to protect the traditionally held geothermal resources which includes the ability to ensure their sustainable use in Rotorua.¹ Currently, Nona Taute at University of Auckland is working on bringing Māori values and conventional geothermal development framework together in a construct that can have wide reaching benefits.² Geothermal developments must appropriately embrace the principles of kaitiakitanga for ongoing sustainability in the utilisation of ensuring equitable benefits from geothermal developments.

Geothermal enables Māori socio-economic development

- 6. 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.
- 7. 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.
- 8. 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.
- 9. 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).

¹ Nga Wai Ariki o Rotorua: He Kohikohinga: Hau Kāinga perspectives on the health and wellbeing of geothermal taonga within Rotorua, p.47.

² <u>https://unidirectory.auckland.ac.nz/people/profile/dtau326</u>



10. 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.

There are NO zero carbon renewable energy sources. The government is using the wrong metrics to compare renewable sources.

11. Power generation and energy transformation are inherently carbon-releasing processes. There is no such thing as a carbon-free energy source of electricity generation. Concrete structures used to hold back immensely powerful volumes of water, smelting of high-grade silica to build the most efficient photovoltaic (PV) solar panels, natural carbon emissions from geothermal plants and the manufacture and shipping of wind turbine blades all have implications for the release of carbon. What is critical for Aotearoa's energy future is to develop the mix of resources that overall have the most appropriate life-cycle emissions intensity for NZ at a given time. The figure below shows the range of life-cycle emissions by energy source.³



Figure 1: Full life-cycle emissions intensity by electricity generation fuel types (gCO₂e/kWh)

12. Seeking the energy sources that have the lowest life-cycle emissions factor is the key to unlocking a sustainable energy future, geothermal is one of these energy sources that remain within reach for Aotearoa's energy future. Further, the technology employed in wind, solar, biomass, etc. all have variable emissions profile over their life-cycle. Whilst we acknowledge that carbon-based fuel sources are indeed

³ McLean, K., Richardson, I., Quinao, J., Clark, T., and Owens, L. 2021. Greenhouse Gas Emissions From New Zealand Geothermal: Power Generation and Industrial Direct Use. Proceedings 43rd New Zealand Geothermal Workshop, Wellington, NZ, 23-25 November 2021.

the source of significant emissions, the 'silver bullet' of wind, PV, biomass and hydro must be considered against the availability of energy generation (e.g. sunny days, windy days, rainy years) and as such the energy future of Aotearoa must consider what other low emissions sources are domestically available: geothermal is one of these.

GEOTHERMAL IS THE NEW GOLD AND PLENTIFUL: 12,000 GWh BY 2030.

- 21. Geothermal is an abundant energy resource in Aotearoa that the world looks to with envy. We have the second highest installed geothermal energy profile per capita in the world (second only to Iceland) and are part of an elite group of countries who have more than 1000 MWe of installed geothermal electrical capacity.
- 22. More than 12 TWh of additional geothermal electricity generation with low-carbon emission profiles are expected to be online by 2030. The current construction of Tauhara near Taupō will bring some 150 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. Several other areas such as Tikitere, Tokaanu-Waihi-Hipaua, Reporoa, Atiamuri, Rotoma, Horohoro etc. (this list includes limited development systems, and research systems where not enough is known to classify them but there are also development systems which have not been maximised) are candidates to make further contributions to the energy profile of Aotearoa. 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.
- 23. There is room for more however, and this is not just in industrial-scale electricity installations. There is opportunity to significantly increase the utilisation of Geoheat for industrial process heat applications and commercial operations. Heat is readily available at Taupo / Tauhara and at Kawerau.
- 24. The maps below show the Taupo Volcanic Zone with the focus on high-temperature (high energy potential) geothermal resources however most of Aotearoa has low temperature geothermal potential. The adoption of heat-pump technology means that a lower temperature heat source can be used to produce higher temperature energy with the addition of a lesser amount of electrical energy in the heat pump. Ground source geothermal is a perfect heat source for such applications. This sort of technology has been adopted in the Christchurch central business district as part of the post 2010-2011 earthquake reconstruction work. To further foster the uptake; pilot studies, innovation, and the desire to realise are required. The climate change emergency demands that we explore all options on the table and geothermal for all Aotearoa is one avenue to do this.
- 25. In the submission to Climate Change Commission, Contact Energy⁴ submitted that geothermal (existing and future capacity in NZ) generation would rise to 12,000 GWh by 2030. In other words, geothermal generation would grow by 4,400 GWh from 2020 (where the total generation was 7,600 GWh). This corresponds to an increase of 462 MWe of capacity, net of any de-ratings or decommissioning.
- 26. The Contact Energy (Table 1) estimate represents the new generation potential provided adequate policies are in place. There are many factors that will determine how much new geothermal capacity will actually come on-line by 2030, among them: the price of carbon, the NZD exchange rate, the cost of

⁴ <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>



money, project costs (including permitting), the price of wholesale electricity, the demand for electricity, and the cost of alternative generation.

- 27. These factors are difficult to estimate. So, the CCC's estimation, driven by the projects currently permitted and announced, represents a P50 or likely scenario, while the Contact Energy projection expresses the potential upside (P90).
- 28. Accordingly, NZGA acknowledges the range of potential outcomes and clear government policy objectives will attract commercial investments to accelerate our decarbonisation pathway.

Table 1: Contact Energy 's recommendation to Climate Change Commission, March 2021

Recommendation: Model geothermal generation growth to 12 TWh by 2030	
The Climate Change Commission should factor in increased growth in geothermal. Based on our analysis, we recommend that the Commission's stated contribution of geothermal is increased to:	
2025 2030 2035	11 TWh 12 TWh 12 TWh

- 29. Beyond renewable electricity there is significant renewable Geoheat available right now for process heat supply to industrial and commercial facilities. 2.4PJ per annum of geothermal energy (as steam) is available now at the Kawerau Industrial facility.
- 30. NZGA believes that activity that it is seeking to foster in the 2022 2023 period can deliver low carbon energy for industrial process heat use at about \$10/GJ.
- 30. The EECA Industry Development Programme aims to develop relationships with and support industry partners and associations that are aligned or work in connection with EECA's purpose and objectives. In 2022/23, it is proposed that the funding is <u>RING-FENCED</u> to three organisations, namely: Carbon Energy Professionals, Bio Energy Association and Drive Electric.
- 31. NZGA requests that EECA include the NZGA and specifically the Action Plan 2022-2023 activity associated with the Geoheat Strategy for Aotearoa NZ 2017-2030 in the Industry Development Programme inside of the <u>RING FENCE</u>.

We recommend increasing funding of the Industry Development Programme from the proposed \$596,170 to match previous funding level.

We recommend expanding the funding of Industry Development Programme to fund other associations (New Zealand Geothermal Association) and industry bodies to support activity that is aligned and working in connection EECA's purpose and objectives. NZGA specifically request that \$200,000 be allocated by EECA for the 2022 – 2023 years to partially fund the Geothermal Business Development Lead role that is crucial in delivery of the 2022-2023 Action Plan Activity to deliver the Geoheat Strategy for Aotearoa NZ 2017-2030 discussed above.



Aotearoa geothermal heat map:







SOLUTIONS: NEW ZEALAND GEOTHERMAL VALUE CHAIN



Expanding on each category of geothermal potential:

A. Ground source heat:

31. Geothermal heat pumps, also known as Ground Source Heat Pumps must be considered when discussing the impact of heating and cooling 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 cooling and further curtail carbon emissions.

We welcome the increased funding of the Technology demonstration programme.

This programme could benefit from the inclusion of Ground source -Geothermal Heat Pumps in the demonstration programme.

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

32. In 2017, the Association published the Geo-heat Strategy⁵ 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 to be an energy efficient method for production of biomass pellets.

⁵ https://www.nzgeothermal.org.nz/downloads/Geoheat_Strategy_2017-2030__Web_Res_.pdf







Figure 2: A schematic diagram of different applications from direct heat use.⁶

- 33. 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.
- 34. 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 will publish the 2022-2023 Action Plan in early 2022 and would be happy to discuss recent achievements.

We welcome the increased funding of Large Energy Users – Direct Programme.

This programme could benefit the Geoheat Strategy and the actions agreed for 2022/23 under the Action Plan.

⁶ <u>https://causewaygt.com/</u>

CO2 Emissions Reduction technology

- 35. The New Zealand Geothermal Association (NZGA) Emissions Working Group has been established in 2021 to facilitate cooperation, information sharing and collaboration between NZGA members to monitor, measure, manage, reduce and ultimately eliminate operational non-condensable gas emissions (the emissions) from member organisations (owners and operators of geothermal fields).
- 36. The Emissions Working Group provides a strong, collective industry voice and representation for the management and reduction of emissions from geothermal field operators and developers. It promotes geothermal energy use as a key renewable energy source which plays its part in meeting New Zealand's net zero carbon emissions by 2050 goal.
- 37. It aims to represent the interests and aspirations of the industry by applying best practice science, mātauranga Maori, engineering and technology solutions to emissions problems. The Working Group also provides a collective voice to influence and shape policy through collective industry submissions and representation to government.

We welcome the increased funding of Technology demonstration programme.

This programme could benefit the trialling, development, and deployment of emissions reduction technologies in Aotearoa.

Application of geothermal energy to the production of low emission transport fuels

- 38. Geothermal energy serves as a great contributor to the production of low emission transport fuels. Geothermal energy can be used to assist electrolysis of hydrogen by the use of electricity generation and high temperature electrolysis and storage solutions.
- 39. Production of biofuels will reduce our dependency on imported fossil fuels for the transportation sector. Geothermal energy certainly will contribute to the production of biofuels by replacing some of the energy input.

We welcome the increased funding of Low Emission Transport Fund.

This programme could benefit the trialling, development, and deployment of low emission fuel for transportation by using geothermal energy in Aotearoa for electricity generation.

Establishing Geothermal Clusters in Aotearoa

- 40. Clusters are groups of specialised enterprises, and other related supporting actors in the same location that cooperate closely. Together, clusters can be more innovative, create more jobs and business expertise to promote sector value chains and development of emerging industries.
- 41. NZGA has previously engaged with NZTE to investigate this initiative and recently we have also begun our discussions with Amplify (Taupō regional economic development unit). We welcome the opportunity to have EECA's involvement in this topic.

We welcome the initial funding of Sector Decarbonisation Programme.

This programme could benefit the feasibility study and business case preparation for the establishment of Geothermal Cluster in Aotearoa.





CONCLUSION

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

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

No stone unturned, no one left behind, every carbon molecule counts!

We would be happy to answer any further queries.

Nāku noa, nā

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