Proceedings World Geothermal Congress 2026
Calgary, Canada, June 8 – 11, 2026

The Role of National Policy in Advancing Geothermal Energy: New Zealand's Coordinated Approach

Tsui K[1]*, Baxter C[2], Jackson M[3] and Mandjes R[4]
New Zealand Geothermal Association[1]*, Seequent ULC[2], Mitchell Daysh[3], Canistra[4]
ce@nzgeothermal.org.nz

Keywords: national energy strategy, collaboration, market development, indigenous

INTRODUCTION

Having secure, reliable and sustainable energy sources is important for New Zealand's thriving economy. The Government recognises the importance of the role geothermal resources play both in the energy supply (heat), in the renewable electricity market, and tourism (export earnings). In July 2025, the Government (supported by the New Zealand Geothermal Association) launched the draft New Zealand Geothermal Strategy. The final Strategy document will be released by the end of 2025.

The aim of the Strategy is to unlock our abundant geothermal resources that present game-changing opportunities for both economic growth and energy security.

This paper outlines New Zealand's geothermal landscape and the coordinated approach between the Government and the industry to finalise the Geothermal Strategy. Recognising both the Government and the industry's commitment to play an important role in ensuring the geothermal sector remains at the global forefront.

1 GEOTHERMAL LANDSCAPE

New Zealand's unique geological setting has provided the nation with significant geothermal taonga (treasures). Since the migration and arrival to New Zealand around 700 years ago, Māori communities that have lived near geothermal resources (mainly across the Taupō Volcanic Zone) used them in various ways and always regarded them as having high customary values. Hot pools (ngawha, puna, waiariki) provided hot water for cooking and bathing. Hot ground and steam was used as food preparation and ovens. Mud and waters from some pools had medicinal, fiber dyeing and other properties. From a cultural value perspective, Māori mythology describes geothermal resources as being created by atua (gods) who used their powerful forces to shape the volcanic and geothermal landscapes we see today. These explanations and beliefs continue to be passed down through generations and are unique to each particular iwi (tribe). As kaitiaki (guardians) of geothermal resources, Māori see it as their duty to ensure the mauri (life-force) of these resources is protected and appropriately managed for future generations.

The abundance of geothermal activity at relatively shallow depths, particularly within the Central North Island region, combined with early Government-led geothermal exploration in the 1950's led to the innovative development of the Wairakei geothermal power station - New Zealand's first, and the world's second - which first generated electricity in 1958. Incredibly, it is still operating nearly 70 years later and is now one of 17 geothermal power plants across 8 geothermal fields, delivering a combined generation capacity of 1,207 MW (Transpower, 2025). In 2024, this fleet of geothermal power stations generated 8,741 GWh, or 19.9% of New Zealand's electricity (MBIE, 2025).

In addition to electricity generation, geothermal heat and steam is also used to power industrial processes, such as timber drying and tissue manufacturing. In 2023, the direct use of geothermal energy across New Zealand's industrial, agricultural, commercial, and residential sectors amounted to 7.45 PJ, with an additional 1.25 PJ (MBIE, 2025a) used for co-generation (i.e. the generation of electricity and heat).

New Zealand's dynamic volcanic activity also produces geothermal systems containing spectacular surface features, including the largest puia (geyser) in the Southern Hemisphere. These culturally important features have been revered by Māori over many centuries and have been shared with tourists ever since European settlers arrived in the early 1800s through to the current day. In 2024, 27.5% of international visitors reported experiencing a geothermal attraction while in the country (MBIE, 2024). These are primarily Māori-owned businesses, with geothermal tourism business ranking one of the country's largest tourism offerings. With the

sector as a whole a key export earner (BERL, 2025). New Zealand regulations currently protect a number of geothermal systems containing surface features with high cultural and tourism values.

Although New Zealand is proud of its geothermal pioneering achievements, some of the early geothermal developments proceeded without adequate consultation with Māori communities, and in some cases, led to the destruction of hot springs and geysers, subsidence of land, inundation of sacred places and the loss of cultural heritage. Some also led to displacement of local Māori communities resulting in disruptions to traditional lifestyles and practices, causing social upheaval and loss of livelihood for those who depended on geothermal areas as a part of their way of life. Although modern geothermal development practices are now significantly more sustainable and can successfully minimise adverse environmental impacts, the loss and hurt caused by early government geothermal project development is not forgotten by Māori.

2 INDIGENOUS GEOTHERMAL LEADERSHIP

Since being colonised, New Zealand gradually gained more autonomy from Britain, and in more recent times, has seen significant social and political reforms, including the Crown's recognition of historical Treaty of Waitangi breaches, associated Treaty settlement agreements with iwi and the recognition of the Treaty in New Zealand's legislation. Although residual Treaty issues remain in Aotearoa, Māori actively engage in managing, protecting and developing geothermal resources. This involvement provides tangible ways in which they can exercise their duty as kaitiaki (guardians) for these highly valued taonga.

Where Māori have managed to retain ownership of land overlying geothermal resources and/or received geothermal assets or were returned geothermal land from the Crown as part of Treaty of Waitangi claim settlements, this kaitiaki role has in a number of instances culminated in Māori entities gaining and exercising direct or partnership control of nationally significant geothermal developments generating substantial environmental and economic benefits to New Zealanders as well as delivering cultural and other tangible benefits directly to their own people. Examples include Tuaropaki Trust (Geothermal electricity generation and direct heat use) and Tauhara North No.2 Trust with Geothermal electricity generation. These Indigenous Māori-led geothermal developments provide a source of inspiration and belief to other New Zealand Māori that control of their own destiny can be realised.

3 CURRENT FOCUS OF EMERGING TECHNOLOGIES

Separate from the value New Zealand benefits from its geothermal resources, this "heat beneath our feet" has much more untapped commercial potential – from extracting valuable minerals dissolved in geothermal fluids, to potentially game-changing energy delivery prospects from supercritical geothermal fluids, to pioneering biotechnology that leverages the resilience of microorganisms thriving in extreme conditions. All these innovations open new economic pathways and would position geothermal as a source of scientific advancement, environmental stewardship, and industry transformation.

A particular area of interest for New Zealand are the deeper supercritical geothermal resources that exist at depths beyond 5 km and at temperatures exceeding 400 °C. This is a largely unexplored realm, but if the technology can be developed to access and harness these resources, they could deliver up to 3 times more energy than conventional geothermal fluid (GNS, 2024). Backed by New Zealand's Government, with an initial $60M research investment recently confirmed, this bold exploration initiative could redefine New Zealand's energy future.

4 KEY CHALLENGES

Although New Zealand's geothermal journey to date has built up a strong geothermal resource base and has developed a wide range of technical expertise, to the extent these have propelled the country forward as a global geothermal leader, several critical challenges are limiting the sector's expansion into some of the emerging geothermal technologies and uses now available or potentially available through further effort. In turn, New Zealand's aspiration to accelerate its contribution to decarbonisation and regional development is also constrained.

A key barrier is the time and cost to assess project viability, especially early on. Exploration and drilling can cost tens of millions, particularly in greenfield sites with uncertain resources. Necessary infrastructure adds further financial risk. Fragmented access to geothermal data compounds this, with information currently siloed across agencies and operators. A lack of centralised, open-access platform slows progress and raises entry barriers for new developers and tangata whenua (local people). While over 100 geothermal systems are known, few are well-characterised, making it hard to match resources with suitable technologies.

Although New Zealand's regulatory framework for regulating the use and development of geothermal resources has served the country well over the last three decades or so, where most high temperature geothermal systems classified for development (i.e. the "low-hanging fruit") now have significant generation installments in place, it has reached a point where the regulations have been outpaced by the advances over recent years in geothermal technology and the evolving range of applications. Current settings do not adequately support low-temperature or emerging technologies such as geoheat systems, supercritical geothermal, or mineral recovery (Climo et al. 2020; MBIE, 2010). This regulatory misalignment creates uncertainty and delays, discouraging innovation and investment. The structure of the free energy market adds further risk, with demand fluctuations affecting investor confidence. Without clear signals on future energy demand, especially from transport, industry and data infrastructure, developers struggle to justify long-term investment. Identifying and quantifying this future demand is essential to building confidence in geothermal as a reliable, scalable energy solution.

In order to move forward, the New Zealand Government announced a draft Geothermal Strategy in 2024 "From the Ground Up" including an ambitious goal of doubling geothermal energy use by 2040. To support this goal, it has been initially identified that a coordinated national approach is needed to align stakeholders, prioritise investment, and guide research and development.

5 STRATEGIC GOALS AND ACTION FRAMEWORK

To enable the sustainable growth and diversification of New Zaland's geothermal sector, the draft strategy outlines five interconnected goals that address key barriers and opportunities across the value chain.

- Goal one: Data and Insights, focuses on creating a baseline of publicly available data to reduce uncertainty and unlock new developments.
- Goal Two: Regulatory Readiness aims to modernise legislative and planning frameworks to support both established and emerging geothermal technologies.
- Goal Three: Technology Uptake supports broader use of industrial and residential applications of geothermal.
- Goal Four: Regional Clusters seeks to stimulate place-based economic development through geothermal hubs, with emphasis on Māori-led initiatives and rural revitalisation.
- Goal Five: Science and Innovation, supports research and development to advance geothermal capabilities and maintain New Zealand's position as a global geothermal leader.

These goals are supported by targeted actions summarized in Figure 1. The strategy is structured across three implementation horizons.

- Horizon 1: 2025-2026, focuses on foundational actions such as data establishment and regulatory clarification.
- Horizon 2: 2027-2028, builds on these foundations to pilot technologies and refine permitting frameworks.
- Horizon 3: 2029 onwards, aims to scale adoption, integrate advanced innovations, and embed geothermal development within national planning instruments.

Collectively, these horizons provide a sequenced pathway to reduce investment risk, improve system efficiency, and accelerate the sector's contribution to national decarbonisation and regional development objectives.

ACTION PLAN GOALS	Imploving aecess to geothermal data and insights	Ensuring regulatory and system settings are it for purpose	Advancing knowledge dluptake of geothermal fechnologles	Enabliring place.based geothermal clusters	Driving science. research and Innovation
HORIZON 1 2025–2026	1. Make relevarat publicly available data metaclala and information ession to final, and accest 2. Deliver 2 national induaaton system for gepthermal resoutce	• Finalise the application of Decision | of AIBIE ×30022 resource permissions *set fes* require • Imortinnonarg oltrory la and ops of settings implementation group • Publish a whte pape sper future frameworks imprgroup • Publish a white paper fature frameworks gretets timewerite for geothermal produsity/and industrlul heal sitt	• Promote the role of geothermal energy in New Zooland with stakeholders and prospective customers • Capitalize on international and domoosic to excourame trial geothermal technology • Deliver sodic professional development on enccunge and exable development across industries. Expand teritary training with government support	• Undertake driling prograrnme for supercritical geothermal resource test site • Run case geoperation sadies conductoned operational geothremal technology with relevent stakeholders	• Undertake difling prograrnme for supercritical geothermal resource test sile
HORIZON 2 2027–2028	3. Complete open standard requirements to support engping collection and anaiysis of geothermal boseline data 4. Enharce national indicaator system including production and operational data	• Ensure geothermal consenting continues to encourage and enable development scress the country • Progress recommmendations from the white paper and implement trameworks ' across industries,. Expand tertiary training with goement support	• Deliver rexolutions to pilet industry greem house agc entissions measurements	• Deliver second drilling supercritical geothe driveloping vipicar ming geothermal recource well	• Deliver second driting supercritical geothermal resource test well
HORIZON 3 2029 onwards	5. Start a-chen user hub/ resource	• Investigate a new approach to final resarune fature resource tertmp tematedand infanerial hest interests	• Deliver second drilling supercritical geothermal rese- urce test well	• Deliver second conce diffing supercritical geothermal resource test site	• Develop transformative govennmenal schemes to effective heat and insights
HORIZON 3 2029 onwards	5. Start a phone user hubiresource	• Investigate a new approach to final resource Implemenial envore erouch dreverets	• Deliver second drilling supercritical palsonce		

Figure 1: Detailed action frameworks outlined in the strategy.

Despite the ambition of the draft Geothermal Strategy, the New Zealand Geothermal Association (NZGA) asserts that the current pace of change is insufficient to meet the 2040 targets and that the draft strategy's implementation horizons require some reconfiguration to accelerate the change necessary to achieve its overall goal of doubling geothermal energy use by 2040. NZGA also recommends the urgent implementation of a government-led derisking campaign to unlock investment and reduce barriers to geothermal deployment. Central to this is the establishment of a Geothermal Centre of Excellence, envisioned as a national innovation and coordination hub to drive research, workforce development, and Māori-led enterprise. Importantly, NZGA's submission includes specific recommendations intended to inform the final strategy, which is still to be issued at the time of writing this paper. This submission reflects extensive member engagement, ensuring sector-wide alignment. Accelerated action is essential for maximising the sustainable use of New Zealand's geothermal resources and, in turn, realising the full value of these resources towards achieving accelerated decarbonisation and regional revitalisation.

6 INTERNATIONAL COLLABORATION

New Zealand's geothermal industry, which has been thriving for over 75 years, has been instrumental in the country's energy sector. Both generators and service providers have collaborated to build and develop a robust geothermal industry that now supplies nearly 20% of New Zealand's electricity. Equipped with this knowledge, New Zealand has consistently played an active role within the global geothermal community. New Zealand has been actively participating in the International Geothermal Association (IGA), the International Energy Agency Geothermal Technology Collaboration Programme (IEA Geothermal TCP) and Women in Geothermal (WING) since their establishment, respectively in 1988, 1997 and 2013, and has been involved in numerous other international geothermal organizations helping drive collaboration, promote education, and foster development within the industry.

Expanding on this foundation, the overall vision of the draft Geothermal Strategy is to secure New Zealand as a global leader in sustainable development, delivering innovation, resilience and inclusive growth for future generations. The NZGA supports this vision and considers that New Zealand can not only be a country that produces more clean geothermal energy at home, but it can also be global development partner by collaborating with other Governments and international entities to develop their own geothermal resources through knowledge sharing, technology transfer and innovation.

The NZGA has been working together with the New Zealand Government and industry partners to actively broadcast the country's gained experience internationally. New Zealand companies have supported government initiatives through the Ministry of Foreign Affairs and Trade (MFAT) international programs like Indonesia-Aotearoa New Zealand Geothermal Energy Programme (PINZ), New Zealand-Africa Geothermal Facility (AGF) and Aotearoa New Zealand-Caribbean Facility for Renewable Energy (FRENZ), to collaborate and provide support with:

- Policy & market development; regulatory advice and planning;
- Skills & workforce; NZ-hosted and in-country training course;
- Project preparation; feasibility, procurement support, collaborating with NZ expertise); and
- Commercial facilitation; New Zealand Trade and Enterprise (NZTE) and Ministry of Foreign Affairs and Trade (MFAT) supporting NZ capabilities at international events such as IIGCE, NGAP, WGC and NZ Geothermal Week.

Team initiatives including MOU's between Earth Science New Zealand and BECA, the partnership between Seequent and IGA have helped drive geothermal growth and collaboration internationally, and are great examples of how New Zealand has been exporting its geothermal expertise globally.

New Zealand's broader science and innovation landscape has long been driven by the ambition to solve domestic challenges and improve economic, environmental, social, and cultural well-being. With the introduction of the draft Geothermal Strategy the Government is sending strong signals to encourage the industry to continue advancing technology, commercial partnerships, and capability so that New Zealand continues to be a leader in the global geothermal industry.

CONCLUSION

New Zealand's geothermal sector stands at a pivotal moment. With a rich legacy of innovation and cultural stewardship, the draft national strategy presents a timely opportunity to unlock the full potential of geothermal energy for decarbonization, regional development, and Māori economic transformation. The structured horizon-based framework provides a clear pathway for implementation, yet the pace of change must accelerate to meet the 2040 targets. The New Zealand Geothermal Association advocates for immediate government-led derisking initiatives and the establishment of a Geothermal Centre of Excellence to catalyst innovation, workforce development, and inclusive growth. Through coordinated policy, investment, and industry collaboration, New Zealand can reaffirm its global leadership in sustainable geothermal development.

REFERENCES

Business and Economic Research Limited (BERL): The Value of Māori Tourism in Aotearoa New Zealand. Commissioned by New Zealand Māori Tourism (2025).

Climo, M., Chambefort, I., Carey, B., Bendall, S., and Blair, A: New Zealand's Supercritical Opportunity: Moving from potential resource to deployed technology, Proceedings, 42nd New Zealand Geothermal Workshop, Waitangi, New Zealand (2020).

GNS Science: Power prices are painful but geothermal could be New Zealand's superhot solution. (2024) https://www.gns.cri.nz/news/is-the-superhot-energy-solution-beneath-our-feet/

Ministry of Economic Development (MBIE): International Visitor Survey. (2024). https://www.mbie.govt.nz/immigration-and-tourism/tourism-research-and-data/international-visitor-survey

MBIE: Geothermal Energy: Summary of emerging technologies and barriers to development. (2010). Microsoft Word - 1006360_1.DOC

MBIE: Electricity Statistics. (2025). https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/electricity-statistics

MBIE: Energy balances. (2025a). https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/energy-balances

Transpower: 2025 SOSA – Final Supplemenary Data – Final Version. (2025). https://www.transpower.co.nz/invitation-comment-security-supply-assessment-2025-closed