KAITIAKITANGA FUTURE GEOTHERMAL INNOVATION AND DIRECT USE

Alec Wilson[1], Taparoto Nicholson[1], Greg Bignall[2], Diane Bradshaw[2]

[1] Waiariki Māori Geothermal Advisory Group 1218- 1224 Haupapa St, Private bag 3017, Rotorua 3046

[2] GNS Science, Wairakei Research Centre, Private Bag 2000, Taupō, 3352, New Zealand

Keywords: *Te Arawa, Waiariki, Statutory Acknowledgements, Iwi Affiliates, Kaitiakitanga, He Kai Kei Āku Ringa, Māori economy, direct use, natural resources*

ABSTRACT

There are significant economic growth opportunities for both Māori and the wider New Zealand economy to work constructively together to realise the potential of natural resources. Taking a constructive and open approach to discussions on the use and development of these resources would lead to economic growth outcomes that are mutually beneficial to those that play a role as kaitiaki, Iwi Māori and all New Zealanders. Māori are interested in economic development opportunities and support a constructive discussion about the sustainable utilisation of natural resources.

The definition of kaitiakitanga should not be limited by the statutory definition, only tangata whenua can adequately define the nature and the role of a kaitiaki in respect of a particular resource. The tangata whenua of this region are Ngāti Tūwharetoa and Te Arawa who trace their descent from the common ancestor Ngātoroirangi of the Te Arawa waka. Calling his sisters Pupu and Te Hoata in Hawaiki bringing fire to his aid thus creating geothermal fields in development today. Many processes require this heat and can take advantage of geothermal energy to provide industry with an opportunity for a range of innovation and uses, depending on the temperature and sustainable extraction of the available geothermal fluid. Installations can be stand-alone, clustered or arranged in a cascading arrangement (e.g. a direct use application, after high temperature use for electric power generation), although developments may conversely cascade power generation off the direct use.

Māori are major stakeholders and contributors to economic growth in the regions, particularly in the central North Island, and the Māori economy has significant interests in many geothermal resources. Government targets pursue increased use of renewables and direct use of geothermal energy, as do local and regional economic development agencies. Māori is well-placed to meet some of these aspirations. This paper will explore kaitiakitanga, future geothermal innovation and direct use and show how Māori work best and most productively in collaboration – to develop scale in business and leverage existing resources.

1. INTRODUCTION

1.1 Te Whakatau O Ngātoroirangi

E Para E! Tikoko o te au marama
Tukua au kia puta ki tawhangawhanga nui no Rangi, no Papa
He aio; tu atu te makariri
Haramai te werawera
Hika ra taku ahi ki a Kautete tu
Hika ra taku ahi ki a Te Pupu
Hika ra taku ahi ki a Te Hoata
Ki a Te Moremore-o-te-rangi.

Māori consider themselves to be guardians of the environment, protecting and ensuring sustainable natural resources for future generations. Kaitiakitanga demonstrates the commitment Māori have to consider long-term sustainability of the resources and people impacted by any business decisions. Most of the traditions from Te Arawa, Tūwharetoa and Mataatua sources ascribe the origin of Geothermal activity in the Taupō Volcanic Zone to the exploits of Ngātoroirangi, and his sisters Kuiwai and Haungaroa aided by the atua Te Pupu and Te Hoata (Wilson et al., 2015).

Te Arawa, a confederation of tribes "Mai Maketu ki Tongariro," have held firm to their oral traditions passing these from generation to generation in perpetuity ensuring the continuation of their culture, their customs and the practice of ancient traditions through which they maintain a strong sense of spiritual connection to their spiritual homeland of Hawaiki. (Wilson et al., 2017).

One such narrative recants the indigenous world view of geothermal origins. A journey of exploration by Te Arawa ancestor Ngātoroirangi a Tohunga (high priest) born with a command of both physical and spiritual realms.

Ngātoroirangi was also navigator of the great voyaging waka Te Arawa, which made its final landfall at Okūrae (Maketu) in the Bay of Plenty where it remains to this day. (Wilson et al., 2017).

There is a clear correlation made in these traditions between the volcanic mountains and areas of surface geothermal activity, the hot springs, geysers, mud pools, sinter terraces and steam vents. Ngātoroirangi ascended Tongariro, where he almost perished, so intense was the cold on that mountain. Hence Ngātoroirangi called upon his ancestors to send heat and warmth to him, lest he perish. One of his vocations is shared above. (Wilson et al., 2017).

From the time of Ngātoroirangi, geothermal heat and energy have been considered taonga tuku iho (precious gifts provided by the gods) for our use. Te Arawa have since then utilised these for numerous domestic purposes and through trial and error discovered the different healing qualities ngāwhā (hot pools). This vast knowledge and routine of practices have become the traditional fabric which have defined these geothermal communities. (Wilson et al., 2017).

2. KAITIAKITANGA

In order to assist with consultation, local authorities are required to maintain, for each iwi and hapū within its region or district, a record of the contact details for each iwi authority, the planning documents recognised by each iwi authority, and the area over which iwi or hapū exercise kaitiakitanga. Section 35A Resource Management Act. As kaitiaki, this may include determining, for example, who should, or should not, have access to areas and resources, and how those things may or may not be utilised.

The Waiariki Māori Geothermal Advisory Group enables the ethic of kaitiakitanga through working with other industry groups and Māori to develop sector strategies. In order to overcome the existing barriers, we need to understand the costs and benefits that can be realised. Māori can participate in a productive conversation about the benefits and opportunities of sustainable development and use of these resources with all New Zealanders.

2.1 Māori and the RMA

RMA Principles - All persons exercising functions and powers under the Act are required to recognise and provide for seven matters of national importance set out in section 6. This includes:

- Section 6(e) the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, Wāhi tapu, and other taonga.
- Section 7 of the Resource Management Act sets out 'other matters' which persons exercising functions and powers under the Act must 'have particular regard to'. This includes section 7(a) kaitiakitanga.
- Section 8 requires that all persons exercising functions and powers under the Resource Management Act take into account the principles of the Treaty of Waitangi.

3. MĀTAURANGA MĀORI

Mātauranga Māori (Barlow 1993; Durie 1998; Harmsworth 1998; Harmsworth et al. 2002; Mead 2003; Waitangi Tribunal, 2011) provides the basis for the Māori world view and is a perspective encompassing all aspects of knowledge – e.g. philosophy, beliefs, language, methods, technology and practice. There are numerous definitions of mātauranga Māori. One of the more generally accepted is Marsden's (1988), which defines it, in a traditional context, as "the knowledge, comprehension or understanding of everything visible or invisible that exists across the universe'; this includes all Māori knowledge systems or ways of knowing and doing.

Ūkaipōtanga refers to the place where one is nurtured, where one finds their strength and their energy, grounding themselves to the land and home. It is recognition of origins, of treasured ancestral land passed down from generation to generation. They therefore have a sense of responsibility to care for and protect the place that passed on to them, as well as create the conditions for future generations to thrive. NZTE Māori Economy Investor Guide.

Māori are a tribally-based people. Each tribe (known as an iwi) is associated with specific geographical areas. Within these tribal groups are sub-tribes or smaller communities (known as hapū), which consist of a number of related families. The extended family unit is known as whānau. In Māori culture, land ownership and commercial activities can be undertaken both privately and collectively (as is also the case for other indigenous cultures around the world). The parent of the collective organisations will usually be a Trust (or occasionally an incorporated society). 'Māori land' owned by these collective organisations is recognised in legislation as a special category of asset, and is protected by specific legislation (NZTE Māori Economy Investor Guide, 2017).

With the majority of geothermal resources being on land controlled by Māori groups and trusts, collaboration is a driving force in the development of geothermal direct use opportunities (Richter, 2017).

4. GEOTHERMAL DIRECT USE

Geothermal power generation is an established industry in New Zealand, providing 1826 GWh electricity generation in the March 2017 Quarter (http://www.mbie.govt.nz/ info-services). Direct use of geothermal heat can make greater impact as it becomes an increasing part of New Zealand's geothermal energy portfolio (Hall and Climo, 2015; Carey et al., 2015). The Geoheat Strategy for Aotearoa New Zealand, 2017–2030 (see http://nzgeothermal.org.nz/geoheat/) was launched on 27 June 2017, with the New Zealand Geothermal Association (NZGA) being the strategy owner, and aims to double direct use of geothermal energy by 2030 and stimulate economic development using renewable energy solutions. The strategy provides a path for growing geothermal direct use in New Zealand, with a governance from industry, Maori and from the NZGA.

New Zealand uses ~7.5PJ of energy (per annum) from direct heat from geothermal resources, but the goal of the Geoheat Strategy is to build steadily towards 15PJ, as well as increasing new jobs. The view is that benefits will accrue by increasing understanding in industries, groups and individuals who do not currently fully appreciate the advantages of using a renewable geothermal source to meet their energy needs. Direct heat is already used widely for timber drying, in commercial scale glasshouses, for milk processing, tissue paper manufacturing, aquaculture, honey processing and bathing, and there are already many success stories in New Zealand, but also potential for increased uptake in the future.

At the forefront, is the possibility to increase direct use of geothermal energy by industries located near geothermal resources, who might be able to substitute non-geothermal based fuels. Many processes that require heat can use geothermal energy directly – although the temperature of the available geothermal fluid has to match the temperature required for the process. In this regard, understanding the character of the geothermal system, and its capacity to sustain development over many years, and minimise impact on the environment, is as important for direct use applications as it is for power generation.

A number of industrial scale applications exist in the forestry sector, which has a high demand for thermal energy for efficient timber drying, as well as creation of high value products from secondary timber processing, such as fibreboard, laminated timber, plywood and wood-plastic composites. Infusing plastic with wood fibre using geothermal direct heat to create a wood-plastic composite can be an effective alternative to preservative-treated wood, as the process helps to prevent water absorption. Agriculture is a primary industry of New Zealand, and this industry already has a strong track-record of using geothermal energy in production and processing, to heat, irrigate or sterilise soil, or to create microclimate in greenhouses to promote cultivation of fruit, vegetables or flowers, commonly using geothermal water of 60 – 80ºC, whilst there is potential to enhance growth rates by redirecting geothermally-sourced CO_2 into a greenhouse. Aquaculture, applications for processing dairy and honey products and horticultural crops, also meat, leather and wool processing, and fish drying and fish oil processing can all use geothermal direct heat to meet their needs. Technologies are also being developed for converting biomass into biofuels – co-location of forestry and geothermal resources mean geothermal energy can be used to supply

process heat for timber processing and paper manufacture, such as at Kawerau, with biomass residues put to high value use, such as for biofuel.

Figure 1 shows the total number of geothermal installations in New Zealand by their primary category. Where an installation fits into two or more categories, the primary category is the one that uses the most geothermal energy.

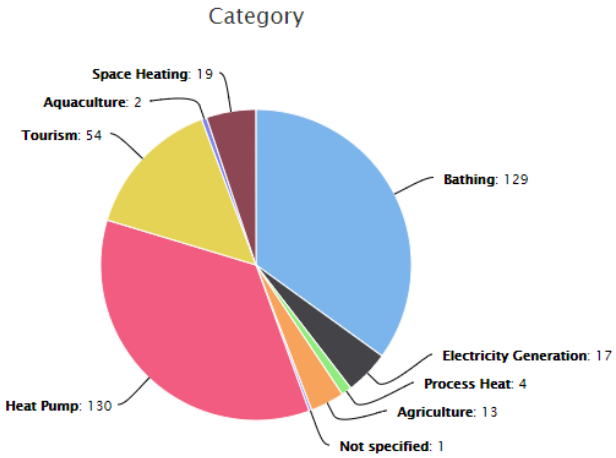

Figure 1: Geothermal Use in New Zealand (GNS Science, 2017)

The science of geothermal system delineation is well understood, and potential developers or users of geothermal resources in New Zealand are able to draw on many decades of experience and know-how to support their aspirations. Geophysical and chemical techniques to define the character of the geothermal systems were initially developed at Department of Scientific and Industrial Research (DSIR) in the 1960's onwards, whilst new geological framework modelling and numerical (resource capacity assessment and development scenario) modelling provides confidence resource exploration and development decisions can be made that reduce investment risk. Never the less, the decision to use geothermal energy can appear complex and/or confusing to those uncertain about resource exploration, characterisation, environmental issues, drilling, or the resource consent process. There are many success stories in New Zealand, as well as lessons learned, that should give potential developers confidence decisions concerning possible geothermal development can be made that reduce financial or development risk, mitigate possible effects, or identify early if an activity is not viable. The NZGA, GNS Science through its Government-funded research programme and outreach, existing New Zealand developers and consultants exist to facilitate geothermal developments that will have positive impact for iwi, and the Māori economy generally.

5. THE NEXT 10 YEARS AND BEYOUND

He kai kei aku ringa is the Crown-Māori Economic Growth Partnership and national Māori economic development strategy (He Kai Kei Aku Ringa, 2017). Established in 2012, it provides a vision for a productive, innovative, export oriented Māori economy driven by whānau. Literally it means 'providing food by my own hands'. It has become a metaphor for the resilience and economic self-determination of Māori people.

E RERE! heralds the next phase of He kai kei aku ringa where we take stock and reflect on the achievements of the Māori economic renaissance and turn to the future opportunities for the mighty Māori economy.

E RERE represents the five goals of He kai kei aku ringa

1. Employment – Whai Mahi – growing the future Māori workforce.
2. Rangatahi – supporting Māori youth to define and lead their economic aspirations.
3. Enterprise – Whai Pakihi- growing Māori enterprises.
4. Regions – Rohe Tū Pakari – increasing Māori participation in regional economies.
5. Education – Whai Mātauranga - upskilling the Māori workforce.

5.1 The Māori Economy

Ka tangi te tītī — The migratory bird that searches the globe for economic opportunities, it is connected to the home, but with a global view.

Ka tangi te kākā — The bird of the forest resources the domestic market.

The Māori economy is broadly defined as those privately owned and collectively-owned businesses that acknowledge their genealogical links to Māori ancestors. It currently represents $50 billion dollars in assets, which is approximately 6% of the total New Zealand asset base. Māori enterprises represent a rapidly growing segment of the wider New Zealand economy. They are poised to accelerate their rate of growth and increase their relative proportion of New Zealand's asset base and GDP. The New Zealand economy has been growing at 2-3% per annum and many of the key economic indicators for the Māori economy have been improving more rapidly than this at >5% per annum (including the growth in assets and incomes). This could result in the value of Māori assets growing from $50 billion to $100 billion by 2030. Māori are at the forefront of New Zealand's economic momentum.

5.2 Investment opportunities

It is expected that Māori will invest NZ$1.5 billion to NZ$2.0 billion per year over the next 10 years; and some of this investment will be enhanced through joint ventures and partnerships with other parties. The level of investment will range from venture funding ($1 million to $20 million), to significant initiatives requiring >$100 million and potentially up to $500 million, depending on the role of the investor. To date, Māori economic growth has centred around four main sectors with strong links to natural resources, land and culture. These include: agri-sector, forestry and fishing, tourism, property, construction and infrastructure, technology and innovation. These sectors are critical to the New Zealand economy, and to export growth in particular. Māori play a pivotal role in each since they control 50% of New Zealand's sustainable fishing quota, and own around 1.4 million hectares of land with significant opportunities for development.

5.3 Te Rautaki Māori - The GNS Science Māori Strategy

Creating mutual value by unlocking the potential of GNS Science-Māori relationships.

Mā tini, mā mano, ka rapa te whai by joining together we will succeed.

GNS Science's purpose is to undertake research that drives innovation and economic growth in New Zealand's geologically-based energy and minerals industries, that develops industrial and environmental applications of nuclear science, that increases New Zealand's resilience to natural hazards and that enhances understanding of geological and earth-system processes. The economic and social benefits comprise: energy, mineral, and water wealth; protection of people and infrastructure from geological hazards; and new technologies for a transformed economy.

The Māori business strategy (Te Rautaki Umanga Māori – Te Rautaki) is an opportunity for GNS Science staff to think about Māori as client, collaborator, stakeholder, economic powerhouse, and business partner. GNS Science is committed to remaining at the forefront of the application of science for societal development. The creation of seamless relationships with Māori is a crucial element within this commitment (Hunter, 2017).

6. REGULATIONS

6.1 Māori and climate change mitigation

Many Māori support New Zealand joining with other countries to take measures to reduce emissions and mitigate the potential future effects of climate change (CCILG, 2016). Second, Māori have Treaty of Waitangi interests in the protection of their ancestral lands and waterways, and more broadly the natural environment, expressed in the values of kaitiakitanga. Kaitiakitanga "denotes the obligations of stewardship and protection … [and] is most often applied to the obligation of whānau, hapū and iwi to protect the spiritual wellbeing of natural resources within their mana" (New Zealand Law Commission, 2001).

6.2 Geothermal Energy Regulations 1961

The long awaited review of the Geothermal Regulations established in 1961 by the Ministry of Business Innovation & Employment (MBIE) is now underway.

7. CONCLUSIONS

As the Māori economy grows, Māori enterprises seek to build relationships with investment partners for mutual benefits. Māori enterprises have some special features, including a strong platform of cultural values, an intergenerational perspective on economic development and a particular focus on enduring relationships. Combined with the business acumen of Māori economic leaders, these special features provide unique entry points and opportunities for investors.

Māori values and culture play a vital part in both social and commercial activities. For the potential investor, having an understanding of these values is important for a number of reasons. These values are inherent in many aspects of the commercial relationships Māori organisations form with investors, customers, suppliers and external stakeholders. Recognising these values, and engaging with the culture, adds a dimension to the commercial relationship that is unique and valuable in its own right. The intention is to work co-operatively with those who have an interest in mātauranga Māori values to develop principled and practical solutions to issues that arise in the next 10 years in geothermal renewable energy.

ACKNOWLEDGEMENTS

Affiliate member of Te Arawa Iwi - Alec Wilson Chairman Wairaiki Māori Geothermal Advisory Group 2015.

Affiliate Te Arawa Iwi and Hapū Claims Settlement Act 2008. Bay of Plenty Regional Council – Statutory Acknowledgements Addendum. September 29, 2008.

He kai kei aku ringa The Crown-Māori Economic Growth Partnership. Action Plan 2012-2017 Māori Economic Development Panel November 2012 pg 28.

NZ Geoheat Strategy for Aotearoa NZ 2017 - 2030 – Foreword Waiariki Māori Geothermal Advisory Group C/O Te Puni Kōkiri, Level 1 Te Puni Kōkiri House Rotorua 3046, New Zealand.

Tūhono Whakapiringa acknowledges the Board, the GNS Science staff and Māori network who contributed or added to this strategy. Hunter, B. 2017 GNS Science.

REFERENCES

Carey, B.; Dunstall, M.; McClintock, S.; White, B.; Bignall, G.; Luketina, K.; Robson, B.; Zarrouk, S.; Seward, A.: 2015 New Zealand Country Update. In. Proceedings World Geothermal Congress, Melbourne, Australia. 18p. (2015).

Climate Change Iwi Leadership Group, http://www.mfe.govt.nz/sites/default/files/media/NZETS_reviewstage1-Climate_Change_Iwi_Leaders_Group180.pdf, accessed 30 August 2017, (2017).

Climo, M.; Hall, J.; Coyle, F.; Seward, A.; Bendall, S.; Carey, B.: Direct Use: Opportunities and Development Initiatives in New Zealand. Proceedings World Geothermal Congress 2015, Melbourne, Australia, 19-25 April 2015. (2015).

GNS Science: Geothermal use database, https://data.gns.cri.nz/geothermal/charts.html, (accessed 30 August 2017), (2017).

Hall, J.; Climo, M.: Geothermal Direct Use in New Zealand: Industrial Heat Park Opportunities. GNS Science Report 2014/17. 36p. May 2015. (2015).

He Kai Kei Aku Ringa: E RERE Māori Economy Conference Videos and Presentations - 16 June 2017, Rotoruahttps://www.erere.maori.nz/erere-conference-material https://www.erere.maori.nz/ (2017).

Hunter, B.: Te Rautaki Maori The GNS Science Māori Strategy pg2. (2017).

Māori Economy Investor Guide 2017 p. 16 and 18. www.nzte.govt.nz. (2017).

Marsden M : The natural world and natural resources. Māori value systems and perspectives. Resource Management Law Reform Working paper 29. Part A. Wellington, Ministry for the Environment. (1988).

New Zealand Law Commission: Study Paper/Law Commission, Wellington, 2001 ISSN 1174–9776 ISBN 1–877187–64–X This study paper may be cited as: NZLC SP9. (2001).

Richter, A.: http://www.thinkgeoenergy.com (accessed on 30 August 2017), (2017).

Waitangi Tribunal: Ko Aotearoa Tenei: Report of the Waitangi Tribunal into claims concerning law and policy affecting Māori culture and identity (Wai 262). Wellington, Waitangi Tribunal. (2011).

Wilson, A.: Foreword. In: Climo, M.; Bendall, S.; Carey, B. 2017 Geoheat Strategy for Aotearoa NZ. 2017-2030. New Zealand Geothermal Association. (2017).

Wilson, A.; Nicholson, T.; Bignall, G.; Bradshaw, D: Kaitiakitanga and The Next 10,000 Megawatts NZGA Workshop, Wairakei, Taupō pg5. (2015).

Barlow, C.: Tikanga Whakaaro: Key concepts in Māori culture. Auckland, Oxford University Press 1993 (1993).

Durie, M.: Te mana, Te kawanatanga: The politics of Māori self-determination. Auckland, Oxford University Press. 280 p. (1998).

Harmsworth, G.R.: Indigenous values and GIS: A method and framework. Indigenous Knowledge and Development Monitor 6 (3): 3–7. http://app. iss.nl/ikdm/ikdm/ikdm/6-3/harmsw.html (1998).

Harmsworth, G.R.: Coordinated monitoring of New Zealand Wetlands, Phase 2, Goal 2: Māori environmental performance indicators for wetland condition and trend. Landcare Research Contract Report LC0102/099. Palmerston North, Manaaki Whenua – Landcare Research. 65 p. (2002).

mead, H.: Tikanga Māori: Living by Māori values. Wellington: Huia Publishers and Te Whare Wananga o Awanuiarangi. 398 p. (2002).