

Geoheat Strategy &
Action Plans:
Summary of Consultation
Processes 2015-2022

MAY 2022



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Acknowledgement

The Geoheat Strategy and it's Action Plans have been developed in a consultative and collaborative way, with input and multiple views being contributed by people across Aotearoa New Zealand with an interest in our geothermal future. The authors would like to thank all those who have contributed their time and expertise.

INTRODUCTION

The Geoheat Strategy for Aotearoa New Zealand 2017-2030 is the roadmap to foster further uptake of geothermal energy for process use (“geoheat”). This report is a compilation, recording the consultation undertaken over the past decade in the development of the Strategy and three Geoheat Action Plans (2018-2019, 2020-2021, 2022-2023). It also compiles a record of published papers and presentations.

This document does *not* detail the content of the Geoheat Strategy, nor the content of any of the Action Plans, nor the progress made in delivery of Action Plans. Rather this report is process focussed, detailing *how* the content of these documents was developed. For detailed information about the Strategy, Action Plans and delivery progress, the reader is directed to familiarise themselves with the family of Strategy documents (Table 1), and the published papers (Appendix 1). An effectiveness review is included in each of the Action Plans, reviewing the previous two years of activity.

Table 1: Strategy Documents (available at www.nzgeoheat.nz)

Year	Document
2017	Geoheat Strategy for Aotearoa New Zealand
2018	Action Plan 2018–2019; Geoheat Strategy for Aotearoa NZ
2020	Action Plan 2020–2021; Geoheat Strategy for Aotearoa NZ
2022	Action Plan 2022–2023; Geoheat Strategy for Aotearoa NZ

A BRIEF HISTORY

Strategy Development

The Geoheat Strategy’s journey (shown pictorially in Figure 1) began with ideas shared with the geothermal community in November 2012 at the New Zealand Geothermal Workshop. Sufficient interest meant GNS Science staff and the then NZGA President (Brian Carey) pursued the development of the Strategy. The Strategy was designed to be high-level and enduring, and the desire was to have an engaged process and a Strategy that would be acted upon, not just a document left on a shelf.

The New Zealand Geothermal Association (NZGA) became the host for the Strategy, arising from an in-principle ratification for the work at a NZGA Board meeting (7th March 2016). Stakeholder consultation was undertaken throughout the period 2015 to 2017 as the Strategy was developed, stemming from the belief consultation would generate interest, deliver a robust Strategy, and provide the basis for growing a group of people and organisations interested in actively working to implement the Strategy goals. More details of this are included in the chapter on Consultation Processes.

The Geoheat Strategy was launched on 27th June 2017 at the New Zealand Geothermal Association winter seminar, held at Wairakei. A [launch video](#) was prepared by GNS Science for NZGA, and the launch was recorded in an article in Energy News (see Appendix 2). The NZGA website was (and continues to be) used to deliver documents, consultation material and to receive feedback through the [geoheat webpages](#).

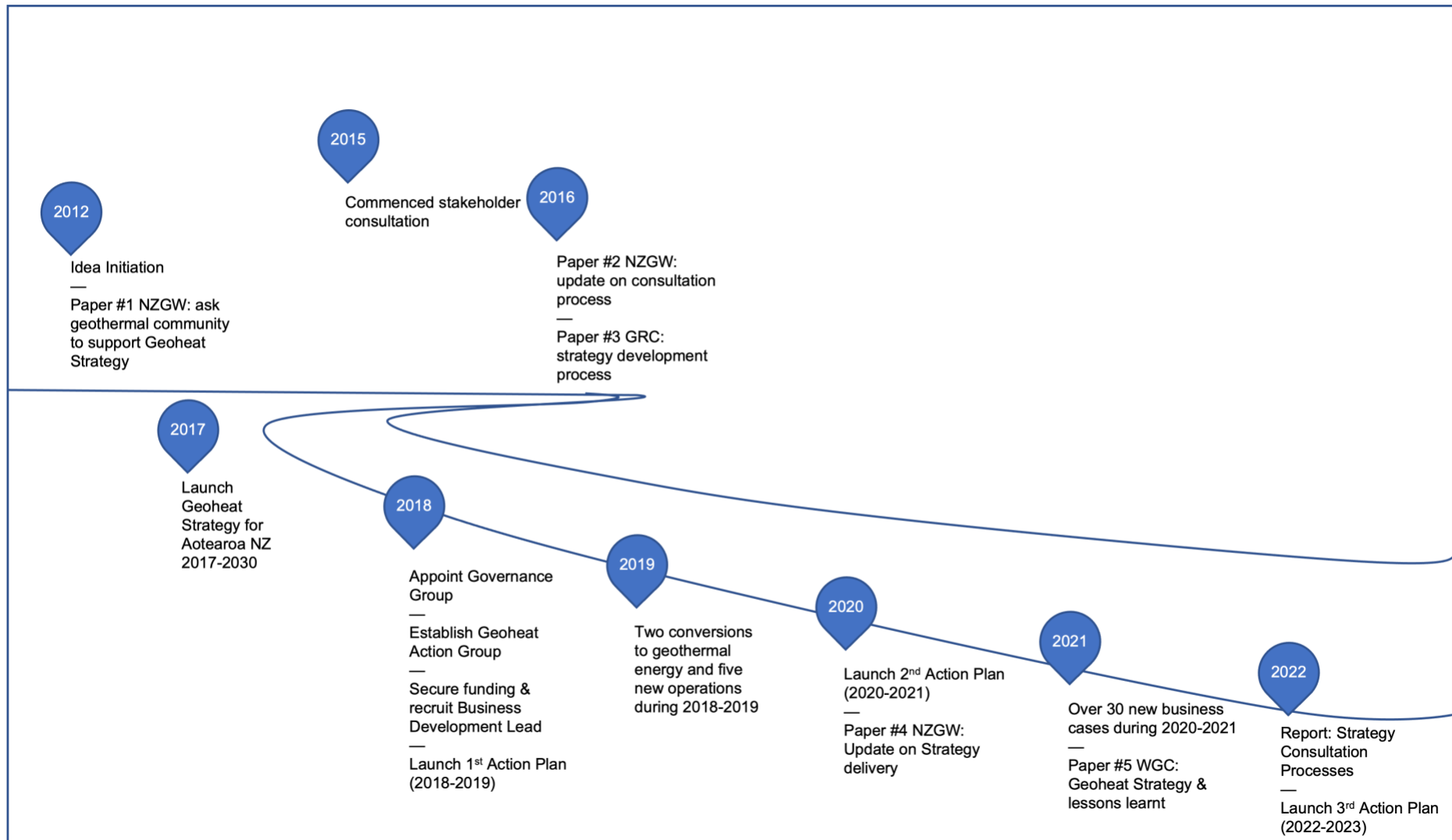


Figure 1: Key markers on the Geoheat Strategy journey, 2012-2022.

Approach to Implementation

Action Plans

Action Plans are used to enable Strategy implementation to be responsive, flexibly adapting to the prevailing circumstances, while seeking to take the most progressive next steps to move towards accomplishing the Strategy's goals.

Targeted Action Plans, under the geoheat umbrella, have been produced every two years (2018, 2020 and 2022). The activity and documents are regularly reviewed seeking to improve implementation effectiveness, enabling reprioritisation and refocusing of delivery activity.

Each Action Plan identifies one or more overarching objectives, and outlines priority actions to be undertaken over a two-year period to advance the achievement of the objectives and the goals of the Strategy overall. These are discussed in more detail in sections that follow. Each Action Plan reports progress and achievements over the period of the previous Action Plan.

Roles & Responsibilities

People are the agents of activity delivery, and three groupings are noted here:

- i. *Governance Group*: The NZGA, as strategy host, appointed a governance group in 2018 to provide project oversight and governance for the Geoheat Strategy activity. Membership in the governance group comprises expertise in economic development, Māori and industry perspectives, and planning and regulatory considerations. The Geoheat Governance Group was established to:
 - Provide project oversight and governance functions for the New Zealand Geoheat Strategy 2017 – 2030;
 - Provide advice and direction to the Business Development Lead / Strategy Coordinator;
 - Provide regular reporting to the NZGA Board;
 - Direct and participate in strategy effectiveness reviews and respond to review outcomes as necessary;
 - Coordinate and align with regional economic development programmes;
 - Establish and maintain connections into central Government; and
 - Set a long-term vision for direct geothermal use in New Zealand and track progress towards achieving this.
- ii. *Geoheat Action Group*: Volunteers sharing insights and experiences, discussing the next steps, and sharing areas where others might support Geoheat activity. It is a forum to discuss sector issues and be inspired by colleagues. The group meets 5-6 times annually. With voluntary input, activity occurs where people and organisations are interested and willing to put in their time and resourcing.

iii. *Business Development*: Two specific roles focussed on developing Geoheat business opportunities since the Strategy was launched.

- *Business Development Lead (BDL)*. The Business Development Lead role, assumed by Andrea Blair and under the auspice of the Bay of Connections, catalysed activity through the period December 2017 to the end June 2020, when funding concluded. This vital role connected parties, created opportunities and assisted with the development of business cases, encouraging investment in geoheat opportunities.
- *Geothermal Cluster Lead*. Through 2021 Amplify have funded a Geothermal Cluster Lead (0.5 FTE), Fiona Miller, and are funding the continuation of this role through 2022. The role is focussed on attracting and growing geothermal-based industry in the Taupo District, including geoheat opportunities.

More information on some of these roles can be found in the Climo et al., 2020 World Geothermal Congress paper (see Appendix 1).

CONSULTATION PROCESSES

The importance of sector involvement to the ultimate robustness and uptake of the Strategy formed the basis for the consultation process. The process aimed to be inclusive, stakeholder-led, non-partisan and unbiased.

Geoheat Strategy

Stakeholder Workshops

The strategy development process began with a systems mapping exercise, by the Strategy authors and GNS Science geothermal team members, to identify key influences for increasing the direct use of geothermal resources. These preliminary draft success factors were then taken to stakeholders for feedback/validation using facilitated focus group workshops.

Through 2015, workshops were held with a broad cross-section of interested persons, including:

1. NZGA Generation and Industrial Heat Interest Group — 3 August 2015 (Wairakei)
2. Bay of Connections Governance Group — 10 August 2015 (Taupō)
3. Waiariki Māori Geothermal Advisory Group — 9 September 2015 (Rotokawa)
4. 2015 New Zealand Geothermal Workshop — 18 and 19 November 2015 (Wairakei)

Participants in these forums included representatives from the following:

Government Agencies

- Ministry of Business, Innovation and Employment
- Energy Efficiency and Conservation Authority
- GNS Science
- Te Puni Kōkiri
- New Zealand Trade and Enterprise

Iwi, Māori Landowners and Māori Trust Representatives

Regional and Local Government

- Bay of Plenty Regional Council
- Waikato Regional Council
- Rotorua Lakes Council
- Taupō District Council
- Kawerau District Council

NZGA Members and Industry Groups

Conference Participants at 2015 New Zealand Geothermal Workshop

Regional Development Agencies

- Bay of Connections

District Development Agencies

- Grow Rotorua
- Enterprise Great Lake Taupō
- Kawerau Enterprise Agency Incorporated

Through this consultation key success factors were identified, and participants contributed material on potential actions to drive change. The details of this material collected from the workshops was published as a conference paper (Climo et al) at the 2016 New Zealand Geothermal Workshop (see Appendix 1).

Public Consultation

Stakeholder input was used to develop an initial draft of the Strategy, which was released for comment in March 2016. The document was circulated directly to key contributors and interested parties, and made available online through the New Zealand Geothermal Association website. Submissions and feedback on the draft document were accepted until the end of May 2016. Comments were received from individuals and built into the final version of the Strategy, as was editorially appropriate.

Waiariki Māori Geothermal Advisory Group

Dialogue on developing the strategy continued with the Waiariki Māori Geothermal Advisory Group (with a meeting on the 20th July 2016), which led to assistance with Te Reo Māori aspects in the document. The Chair of the Waiariki Māori Geothermal Advisory Group assisted in writing a foreword for the Strategy and joined the launch event at the NZGA seminar on the 27th June 2017.

Action Areas

Suggested actions for implementation of the Strategy were collated as part of the stakeholder consultation in 2015 and 2016. Workshop participants were asked for their ideas on barriers to uptake, and actions to reduce these barriers were explored and collated. This was not an exhaustive list, but it was very long, so prioritisation was needed.

Thus, participants were asked to identify their top three priorities from a preliminary list of key success factor/action areas. For each priority action area, participants were asked:

- i. How does this priority area contribute to increased use of geothermal resources?
- ii. What are our current strengths?
- iii. What is holding us back?

From this information, the Strategy development team identified gaps, key questions and recommended actions to produce a priority action list.

Five priority actions were included within the Geoheat Strategy itself (published in 2017). These were deemed critical to activate the Geoheat Strategy and build a foundation for successful implementation. Additionally, the Geoheat Strategy document listed 19 suggested action areas for future work.

Action Plan #1 (2018-2019)

Consultation to inform the first Action Plan (2018-2019) came from two sources:

- (i) the business development lead defined priority actions, and
- (ii) material collated during Strategy development and stakeholder consultation.

Priority Actions

The fundamental driver for the first Action Plan was to develop new projects, with the assumption that early runs on the board, in terms of geothermal heat utilised and jobs created, allowed for successes to be celebrated and shared, and momentum would continue to build.

This goal to develop new projects was expressed via four priority actions for 2018-2019, defined by the Business Development Lead. (The establishment of a business development lead, and funding for this role were two of the five priority actions in the Strategy document in 2017). The Business Development Lead was responsible (and resourced) the advancement and delivery of the four priority actions.

Supporting Workstreams

The first Action Plan (2018-2019) also contained a 'longlist' of supporting workstreams, which were informed by the 'suggested action areas' listed in the Strategy document (which came from the Strategy consultation). These fell into two categories:

- *Ongoing activity* – business as usual, or activity to be maintained to build critical mass. Able to be undertaken by interested individuals or organisations.
- *Beyond 2019* – lower priority, more complex, requiring substantial funding, or currently beyond the mandate of individuals/organisations interested in pursuing the activities in the 2018-2019 Action Plan period.

Activity in these supporting work streams was intended to be undertaken by members of the Geoheat Action Group (the establishment of which was also one of the five priority actions from the Strategy document in 2017).

Action Plan #2 (2020-2021)

Broad stakeholder consultation was not undertaken to inform priorities and actions in the second Action Plan (2020-2021). Rather the authors (including the Business Development Lead) developed these based on:

- the action areas defined in the Strategy;
- experiences and insights gained from implementing the first Action Plan (2018-2019) and progress made;
- known availability of resources (funded and self-funded time); and
- feedback from members of the Geoheat Action Group, including geothermal industry insights.

The second Action Plan followed a similar format to the first Action Plan, with two objectives, four priority actions (to be led by the Business Development Lead) and supporting activities / other actions to be undertaken by members of the Geoheat Action Group.

Action Plan #3 (2022-2023)

Consultation to inform the third Action Plan (2022-2023) came from:

- (i) a survey of the New Zealand geothermal community, and
- (ii) consultation focussed on active Geoheat Action Group members.

2020/2021 Review & Survey

One of the actions in the second Action Plan (2020-2021) was to seek continued input, involvement and feedback on the Action Plans and Strategy. A full Strategy review was not deemed necessary, given the high level of engagement in Strategy implementation and the successes achieved to date. The aim was to use the various opportunities already established for industry interaction.

An online survey was developed (see Appendix 3 for questions). This survey was advertised as being open for feedback in presentations and a conference paper delivered in November 2020 to the NZ Geothermal Workshop. In March 2021, the same survey was publicised via the NZGA newsletter, ensuring access by all NZGA members (with feedback closing at the end of April 2021).

A total of 23 responses (see Appendix 3) were received for this survey. Key findings were:

- Those who are familiar with the Geoheat Strategy think it has been effective
- Many had not read the Strategy documents, and some did not know it existed
- All respondents support continuing work on increasing the uptake of direct geothermal use through the approach of the Geoheat Action Plan
- There is a desire to learn more and for there to be greater communication, promotion and connection, including hearing from businesses that the Strategy helped to develop
- The factors seen to be preventing or hindering existing businesses transitioning to geothermal energy were lack of knowledge and awareness about:
 - geothermal: availability, locations and energy options
 - consenting processes

- infrastructure and transport
- industry contacts
- costs, risk and value
- business cases and pilot scale facilities

Geoheat Action Group Consultation

One-on-one interviews were held with the most active members of the Geoheat Action Group. Participants were asked to review the progress of the second Action Plan, and to share their thoughts on what the priorities should be going forward. Discussions covered past successes, issues preventing progress, and future opportunities.

The draft of the third Action Plan was made available to the full Geoheat Action Group membership, and two rounds of review were undertaken. The document was revised, updated and adjusted accordingly based on the feedback received.

Two key changes in approach influenced the development of the third Action Plan:

- i. The Action Plan was to be a standalone document — it cannot rely on the assumption that the reader has read the Geoheat Strategy and the previous Action Plans.
- ii. Implementation cannot rely just on a funded individual for achieving the priority actions (e.g. a business development lead). The 2022-2023 Action Plan has been focussed to six integrated and mutually reinforcing Actions, which members of the Action Group will advance collectively — supported and supplemented by a dedicated geothermal business development role (as funding is secured).

PUBLISHED PAPERS & PRESENTATIONS

Published Papers

Five publicly accessible conference papers are specific to the Geoheat Strategy content, processes and progress(see Appendix 1 for links).

Year	Workshop / Conference	Title	Authors
2012	New Zealand Geothermal Workshop	Watt? A Geoheat Strategy for NZ	Brian Carey, Melissa Climo
2016	New Zealand Geothermal Workshop	Developing a Geoheat Strategy to Increase Geothermal Direct Use in New Zealand: Stakeholder Consultation	Melissa Climo, Brian Carey, Simon Bendall, Anya Seward
2016	Geothermal Resources Council	Strategies For Increasing Geothermal Direct Use in New Zealand	Melissa Climo, Brian Carey, Anya Seward, Simon Bendall
2020	New Zealand Geothermal Workshop	Geoheat Strategy for Aotearoa New Zealand – 2020 Progress Update	Melissa Climo, Anya Seward, Andrea Blair, Simon Bendall, Brian Carey
2020	World Geothermal Congress	Driving the Uptake of Geothermal Direct Use in New Zealand: Successful Strategies, Empowered Champions, and Lessons Learnt Along the Way	Melissa Climo, Andrea Blair, Brian Carey, Simon Bendall, Stephen Daysh

These publicly accessible conference papers provide updates on geoheat developments and growth, arising from the activity of the Geoheat Action group and geothermal community (see Appendix 1 for links).

Year	Workshop / Conference	Title	Authors
2015	World Geothermal Congress	Direct Use: Opportunities and Development Initiatives in New Zealand	Melissa Climo, Jonathan Hall, Fiona Coyle, Anya Seward, Simon Bendall, Brian Carey, Brian White
2017	New Zealand Geothermal Workshop	Geothermal Tourism in New Zealand: Borrowing from International Examples	Andrea Blair, Melissa Climo, Matt Stott, Ed Mroczek, Simon Addison
2017	New Zealand Geothermal Workshop	Geothermal Economic Development in New Zealand- Using a "Kissing Frogs" Approach	Melissa Climo, Andrea Blair, Martin Frohlike, Will Samuels
2018	Mexican Geothermal Association	Geothermal Fuels Prosperity: How geothermal projects in New Zealand are catalyzing significant socio-economic benefits for Māori	Andrea Blair, Paul Siratovich, Aroha Campbell
2019	IRENA publication	Accelerating geothermal heat adoption in the agri-food sector	Luca Angelino, Fabian Barrera... Andrea Blair et al
2020	World Geothermal Congress	Geothermal Is the Solution: How a Small Town in New Zealand Is Growing the Prosperity of Its People Using Its Geothermal Resources	Kylie Hawker-Green, Andrea Blair, Murray McCaw

Presentations

Year	Workshop / Conference	Title	Presenter
2012	New Zealand Geothermal Workshop	Watt? A Geoheat Strategy for NZ	Brian Carey
2015	World Geothermal Congress	Direct Use: Opportunities and Development Initiatives in New Zealand	Melissa Climo
2016	IEA Geothermal, Central and South American Workshop on Geothermal Energy, Cuernavaca, Mexico	Opportunities of Geothermal Direct Use	Brian Carey
2016	IEA Geothermal Direct Use Workshop, Chiang Mai, Thailand	New Zealand Direct Use and a little more	Greg Bignall
2016	New Zealand Geothermal Workshop	Developing a Geoheat Strategy to Increase Geothermal Direct Use in New Zealand: Stakeholder Consultation	Brian Carey
2016	Geothermal Resources Council	Strategies for Increasing Geothermal Direct Use in New Zealand	Andrea Blair
2017	New Zealand Geothermal Association Winter Seminar	The Time is Right What are you waiting for	Brian Carey
2018	NZ Association of Properties of Water and Steam	Industrial Use of Geothermal Energy in Kawerau	Jaime Quinao

Year	Workshop / Conference	Title	Presenter
2018	Chemeca	Geothermal Energy in New Zealand Process Industries	Brian Carey
2018	Columbian Geothermal Association	Growing New Zealand's Geothermal Direct Use	Andrea Blair
2018	Woodtech Conference	Using Geothermal Energy as Process Heat for Kiln Drying Operations	Brian Carey
2018	Geothermal Resources Council	Geothermal Direct Heat Use in Kawerau, New Zealand	Jaime Quinao
2018	IEA Geothermal Workshop Daejeon, Korea	Geothermal Energy for a Green Economy. Geothermal Direct Use Applications	Brian Carey
2018	New Zealand Geothermal Workshop	Over 60 Years of Direct Geothermal Use at Wairakei - Tauhara and Growing Stronger	Brian Carey
2019	International Workshop on Geothermal Energy, Canary Islands Institute of Technology	Deep Geothermal Energy Utilisation in New Zealand	Brian Carey
2019	New Zealand Geothermal Association Wellington October Workshop	Direct use of Geothermal Energy in a Low Carbon World	Brian Carey
2020	New Zealand Geothermal Workshop	Geoheat Strategy for Aotearoa New Zealand – 2020 Progress Update	Jaime Quinao
2021	World Geothermal Congress	Driving the Uptake of Geothermal Direct Use in New Zealand: Successful Strategies, Empowered Champions, and Lessons Learnt Along the Way	Andrea Blair
2021	World Geothermal Congress	Geothermal Is the Solution: How a Small Town in New Zealand (Taupō) is Growing the Prosperity of Its People Using Its Geothermal Resources	Kylie Hawker-Green
2021	New Zealand Geothermal Week	Process Heat Show Case Presentation	Fiona Miller, Craig Stephenson, Jaime Quinao and others
2021	World Bank Global Direct Use Conference	Webinar: partnering to Reduce Emissions: Geothermal on a Truck	Craig Stephenson
2021	Colombian Geothermal Association: Direct Use Webinar	Webinar: partnering to Reduce Emissions: Geothermal on a Truck	Craig Stephenson
2021	Digital Indonesia International Geothermal Convention - September	Direct Geothermal Use – Value Creation	Brian Carey

Submissions

Year	Organisation	Submission / Consultation Document
2019	EECA & MBIE (Energy Markets Policy Building, Resources and Markets)	Process Heat in New Zealand (PHiNZ)
2020	MBIE (Energy Markets Policy Building, Resources and Markets)	Accelerating Renewable Energy and Efficiency
2021	Climate Change Commission	He Pou a Rangi Climate Change Commission 2021 Draft Advice for Consultation

SUMMARY

The Geoheat Strategy was launched in 2017, and three Action Plans have subsequently been developed and published (2018, 2020 and 2022) seeking to advance the uptake of Geoheat in Aotearoa New Zealand.

This report has been compiled to record the processes and approaches used to develop and implement the strategy, particularly the consultation undertaken in the development of each document. The report also compiles a record of published papers and presentations.

APPENDICES

Appendix 1: Published Papers

The following publications can be accessed via the links below.

Developing a Geoheat Strategy for Aotearoa New Zealand

- B. Carey, M. Climo. 2012. [Watt? A Geoheat Strategy for NZ](#). New Zealand Geothermal Workshop.
- M. Climo, B. Carey, S. Bendall, A. Seward. 2016a. [Developing a Geoheat Strategy to Increase Geothermal Direct Use in New Zealand: Stakeholder Consultation](#). New Zealand Geothermal Workshop.
- M. Climo, B. Carey, A. Seward, S. Bendall. 2016b. [Strategies for Increasing Geothermal Direct Use in New Zealand](#). Geothermal Resources Council.
- M. Climo, A. Seward, A. Blair, S. Bendall, B. Carey. 2020. [Geoheat Strategy for Aotearoa New Zealand – 2020 Progress Update](#). New Zealand Geothermal Workshop.
- M. Climo, A. Blair, B. Carey, S. Bendall, S. Daysh. 2020. [Driving the Update of Geothermal Direct Use in New Zealand: Strategies, Empowered Champions, and Lessons Learnt Along the Way](#). World Geothermal Congress.

Related publications arising from activity by the Geoheat Action Group

- M. Climo, J. Hall, F. Coyle, A. Seward, S. Bendall, B. Carey, B. White. 2015. [Direct Use: Opportunities and Development Initiatives in New Zealand](#). World Geothermal Congress.
- Andrea Blair, Melissa Climo, Matt Stott, Ed Mroczek, Simon Addison. 2017. [Geothermal Tourism in New Zealand: Borrowing from International Examples](#). New Zealand Geothermal Workshop
- M. Climo, A. Blair, M. Frohlike, W. Samuels. 2017. *Geothermal Economic Development in New Zealand – using a “Kissing Frogs” Approach*. New Zealand Geothermal Workshop.
- Andrea Blair, Paul Siratovich, Aroha Campbell. 2018. [Geothermal Fuels Prosperity: How geothermal projects in New Zealand are catalyzing significant socio-economic benefits for Māori](#). Mexican Geothermal Association.
- IRENA [Luca Angelino, Fabian Barrera... Andrea Blair et al.] 2019. [Accelerating geothermal heat adoption in the agri-food sector](#). International Renewable Energy Agency.
- Kylie Hawker-Green, Andrea Blair, Murray McCaw. 2020. [Geothermal Is the Solution: How a Small Town in New Zealand Is Growing the Prosperity of Its People Using Its Geothermal Resources](#). World Geothermal Congress.

Appendix 2: Energy News Article

Geoheat strategy to increase industrial use launched

Felicity Wolfe - Tue, 27 Jun 2017

A strategy aimed at doubling industry's use of geothermal heat by 2030 has been launched at a New Zealand Geothermal Association seminar.

Strategy initiator Brian Carey says the work looks at ways of making "inroads" into the 60 per cent of the country's primary energy use that is not renewable. That includes transport fuels – Contact Energy and Mercury NZ have been championing greater electric vehicles and both have strong geothermal generation portfolios.

But Carey says geothermal heat has a strong opportunity to replace much of the coal and natural gas used in industrial processes. The strategy aims to increase the "depth of understanding" in industries which do not realise they could benefit from using a renewable steam source instead of fossil fuels.

Carey, who is also a geothermal applications and industry specialist at GNS Science, says that they will tend to look at the economics first and environmental benefits second. The strategy will bring together that information to make that analysis easier.

In 2015 geothermal heat accounted for about 7.5 PJ of the country's direct heat use. The [Geoheat Strategy](#) lays out early steps and processes to increase the amount of energy used by industries to about 15 petajoules by 2030 and create 500 new jobs in the industry during that time, Carey says.

The strategy document notes that a timber drying facility might account for about 1 PJ per year of direct primary geothermal energy use. A 12-hectare glasshouse might use less than 0.3 PJ each year.

"So in order to reach the 7.5 PJ / annum target, the strategy envisages the creation of four or five larger direct use projects (e.g. timber processing, large glasshouses, etc), as well as a range of smaller projects (e.g. bathing, smaller scale glass houses, etc.) over the next 10–12 years."

While the strategy suggests a priority order, at this stage that is a starting point, Carey says.

"The strategy will iterate to success. It is a journey that will change through time."

Priority actions

The document lays out five priority actions during the next year to lay the foundations for promoting and developing direct use with initial joint funding from GNS and the NZGA.

Carey says the strategy is "in-step and aligned" with the Government's energy and carbon-reduction targets, including its stated aim of de-carbonising industrial processes. The strategy also works with regional economic development initiatives such as Bay of Connections' strategy which looks to grow the economy in the geothermal zone and Mauri Ohoho – the Māori Economic Development Strategy.

Carey says the primary scope is to increase industrial use of geoheat in high-heat geothermal regions – Taupo, Rotorua, Kawerau and Northland. But it could also support other lower heat developments elsewhere in future.

A governance group has been formed and the next step is to hire a coordinator to start to communicate, engage and start to implement regional strategies to attract investment in Waikato, the Bay of Plenty and Northland.

The coordinator's core function in the first year is to identify the workplan. Carey is working on the initial stages of the strategy implementation with fellow GNS geothermal business development manager Andy Blair. That will be handed over once the recruitment process is completed.

The work includes establishing an online research and advisory hub for direct geoheat use. Carey says volunteers from across the various industry sectors are needed to take part in an industry action group.

"We are looking for the expertise to support the activity."

Success factors

The strategy aims to build awareness of the resource and increasing it until it is seen as “intrinsically linked to our national identity”.

It will bring together data and information to provide interested firms with a clear value proposition, including “green” branding for products.

Carey says it will utilise the country's existing world-leading capability in the sector – which will also help with retention of those people when there are down-turns in electricity demand.

It will also work to ensure there is consistent national, regional and district level policies for geothermal use and help support innovation and the best practice application of technologies.

Industry support

Carey has been working on the project since developing a presentation with GNS research manager Melissa Climo in 2012. Its development included talking to a wide range of potential users and groups who would benefit from geoheat use and getting them involved.

Speaking at today's launch, NZGA president Andy Bloomer said that the strategy has been developed by GNS – “particularly by Brian” but says the industry association is “very happy to support it”.

The use of geothermal heat in industry is “in New Zealand's DNA” with volcanic zone businesses starting to use it in the 1950s. He says there could be a lot more use commercially, in tourism and for domestic purposes – in the right areas.

The association is looking to provide more support for non-electricity uses. It will also engage more with policymakers to raise the awareness of and support for geothermal in government, Bloomer says.

Appendix 3: 2020/2021 Survey

Questions

- A. How effective do you think the Geoheat Strategy for Aotearoa NZ has been at driving the uptake of direct geothermal use to date? (1 don't know, 2 not at all, 3 marginally effective, 4 effective, 5 very effective)
- B. I have read all or part of the Geoheat Action Plan 2020 – 2021 (Y/N)
- C. I support continuing work on increasing the uptake of Direct Geothermal Use through the Geoheat Action Plan approach (Y/N)
- D. Please explain your choice to question 3 above.
- E. What is it that you particularly like / don't like about the way this work is being undertaken?
- F. The four main priorities in the current Action Plan for the 2020 - 2021 calendar years (page 11) are :
 - 1) Funding Strategy
 - 2) Partner with Māori Organisations
 - 3) Partner with Central Government
 - 4) Deliver Business Cases

Four questions :

- a) Do you agree with the action plan priorities for 2020 – 2021 ? (Y/N)
- b) Please list the action plan priorities for 2020 – 2021 (including any new priorities you consider should be included) in order of importance from most important to least important.
- c) Are there any specific actions under these priorities that you would recommend?
- d) If you have any other comments on the priorities please note them here in your answer
- G. Do you have any suggestions for the priorities for the next Action Plan, covering the 2022 – 2023 period?
- H. Are you aware of any specific businesses or organisations that would benefit from transitioning to geothermal energy ? Please enter the name of the organisation and its current location.
- I. What do you think the key factors are that prevent or hinder existing businesses transitioning to geothermal energy?
- J. Resourcing - Have you any suggestions as to where the Action Group might find resources (funding / time / other) that might be able to be directed to support the Geoheat Strategy / Action Plan work.
- K. Other - Please add any other comments and ideas
- L. If you are comfortable recording your name and contact email address we will inform you once the results are compiled. *[Note: responses not included in this document]*

Responses

ID	A	B	C	D	E	F	G	H	I	J	K
1	4	No	Yes	Supports diverse and sustainable resource use	No opinion		No				
2	5	Yes	Yes	Its achieving results		A yes B 1,4,3,2			Business case commentary, pilot scale trial facilities		
3	1	No	Yes								
4	1	No	Yes			A - yes B - 1,4,2,3					
5	1	No	Yes	Like to greater uptake in NZ			No	No	Knowledge and infrastructure	Regional economic development bodies	
6	3	No	Yes	Probably the main way geothermal can play a part in transition to zero carbon in NZ							
7	4	Yes	Yes	I am a researcher aiming to provide solutions for a low carbon future	We need to hear more from the businesses that the strategy helped develop.	Yes	No	I don't know	Cost, availability	I don't know	
8	3	No	Yes	I never knew this existed! This will help me out heaps!	Opportunities for direct use and smaller scale thinking	To address scale and access to resource.		Pink and White. We need a good bore!	Added value for investment.		

ID	A	B	C	D	E	F	G	H	I	J	K
9	4	No	Yes			Yes	Better communication of geothermal as a long term energy source. Emphasis on keeping cash cycling within communities	Waipa sawmill Rotorua; Scion campus Rotorua;	Understanding long term savings in comparison to initial investment. Need more economic case studies published.	Student volunteers and more community level engagement	
10	1	No	Yes	This is way of the future	Share / communicate more widely	D: more advertisements, public engagement, even within geothermal industry	As per previous		Cost	Local council maybe	
11	3	No	Yes	I would like to participate on this.	N/A	no	no	no	Lack of knowledge	no	
12	1	No	Yes	I think it's important to get a balance between development and use of the resource that's sustainable		The priorities look good but it's important to work with local and regional councils to understand the regulatory framework you're working within			Cost and the uncertainties around using geothermal such as obtaining consents		
13	1	No	Yes	Efficient use of existing heat resources		I don't know enough to comment.		Vortex Power Systems, Auckland Uni	For VPS - we are Thermofluids people but we lack industry contacts.		
14	1	No	Yes	I don't know too much about the action plan but support a push to	Cross disciplinary approach	Yes.	No.	No.	Lack of awareness or knowledge about geothermal.	No.	

ID	A	B	C	D	E	F	G	H	I	J	K
				increase direct use.							
15	4	No	Yes	It seems to be working	I only see the benefits on the ground so I feel it is a positive initiative		A focus on bringing in outside organisations including natural competition ie oil and gas	Honeycliffs Edgecumbe bop	Location location location	Nil	
16	4	No	Yes		N/A	A: Yes B: Same order C:No D:N/A			Awareness of energy options		
17	1	No	Yes	I don't live in NZ but I currently have a student modelling a complete geothermal district heating scheme for Helena, Montana. He might be interested in connecting with you.	Have not been involved.	Provide some data/specific well defined problems/ topics/ supervision support for a few graduate student projects or theses.(or \$)			Initial cost, or lack of information		

ID	A	B	C	D	E	F	G	H	I	J	K
18	1	No	Yes	I believe Geothermal can do much more for the community if more direct use applications are use.	I am not too familiar with the work done so far but I am looking forward to get better informed	A) yes B) 3, 2, 1, 4 I believe that the best way to start is where we have power plant and optimised the use of the current resource to reduce initial investment	Accompany small ideas and bushes models to make the projects happen		Cost and transport	Use current companies and help them to partner with small businesses	
19	1	Yes	Yes	I know there are new direct use projects but I don't know how geoheat has helped them, and how the companies have used geoheat. Good ideas.	The topic is crucial to decarbonisation.	Sounds good. 3-4-2-1 Need to communicate to the public the beauty and economic efficiency of direct use.	Some examples from overseas of direct use aspects that could be done in NZ and how the people who benefeciate from it feel good about their direct use infrastructure.	Council buildings should lead the way a d have show-cases/tours. Interest from individuals who don't know where to start.	People don't know how well it can work. Upfront risk and cost. How well could it work outside of the TVZ?	Kiwinet?	
20	1	No	No	Don't know the plan yet	It's exciting, I do support the idea, to push on direct use, would be useful to somehow be able to inform other people on the program/project to make it even more advertised	A yes	How can we connect people with good ideas with the project and funding		Potentially geothermal energy is not seen as something "cool" yet, it is not seen as something worth to add to the business in terms of branding, maybe if we educate people that geothermal energy is awesome than other will want to join us not only because it is obviously good but because they will benefit from it in terms of branding	Oil and gas?	More open communication, go to seven sharp with that

ID	A	B	C	D	E	F	G	H	I	J	K
21	3	No	Yes	I think NZ is behind on direct use of geothermal and should be increased and promoted	I was not aware of the work so it is great to find out about it but it could maybe be promoted better to let people know what is happening	Yes 2314 I need to read the document more thoroughly	I think district heating should be a priority. It is crazy that NZ does not have district heating across the country. The health and social benefits would be amazing.		Lack of awareness or fear that it is too costly and difficult to transition		I would be keen to be involved in the group if you are welcoming new members
22	5	Yes	Yes	Good work by the team	The collaboration aspect.	A. yes B. 4, 2, 1, 3 C. No D. None	Space heating for large users as a focus - to drive social awareness	Councils	Upfront cost and misunderstanding of risk.	Potential for government funding.	Let's keep going.
23	5	Yes	Yes	Moving industry from fossil to renewable energy is very important.	N/a.	A - yes.	No.	No.	Knowledge of what is possible and confidence that it will work.	No.	