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Geothermal Is the Solution: How a Small Town in New Zealand (Taupō) Is Growing the Prosperity of Its People Using Its Geothermal Resources

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ABSTRACT

New Zealand has used its high temperature geothermal resources to generate electricity for over 60 years, but more recently geothermal generators, Māori organizations and tribes and local communities have sought ways further capitalize on local geothermal assets and add greater value to their regions. This includes the direct use of geothermal energy for heating and cooling applications, such as space heating, industrial processing, horticulture, balneology and tourism (Blair et al, 2018).

Taupō is a small town located in the center of the North Island of New Zealand nestled amongst high temperature geothermal reservoirs in the Taupō Volcanic Zone. Enterprise Great Lake Taupō supports economic development in the Taupō District.

This paper will discuss the strategic approach of a small town in New Zealand to use its geothermal resources to growth the prosperity of its people. It will include examples of projects, lessons learnt, approach, strategy and future aspirations.

1. INTRODUCTION

1.1 New Zealand Economy

New Zealand (NZ) has an advanced market economy (IMF, 2018), ranked 16th in the 2018 Human Development Index (United Nations, 2018) and 3rd in the 2018 Index of Economic Freedom (Heritage Foundation, 2018) It is a high-income economy with a nominal gross domestic product (GDP) per capita of US$40,713 (OECD, 2019a). Annual GDP growth for the year ended March 2019 was 2.7%, while the size of the economy in current prices was NZ$296 billion (Statistics NZ, 2019). New Zealand is heavily dependent on international trade, with manufacturing and service sectors complementing an export-oriented agricultural sector base. The tourism sector generating a direct annual contribution to GDP of NZ$15.9b, and a further indirect contribution of NZ$11.1b; a total contribution of 10.4% to national GDP (TIA, 2018).

1.2 Regional Economic Development - national context

Typically districts and regions, territorial authorities and regional councils all have economic development agencies and/or functions. Their collective mandate is both economic growth and economic development; to enrich communities through the creation of wealth and jobs by working with business. Yet, New Zealand's centralized form of government, and policy formation processes, limit local opportunities to try out policies/initiatives that sound locally promising, but are considered risky (Crampton and Acharya, 2015).

The current New Zealand Government has an emphasis on economic development through the implementation of the "Provincial Growth Fund" (PGF), a competitive fund of NZ$3bn (spread over three years) to support and accelerate sustainable development opportunities in provincial New Zealand. Through the PGF, the Government seeks to ensure that people living all over New Zealand can reach their full potential by helping build a regional economy that is sustainable, inclusive and productive (MBIE, 2019a).

Whist previous governments have identified foreign direct investment as a key component of achieving economic growth, the Provincial Growth Fund takes an alternative approach to activating the regions by providing domestically owned companies access to growth capital that may previously have been difficult to source without going offshore.

The PGF has a defined position on supporting the Energy Sector; 'the PGF will invest in energy projects that support increased productivity in the regions but is not the primary source of government investment in energy projects' (MBIE, 2019b). It is hoped that the PGF will allow a more regionalized and localized approach to economic development.

1.3 Regional Economic Development - local context

The Bay of Connections (BoC) supports strategies that encourage economic growth in the Bay of Plenty Region and the Taupō District. In December 2011, BoC launched an Energy Strategy (BoC, 2011) outlining a spectrum of potential energy opportunities including geothermal energy as a key focus. In 2016 an update to the Energy Strategy (BoC, 2016) was released outlining a vision to create wealth and wellbeing through renewable and sustainable energy, by creating sustainable new business growth opportunities and employment.

"The region's existing renewable energy industries and generators – including those who are literally generating their own steam for manufacturing and production purposes – can be leveraged to create ecosystems and business clusters" (BoC, 2016).

1.4 The Taupō District

This paper shares the learning from a strategic approach to economic development leveraging geothermal resources from New Zealand's Taupō District.

Enterprise Great Lake Taupō (EGLT) is the economic development agency for the Taupō District, having been established in 2008 to drive economic development opportunities on behalf of the wider community of stakeholders including iwi* interests, local government (territorial authority), business community (Chamber of Commerce et al) and tourism marketing (Regional Tourism Office).

[Iwi – maori tribe, defined as an extended kinship group, tribe, nation, people, nationality, race - often refers to a large group of people descended from a common ancestor and associated with a distinct territory.]*

The Taupō District is a relatively young Territorial Authority (TA) in the New Zealand context, having been officially constituted as a borough in 1953 and a District in 1989, and the District is home to the main Taupō township along with a number of smaller satellite towns and villages including Turangi, Mangakino and Kinloch.

It is the 20th largest urban area in New Zealand and is the 8th fastest growing Territorial Authority region ordered by nominal GDP per capita growth over 2013-18, from 66 TAs in NZ (MBIE 2019c).

The township of Taupō is located at the outlet of Lake Taupō, New Zealand's largest lake, in the northeast part of the lake where it discharges to the Waikato River. The river flows over the spectacular Huka Falls, a short distance north of the town that is considered the most visited natural attraction in New Zealand.



Primary production (forestry and dairy) were the core contributors to the local economy since the 1950s, complemented by the tourism sector and energy production (both geothermal and hydro). The District has experienced traditional boom and bust cycles over the past 70 years, with large investment, both state and private, in energy generation plants, wood manufacturing factories and tourism infrastructure.

2. THE TAUPŌ DISTRICT ECONOMY AND THE ROLE OF ENTERPRISE GREAT LAKE TAUPŌ

With a base population of 37,200 residents and 4968 business units (Infometrics, 2019), the Taupō District currently has a stable and balanced economy comprising of a small number of large primary industry producers (Figure 1), and by a burgeoning tourism industry.

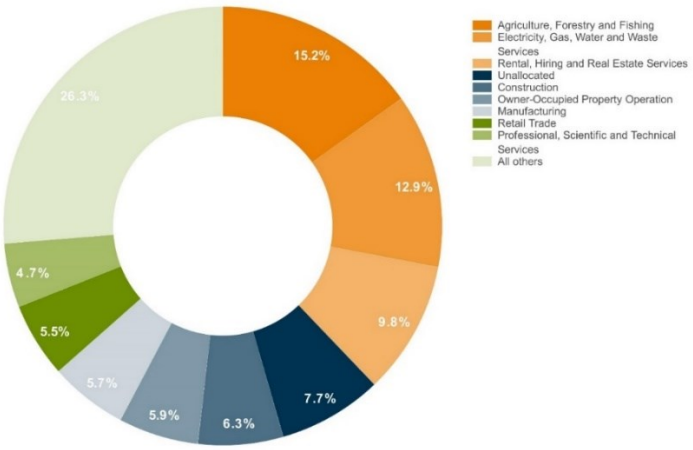


Figure 1: Taupō District Proportion of GDP by industry, 2018 (Infometrics, July 2019)

The Taupō District has demonstrated sustained GDP growth since 2001 (Figure 2), albeit with a minor dip post the Global Financial Crisis, at times outperforming the national GDP growth.

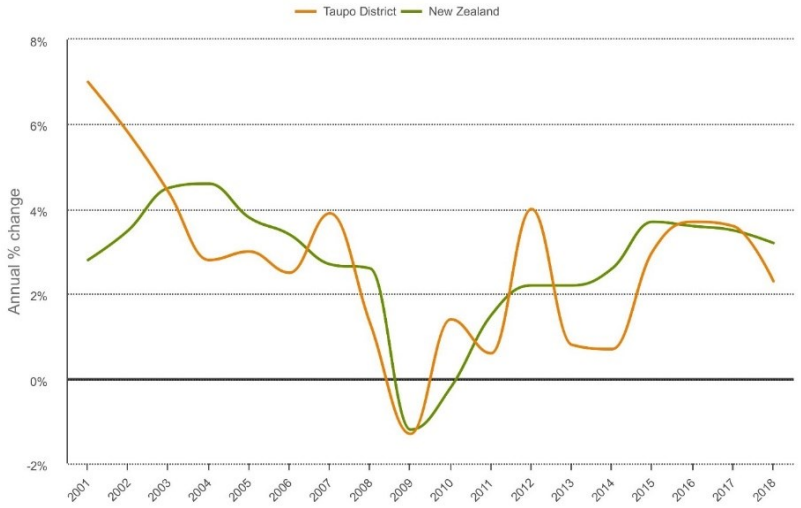


Figure 2: Taupō District GDP Growth, 2001-2018 (Infometrics, July 2019)

The energy sector has been a significant contributor to GDP growth over the past year, as demonstrated in Figure 3.

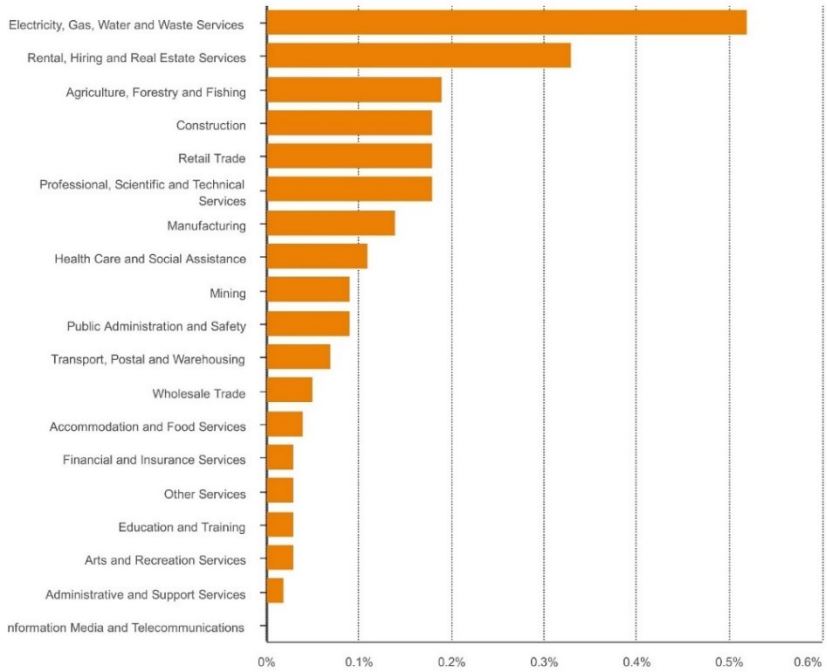


Figure 3: Industries by contribution to GDP growth in Taupō District, 2000 to 2018, Infometrics, July 2019

There is no single 'industry' measure to record the impact and value of the tourism sector as it is made up of many sub-sectors (retail, accommodation, fuel, real estate services, et al), however, it is estimated to contribute 19.7% to the District GDP and employees 34.3% of our total labour market (Infometrics 2019).

Like the tourism sector, the impacts of the geothermal industry on the Taupō District economy cannot be classified into one industry code. Geothermal activity (direct and indirect use) spreads into multiple codes including Electricity, Fishing, Construction, Professional/scientific/technical services, Manufacturing, Mining, and Education & Training.

The Taupō District has seen steady population growth (both natural and net migration) of ~.75% year on year for the past twenty years (Infometrics 2019). With lower than NZ average unemployment figures, the district experiences labour market challenges in certain sectors, as business unit growth (Figure 5) and job unit growth has outstripped population growth. Figure 4 demonstrates the impact of the global financial crisis and the subsequent slow-down of the NZ economy in to 2007-2013 period. The Taupō economy has returned to a positive growth cycle post GFC and indications are this stable period will continue for some time.

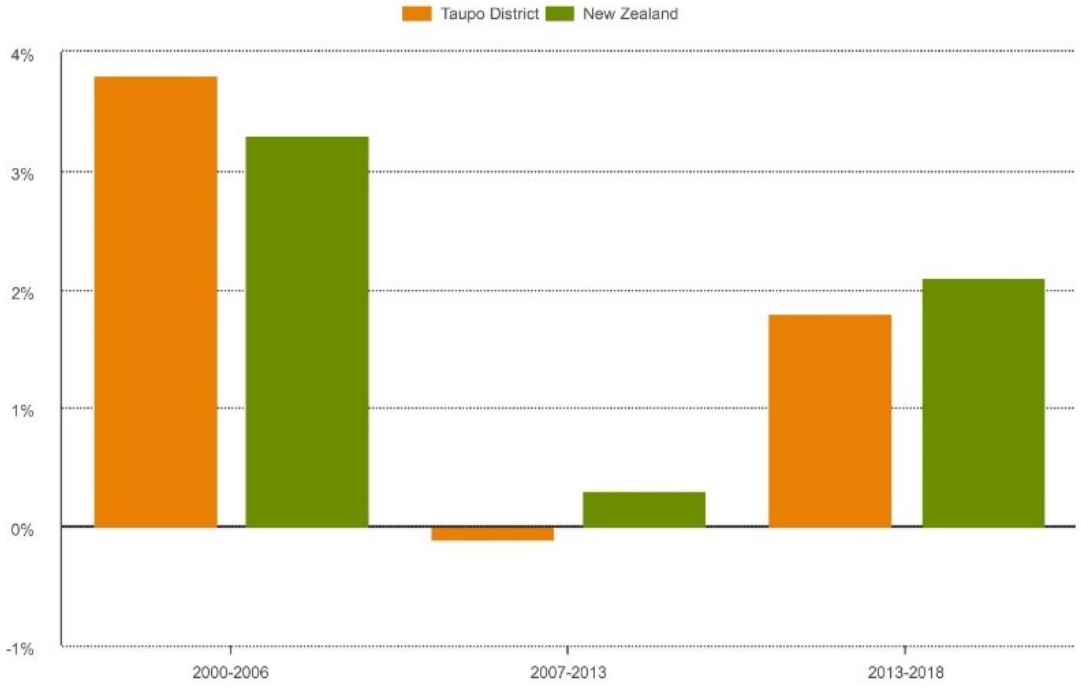


Figure 4: Business unit growth over three time periods, Infometrics 2019

2.2 The role of Enterprise Great Lake Taupō (EGLT)

EGLT is the economic development agency for the Taupō District, and they exist to grow the economy of the district. They aim to leverage Taupō's natural advantages and work with business and stakeholders to champion sustainable growth throughout the Taupō district. Their vision is that Taupō is a vibrant and prosperous district, where both talent and business thrive. They work in a collaborative environment with a multitude of stakeholders including central and local government, industry, iwi (indigenous), regional economic development collaboratives and government departments.

An economic development agency cannot enforce or determine any commercial decision, they can but connect, encourage and inform the process.

They have defined work streams in the following areas:

1 Support local businesses to thrive; by providing one on one support from qualified business advisors, dedicated high-growth programmes and courses, financial support for capability development, business mentoring and coaching, business development training courses, and networking events.

2 Attract new businesses to the area; inward investment campaigns both domestically and offshore in partnership with NZ Trade and Enterprise, tailored support packages for those relocating to the district, comprehensive business case development for large scale attraction opportunities, and gap analysis to identify future sector opportunities.

3 Support start-ups and entrepreneurs; access to capital funding and growth funding, programmes and courses, networking group, profile and engagement building events and themed activities, and PR to build awareness of successful start-ups.

4 Connection and Advocacy; liaison and relationship building with key stakeholder groups, high trust engagement with key central government agencies and Ministers, issue identification and resolution, and regular communication to business community via multiple channels.

5 Research and Monitoring; identification and research into growth constraints, monitor economic performance and identify weak signals, provide data and analysis to support business case development and co-fund/co-development feasibility studies.

EGLT adhere to set of guiding principles (below) that are formed from tikanga (values).

- Whanaungatanga – Whanaungatanga is the building of relationships through shared experiences and working together that provides people with a sense of belonging, which in turn serves to strengthen each member of the group. Economic development is a team game – it is essential that all players in the team understand the aspirations of the collective, and a sense of belonging towards the common goal keeps motivation high.
- Kaitiakitanga - A kaitiaki is a guardian, and the process and practices of protecting and looking after the environment are referred to as kaitiakitanga. As economic development practitioners, EGLT are the kaitiaki of the sustained growth of the district and must hold this role with integrity and demonstrate leadership in all they do. The balance between environmental and economic outcomes can create tension and requires the understanding and empathy for both drivers to navigate both and create a successful outcome.

- Manaakitanga – Manaaki is the process of showing respect, generosity and care for others. EGLT must respect the intent of its corporate stakeholders, the aspirations of its iwi partners, the framework of central and local government and the desires of the local community in forming an achievable economic development strategy.
- Tapatahi – Tapatahi is honesty, allegiance, loyalty and good faith. EGLT must always act with integrity and in good faith and are often entrusted with highly sensitive and commercially confidential information. It is essential that an economic development agency can be trusted.
- Haututanga – Haututanga is leadership. EGLT must lead both in words and actions in the setting and delivery of robust economic development strategies that better the lives of all who live in the Taupō District. This doesn't come without conflict as there are contrary views as to 'what is best', and tension between environmental, social and economic drivers in our community.

2.3 Sustained Growth in the Taupō District

EGLT have a comprehensive strategy (detailed in section 3) to grow the Taupō District economy. It is essential that constraints on growth are acknowledged through the strategy development and implementation process, and with limited resources (2.75FTE) the organization needs to act with clear intent within the bounds of their operational scope.

Analysis of the employment mix in the Taupō District demonstrates that some sectors generate a higher 'employee contribution to GDP' and are therefore important growth sectors for the Taupō District. Table 1 is a subset of key industries, selected to demonstrate the range in GDP contribution by industry, against the Taupō District average of $100,690 GDP/employee.

There is a clear aspiration to create additional job opportunities in the sectors/areas that contribute a higher GDP per Employee ratio, without negatively impacting on the ability to satisfy labour market demand. Core administration and ancillary functions are essential enablers for industry so their value cannot be discounted.

Therefore, a strategy is required that attracts skilled workers, alongside an inwards investment programme that attracts high GDP yield commercial businesses to the district.

Table 1: Taupō District Industry sectors by GDP contribution, Infometrics, 2018

Industry	Level ($m)	% of total	Employment	% of total	Employee Contribution to GDP
Electricity, Gas, Water and Waste Services	242.2	12.90%	390	2.10%	$ 621,025.64
Mining	24.4	1.30%	140	0.70%	$ 174,285.71
Agriculture, Forestry and Fishing	285.5	15.20%	2,172	11.60%	$ 131,445.67
Information Media and Telecommunications	9.4	0.50%	92	0.50%	$ 102,173.91
Transport Postal and Warehousing	54.1	2.90%	696	3.70%	$ 77,729.89
Manufacturing	108.3	5.80%	1,426	7.60%	$ 75,946.70
Professional Scientific and Technical Services	88.6	4.70%	1,229	6.60%	$ 72,091.13
Construction	118.2	6.30%	1,856	9.90%	$ 63,685.34
Tourism	371.3	19.70%	6,404	34.30%	$ 57,979.39
Retail Trade	103.9	5.50%	2,093	11.20%	$ 49,641.66
Administrative and Support Services	16.9	0.90%	474	2.50%	$ 35,654.01
Accommodation and Food Services	67.6	3.60%	2,380	12.70%	$ 28,403.36

3. A STRATEGY FOR INCLUSIVE GROWTH

As identified above, the Taupō District economy is built upon many sectors, some that generate a higher GDP yield, whilst others provide essential community and enabling services.

EGLT believe in the principles of inclusive growth, that is, economic growth that is distributed fairly across society and creates opportunities for all (OECD, 2019b).

In order to achieve this aspiration, targeted delivery of strategic interventions is required, and identification of lead opportunities that maximise the competitive advantages of the district then become the priority projects for EGLT.

Taupō must play to its strengths as a community and as a dynamic and growing district. Abundant renewable energy, and in particular geothermal, is unique to the Taupō District and provides a strong and resilient competitive advantage in the New Zealand landscape.

EGLT aspire for Taupō to be recognised as a centre of geothermal excellence globally and will achieve this objective through authentic and smart approaches to development. (Hawker-Green, 2018)

Whilst EGLT are the leaders in driving this strategy, they recognise that a collaborative approach is required to fully leverage the opportunities for development and growth. This section details EGLT's synergistic approach to collaborative strategy development and implementation of the geothermal strands of the strategy.

3.1 Historic approach to Geothermal Economic Development projects in Taupō



The Taupō community has been involved in the geothermal sector since the Wairakei geothermal development in the 1950s, and when EGLT was formed in 2008, opportunities to leverage the geothermal sector was identified as a key strategic pillar.

In 2012, the second iteration of EGLT's strategic plan identified 'Adding Heat to Primary Product' as one of four key focus areas (EGLT 2012). Actions included identifying large scale opportunities involving geothermal use, working on feasibility studies on these opportunities and investigating heat parks as a concept (Climo et al, 2019).

EGLT went on to successfully advocate for the creation of a Geothermal Business Development Lead role within the Bay of Connections in December 2017, with a defined scope to foster the uptake of direct geothermal use in the wider Bay of Plenty area including Taupō.

EGLT are active participants in the NZ Geoheat Strategy as developed and owned by the NZ Geothermal Association (NZGA).

The NZ Geoheat Strategy aims to foster sustained (and sustainable) growth, realise untapped potential, and play an important part in NZ's renewable energy future. It targets some 7,500 TJ/year of additional primary geothermal energy that could be accessed for industrial / commercial use, which if connected to businesses, could grow New Zealand's direct use by about 40% (Climo et al., 2016) by 2030. Importantly employment would be associated with this growth in geothermal energy utilisation.

3.2 "Kissing Frogs" Model

EGLT's first significant foray into proactively seeking direct foreign investment in geothermal developments to grow the Taupō economy presented mixed results and was summarized in the 'Kissing Frogs' paper (Blair et al, 2017).

The "Kissing Frogs" model was created as a campaign of selecting and rapidly testing potential options for local economic development and attracting foreign direct investment. As per the fairy tale, the analogy is that some frogs will turn into princes; however, the reality is that while many frogs can be kissed, many just remain frogs and never leave their pond.

This model is one of specificity and focus; of pursuing limited strong probabilities rather than chasing many low-moderate possibilities. A willingness is required to rapidly try and test out new ideas and discard the ones that don't work. The other key difference in this model was not to look for investors, but rather to partner with sales channels to accelerate access to market.

The Kissing Frogs model evolved into eight key steps;

Step 1: Define Success (what are we trying to achieve?)

Step 2: Focus (what are we good at?)

Step 3: Build a business case (is this niche viable?)

Step 4: Assemble a great team (who are the key people?)

Step 5: Test the market (do we understand the market's needs?)

Step 6: Build the foundations (is it a done deal?)

Step 7: Hook the preferred targets (can we tempt the targets?)

Step 8: Follow through (can we close the deal?)

The success measures for the 'Kissing Frogs' model were defined as:

a. creation of jobs and industry (not business net displacement);
b. attraction of foreign direct investment (FDI) into the District;
c. growth commodity products that have a large ready-made offshore market;
d. no products that require offshore legislative or building code changes, or could not be exported cost efficiently;
e. attract a commercial partner at the outset; and
f. rapid opportunity evaluation, minimise time spent on dead ends.

After a rigorous opportunity identification process, MDF was selected as the niche manufacturing commodity to pursue, with the stronger market opportunities. The lifecycle of an MDF plant is over 20 years and would be expected to deliver large numbers of jobs and investment over a long time period. MDF also has the advantage of further downstream value addition potential. For example, once a local source of MDF comes available, flooring manufacturers could be attracted to the region (Blair et al, 2017).

A business case was developed for an MDF factory in Taupō that utilized geothermal energy and locally sourced pulp, and a promotional prospectus document was produced that summarized the opportunity. The opportunity was then pitched, in person, to three top shortlisted companies in China. Two of these Chinese companies then sent delegations to Taupō to investigate the opportunity further and complete their own feasibility studies. Whilst the project hasn't as yet come to fruition, the process, relationships, learnings and IP generated from the process has been valuable, and the Kissing Frogs model will be used by EGLT for future targeted attraction projects.

3.3 Taupō District Council approach

In 2017, Taupō District Council undertook a comprehensive review of district economic strengthening opportunities to support it's aspiration that the district becomes the 'most prosperous and liveable in the North Island'. The Taupō District Economic Strengthening Plan identified Geothermal as one of six catalyst project areas as follows;

"Taupō's geothermal resources have the potential to further generate significant benefits for the district through attracting larger industry and research centres. The geothermal energy on which Taupō rests can be used in direct use by businesses to facilitate the growth of local industry. Further research into potential applications via the NZ Geo-Heat Centre will aid in developing future geothermal opportunity in the district.

Next Steps:

a. Continue to develop contacts with suitable research partners to front a geothermal research facility
b. Progress with industrial partners suitable to develop direct-use industry in the district
c. Develop critical pathways for direct-use industrial zone
d. Complete a business case for the NZ Geo-heat Centre in order to analyse feasibility, requirements, potential funding and next steps
e. Prioritise development of NZ Geo-heat Centre and collaboration of research and industry partners
f. Identify and connect with investment partners.
g. Continue to expand and improve current geothermal offering"

(Taupō District Council, November 2017)

3.4 New strategic focus on leveraging natural advantages

As noted above, EGLT's strategy development in 2012 had included a strand on 'adding heat to primary product'. This wider strategy was focused on defined work streams for attracting, growing and retaining small, medium and large businesses. The focus on attracting large businesses was a dedicated work stream and resource for attracting international investment into the development of a new geothermally fueled factory that would produce MDF from locally sourced wood pulp. This project is detailed above in section 3.2 ('Kissing Frogs').

In 2017, EGLT undertook a full strategic review and developed a comprehensive new plan. This was a detailed review that took the Board and Management team back to first principles of strategic planning; undertaking a SWOT analysis, analyzing the metrics of the economy, reviewing work previously undertaken and gathering learnings from what did and didn't work well, identifying opportunities to collaborate and partner on new initiatives, and looking to the future and the impact of external factors such as the Provincial Growth Fund and changes to immigration and international investment regulations.

The current strategy (2018-2021) is defined into six pillars;

- Home of competitive, innovative and sustainable business
- A place where talent thrives
- Investment ready environment to accelerate growth
- Great ideas grow from shed to stock exchange
- Leverage our natural advantage
- Smart, nimble and connected

(EGLT, January 2018)

The strategy is aspirational with drivers defined as "being the champion for development and sustainable growth; collaborating with others to accelerate outcomes; facilitating and enabling programmes and services that support local business and industry; focusing

our energy and resources on projects that have demonstrable impact; supporting and connecting across the public and private sectors; and delivering high value outcomes in all that we do."

The overarching objective is to grow the economy for all that live in the Taupō district, so that both residents and businesses thrive.

The strategy follows a cluster-based format for some aligned strands, including geothermal. Clusters are geographic concentrations of competing and collaborating firms that tend to produce innovation and higher than average wages. Cluster-based economic development strategies are interventions designed to improve a cluster's performance by addressing the common needs of businesses within the cluster. The concentrations that characterize clusters typically include competitive firms, cooperating suppliers, service providers, knowledge providers, and associated institutions that do business with each other and share needs for common talent, technology, and infrastructure. Interdependencies that define clusters include supply chains, core technologies, and proximity to natural resources or distribution channels. Because of the many elements that contribute to clusters, they are sometimes referred to as "economic ecosystems." (ICMA, 2012)

With an implementation plan phased from 2018 to 2021, EGLT has identified opportunities that align to the Taupō District Council Economic Strengthening Plan and the NZ Geoheat Strategy and have prioritized their resources accordingly to focus on three projects in the geothermal cluster;

1. Geothermal Centre of Excellence (working title for NZ Geo-Heat Centre)
2. Karapiti Heat Park (a direct-use industrial zone)
3. Wairakei Corridor Master Plan (industrial tourism cluster around existing generation and direct use assets)

The Geothermal Centre of Excellence is an advanced concept, with the objective to ensure that world-class tertiary education and research is undertaken in the area, to further enhance and protect New Zealand's geothermal assets.

The Karapiti Heat Park project is lead by Contact Energy, with the objective to cluster multiple complementary heat users in one physical location within the wider Wairakei energy corridor.

The Wairakei Corridor Master Plan initiative is in a delicate embryonic stage, with EGLT bringing together the many and varied stakeholders (with more than 40 different entities in the mix) to have formative discussions around what a collaborative and cohesive master plan could look like.

4. STRATEGY IN ACTION

4.1 Collaboration and Partnership

Recognising that they are a small player with limited resources, EGLT has proactively sought partnership and collaboration opportunities with other interested parties to accelerate these projects.

They have worked directly with New Zealand Trade and Enterprise (NZTE) to develop a Taupō geothermal narrative that transcends multiple industries and audiences. Working with NZTE and key industry partners like Contact Energy and Tauhara North No 2 Trust, they have identified greenfield investment opportunities and are now implementing attraction strategies to bring potential investors into the area.

4.2 Evolution not revolution

The 2012 iteration of the EGLT strategy had a clear focus on one defined opportunity, the attraction of a large MDF factory to the district, facilitated through direct foreign investment, with a significant percentage of organizational resource dedicated to the single objective.

The new strategy demonstrates an evolved approach to large scale investment, with multiple opportunities being considered concurrently in a cluster approach, and resources shared equitably across the projects.

EGLT have an increased impetus on supporting private NZ companies to accelerate their growth and currently have 28 'pipeline' projects underway, 11 of which relate to direct or indirect use of geothermal.

4.3 Measures and success

There are a number of metrics that EGLT monitor to determine if their strategy for economic growth is achieving the desired outcome to broadly 'grow the economy.' These include job units, business units, unemployment rates, GDP, GDP per capita, GDP per employee, export earnings and wellness indicators (engagement, health, social factors, housing, et al).

The three priority projects for implementation 2018-2021 are all in various stages of development and are monitored closely by the Board of EGLT to ensure progress is aligning to expectation and objective.

Given the collaborative nature of these projects, EGLTs role in influencing, connecting and supporting is paramount. That comes with the flip-side effect, being that projects will only progress as fast as the slowest member of the team. It can be frustrating when move as quickly as one party would like, but economic development is a long game and complex projects with multiple stakeholders require time to implement.

5. GEOTHERMAL DEVELOPMENT EXAMPLES FROM TAUPŌ

Supporting existing industry, enabling new industry and added competitive branding advantages, geothermal energy provides a platform for economic growth and prosperity. (Blair, 2018)

There are many success stories where geothermal resources have been used to create new industry and employment in Taupō. These three selected provide a cross section of industry, scale and stage.

5.1 Established and high growth: Miraka

Miraka, a Māori owned organization based on top of the Mokai geothermal field, is the first geothermal dairy processing factory in the world. They use renewable steam generated from geothermal fields adjacent to the plant.

Well established in the New Zealand dairy-processing industry, Miraka has with strong values founded on the cultural beliefs of its owners. These values include Kaitiakitanga (guardianship of people and the environment), Excellence, Integrity, Innovation and Tikanga (respecting diversity and cultural values).

Miraka has an intergenerational view of business with a long-term view on partnership, growth and profitability.

Protecting the environment, our natural world in which we operate is of paramount importance to Miraka. They strive to ensure that future generations benefit from their work and that the footprint we create today does not adversely affect the future. By-products from dairy processing are broken down into fertiliser utilising a worm farm located next to the plant. Treated water is used to irrigate neighbouring farmland.

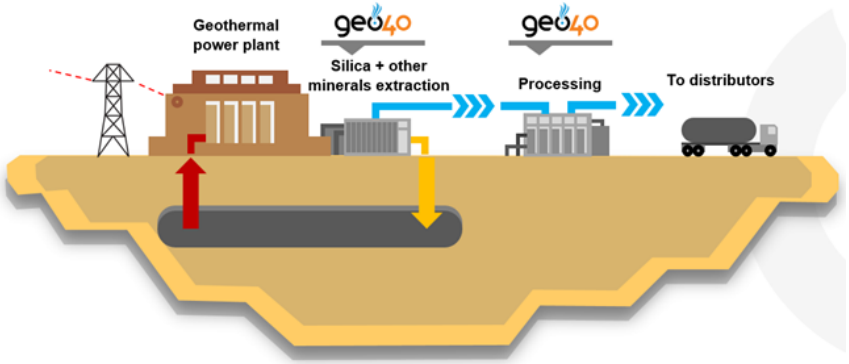
Miraka is committed to making products which nurture our world. They currently sell to 27 countries across multiple regions. Their current product offerings include 25kg milk ingredient powders and 250ml UHT cartons. Under their consumer brand Taupō Pure they offer a range of whole milk powders, skim milk powders and nutritionally enhanced milk powders for seniors, families and children. Their ambition is to continue to grow their reach and the types of products which they have to offer.



Miraka works closely with its farmers to optimise farming practices that set a high standard of quality and sustainability. The ‘Te Ara Miraka’ program improves efficiency and produces first class raw milk leading to greater profitability to both farmers and Miraka, with a lower environmental footprint.

5.2 Emerging and high growth: Geo40

Geo40 is a high-tech venture that extracts valuable minerals from geothermal fluid. Geo40 has developed the technology to build and operate the world’s first commercial demonstration plant to extract silica from the geothermal fluid used for power generation, after which the geothermal fluid is reinjected back into the underground geothermal reservoir.



The colloidal silica ‘mined’ from the waste geothermal fluid is a high-value specialty mineral which is internationally sought-after in a range of technical applications, such as in the construction, ceramics, and paint industries.

Geo40 have recently received $15m in Provincial Growth Fund investment that will enable the rapid development of a full-scale commercial plant at the site of Contact Energy’s Ohaaki geothermal operations to the north of Taupō in New Zealand.

They have long term growth plans for expansion into other geothermal fields, both in New Zealand and internationally.

Geo40 work closely with their iwi partner, the Ngati Tahu Tribal Lands Trust, and Contact Energy to ensure jobs and training opportunities for local people. The company currently employs 19 people. The expansion will create 70 jobs over the plant's construction, and eventually create up to 30 permanent jobs in the Taupō area.

They report a high level of interest in their silica recovery technology and products from overseas markets, particularly in the United States, parts of Asia and Japan, and state all of the commercial plant's silica production is already covered by indicated off-take from international customers. (Lea, 2019)

Geo40 has filed three patent applications over the last three years which are being considered internationally and when granted would provide intellectual property protection for 25 years.



In addition to the silica extracted from geothermal fluid, Geo40 is also developing the technology to extract other minerals, including lithium. Laboratory research in the USA and Japan has confirmed that over to 85 per cent of lithium from the Ohaaki geothermal fluid can be extracted and Geo40 will look to test this technology in its commercial demonstration plant in late 2019.

5.3 The Start-up Industrial Tourism: Rogue Bore Brewery

The 'Rogue Bore Brewery' is New Zealand's first Carbon Zero brewery, producing beer that is brewed and carbonated using 100% geothermal energy and showcased to the world through an industrial tourism experience.

Whilst still in establishment phase, the brewery will be sited in the heart of the Wairakei Geothermal Steamfield and will form a catalyst for industrial tourism activity in the Taupō district. The beer will be sold onsite through a bar/taproom/restaurant and wholesaled nationwide with plans for export market development.

Named after a geothermal bore that exploded in 1960 creating a massive crater and a resultant geyser that became a national tourist attraction, the Rogue Bore Brewery aims to maximise the global rise in micro- and craft- brewery markets and develop an internationally competitive brand.

They are positioning their start-up business at the intersection of three significant global trends; tourism, craft beer, and sustainability. Rogue Bore aspire to minimize their environmental footprint in all aspects of their operation, whether it be minimizing water use, using only recycled class & aluminum or using spent grain as stock feed for the meat they use in the restaurant.

By utilising geothermal cascade through a heat exchange system for heating and production, the Rogue Bore will be utilising geothermal resources for both a commercial advantage and a unique brand proposition. They expect to be operational by mid- 2020.

6. KEY LEARNINGS

- **Evolution not revolution:** Economic strategy development and implementation is an ongoing and iterative process – it is not linear with a clearly defined 'start' and 'stop' position. To keep ahead of the curve, constant monitoring for weak signals and emerging opportunities must occur, with the strategy framework structured to allow constant evolution.
- **Partnership and collaboration are not just buzz words:** To genuinely great impact, no single agency or entity can work in isolation. There must be an shared understanding of the definition of success, and clarity around roles and responsibilities, along with respectful recognition of the value each party brings to the table.
- **Play to strengths:** Taupō has a genuine commercial advantage at a national and global level through the abundance of geothermal resource. Harnessing that opportunity comes with the acknowledgement that there are other industry sectors that are not as competitive, and other sectors that will not get the same level of dedicated development resource. In a constrained resource environment, economic development agencies need to 'pick winners' and back them fully.
- **Identify and respect constraints:** Every economy operates within a constraint environment, and until current and future constraints are identified, researched, considered and mitigated; any growth strategy will be stymied and potentially derailed. Constraints can often be transformed into opportunities – and should never be used as excuses.

- **Cluster development:** There are numerous benefits that come from applying a cluster-development approach to traditional economic projects. By involving multiple players, activities, objectives and outcomes, the breadth of the impact is multiplied and the synergies realized can make all the difference between failure and success. Education and research are critical components of a successful cluster development, therefore academia must be included at the formative stages.
- **Authenticity wins:** Enterprise Great Lake Taupō don't pretend to be a large-scale regional development agency – they are proud of their small District, the work they produce and the outcomes they generate for their community. They act with honesty and integrity, with senior management and Board choosing genuine engagement over arms-length fleeting publicity.

7. SUMMARY

Whāia te iti kahurangi ki te tūohu koe me he maunga teitei

Seek the treasure you value most dearly: if you bow your head, let it be to a lofty mountain.

This whakatauki (proverb) is about aiming high or for what is truly valuable, but it's real message is to be persistent and don't let obstacles stop you from reaching your goal. Economic Development is an exercise in persistence – as demonstrated in the EGLT Kissing Frogs model.

Taupō aspires to be New Zealand's Geothermal Centre of Excellence, with academia and industry maximising the abundant natural resource.

The Taupō District has already harnessed the potential of direct use by attracting and growing geothermal industry, and there are many projects in the pipeline that will continue to allow this community to realise wide reaching economic benefits and grow the prosperity of its people.

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