
Newsletter 8 July 2010

Hi Everyone,

This June issue of the newsletter has more than the usual content. We are pleased to report that geothermal in New Zealand is really taking off. So much so that geothermal generation typically accounts for 12.5-14% of total NZ generation now whereas it has been as low as 6.4% in 2003.

Alongside the regular newsletter features, this issue presents a round-up of events in the last 6 months in NZ's geothermal industry presenting in particular a focus on new use ventures, recent commissionings and new and potential developments.

This Issue is set out as follows:

- President's Report
- Generation and Use - Update
- Board Report

President's Report

We are in exciting times in Geothermal in New Zealand. In the last six months we have seen two power plants commissioned. Contact's Tauhara 1 plant (23MW's) and the Tauhara North No. 2 Trust and Mighty River Power's Nga Awa Purua plant (138 MW's) take New Zealand's generation up to over 750 MW's putting us firmly in 6th place globally:

Country	MW
USA	3,086
Philippines	1,904
Indonesia	1,197
Mexico	958
Italy	843
New Zealand	750
Iceland	575
Japan	536

(Source: GEA market overview 2010).

Process heat too has been growing. As well as continuing to have the world's single largest geothermal process heat user in the world in Norske Skog Tasman Newsprint Mill, process heat supply is in the process of being established to SCA's Kawerau tissue plant. Ngati Tuwharetoa Geothermal Assets will be supplying steam to the tissue plant. Solid Energy is also using geothermal steam for pellet drying in its new Taupo plant. There are also

investigations going on into the possible utilisation of geothermal steam for milk powder processing.

The use of geothermal steam as a process heat supply remains significantly underutilised in New Zealand. This is especially so in my view in the central north island in wood processing. Utilising geothermal steam for processes such as timber drying is much more thermally efficient than for the generation of electricity. Efficiencies of over 50% heat transfer can be achieved compared to electricity generating 12% to 20% heat to electricity conversion.

Expansion in geothermal generation looks set to continue strongly in the medium term. Contact Energy's Tauhara II (250 MW's) project, Mighty River Power's Ngatamariki project (110 MW's) and Rotoma No.1 Trust (35 MW's) are all at different stages of the resource consenting process.

The recent World Geothermal Congress in Bali, Indonesia was well represented by New Zealand companies supporting geothermal. Approximately 60 delegates from New Zealand's broad spectrum of the geothermal industry were present; many having booths in the exhibition hall as well as presenting papers.

New Zealand Trade and Enterprise, along with New Zealand's ambassador to Indonesia, David Taylor, hosted a lunch where New Zealand companies were invited to meet with Indonesian geothermal representatives. Colin Harvey presented New Zealand's exciting geothermal situation and company capabilities.

Looking forward, the next World Geothermal Congress in 2015 is to be jointly hosted by New Zealand and Australia. The venue for the conference is to be in Melbourne with field trips to destinations in Australia and New Zealand. The joint hosting of the World Geothermal Congress 2015 provides an excellent opportunity for New Zealand to promote geothermal and to promote New Zealand-based geothermal companies and expertise around the world. We do need help in the form of volunteers willing to be involved in helping organise this event, so please put your hand up if you can help.

The Australian geothermal associations and the Victorian Government are already right behind this event so we need to increase our participation if we want to gain exposure from this event.

At the conclusion of the World Geothermal Congress conference in Bali I went on to visit Star Energy's Wayang Windu plant in Indonesia. Sitting on an estimated 40% of the world's geothermal resource, Indonesia has high expectations and plans for geothermal growth. They also have a state owned and regulated single electricity sales company so are facing some policy and economic challenges realising their growth plan, which is currently set at an additional 4,000 MW's generation by 2020!

On the way to Wayang Windu I visited the Lapindo mud flow in East Java, Indonesia. While not in any way a geothermal operation the blow-out disaster was a first hand example of what can go wrong with well drilling, in this case for gas. For those who have not heard of this disaster before it began in 2006, while drilling for gas, an Indonesian company, PT Lapindo Brantas, lost control of the well they were drilling and the drilling rig was engulfed by mud and gas.

There was an earthquake two days before the mud flow began but its contribution to the disaster is highly contested. An alternative and more commonly held view is that no steel casing was used from about 1,300 metres deep which would have prevented the blow-out. Regardless of the cause, the result is a real disaster. The mud flow continues at an estimated 100,000 m³ a day. A large weir (15 metres high) has been built to contain the mud. The local area has subsided by up to 15 metres under the weight of the mud. Some scientists predict a caldera could be forming. No end is in sight for the mud flow. A reported 7,000 people have been displaced from their homes. It appears to have affected far more.

Moral of the story, take care when interacting with Mother Nature and don't be tempted to cut corners!

Spence McClintock, President

Generation and Use - Update

Direct Use:

- ***Mokai glasshouses***

The **Mokai geothermal system** lies 25 km North West of Taupo. The Tuaropaki Power Company, which is 75% owned by the Tuaropaki Trust owns the geothermal power stations, steam gathering systems and wells at Mokai. In 1999 the Company built a 55 megawatt geothermal power station on the site and this has been subsequently expanded to 114 MWe.

Starting with five hectares of geothermally heated glasshouses in 2002, tomatoes and capsicums are now grown in 12 hectares of glasshouses. Gourmet Mokai Ltd who run the operation say the crops are mainly produced for export. The growing technique employed is 'hydroponics' where each plant is individually fed with water and fertilizer. The heat for the glasshouse is supplied from geothermal fluids discharged from well MK-2, owned by the Tuaropaki Power Company. The venture employs 50 people usually (with a peak of 130 people) from Mokai and Mangakino. A key part of the development is re-injecting used geothermal fluid back into the deep geothermal aquifer to minimise the impact on existing geothermal features and natural ecosystems. This is done through a shared injection system with the power station.

The glasshouses at Mokai are thought to use about 300TJ/year of geothermal heat, making them the fifth largest direct user of geothermal energy in New Zealand. The Trust plans to expand the glasshouse to 20, and then 50, hectares.

Commissioning Milestones:

- ***Nga Awa Purua on the Rotokawa Field – 140MW***

The **Nga Awa Purua Geothermal Power Station** - a joint venture between Mighty River Power (MRP) and the Tauhara North No.2 Trust (the joint venture is known as Rotokawa Joint Venture Ltd) – opened in May. With a capacity of 140MW, it will supply up to 3% of New Zealand's electricity needs and enough to power 140,000 homes (equivalent to Taupo, Rotorua, Hamilton and Tauranga combined). The \$430 million project first generated

electricity on 18 January and is one of the largest geothermal power stations to be built anywhere in the world in the past ten years. Nga Awa Purua houses the largest single shaft geothermal turbine in the world. The turbine weighs 70 tonnes, and with its casing weighs 210 tonnes. The turbine is 'triple flash' and has been custom designed to make the most efficient use of the Rotokawa steamfield.



The development brings MRP's total geothermal capacity to 400MW - achieved in little over 10 years. Key to the success of this recent development has been the strong relationship between MRP and the Tauhara North No.2 Trust. The first earthworks for Nga Awa Purua began in May 2008, and the plant was feeding electricity into the national grid less than two years later in January 2010. The completed power station was commissioned in April - ahead of schedule, on budget and with a greater capacity than originally anticipated. MRP plans further geothermal developments in the years ahead both greenfield and involving reservoirs on which they already have power station developments. Future developments will - they note - be more expensive than any developments to date and will depend on a market and policy framework that is supportive of investment in renewable energy.

MRP and the Tauhara North No.2 Trust have been granted resource consent (still subject to appeal) for a 110MW geothermal power station at Ngatamariki, north of Nga Awa Purua, and are actively investigating other prospective geothermal sites.

- ***Tauhara 1 by Contact Energy – 23MW***

Contact Energy's 23 megawatt (MW) **Tauhara One Geothermal Power Station** has been



completed ahead of schedule and under budget. It will provide sufficient baseload renewable energy for about 23,000 homes.

The Te Huka binary plant - also known as Tauhara One - is the first project in Contact's \$600 million current investment programme to be completed.

Contact already held resource consents for this project, and initial development costs, including wells and associated steamwork, were estimated at around \$100 million. The plant is powered with steam and brine from the Tauhara steamfield, and all used geothermal fluid is reinjected back into the edge of the steamfield.



A binary plant uses geothermal steam and water to heat an intermediate liquid with a low boiling point to produce a vapour that spins gas turbines. This type of technology is particularly suited to plants using relatively low volumes of geothermal steam and fluid.

New / Potential Developments:

- ***Ngatamariki Geothermal Power Station – 110MW***

Hot on the heels of the ***Nga Awa Purua*** development Mighty River Power and the Tauhara North No. 2 Trust were granted resource consents in mid May for the construction and operation of the **Ngatamariki Geothermal Power Station**. The consents were subject to appeal until 3 June 2010.

The consent application for the proposed 110MW power station, was lodged in November 2009 by the Rotokawa Joint Venture Ltd – the commercial partnership between MRP and the Tauhara North No.2 Trust. The construction on the project is valued at \$400 million and is likely to commence this year and begin operation by the winter of 2013.

Once commissioned, Ngatamariki will take MRP– in partnership with their Maori Land Trust partners – close to operating 500MW of geothermal electricity, enough power to supply half a million New Zealand households.

Over the past six years MRP’s capital expenditure had been more than \$1 billion – with the bulk of that going towards its domestic geothermal development programme. MRP has also revealed information on its developments on geothermal energy in Chile. Further details [here](#).

- ***Tauhara II by Contact Energy – 250MW***

Contact’s proposal for the development of the Tauhara 2 geothermal station is the first to be referred to an independent board of inquiry under the new Environmental Protection Authority (EPA) as a nationally significant project. Recent changes to the Resource Management Act mean that the hearing must be completed within nine months with limited appeal rights

Tauhara 2 will have capacity of approximately 250MW, enough to supply power to all the homes in greater Wellington. The application was the first to be submitted directly to the EPA without call in from a regional or territorial authority.

Submissions to the Board closed on 14 May and 60 submissions were received. It's likely that hearings will commence in early October in Taupo, with a decision expected in mid-January 2011. The 250MW power station represents around NZ\$1bn of investment in the Taupo region.

[Contact also expects exploration of the Taheke geothermal resource to commence soon, in conjunction with its joint venture partner, the Taheke 8C Incorporation.]

The board of inquiry is headed by Environment Judge Gordon Whiting. Further details can be found [here](#) on the EPA site.

Consenting Environment:

Regional Councils Environment Bay of Plenty and Environment Waikato (EW) have agreed to explore collaborative management of the bulk of New Zealand's geothermal resources.

Under a memorandum of understanding (MoU) signed between Environment Bay of Plenty Chief Executive Bill Bayfield and EW Chief Executive Bob Laing, the two councils acknowledge that collaborative management makes good sense.

"Electricity generators see geothermal energy as the most strategic renewable energy source in the country and plan to invest around \$3 billion in the next five years. This is a huge proposed investment and it's to everyone's advantage to have consistent management," said Mr Laing.

The Resource Management Act requires councils to balance the competing demands of development, tourism, conservation and the cultural values of a resource.

"While New Zealand has considerable experience in using geothermal energy, geothermal systems are highly complex," Mr Laing said.

"With big developments, there needs to be an accurate assessment of the risks, such as the likelihood of subsidence or earthquakes, the effects of re-injection of fluids, downstream impacts on water catchments, impacts on groundwater and consideration of future uses.

"This requires specialist scientific and technical geothermal expertise which is scarce. By working together we can share this knowledge, reduce costs, and effectively and efficiently manage this nationally important resource."

Mr Bayfield said the MoU would align both regional councils' policies, monitoring and, in the longer term, their resource consent and compliance processes for managing geothermal resources.

"Together, we manage most of New Zealand's geothermal resources, predominantly in the Taupo Volcanic Zone, which stretches from south of Taupo to White Island (Whakaari) and beyond. Environment Waikato has a lot of experience in large geothermal development,

while our experience is more on management of multiple shallow geothermal bores, so this agreement is a natural collaboration of our complementary skills and resources,” he said.

The MoU says four areas for potential collaboration are policies, resource monitoring, consents and regulations, and community engagement.

Short-term objectives of the agreement include:

- determining cost recovery principles and procedures related to geothermal development applications, monitoring and compliance
- developing data and information compatibility.

A working group involving staff from both councils will develop a plan for achieving these short-term objectives.

Board Update

Elections and Board Matters:

- ***IGA Elections***

By now all NZGA members should have received IGA Board voting material by email from IGA. If not, please contact the NZGA Executive Officer (brian.white@eastharb.co.nz). We point out that NZGA has nominated three of the candidates (Colin Harvey, Juliet Newson and Paul Quinlivan) so we would encourage your consideration of them. We would also encourage you to consider other candidates from the region.

- ***NZGA Elections***

We are starting our own NZGA election process with a call for nominations. The NZGA Board has approved a temporarily shortened process such that the new Board members can commence duties at the AGM. Documentation will be issued shortly. Note that there are 6 Board positions that can be filled. Of the 5 positions that are rotated, John Burnell and Phil Hutchings will not be restanding at these elections.

On a related matter, the NZGA Board agreed to temporarily coopt Rick Smith of PB Power to the Board until the AGM in November.

Recent Submissions:

- ***Environment Bay of Plenty Regional Policy Statement***

EBOP has started consultation on their draft Regional Policy Statement. The region includes a significant portion of the national geothermal resources. Tricia Scott undertook an initial review after which a submission was prepared and sent on 31 March. This constructive submission emphasised the key role of geothermal energy amongst all renewable energy forms which the government is trying to encourage. Costs were placed against restrictive decisions, with free assistance from EnergyLink in terms of Bay of Plenty data. For content see the NZGA website <http://www.nzgeothermal.org.nz/Publications/Submission-on-EBOP-Draft-Policy-Statement-100401b.pdf>.

- **MED Geothermal Barriers Paper**

A long-awaited paper from Ministry of Economic Development (MED) on barriers to a range of geothermal opportunities came out for comment (see <http://www.med.govt.nz/upload/71880/GeothermalBarriers.pdf>). A brief response was prepared and sent on 21 April (see <http://www.nzgeothermal.org.nz/Publications/Submission-on-MED-Geothermal-Paper-100421.pdf>). This was followed up by MED with some specific questions on information barriers.

Major Conferences:

- **World Geothermal Congress 2010 Bali**

About 60 delegates from New Zealand attended the World Geothermal Congress in Bali 25 – 30 April 2010. The WGC is the premier event in international geothermal calendars, with over 2,500 delegates attending in total. The organisation for this, venue amid a range of resorts, and content of the program (including cultural events) was all outstanding. Many people attended field trips, with Spence having covered off his own experiences in his introduction.

The NZGA was able to work closely with New Zealand Trade and Enterprise (NZTE) and the New Zealand Embassy in Jakarta in raising the profile of the various New Zealand companies represented at the Congress. Again, support from these organisations was outstanding. This included media coverage, a hosted lunch targeting regional companies (including an information pack profiling the various New Zealand companies present) and further assistance with a casual New Zealand function on another day. David Taylor is New Zealand's new ambassador to Indonesia and had only been in the job a few days before he came to Bali to support our geothermal interests by joining in these activities and also attending the University of Auckland alumni function on the 26th of April.



Photo from the formal lunch

Prior to the congress, the Board agreed to support it with \$1500 for fellowships.

At the Congress closing ceremony, a number of people signed an aspirational statement known as the Bali Declaration. The content of this can be found on the IGA website <http://www.geothermal-energy.org/>. At a recent NZGA Board meeting, the Board decided to endorse this declaration, and Spence has signed this on NZGA's behalf.

- **World Geothermal Congress 2015 Melbourne**

For those who don't know, New Zealand and Australia geothermal associations have jointly won a bid to host the next World Geothermal Congress in 2015, with the venue being in Melbourne but with field trips in New Zealand and Australia.

In recent months, effort was directed at finalising the agreement between the International Geothermal Association, New Zealand Geothermal Association, Australian Geothermal Energy Association and Australian Geothermal Energy Group (together this group is known as the Australia and New Zealand Geothermal Energy Associations or ANGEA). This agreement was jointly signed at the closing ceremony at WGC 2010. For New Zealand this was signed by Spence McClintock and witnessed by Alan Koziarski, who is the most senior NZTE trade representative in the region.

Efforts are now being directed towards the finalisation of other intra-organisational agreements, including an underwriting agreement. We are also in the process of establishing the Organising Committee which will have the task in coming months of developing the program and budget for the event. NZGA will be nominating the following people to roles on this Committee: Brian Carey (field trips), Juliet Newson, Claude Bannwarth and Greg Bignall. We have also approached one or two other people to give an initial steer in setting up the budget and program. Brian White and Spence McClintock sit on an ANGEA Committee that gives overall direction to the event.

- ***New Zealand Geothermal Workshop***

The New Zealand Geothermal Workshop will take place in Auckland 22 – 24 November 2010 as part of the wider GeoNZ 2010 conference. For details see www.geonz2010.co.nz. Please note that there is \$100 discount on registration fees for NZGA members.

The NZGA Board has agreed to provide direct sponsorship to GeoNZ 2010, and will look to provide further assistance in the form of industry update sessions and other input. The NZGA Annual General Meeting will be held at the venue on 23 November prior to the conference dinner.

Training:

- ***University of Auckland***

Staff from Auckland University have been involved with a number of training programs in recent months around the region, including courses in Singapore, Indonesia and Australia. The post graduate certificate course in geothermal will commence on 14 July (for more details on this see <http://www.des.auckland.ac.nz/uoafp-pgcertgeothermtech1>).

- ***New Drilling Course***

At a recent Board meeting, Marcel Manders reported on a new 20 week duration non-hydrocarbon drilling course established in Greymouth (for details see http://www.nzdrillfed.co.nz/Default.aspx?act=view_detail&mid=27&sdl=true&publicationid=5). This is a drillers assistant course run by Tai Poutini Polytechnic - Greymouth, with the next course planned for August, and includes geothermal modules. The NZGA has in interest in all geothermal-related forms of training.

Action Plan:

The New Zealand Geothermal Association seeks to assist and promote geothermal interests through a range of means that are put forward by its members and agreed by the Board. These actions are set out in an Action Plan developed on an annual basis. Current status of this Action Plan is shown below.

Action	Comments	Status
HIGH PRIORITY		
Government Lobbying and Raised Public Awareness	NZGA should meet with the new Minister of Energy to generally present a case (and allow a briefing by his officials specifically on geothermal energy). NZGA should continue to lobby for NZ membership in the International Partnership for Geothermal Technology to ensure NZ remains a force in geothermal science and technology	Ongoing prompts and offers of assistance on International Partnership on Geothermal Technology
Submissions on Policy	NZGA will make relevant submissions in response to government consultation documents e.g. climate change regulations, etc	Submission made on MED Geothermal Barriers paper Submission on EBOP Regional Policy Statement
Review of Training Requirements	Information and Education Subcommittee should meet to set its own terms with a view to high level direction for NZGA, and to develop broad industry training strategies. Training and currency of information is critical in an expanding industry with ongoing development. This applies to electricity generation, heat supply and heat pump applications. It covers tertiary and trades development.	
Skills Action Plan	Board and industry members are to review and revise the Action Plan included in the Skills Action Plan. Industry and government should be lobbied to support educational programs in geothermal engineering and science to address skills needs as highlighted in the report. As companies and consultancies seek to increase their human resources, hiring of off-shore talent should not stop government and industry from increasing support of programs that seek to raise home-grown talent.	Skills Action Plan discussed by Board 30 June and now to be updated.
Development of an NZ standard for emissions testing	With the ETS about to be implemented this year, industry should ensure that current emissions testing procedures are formalised into a standard to enable continued use	Brian Carey, Spence McClintock and Paul Bixley have progressed this.
INTERMEDIATE PRIORITY		
Website Update	The website will be continually updated to include latest studies and information. Some of the tasks below reflect current weaknesses in the website and NZGA's knowledge base. This is one of the principal means by which we educate the public and inform our own members.	Ongoing
Annual NZGA Seminar and the New Zealand Geothermal Workshop	These will be the premier national industry events for information dissemination and networking.	A decision has been made not to have a seminar this year because of WGC 2010, but to fully support the Workshop and to incorporate elements of the Seminar within the workshop, including company update presentations and NZGA Action Plan discussion.
World Geothermal Congress 2010	This is a premier geothermal conference	Over 60 NZ delegates attended. The Executive Officer provided a range of support roles
World Geothermal Congress 2015	NZGA should provide necessary support for the joint NZ/Aus World Geothermal Congress 2015	ANGEA/IGA agreement was signed at WGC2010 and review of other agreements continues. Initial volunteers have been found for the Organising Committee
Geothermal Short Courses	Short courses (normally crammed into a day), can give a broad overview of geothermal energy for consenting agencies, developers and other interested parties. This assists development directly. Policy and industry overview meetings are still required	Standard University of Auckland courses have been advertised and we will give encouragement for a 1 day short course at the Geothermal Workshop.
Skills and Services Register	A skills and services register has been developed by HERA to emphasise NZ capabilities and has been added to the NZGA website. This should be updated on a regular basis. It needs to be broadened to include more than manufacturing and engineering skills Members of the Industry Capability Network NZ have a role in linking EPC contractors with local support services.	Underway by HERA.
Geothermal Drilling Report	Continuing a suite of geothermal reports, a report will be prepared on geothermal drilling and well design outlining current practice, costs, differences between conventional fields and EGS developments, new areas of development and issues to be addressed by industry	MB Century is looking undertake this work.
Development Guideline Report	While large generators can handle their issues, there may be a large number of issues faced by small generators. This will provide a beginners guideline to geothermal development.	East Harbour is looking to undertake this work

Description of Major Geothermal Developments	This information, aimed at the public and those with a general geothermal interest, is of general interest	All major developers were approached with information requirements. Contact and MRP have committed to complete this.
Geothermal Heat Pump Studies	Heat pumps are now entering the New Zealand market. Initial indications are that, for large domestic loads (including water heating) and above, this option is competitive with other common heating options so could be a significant contributor to our national energy future. This new review should look at the value chain	GNS Science is reporting on Heat Pumps as part of their Low Enthalpy research program
Memorabilia and Industry Archive Facilitation	It is recognised that key information and equipment could be lost if an industry archive is not established. The NZGA should facilitate discussions to collect and preserve this pioneering material.	Initial discussions were held with Contact Energy on a temporary storage location
Comparisons Between Conventional and EGS Developments	New Zealand consultants will have a growing interest and involvement with EGS developments, but there are some key differences. These should be outlined on the NZGA website.	
Emissions Trading Scheme Information	Major geothermal industries will be subject to emissions trading scheme regulation and potential trading. This is a major change in the industry for which there may be little understanding. Some paragraphs are required on the NZGA website.	

Membership:

- **Individual Membership**

The NZGA currently has 282 individual members. When members change employment we would like to encourage them to forward new contact details to the Executive Officer. Currently, only 23 people have yet to pay their subscriptions (please do so soon).

- **Life Membership**

The Board acknowledges that there are many people who have made a significant contribution to the geothermal industry. One avenue of recognition that the Board can give is through the awarding of a limited number of Life (or Honorary) Memberships. The Board has recently agreed on the criteria to be used to determining eligibility for these Life Memberships, so now is able to consider nominations.

- **Corporate and Institutional Membership**

The latest drive for corporate and institutional membership is under way under the new tiered membership scheme. This still is the principle means by which funds are raised for the ongoing work of the Association. We now show the members against their membership level on the NZGA website (see <http://www.nzgeothermal.org.nz/about.html>) and include links to their respective websites. In coming weeks we will also add short profiles on each of these companies. We are still well below our target. If your company is involved in the geothermal industry, and so benefits from the long term advocacy and coordination of the NZGA, then we would encourage you to contact the Executive Officer or other Board Members about your support role.

The NZGA would like to thank all of its members for their ongoing support of this industry.

Brian White
Executive Officer

Spence McClintock
President

Colin Harvey
Past President