

## A Geothermal Energy Perspective

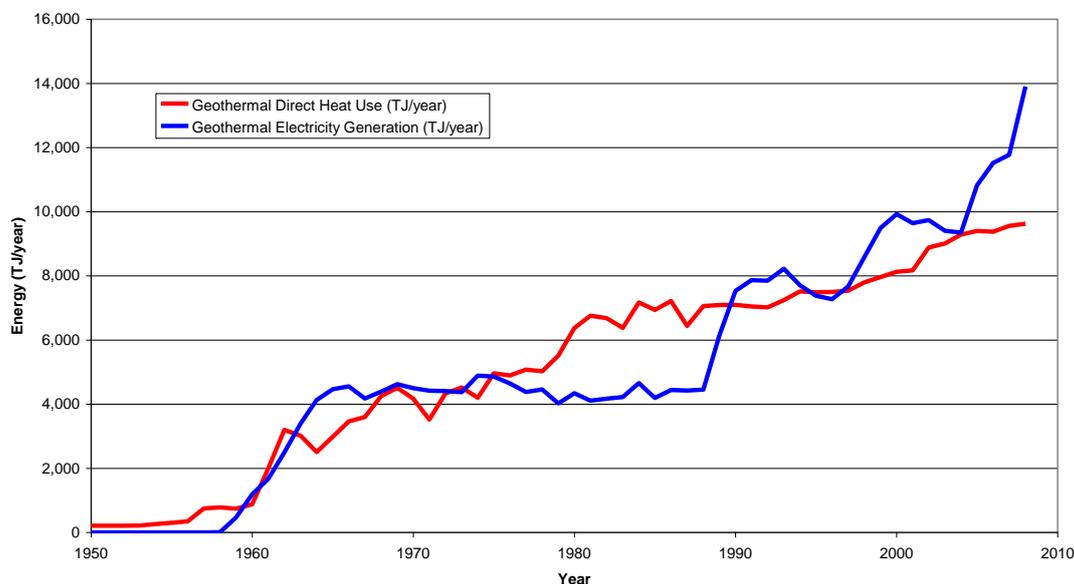
By Brian White, Executive Officer, New Zealand Geothermal Association

### Past Year – Achievements and Failures

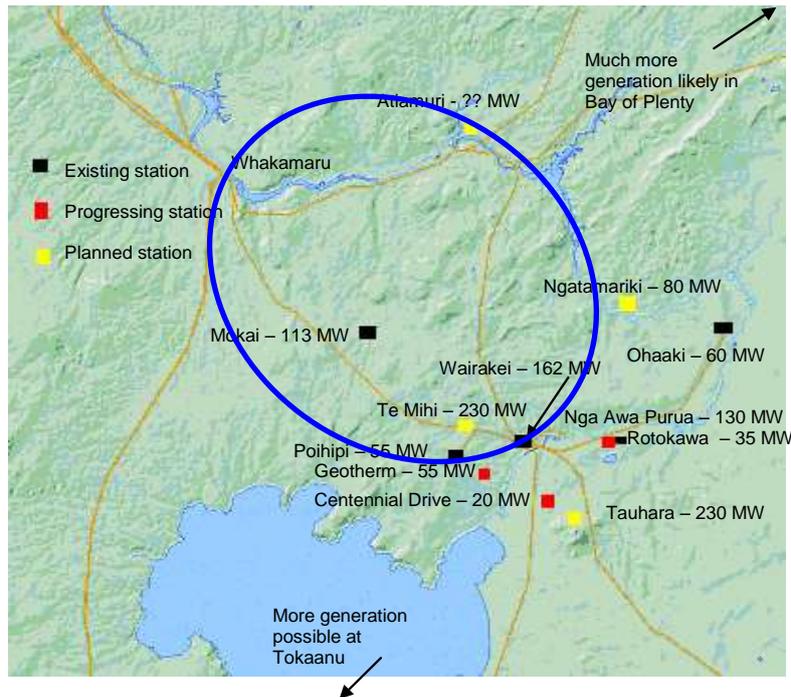
The geothermal industry is the place to be, with a lot of development over the last few years and much more to come in the next few years. Geothermal energy is now getting the profile it deserves as a reliable, low emission, baseload renewable energy form independent of weather and capable of delivering energy at some of the lowest unit rates of any energy option for heat or electricity generation.

Although no major new projects were commissioned in the 2009 calendar year, the national statistics (see graph) show the increase in generation that resulted from projects commissioned late in 2008. Through 2009 construction continued at the Contact 23 MW Tauhara 1 project and the Mighty River 132 MW Nga Awa Purua project (that includes the world's largest geothermal turbine), while exploration drilling and testing continued at Ngatamariki (Mighty River) and Tauhara (Contact). Drilling in 2009 was at record levels with twice the annual number of wells drilled than during previous extended drilling peaks through the late 1950's/1960s and in the early 1980s. Consent applications have recently been submitted by the Rotokawa Joint Venture (Mighty River and Tauhara North No 2 Trust) for the 100-130 MW Ngatamariki geothermal power station. Consent hearings for the 35 MW Rotoma geothermal power station under Rotoma No 1 Incorporation have just commenced but adjourned for further information. Further major direct heat projects have been announced. The following graph shows the current state of geothermal electricity generation and direct heat use. The very steep upward growth curve for electricity generation is evident and should continue for a few years yet, based on announced projects.

Comparison of Geothermal Direct Use and Electricity Generation



In February 2009 the Electricity Commission approved Transpower plans around the reinforcement of a transmission grid portion known as the Wairakei Ring, so that the \$140 million grid upgrade project should be implemented by 2013. The attached map shows a number of built or planned geothermal stations in the vicinity of this Ring which could have been constrained if reinforcement did not happen. This “transmission project to enable renewables” will allow these geothermal projects to proceed in unrestricted baseload operation.



Both within the industry and nationally the NZGA has been re-educating people that geothermal resources are not just for large scale electricity generation, but there are options covering small scale generation, heat production (at industrial and domestic levels), demand reduction (using geothermal heat pumps) and wider non-energy options too. It is all too easy to fall into the big electricity mindset. Education is done primarily through our website [www.nzgeothermal.org.nz](http://www.nzgeothermal.org.nz) but also through seminars and the annual NZ Geothermal Workshop. We have developed a number of well-consulted reports on the various sectors of the industry. This year we have completed three reports with EECA funding looking at:

- the personnel skills within the industry and their adequacy for the upcoming developments,
- an assessment of historical and current direct use of geothermal for heating and pools, and
- a study of geothermal heat pumps which can have niche applications anywhere in the country.

In addition, SKM has completed a major report on the costs associated with geothermal electricity generation. From an industry perspective it is pleasing to see our understanding and information base across the broad energy fronts taken forward by these projects.

During the year New Zealand and Australian geothermal associations cooperated in a bid to bring the 2015 World Geothermal Congress to this part of the world (field trips in New Zealand and conference in Melbourne). This is the premier geothermal event occurring every 5 years. We have just heard that this bid was successful.

### **Forward View (1 year then more) – Predictions, Concerns and a Wishlist**

Over the coming year we will see further major increases in geothermal electricity generation capacity as Contact's Tauhara 1 binary cycle plant and Mighty River Power's 132 MWe Nga Awa Purua project come on line. These stations alone will lift total geothermal contribution to national generation to around 13.5% (c.f 6.4% only 5 years ago). Assuming consenting goes well then Ngatamariki development should follow in close sequence.

Mighty River has re-stated a goal of a 400MW geothermal portfolio by 2012 in their latest annual report with about another 120MW to build, depending on how they count Mokai generation in which they have a 25% share, or how they treat their offshore investments. All of this could come from Ngatamariki but there is spare capacity in other fields they have co-developed with their partners.

Contact is preparing for consents for the large Tauhara 2 development (over 200 MW). This appears to have pushed out the Te Mihi redevelopment of Wairakei for which the original turbines are now 50 years old but still going strong.

Growth will also be seen in direct heat use. Kawerau is already the site of the world's largest geothermal industrial direct use application. This is set for another step increase because the Kawerau SCA pulp mill is working with Ngati Tuwharetoa Geothermal Assets to replace fossil fuels with geothermal heat in 2010.

In total it is thought that around 1100MW equivalent of conventional high temperature geothermal development is still readily consentable/developable including all the projects currently in the pipeline. This should see continuing development of major generation and heat projects over the next 5 to 10 years.

A number of Maori Trusts have been involved with, or are considering geothermal investments of a range of types. Over the last few years, various Trustees have invested time in bringing themselves up to speed with geothermal development and establishing relationships within the industry, ready to make decisions. With cash flows coming from ongoing operations, and clarity coming from Treaty settlements I am expecting that the coming year will see some of this work translate into public projects such as the Rotoma proposal, with at least consent applications and possibly some construction.

The geothermal heat pump industry is right at its infancy. There will be more commercial and large domestic applications in the coming year, particularly as we step out of recession. I would like the profile of this energy option raised further, and measures introduced by industry around formal certification of installers.

Our recent personnel survey indicated that the New Zealand geothermal industry might have about the right number of personnel (or need to expand a little) for the various expansion plans that have been talked about and bearing in mind that some of our consultancies are primarily focussed on offshore work. We need to keep succession in mind with an aging workforce. We continue to be able to bring in staff from overseas, and this makes for a very diverse and interesting community. However, I would like to see a greater number of New Zealanders entering this fascinating area, and that is happening.

Next year will see one of the greatest impacts on energy as a price of carbon enters the energy markets through an emissions trading scheme, recently revised. Major industry and the generators will be in a good position to understand the new carbon market and to hedge themselves. For the small players, this will introduce a new area of uncertainty that forms a partial barrier to new entry. Overall the impact will be positive for geothermal investment, as geothermal has low emissions so will improve relative to fossil fuels when lifetime costs are assessed.

Environment Bay of Plenty is preparing to revise their geothermal Plan and their Policy Statement. This will parallel the model established by Environment Waikato recently, but also synthesise other well laid out plans. Developers have been able to work within both the current EBOP framework and the EW framework, so it is hoped that changes will have little impact on readiness for development while ensuring necessary protections and mitigation measures are in place.

In the end, I hope that the proactive work of the New Zealand Geothermal Association will stimulate appropriate development across the many fronts of geothermal. Through sound advice we hope that government, industry and the public will be well informed of proposed geothermal developments and opportunities.

Brian White, Executive Officer, New Zealand Geothermal Association