

# A geothermal perspective

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The 2011 year was one of progress for geothermal energy as major projects came online and the sector's capacity soared to 13 percent of generation. By Brian White, executive officer NZ Geothermal Association.

THE 2011 YEAR was a very eventful one for the sector: Regional policy statements covering the country's high temperature resources are still under reviewed; consents for Tauhara geothermal power station were announced; major contracts were let for new projects (including some innovative arrangements led by Maori trusts); construction of the new Te Mihi geothermal power station got under way; and new major heat plants were commissioned.

In the area of research and development, major programmes into both hotter/deeper projects and lower temperature developments were started – broadening our future application base. New Zealand has joined a new international R&D partnership that will keep our people at the leading edge while avoiding unnecessary duplication of effort. Our major geothermal training centre is being revitalised with the help of Ministry of Foreign Affairs and Trade. What excites me is that some transformational thinking is now in evidence across the industry.

The year started with the announcement of consents for the 250MW Tauhara geothermal development under the new EPA Board of Inquiry process. Contact Energy has 10 years to develop this project, bearing in mind recent stagnation in demand growth. Of course it is demand growth coupled with retirement of plant such as the Huntly units that will dictate 'new build' requirements.

## Political policies

Most of our high temperature geothermal resources are located in the Waikato and Bay of Plenty Regions and the respective councils have been reviewing Regional Policy Statements (RPS) this year. There were no particular surprises, other than the apparent extent of content differences between the two policy statements despite their intended alignment. Next year Northland Regional Council will review their RPS which covers the remaining known high temperature field.

During the year, the Government consulted on the National Policy Statement on Indigenous Biodiversity. Depending on the detail, this has the potential to significantly impact geothermal development, and Maori interests in these developments – clearly not the intention of the Maori Party when they encouraged this review.

While one view is that any impact on the geothermal industry should be minimal, in the extreme case, if geothermal energy was taken out of the picture, the price path for electricity would take a step jump with an impact on the economy measured in billions of dollars.

During 2011 Government its new Energy Strategy which we regard as containing a more balanced recognition of the role of renewables than earlier documents.

## Project perspectives

No new generation was commissioned this year, but significant projects last year included the 23MW Te Huka project by Contact Energy and the 140MW Nga Awa Purua project by the Rotokawa Joint Venture (Mighty River Power and Tauhara North No 2 Trust), both near Taupo.

For a first year of operation, these projects have both done remarkably well with high availabilities. Overall, geothermal is now contributing around 13-14 percent of all electricity generated nationally.

This year saw the commissioning of the new Miraka milk drying plant over the Mokai geothermal field from which it receives a premium energy supply (it was one of the few dairy plants to continue operation during the recent Maui gas line outage). Unused brine is flashed to a lower pressure and used in the Mokai power station.

Some people in geothermal circles have a concept called 'cascade use' in which waste from power stations can be reused in progressively lower temperature direct use applications. What we find with the country's high temperature fields is that large scale direct use should either be in parallel with generation or else generation should be in a cascade below that of direct use. With one geothermal heated milk treatment plant, it will be interesting to watch that space for other projects.

The year has seen construction start for both Contact's Te Mihi power station (a partial replacement for the 53-year old Wairakei station – the resource consenting is ongoing strong) and for Mighty River Power's Ngatamariki station, both in the Waikato region.

Mighty River Power has brought in a drilling rig from Iceland to assist its efforts. Announcements have been made about new stations at Kawerau and developments at Taheke and Tikitere, all in the Bay of Plenty region. Many of these form part of a 'pipeline' of projects for the major developers, but some include innovative funding arrangements on the part of Maori Trusts.

Our geothermal consultants have been highly competitive, including in the international arena where New Zealand has a leading reputation.

## International marketing

Given the huge overseas market opportunities, our New Zealand companies are now talking about how they can be more "joined up" across the value chain to market services and increase their share of the international geothermal 'pie'.

This is attracting a wider breadth of companies identifying with geothermal development, particularly manufacturers and civil engineers and contractors. Studies have been funded by NZ Trade and Enterprise (NZTE) and Hawkins Infrastructure, while the interests are being loosely collected under the label 'Geothermal New Zealand'.

Several Government departments have an interest in these international efforts including NZTE, Ministry of Foreign Affairs & Trade, Ministry of Economic Development, Ministry of Science & Innovation and the Energy Efficiency & Conservation Authority. The Geothermal Association (NZGA) supports these initiatives and is working within them to strengthen the collective organisation external to NZGA.

## Future view

Research and development looks forward. Efforts in the 'hotter and deeper' programme involve GNS Science, Industrial Research and the University of Auckland in partnership with industry.

Ultimately this stretches our knowledge and equipment and finally extends our proven resources. Our scientists have received various honours for their efforts. Under a restructured funding arrangement, GNS Science has continued with this programme and the Low Enthalpy Geothermal programme. As people become more aware of the available geothermal heat options at potentially attractive prices, then their uptake is likely to increase.

Geothermal heat pumps are a special case of direct use. They don't rely on the high temperatures normally associated with geothermal energy but work with the heat in normal ground or groundwater in the same way that an air-source heat pump exchanges heat with the air.

The exponential growth that is evident in other parts of the world is now being seen here. Geothermal heat pumps present a national geothermal opportunity for a wide range of commercial applications and across the luxury housing market. GNS Science has now been working with the growing number of system designers and installers to formally establish a geothermal heat pump association to address quality and training in this infant industry.

The obvious question is how much more geothermal energy will be installed in the near future? The NZGA assesses that almost

1000MW of baseload geothermal resources can be readily consented and installed using conventional resources, admittedly at progressively increasing prices.

This takes account of fields that require protection for many reasons, including scientific and tourism/cultural value. Together with a growing proportion of wind and hydro, this will meet demand growth for decades.

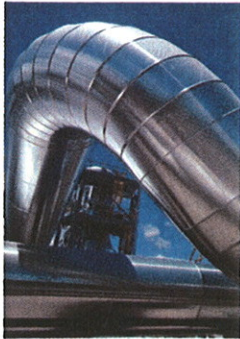
Much geothermal growth will be 'brownfield' extensions of existing developments. However, Mighty River Power is currently progressing a Greenfield development (helped by old Crown wells) on the Ngatamariki geothermal field and both Contact Energy and Mighty River Power are actively engaged with Maori Trust partners on the Taheke field which will be a true Greenfield development. Another Greenfield development may occur on the Tikitere field for which an international tendering process has already selected Ormat ahead of consents or drilling.

Developments will not be limited to electricity generation. Some large scale heat generation plants have been installed lately. While the selection of a geothermal option has been driven especially by economics, an underlying driver is a desire for a clean energy product. The fact that SCA's tissue or Miraka's milk powder has been produced using low emission renewable geothermal energy has marketing value in itself. This may encourage competitors to look at this option also.

In the special case of Kawerau, this is an area open to large scale development with abundant geothermal and woody biomass fuel, coupled with available skilled labour and developed support industries.

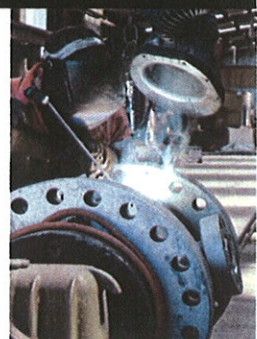
Ngati Tuwharetoa Geothermal Assets is now seeking additional consents to take and reinject fluids for new developments. NZTE has worked with several interests, both local and international to attract industry to Kawerau to take advantage of this green fuel in an industrial symbiosis project. It is also working to develop both biodiesel and jet fuel using processes that combine woody biomass and geothermal heat.

We have a very active geothermal industry which is now preparing to take major steps domestically and internationally over the next few years.

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