

The energy beneath our feet

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Even if new geothermal generation is delayed, a number of studies and new investments have shown that geothermal energy sits at the front of the merit order.

By Brian White, executive officer, NZ Geothermal Association.

SEVERAL YEARS AGO I said we could have 20 percent of electricity generation from geothermal energy by 2020 in a price-driven market. This is still achievable.

With the commissioning of Contact's 23MW Te Huka power station near Taupo and the Mighty River/Tauhara North No.2 Trust joint venture 140MW Nga Awa Purua power station in 2010, geothermal generation reached 13 percent of total generation nationally.

Te Huka is the first stage of a larger Contact development on the Tauhara geothermal field. During the 2010 year, Contact proceeded with consent applications for the second stage 240MW Tauhara development under a new Resource Management Act procedure involving a board of inquiry, and has received a favourable decision.

Also during the year, Contact tendered the development of its 240MW Te Mihi development that will replace the ageing, but still reliable, Wairakei power station.

They may soon be able to tender the Tauhara 240MW project, while accessing limited capital.

This must all be done in the face of stalled demand growth over the last four years. New generation investment in a flat market displaces existing generation. It can lift generation margins to needed levels, but may go further to suppress the price received for generation across the rest of the generator's portfolio.

Several years ago, Mighty River Power set a goal of 400MW of geothermal generation and is approaching this goal (depending on apportionment with partners), while also having a suite of projects in the development stage – including the joint venture 110MW Ngatamariki station for which drilling is well advanced. Having acquired the necessary skills and experience, Mighty River is now investing overseas through GeoGlobal Energy LLC, and this will help with an ongoing pipeline of projects.

An increasing diversity of investors

Several Maori trusts and other land owners have an interest in geothermal development, whether for heat or electricity generation, through joint ventures with energy specialist partners.

In a recent project, Contact is working with Taheke 8C on the Taheke field, and has proceeded with some of the first 'greenfield' drilling in several decades.

Pukeroa Oruawhata Trust is working with the Rotorua District Council on a 1MW or 2MW station proposed for the Rotorua field.

The Tuaropaki Trust on the Mokai field, and a proven leader in geothermal generation, is linked to large glasshouse operations and has now, with Miraka, started construction of a dairy processing plant that will use geothermal heat – the first use of geothermal heat in our dairy industry.

A few years ago, Ngati Tuwharetoa Geothermal Assets (NTGA) acquired the heat supply to the Norske Skog Tasman mill at Kawerau. NTGA has continued to negotiate an expansion of this development, and in 2010 bought in a geothermal supply to the Svenska Cellulosa Aktiebolaget (SCA) tissue mill (also at Kawerau) eliminating its gas requirements. The SCA and Miraka dairy plant investments are based on recognition of the commercial and marketing value associated with supply of high grade low emission heat to industry. New Zealand continues to lead the world in industrial applications of geothermal energy both in scale and technology.

In addition to these Maori trusts developments, and increasing the diversification in the ownership of geothermal development, were investments by lines companies.

In addition, lines companies have also emerged as investors. Top Energy remains an active investor in generation at the Ngawha field, and Eastland Generation (a part of the Eastland Group) has invested in the KA24 station at Kawerau that was completed in 2008. The Eastland investment marks new interest from lines companies in geothermal, helped by electricity market reforms.

During the 2010 year, Environment Waikato and Environment Bay of Plenty, whose areas contain most of the conventional geothermal resources, signed a Memorandum of Understanding to jointly manage the Taupo Volcanic Zone geothermal resources, including greater alignment of geothermal policies and plans, sharing of staff and other in-house resources, and cooperation in environmental monitoring. Both councils are effectively managing their resources while development is occurring, so alignment does not hold much concern for industry.

Sharing international growth

The World Geothermal Congress, a major international showcase event scheduled every five years, was held in Bali, Indonesia in April 2010.

New Zealand companies were well-represented and NZ Trade and Enterprise together with our embassy in Indonesia helped to maximise company profiles at the event. The congress provided the impetus for many companies to recognise the prime opportunities for service or investment internationally, and the value of a nationally integrated approach.

Large and accelerating growth of geothermal energy is expected worldwide. There are some common drivers for this growth including rising fossil fuel prices and a price on carbon. Added to that are some specific government policies to increase the use of low emissions renewable energy, all of which helps to stimulate geothermal investment. The 2011 year will see a number of initiatives based around an NZ Geothermal Inc. concept to improve our

ability to collectively compete in this growing international market.

New Zealand has an active geothermal research and development programme, funded through the Foundation for Research Science and Technology, led by GNS Science partnering with others. Significant research is also being done out of Auckland, Canterbury and other universities. The GNS research covers a broad front from better understanding of conventional high temperature fields in the Taupo Volcanic Zone and associated effects, through interest in pushing boundaries by going for hotter and deeper targets, to making greater use of our low enthalpy resources using heat pumps or direct use (or perhaps electricity generation), to using thermophilic bacteria in the production of bioethanol. If this last effort is successful then geothermal resources will be able to make contributions to energy solutions right across the energy supply and demand spectrum including transport fuels.

Internationally, a focus for geothermal research is the new alternative types of geothermal fields, e.g. enhanced geothermal systems and hot sedimentary aquifers. Published data indicates we have attractive resources of this nature, though the conventional hydrothermal fields will be our development focus in the near term, due to cost considerations.

We need to be ready to support the science and engineering associated with these new resources when the conventional resources run out, and immediately in support of neighbours such as Australia for which there has been heavy investment in this area. Access to key research in this area can be helped through an inter-government agreement known as the International Partnership in Geothermal Technology (IPGT). This is seen by industry as a high value initiative that will leave New Zealand scientists and engineers in a world-leading (or fast-following) position. However, despite lobbying from Mighty River Power, GNS Science, consultancies and the NZ Geothermal Association, national ministers have not engaged in discussions, but we will continue to advocate New Zealand joining this partnership.

Part of the reason for lack of progress with IPGT is 'distraction', as Government has sought to restructure our science and research interests following a Crown Research Institute taskforce in February 2010. This should improve clarity of purpose and greater security around funding for the Crown Research Institutes, and lead to a new Ministry of Science and Innovation that will blend a number of government agencies and roles in a more unified manner.

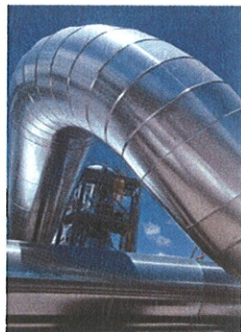


Our universities are involved in both research and training. Several geothermal courses are run around the country but focussed geothermal courses are run out of the University of Auckland. A certificate course now parallels an old 'Geothermal Institute' course run for many years which trained post graduate students from around the world and gave New Zealand companies an opportunity to demonstrate skills both in lectures and field work. There is growing interest in a full revival of this international training institute, and this will reflect back to the NZ Inc. activities mentioned earlier.

I find my own thinking continues to undergo a revolution as I look away from the traditional focus on Central North Island generation to the many other opportunities that are joining these developments.

With geothermal heat pumps and the possibility of drilling almost anywhere for a 'designer' spa, it strikes me that we all have energy beneath our feet. Geothermal energy is a national and international interest and a rapidly changing scene.

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