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Combined Submission on the Draft New Zealand Energy Strategy and the Transitional Measures, and the Draft New Zealand Energy Efficiency and Conservation Strategy

by the New Zealand Geothermal Association

The New Zealand Geothermal Association welcomes the positive initiatives of Government to develop a New Zealand Energy Strategy.

The NZGA represents the views of a diverse membership from large-scale geothermal energy developers, consultants, service companies, research institutions, universities, regulatory authorities and Maori groups. Many of the organisations from which our membership is drawn will be making separate and detailed submissions, some of which will conflict on certain aspects, so it is not the intention of this submission to discuss details.

Overall Support

The New Zealand Geothermal Association is strongly supportive of Government efforts to provide a clearly defined investment environment in which, amongst other things, developers can advance their renewable energy projects. Geothermal developments are capital intensive so require established, positive and consistent planning conditions.

We are supportive of the vision of "a reliable and resilient system delivering New Zealand sustainable low emissions energy" and see geothermal energy as being an essential and significant part of the answer to our energy challenges.

We are broadly supportive of the means for delivering the vision, i.e of providing clear direction, maintaining high levels of security and reliability at competitive prices, maximising efficiency of energy use[1], maximising the proportion of energy from renewables, reducing greenhouse gas emissions and promoting environmentally sustainable technologies.

Importance of Geothermal Energy in the Future Energy Mix

The New Zealand Geothermal Association is encouraged by the positive view taken of geothermal energy in the suite of documents produced with the draft Energy Strategy (though would always want a higher profile).

Some geothermal developments are happening now. The Kawerau and Ngawha geothermal stations are at various stages of construction. Mighty River Power has spoken of their own plans for 400MW of development with another 800MW being possible. Contact has announced major intentions for Tauhara and reinvestment at Wairakei, and have just

[1] We support maximising efficiency of energy use but would have reservations about maximising efficiency of heat or electricity generation where this is not commercially justifiable.

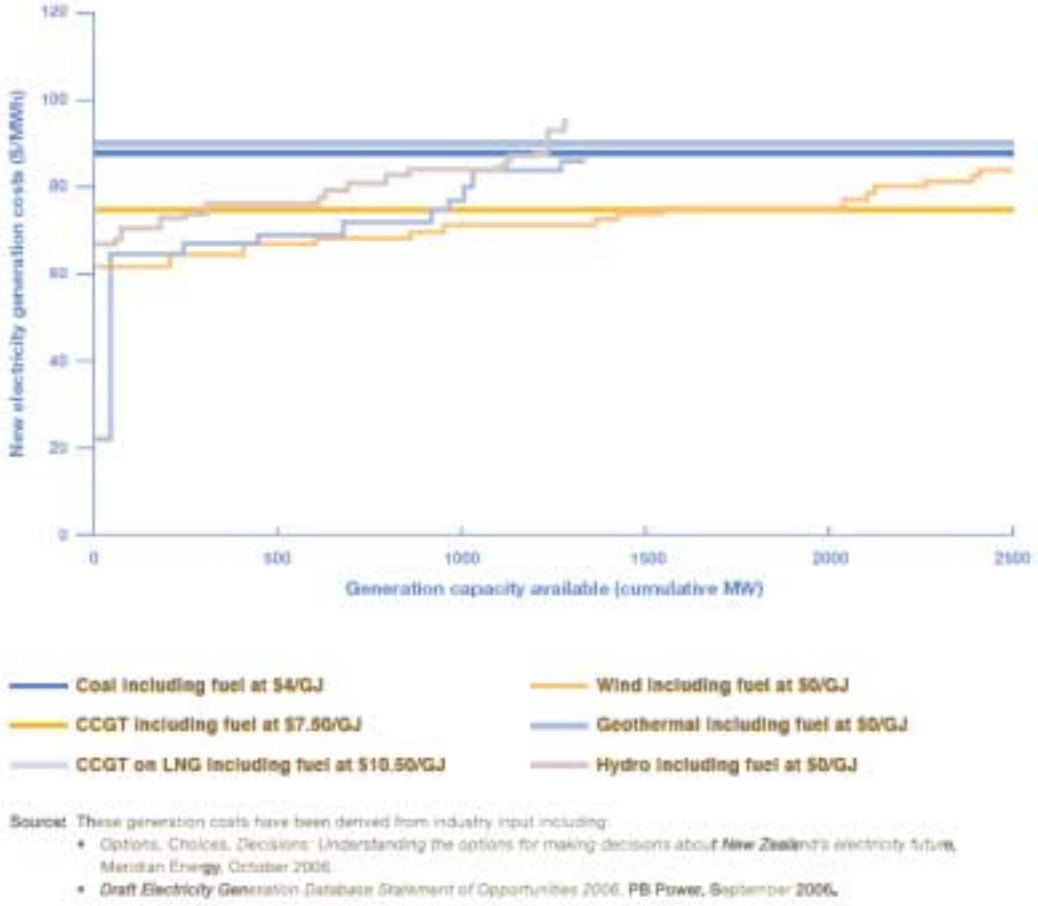
constructed a major geothermal heat supply to timber kilns at Taupo. There have been recent announcements about a mini-district heating scheme on the edge of Taupo. Domestic consumers are looking at heating options including geothermal heat pumps (at the early adoption stage).

Geothermal energy is one of the few renewable energy forms that can generate both electricity and heat reliably, and at competitive prices. Geothermal energy is generally associated with low CO_2 emissions. There are abundant resources (even allowing for the protection of significant fields) that can be consented and developed.

Many future developments will have some benefit for local Maori interests by virtue of their land ownership (and kaitiakitanga role) within geothermal fields.

There have been published estimates of the potential of high temperature fields. These and confidential plans by generators have fed into the cost curves provided in the draft Energy Strategy[2] and shown below.

Figure 1: Typical costs for new generation (taken from the draft NZES)



However, beyond high temperature fields there are numerous warm spring areas that could be providing heat to homes, commercial premises, schools, hospitals, glass houses or pool and spa facilities. Another resource that is well proven overseas but just being exploited by early adopters here is the steady earth and groundwater temperatures anywhere in New Zealand, 1 or more metres below the surface used in geothermal heat pump systems. These latter two resource types represent demand-side opportunities for geothermal development.

[2] NZGA is satisfied with the methodology used to derive the cost curve for geothermal generation and note that it represents the current views of Mighty River Power and Contact (as active developers), and through Meridian the views of one of the two major consultancies in New Zealand on geothermal generation.

In the longer term, there are enormous resources at depth anywhere in New Zealand that could use hot dry rock technology for either heat or electricity. None of this resource has been rigorously assessed, but it will become progressively more important as we move further up the cost curve, or as we seek abundant forms of energy say if we developed an electric vehicle fleet. In practice there may be some opportunities on the margins of developed high temperature fields that could be more commercially attractive than some of the high temperature fields already included in the cost curve i.e. that will actually stretch out the current cost curve as well as lift it higher.

Geothermal energy is frequently base-loaded. This is partly due to the desirability of steady output for some stations within the grid, and because of some inflexibility of operation. In the case of steam-dominated reservoirs, geothermal plant can have a slow load-following ability. However, geothermal generation does not have the flexibility say to counter the rapid and significant swings in wind generation.

Future Innovation

In practice, the rising cost curve for geothermal could see further innovation.

The hot dry rock or "Enhanced Geothermal Systems" technology has already been mentioned. This will lead to considerable extension of the cost curve beyond current prices and quantities. EGS projects are now being developed in a range of countries, helped by government feed-in tariffs or other promotional mechanisms. The reference to feed-in tariffs is not with a view to necessarily advocating these in New Zealand, but serves to show that with a sufficient trigger price, possibly brought on by the passage of time, investment in these technologies does and will occur thereby greatly expanding the resource base.

The rising cost curve could see more immediate investment in silica scale control to allow lower discharge temperatures for future generation plant, and therefore more extraction of energy from the same quantity of hot fluid. The Wairakei binary plant commissioned in 2005 is an example of the type of plant that might be retrofitted to existing developments. New developments can be developed more optimally.

We favour a significant increase in research spending aimed at:

- Defining resources, especially as we start to look away from the currently or near commercial high temperature fields,
- Support of science and technology aimed at expanded production from known resources,
- Reduced development costs, and
- Mitigating environmental effects.

The NZGA is aware that there are still many techniques used overseas that have not become common in New Zealand. Hence as well as fundamental research being carried out in New Zealand, there is a need to maintain strong international technical linkages to maximise uptake of technology that has already been developed elsewhere.

There is a need for greater funding for information dissemination projects to assist uptake or new or underused technologies for heat or electricity, with geothermal heat pumps being one example. This could extend to demonstration projects to be funded to assist uptake where economic. This work should be specifically covered under the NZEECS Action Plan for "clean electricity and heat".

Transmission

The immediately developable high temperature geothermal resources available in New Zealand are located either side of Auckland (at Ngawha in Northland and in the Taupo-Rotorua area). Auckland is our major electricity load centre, and is a city specially targeted for development as part of the economic transformation strategy. Reliable infrastructure links to this load centre are critical for the city's development. Our transmission (and then distribution) lines are the critical elements of this connection.

The geothermal industry requires timely reinforcement of transmission lines beyond Whakamaru to ensure that the new generation possible in the area can be linked to the load centre.

Arguably geothermal energy represents a more efficient use of transmission assets:

- It is closer to the major load centre than, say the major wind resources and some hydro resources so will be associated with lower transmission losses.
- It enables a lesser investment in transmission capacity. Normally transmission lines will be sized to meet demand load (in a net importing region) or to meet maximum supply (in a net exporting region). Geothermal generation provides steady generation in contrast to wind or even hydro, so does not require a margin to allow for variability of generation. Transmission design within wind areas will have to take intermittency of generation into account.

At Ngawha, geothermal energy is being used to further relieve pressure on the transmission system. The Ngawha power station has been generating a significant portion of Top Energy's electricity demand, and the current expansion project will further relieve the demand north of Auckland.

A Strategy to 2050?

We recognise the difficulty in developing an energy strategy in a market economy, but the task is not new to New Zealand. From 1980 the Ministry of Energy published integrated Energy Plans covering all aspects of the energy scene – not only Government-dominated electricity generation, but also industry-led market-based liquid fuels supply. There may be lessons to be learned from this past experience.

The New Zealand Energy Strategy pulls together a number of strands of policy work including that of the New Zealand Energy Efficiency and Conservation Strategy, Climate Change packages and Transport strategies. The benefits of simultaneous development of these strands is recognised.

The current draft document is described as a strategy "to 2050". However, while this document is forward looking, there is no view to 2050. Radical energy transformations can be expected by then. Pessimistic views by oil companies indicate the rise of the hydrogen economy, for which demand for electricity to produce hydrogen will increase many times. This concept is not mentioned. It is accepted that renewable energy forms will enable the transition to a hydrogen economy, and will provide the energy source needed to separate hydrogen from water or hydrocarbons when the technology and infrastructure arrive in force.

There is brief discussion around electric vehicles, including plug-in hybrid vehicles. We note that the implications of such a radical change in our transport fuel system will be a driver for major adjustment within the electricity industry, and that this has not been modelled by MED in their Energy Outlook. The draft strategy contains no strategies or discussion around this radical change for electricity generation and distribution requirements.

Rather than revise the strategy, it should be recognised that the field of vision is much less than stated. It is a strategy with a 10 or at best 20 year vision, and certainly not 40 or 45 years. Aspirationally it should be stated as a strategy "to 2030".

Call-in/Consolidation of Consents

We understand from section 4.3.6, Part 2 of the Strategy that the Government is considering consolidation of consents for wind and geothermal as a means of assisting the process of consenting. The stated goals are to ensure the consenting processes are started and finished in time for sensible planning and construction, and to enable a pool of projects to be considered on a consistent basis leading to an increased quantity of consented sites and establishment of de facto benchmarks for environmental performance.

The geothermal industry is divided in its position on this suggestion. Views are partly based on perceptions of risk.

In the case of Contact Energy risk perceptions are influenced by the length of time it has taken to reconsent Wairakei. The consent application was lodged in 2001 after extensive studies and consultation, and is still not finally resolved (though is currently awaiting the decision of the Environment Court judge due later this year, potentially subject to further appeals). Consequently Contact would welcome the ability to have projects called in to short circuit a potentially long process.

In Mighty River Power's case call-in is seen as undesirable. Mighty River Power favours prudent efficient development of geothermal energy through a full consultation process. Their experience with the consenting of Kawerau power station has been positive. Mighty River Power established the business case for geothermal development on full consultation working within the existing consenting process. A critical early step in development is land access negotiation which can be followed by project consenting at a later stage. Land access negotiation, especially with local Maori interests is a long process of relationship building. Trust and value is undermined if attempts are made to jump this step and move straight to consenting. The consenting process can place these local interests in an adversarial role, rather than a cooperative role established through prior negotiation.

If projects are pooled, there is a risk that projects may be delayed for several years while other projects are brought up to the same position in terms of land negotiation.

Mighty River Power has a pipeline of projects at different stages, and it is not appropriate to expect that several can be simultaneously brought up to the consenting stage, then simultaneously proceed to construction.

In the case of geothermal energy, about 80% of the high temperature resources are in Environment Waikato's area. Environment Waikato has just finalised (subject to one appeal to the High Court) it's geothermal Regional Plan and geothermal Regional Policy Statement. Any call-in of projects will require consideration against these documents so the final outcome may not be much different from it following it's normal course.

A Carbon Charge

The electricity sector is a major contributor to the nation's carbon emissions, and should reasonably face the true cost of carbon emissions. Current major generators of geothermal electricity have no objection to paying a charge truly reflective of the cost of carbon emissions, as long as that is applied in an even-handed manner to other sources. In practice, many forms of carbon charge applied to the electricity industry will have the effect of significantly raising the wholesale price of electricity. This added income will more than offset any charge applied to geothermal CO_2 emissions from the generators' perspective, with the possible exception of Ngawha.

Typical geothermal power station emissions will be about 25% of that of a gas-fired combined cycle plant of the same output i.e. on a gram of CO_2/kWh generated basis, and in some cases is a small fraction of that. Comparative emissions for direct heat use are even more favourable because of better energy conversion rates for direct use.

We have previously noted that many direct uses are of very limited capacity, making a carbon charge of nuisance value, both to the user and to IRD in terms of administration and monitoring costs. The single major geothermal user is Norske Skog Tasman for whom carbon charges are likely to be negated by other measures designed to maintain international competitiveness. For this reason, we would not favour an extension of a carbon charge regime to direct use/heating applications for geothermal energy. Perhaps exemptions for heat plant should be expressed in terms of a threshold level of emissions, and this has been considered by IRD previously.

The former Projects to Reduce Emissions mechanism was used by a range of developers, including geothermal developers, to advance projects. It could be argued, that for electricity

generation, that mechanism led to a double benefit. The mechanism passed through a carbon credit directly, but projects will also receive a benefit at a later time if a carbon charge is applied to the electricity industry (through the charge's effect of passing on the price impact on the marginal thermal generator). This argument does not apply to heat projects so a PRE mechanism could be retained as a means of passing through a carbon signal to the heat market.

5% Real Discount Rate

In the discussion on using energy more efficiently, the recommendation is made that government cost-benefit analysis should use a revised discount rate of 5% real per annum. Perhaps it is just the intention to apply this criterion to projects planned for implementation by government itself. If not then there a disconnection between government assessments and the criteria that commercial developers will use to decide to implement projects.

The NZEECS Approach to Picking Winners

The draft NZEECS objective of clean electricity and heat has been reviewed because of its particular relevance to geothermal energy. Clearly, lobbying has currently secured place holder delivery action plans for a number of technologies including wave and tidal energy demonstration projects, solar water heating projects, and woody biomass projects. There is specific reference to assisting the consenting process for wind. There is no specific reference to geothermal energy within the Action Plan, despite the potential contribution that can be made from this energy source.

In fact, there are only three specific references to geothermal energy in the entire NZEECS document. These are in a pie chart showing geothermal energy currently contributing 12% of our net primary energy in 2005, in Appendix 5 listing capability requirements within the MRST roadmap covering core research science and technology, and in the definition of renewable energy to the extent that its renewability was considered qualified. It would be disappointing if some author misgivings about extent of renewability of geothermal energy meant that this low emission, sustainable technology fell below the radar screen, and failed to realise its significant potential. Internationally, geothermal energy is recognised as a renewable resource, but it is those positive characteristics of low emissions and sustainability that are really being sought in international and New Zealand energy programmes promoting renewable energy. Specifically in the words of the Minister of Energy in his foreword to the overarching draft NZ Energy Strategy "the strategy aims to ensure that New Zealanders reap the benefits of a sustainable low emissions energy system which provides our economy with an enduring competitive advantage."

Geothermal energy potential should be reflected in the NZEECS document and in the relevant Action Plan.

Conclusion

Figure 2: New Zealand Energy Flows for the 2005 Calendar Year (taken from New Zealand Energy Data File September 2006)

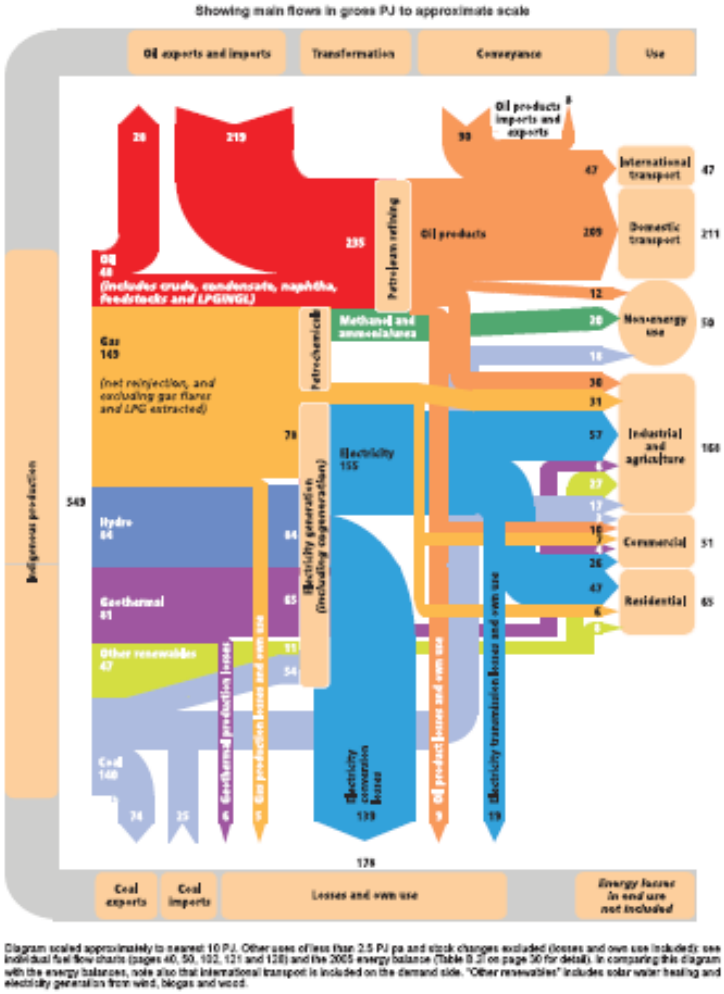


Diagram scaled approximately to nearest 10 PJ. Other uses of less than 2.5 PJ pa and stock changes excluded (losses and own use included); see individual fuel flow charts (pages 40, 50, 102, 121 and 128) and the 2005 energy balance (Table B.2) on page 30 for detail). In comparing this diagram with the energy balances, note also that international transport is included on the demand side. "Other renewables" includes solar water heating and electricity generation from wind, biogas and wood.

Overall, geothermal energy technologies will be taken up. On the strength of power generation alone, geothermal energy use could treble or more making it the single greatest contributor to New Zealand's primary energy inputs (see Figure 2), so the significance of geothermal energy should be reflected in the strategy documents. Government assistance can be most effective in assisting technology uptake at the margins, and in providing the right environment for the established players.

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