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The Honourable Pete Hodgson  
Minister of Energy  
Parliament Buildings  
Wellington

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Dear Sir

**New Zealand Geothermal Association  
Submission on Post Winter Electricity Review**

The New Zealand Geothermal Association welcomes the opportunity to provide comments for the Post Winter Electricity Review, 2001.

**Executive Summary**

The main points of our submission are, in summary:

1. New Zealand possesses a large, readily developable high temperature geothermal resource which is environmentally more friendly than many other sources of energy, in particular, hydrocarbons. It can provide reliable generation at an extremely high load factor, and is not affected by climate.
2. The full benefit of the geothermal resource is not available under the current Resource Management Act.
3. Electricity from geothermal energy is more expensive than that from natural gas. The difference is relatively small and could be offset by a relatively small change in the relative cost of hydrocarbons.
4. For these reasons, we strongly support the development of a National Policy Statement under the RMA covering sustainability and balancing of environmental effects; and the imposition of some form of positive incentive regime.

geothermal resource base, using only current technology and at wholesale electricity prices which are modest in comparison to those in the rest of the world, was 4,100 MW of electrical equivalent. However access to most of this resource base is limited by conservation values, caution over sustainability and local environmental impact and land status. Only about 10 % of the potential has been developed. See attached paper for details.

- ❑ There is considerable potential for expansions to existing projects, which will generally be less expensive than completely new projects and involve negligible resource risk. It was recently estimated that, based on readily identifiable extensions to existing projects by 2010, an additional 200 MW of generation could be commissioned, and the existing 300 MW maintained. This was based on a levelised cost of 4.6 c/kWh for existing recent new projects. A further 175 MW could be added by 2020 while still maintaining an appropriate degree of sustainability. New projects on 8 geothermal fields, that are presently undeveloped and not classified for protection, have the potential of adding a further 500 MW by 2020, assuming the adoption of relatively conservative development strategies.
- ❑ Geothermal is a renewable energy source. It is not always exploited at the rate at which it is renewed, with heat and fluid being depleted. Nevertheless, there is a big difference between “renewable” and “sustainable”, and the national objectives should be for sustainable rather than renewable energy supply. We consider that current geothermal energy use *is* sustainable in terms of the definitions in the Resource Management Act (preserving the needs of future generation) and that a greatly expanded use of geothermal energy would still be sustainable.
- ❑ Modern geothermal developments have low visual and environmental impacts (compared to the older Wairakei and Ohaaki plants).
- ❑ Geothermal generation is unaffected by weather. Geothermal is the only renewable energy form which can provide long term reliable base load electricity generation (e.g. Wairakei plant load factor of greater than 95% for over 40 years)
- ❑ Geothermal is a mature technology with fifty years of successful track record. No-one has ever run a geothermal field to exhaustion and operating costs are low
- ❑ Geothermal power generation generally has low greenhouse gas emissions compared to fossil fuel alternatives. The average CO<sub>2</sub> emissions from actual geothermal plants in New Zealand per GWh are around 25 % of those of combined cycle gas turbine plant (representing the most efficient form of fossil fuel generation readily available), or less than 10% of that of a modern coal-fired plant. We have estimated that if geothermal energy for electricity generation was fully developed in this country (say 4 000 MWe

### ***Barriers to Geothermal Development***

There are however some real barriers to developing geothermal energy in this country. The major constraints to new geothermal projects are both regulatory and economic, the economic constraints being at least partially of regulatory origin:

- ❑ A major barrier to new geothermal generation is the requirement for sustainability under the Resource Management Act (RMA). The requirement for sustainability of the energy content of the geothermal resource is not applied to competing energy resources. For example, it is accepted without question that exploitation of a gas field is done ‘unsustainably’, that is gas is extracted faster than it replenished. This leads to a highly advantaged position for fossil fuels under the RMA irrespective of the relative national merits in terms of economic and environmental impacts.
- ❑ Recent geothermal projects in New Zealand have been small in comparison both to the size of the resources and to developments overseas, largely because of regulatory constraints. This, in turn has led to dis-economies of scale. Two of the successful resource consent applications for geothermal projects in recent years have had the quantity of fluid that can be taken restricted to only about 25 % of that applied for (Poihipi and Ngawha), and in another case 40% (Tauhara).
- ❑ The regulatory process itself leads to long delays which impose a significant up-front cost on the projects, greatly reducing their financial viability. It is exceedingly unlikely that a new geothermal project of 100 MW would be permitted anywhere in the country without an appeal to the Environment Court, adding at least two years and probably over a million dollars in costs in comparison to, say a, new gas turbine project.
- ❑ Economically, the main factor inhibiting the development of geothermal energy is competition from other cheaper power sources, natural gas in particular. With a floating wholesale power price, the actual cost of geothermal generation is almost irrelevant. Pegging the electricity price higher would not encourage more geothermal or hydro generation- it would simply encourage generating companies to install more gas-fired plant and make larger profits. The problem is not that geothermal is expensive, nor even that the power price is too low, it is that gas is cheap and easy to develop. Therefore encouraging more renewable generation by economic means will only come from reducing the cost differential, either by making fossil fuels more expensive through a taxation or permit regime, or incentivising renewables.
- ❑ Constraints on transmission capacity through the North Island reduce the value of geothermal generation. Transpower's reluctance to upgrade transmission capacity, notably through the Whakamaru Substation, mean that power generated in the central North Island

## **Answers to Specific Issues**

As requested we provide comments on each of the issues raised in the Terms of Reference.

### ***1) What factors contributed to wholesale electricity market developments in the 2001 winter?***

The key development was the rise in wholesale prices and hence strong adverse impact on industrial users who did not have hedge contracts. We consider that contributing factors were:

- (a) An over-reliance on a single form of generation, namely hydro with limited storage, which, while it has many benefits, is all adversely affected simultaneously by the climate. Given a dry winter, this led to a perceived (not actual) shortfall in supply which drove prices up.
- (b) A lack of sufficient recent investment in other new generating capacity which is not subject to climatic effects nor external impacts such as oil prices. Geothermal provides an ideal means of generation in that is not affected by climate, is indigenous, and very suited to operating at extremely high load factors. However, the current single-tier pricing structure has provided little incentive for new geothermal generation capacity.

### ***2) How effective were existing market arrangements in responding to these developments?***

The existing market arrangements were effective in terms of causing prices to rise and suppressing demand. They were not effective in terms of “*ensuring that electricity is delivered in an efficient, fair, reliable and environmentally sustainable manner to all classes of consumer.*”, or in ensuring “*greenhouse gas emissions are minimised*”, to quote the 2000 Electricity Industry Policy Statement. They are not effective in providing an incentive for a diverse range of generation to prevent the same situation arising next year.

### ***3) What changes should be made to market arrangements, why are these changes recommended and what are the costs and benefits?***

There should be an incentive provided for encouraging additional reliable generation which is not subject to climatic effects and produce low greenhouse gas emission. That can either be through a carbon emission regime (regulated, tradable or taxed), a mandated renewable target, a subsidy on renewable generation, or a penalty on non-renewable generation. In this context geothermal and hydro should be classified as “renewable” following the Australian model

- (d) Removal of regulatory barriers to greater renewable energy use, in particular those aspects of the Resource Management Act which militate against a national energy strategy (localised decision making) and cause long delays to projects, rendering them uneconomic.
- (e) Change Section 46A "Exemption for new distributed generation from new renewable energy source" clause subsection 4(b) of the Electricity Industry Reform Amendment Act 2001 to allow greater threshold for new geothermal and hydro plants.

We are agreeable to this submission being posted on the website.

Yours sincerely

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*Chairman, Education and Information Committee, NZGA*

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