

**Ministry for the Environment
Environmental Performance Indicators
Proposal for Indicators of the Environmental Effects of Energy
NZGA Submission on June 2000 Draft.**

The comments are as per the Feedback form provided in the document.

1 General questions

(a) *Yes all overlaps between energy and other strands covered.*

(b) *Is definition of energy useful.*

Modify as indicated.

Geothermal energy is an important base load renewable energy resource in New Zealand and this deserves recognition in the definition of energy. The document concentrated more on wind power than geothermal, despite the fact that geothermal energy presently provides 8% of New Zealand's annual electricity generation and wind power provides almost none. Current recovery techniques are able to develop over 1500 MW of additional geothermal generation, and using enhanced recovery techniques this potential rises to 3000 MW.

Section 2.1.3 should also include geothermal reservoirs as energy storage.

2.1.4 should include geothermal heat as a common energy source.

4.2.1 does not mention geothermal energy production and consumption, or geothermal reserves.

In the definition of TPES in 5.4.1 what does 'available energy' mean? Does it mean installed capacity in relation to hydro dams and geothermal power stations? Or does it mean amount of water available to be used if all possible hydro stations were built and if all possible geothermal energy was converted to electricity? The figure 5.2 is meaningless unless the sources of information are referenced, and the indicator is meaningless unless it is better defined.

(c) *Is conceptual framework helpful in understanding environmental effects of energy.*

Modify

Figure 2.2 the pressure of meeting Kyoto Protocol commitments should be included.

(d) *Have we covered all of the relevant policy areas.*

No

The take or pay gas contracts are a policy issue which needs addressing by government as this is a major driver in use of natural gas and hence a major cause of New Zealand's increasing CO₂ discharges to the environment.

(e) Are there any other international agencies with useful energy indicators for NZ.

The International Geothermal Association have prepared significant documentation dealing with the environmental effects associated with the development and use of geothermal energy which would be useful to MfE. The main contributors to the development of these environmental guidelines have been the I.G.A's New Zealand members.

(f) Is our summary of current monitoring accurate. Have we missed any current monitoring.

OK

(g) Do you agree with our assessment of the most important energy environmental effects.

No

Also need to know friendliness of energy source in its production process with respect to environmental effects. i.e. kg of CO₂ released to environment for each kWh of energy produced.

(h) Are there any indicators in Appendix 5 that should be included in our proposed set?

Yes

Candidate indicators 9,10, and 11 all relate to use of renewable energy resource use. % use of renewable energy by resource type should be a key indicator.

It would be useful to have another indicator paralleling no. 22, comparing direct use of geothermal energy to use of geothermal energy for electricity generation. The efficiency of direct use of geothermal energy is much greater than its use for electricity generation. Indeed, there would appear to be nowhere in the proposed parameters where direct use of geothermal energy can be reported, but this is very large at Kawerau for example.

(i) Do you agree that the indicators outlined in Table 6.1 are the appropriate state indicators

Modify

To included release of hydrogen sulphide from the geothermal energy power generation process. This also belongs in Appendix 4, part 1 (air).

Other additions required to Table 6.1 & Appendix 4:

Inclusion of other solutes to cover those of geothermal origin in part 2 (fresh water)

Inclusion of subsidence in part 3 (land).

The effects on geothermal habitats and cultural and scientific values of geothermal features needs to be included as an environmental impact.

'Kokopu' is mis-spelt as 'kokipu'.

The indicators E1 to E10 should be expanded to include efficiency of energy use in transport, including the efficiency losses of converting the transport fuel natural gas to petrol, the efficiency losses of the loss of volume every time petrol is transferred from one receptacle to another, and the effect on the environment of the evaporation of petrol during transfer. Compare the efficiency of thermal electricity generation with the efficiency of natural gas in transport.

(j) Do you agree with our proposed approach to development of Maori indicators.

There appeared to be minimal involvement by Maori. The energy indicators for Maori should include the effects on traditional use, land use, land ownership, mauri of geothermal systems from geothermal use, the confiscation of land for energy production, and the effects on the use and mauri of geothermal features from the raising of water levels in hydro lakes

Section 7.8 needs to include consideration of:

- the effects on kaitiakitanga of having reduced access to ancestral lands which are being used for electricity generation, and the effect of that use on urupa, waahi tapu, etc.
- The effects of hydro dams and geothermal power stations on geothermal features that are used for a variety of tradition uses and that are considered taonga
- The effects of land subsidence, the heating or cooling of ground, the formation of tomos on land that is traditionally used by Maori
- The effects on the future aspirations of Maori from the taking of the geothermal resource (and land) by other parties from areas and geothermal resources that are under claim.

2 Energy Pressure indicators.

Generally agree with all indicators proposed with exception of need to add an additional indicator relating to the use of renewable energy resources .

Other Comments regarding document.

Page 37. Section 4.3.4. It would appear from this section that hydro is identified as renewable, but geothermal is included with fossil fuels as non-renewable, which is incorrect. Geothermal energy resembles a stored groundwater aquifer - it is a renewable source, which is however capable of being exploited at a rate greater than it can be renewed (and there are economic advantages in doing so). The situation is complicated, however, by the fact that the rate of recharge can in fact be stimulated by pressure changes in response to exploitation. At Wairakei, for example, the rate of fluid recharge is now three times as great as it was naturally, and this seems to be indefinitely physically sustainable.

Page 84. Table A2.1 Environmental Impacts from production and use paths.

In the table under Geothermal Activity- Operation accident an **Explosion** has been identified as the Physical impact.

As there is no combustion process taking place in the tapping and use of geothermal energy it is extremely unlikely for an operational accident involving an explosion mechanism to take place. Two possible scenarios are:

- (a) an explosion of the working fluid in a binary cycle geothermal plant, while noting that this has never occurred worldwide as yet.
- (b) a hydrothermal eruption, though this would not normally be described as an “explosion”.

This accident impact requires more explanation or deleting from Table A2.1

Under “Operation: normal”, nitrogen, hydrogen and benzene should be omitted from the section on airborne emissions: the quantities released from geothermal operations are infinitesimal.

Silica, lithium, fluoride, boron and arsenic should be added to the “liquid effluents”.

It is doubtful whether “induced seismicity” needs to be included as an impact - there are no example known worldwide of damaging induced seismicity from geothermal sources.

Under “geothermal system impacts”, a significant omission is the impact on tourism of reduced thermal activity. This is the main reason for the current regulatory regime in Rotorua, for example.

Table A2.1 should include in geothermal land impacts ‘heating of some areas, cooling of others, hydrothermal eruptions, and the creation of tomos’.

Table A2.1 should include in geothermal system impacts ‘effects of scientific and cultural, including Maori, values of geothermal features, and effects on the mauri of geothermal systems’.

Table A2.1 should include in hydroelectric impacts ‘the production of the green house gas methane by decaying vegetation’.

Page 102 Mention is made of net capacity of nuclear and renewables sources for electricity generation, yet in another part of the document it stipulates that New Zealand

would not be considering the use of nuclear energy. Please ask MfE to clarify indication of use of nuclear energy in the document.
