ISSUES FACING WAIKATO REGIONAL COUNCIL IN MANAGING GEOTHERMAL RESOURCES

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SUMMARY Regional councils have been responsible for all aspects of the allocation and management of geothermal resources since the passage of the Resource Management Act **1991.** For Waikato Regional Council ("Environment Waikato"), establishment of geothermal policy and its implementation via the resource consent process, is a continuing and evolving process and a number of issues have made that process challenging. These include: a lack of central government guidance and direct participation in policy and regulatory processes; giving practical meaning to the purpose of the Act, the "sustainable management" of geothermal resources; the difficulties faced in managing a resource which is only partially understood; and the limitations inherent in the consent process to achieve consistent, balanced outcomes.

The topic I have been asked to speak on today is "issues facing regional councils in managing geothermal resources". The reader will note from the title of this paper however, that I have mostly confined it to the experiences of Environment Waikato. While I have no detailed knowledge of the experiences of other councils (Environment BOP and Northland Regional Council), I do suspect that many of the issues I raise in this paper apply elsewhere. Before setting out to address this topic, there are two further disclaimers: first, these are my personal views not the official views of Environment Waikato; and second, my comments are confined to issues surrounding high temperature geothermal resources only.

With disclaimers in place, I now turn to the question – what are the geothermal resource management issues facing Environment Waikato? For the purposes of this particular question, the starting point is probably when government, **through** the Ministry of Energy, released its **1986** Policy and Management Framework for Geothermal Resources. At that stage, statutory responsibilities relating to the use of geothermal resources were shared between the Ministry of Energy administering the Geothermal Energy Act and water (or catchment) **boards** administering the Water and Soil Conservation Act **1967.** The Government's **1986** policy document addressed environmental protection and enhancement procedures, funding and revenue and the status and use of geothermal fields. It proposed protection of certain fields, development **of** others and a group of fields where "no decisions [should be] made on their use which would pre-empt the planning process." The then Waikato Valley Authority responded a year later with its "Geothermal Management Planning: An Overview", cementing into place the government direction at the regional level and setting **up** policies and guidelines to assist in decision-making. Then, in the late **1980s** and early 1990s, local government was totally reformed and the Resource Management Act **1991** was introduced. In combination, these reforms created a regime which devolved all aspects of geothermal resource management to the newly formed regional councils and established the broad principle **of** "sustainable management" which was to underpin everything that councils did in pursuit of their new **RMA** functions. Clearly, there was a need to revisit the established geothermal policy directions in the light of the new statutory regime.

It will come as no surprise to anyone who recalls the free market, non-interventionist ideology of those times and the government haste to devolve whatever responsibilities it could, that regional councils were pretty much left to their own devices to make what they would of their new responsibilities. While there had always been some degree of central government guidance on geothermal resource management, only very rarely did this translate to meaningful input to planning or regulatory processes. For a long time there seemed to be **a** gap between government policy on energy matters and the implementation of planning and regulatory responsibilities at the regional level. Many of the "national interest" issues would have been beyond the scope of direct regional responsibilities anyway, for example, such matters as the place of geothermal in the overall national energy mix. However, even in regard to such things as proposed new geothermal developments or development of regional geothermal policy, one might have expected some degree of government interest. Without

wishing to pass the buck entirely, the previous absence of a coherent national perspective at both planning and regulatory levels was at least partly responsible for:

- inconsistencies between regional councils on their approaches to geothermal resource management, and, arguably
- a playing field tilted somewhat against new exploration/development proposals.

The way that the purpose and principles of the Act itself are defined almost encourages the exclusion of a national perspective, since there is no specific statutory obligation to take account of any national energy interests. They are not irrelevant, they simply have no prominence. This is reinforced by the public participation provided for by decision-making processes under the Act, whether relating to geothermal policy-making or decisions on a particular resource consent application. This often skews the outcome toward an emphasis on local/regional issues. The submitter who is worried about the effects of geothermal development on his property values will arguably "push more buttons" with decision-makers and will attract more attention than some esoteric, and usually unarticulated, concept of national interest. The reality is that national issues and interests usually come a distant second to local issues under the present decision-making regime. Against this background, it is hardly surprising that different management approaches have evolved in different regions. This is partly a function of the statutory decision-making processes but also appears to reflect a conscious government policy of non-intervention. In the 12 years that the Act has been in place, its "call-in" provisions have been used only for the Taranaki Combined Cycle project and, very recently, Meridian's Project Aqua.

There are current Government initiatives to address some of these issues. The establishment of the Energy Efficiency and Conservation Authority **(EECA)** has provided much needed national-level guidance. This has not yet directly translated to clear criteria to be taken account of at the practical level of policy-making or regulatory decisions. However, Government's Resource Management (Energy and Climate Change) Amendment Bill which attempts to addresses issues of energy renewability, efficiency and climate change effects, will. While some of the detail in the Bill as it currently exists is under debate, it appears likely to provide a clearer direction to regional councils for policy and regulatory decision-making. The stated objectives of the Bill include:

- giving greater weight to the value of renewable energy (the definition of which currently explicitly includes geothermal (which I comment on later)), and
- removing climate change as a consideration when considering consent applications for industrial discharges of greenhouse gases.

Both of these objectives address significant issues that currently face regional councils. Government also is reviewing its options for having a greater part to play in regulatory decision-making for nationally significant projects such as large-scale energy development proposals.

Moving from the "big picture" to the practical business of geothermal resource management, the multitude of uses and values of geothermal resources and the often mutually incompatible nature of them, requires a careful balancing act. Probably the greatest challenge facing regional councils is finding the right balance between, and the right mechanisms to achieve, protection on the one hand, and use and development on the other. Or, put another way, how to give meaning to s5, the purpose of the Act - the "sustainable management" of geothermal resources. Sustainable management incorporates seemingly conflicting requirements - by definition it accommodates development, use and protection; it encompasses making provision for the health and wellbeing of present generations, while meeting the reasonably foreseeable needs of future generations; it incorporates a notion of what, in relation to geothermal resources, might be called 'controlled depletion" as well as avoiding, remedying or mitigating adverse effects of use. One of the criticisms of the definition is that it can mean all things to all people. A recent Resource Management Bulletin article makes the point that while "sustainable management" provides a valuable guiding ethic, it is, at the level of specific decision-making, "infinitely nebulous". It goes on to say that "if it is true that s5 is indeterminate...then it in fact provides no real constraint on the policy options councils...may take. Rather, a broad discretion is conferred upon these bodies, who need only refer to the touchstone of "sustainable management" in the most general way." Whether this criticism of the law is justified is obviously a matter for debate but certainly, in the context of geothermal resources, the application of the sustainability principle appears particularly vexed. Numerous papers have been presented to previous geothermal workshops and seminars on the topic of "sustainability" as it affects geothermal. In 2000, Jim Lawless presented a paper to the **NZGA** seminar that proposed 9 possible interpretations of sustainability in a development context.

Aside from the inherent vagueness of "sustainability" as noted above, what this also reflects is that the concept of sustainability as most people would understand it, doesn't "fit"

very well with geothermal resource development. Arguably, this is because geothermal developments are akin, in many respects, to mining. Geothermal resources primarily comprise water and thermal energy. The commonly understood principles of sustainability apply differently to each. In a large-scale development, the extraction and recharge of the water component may be in equilibrium and thus can be sustained indefmitely. However, the energy component (which is the target resource) is usually being mined, that is, extracted at a rate that exceeds the rate of supply and, once depleted is not "renewable" over any reasonable human timefiame. It is this fundamental distinction that has to be grasped before decisions can be made about what constitutes sustainable management of geothermal resources. For these reasons, it has been argued that geothermal energy extraction should be excluded from the "sustainability" purpose of the Act, in the same way that minerals are. One of the things Environment Waikato has submitted on in the Resource Management (Energy and Climate Change) Amendment Bill, noted above, is the definition of geothermal resources as "renewable". While this might be seen as positive for the geothermal industry, it may also be creating a rod for the industry's back by perpetuating the misconception that geothermal resources are indeed renewable within a reasonable timeframe. Clearly, for any reasonable sized commercial development, the energy component is not.

So, how has Environment Waikato responded to the question of sustainability in the geothermal context? Environment Waikato's approach to sustainable management of geothermal resources adopts the following principles:

- categorisation of geothermal systems for "development" or "protection" recognising the inherent impracticalities of trying to achieve both in the same system
- adoption of a "single management body" policy recognising the inherent resource management difficulties that arise from non-integrated, multiple extractors in the same field
- a staged approach to development
- avoidance of adverse effects where practicable, otherwise remediation or mitigation
- a recently proposed timefiame of 100 years for the commercial-scale use of development systems
- a recently proposed policy preference toward infield reinjection.

"Protection" systems are effectively "no go" areas and accordingly, the resource management issues in those systems are relatively minor. Most of the resource management issues that Environment Waikato face are in relation to "Development Systems".

Some of the principles stated above are still open to debate as they are part of currently proposed changes to policy and planning documents. Clearly, though, even for those principles that are firmly established there will remain significant room for interpretation of their meaning. Debate will probably be required on a case by case basis through the consent processes, for example –

- what effects should absolutely be avoided?
- what level of mitigation is appropriate where effects cannot be avoided?
- what safeguards and contingencies are appropriate where the likelihood or extent of effects are uncertain?
- what is the desired end-state of the resource at the end of the 100 years?

It is one thing to be clear about the principles that apply but the practical application of them to a real geothermal development is an entirely different matter. It requires a level of understanding of the functioning of the system and how it will respond in different development scenarios, that seldom exists with certainty. The difficulty lies in the very nature of geothermal systems – their complexity and inaccessibility in particular – and, on this basis, geothermal resources can be distinguished from other physical resources that regional councils manage. Unlike land, soil, water and air, geothermal reservoirs are relatively inaccessible. They exist hundreds if not thousands of metres below the ground and cannot be directly observed. There are usually some surface manifestations but these tell you little about the reservoir itself. It is possible to measure some reservoir characteristics but generally only at isolated points in time and space. Measurements of changes at these points enable some tentative conclusions to be drawn about the nature of the whole system. Computer models are initially built on usually sparse data to enable predictions to be made about the future behaviour of the system. The models are improved as the use of the resource proceeds. The key purpose of models was to enable developers to optimise production. Only recently have they been used to identify likely future effects arising from development.

But even for long-standing developments where there are years of collected data and information available, prediction of adverse effects, on which regulatory processes are fundamentally reliant, is often a case of informed guesswork rather than definitive and quantifiable science. Technical disagreement between experts on

fundamental aspects of the workings of geothermal systems and likely effects of extraction, is common.

For most types of resources, the "cause and effect" relationship is relatively straightforward. A discharge of sewage to a river will cause a readily quantifiable degree of water quality degradation. There will be consequential effects on aquatic life and recreational river users the nature, degree and timing of which can usually be fairly accurately assessed. The luxury of such certainty seldom exists with geothermal. The resource management practice of "suck it and see", (or "adaptive management" as it is sometimes more kindly labelled) is a reasonably accurate description of the philosophy behind past decision-making on geothermal. It simply reflected the inability to know in advance, the response of a geothermal system to development. The knowledge and understanding of how geothermal systems work is better now, but significant uncertainties remain. The relationship between the taking of geothermal fluid and subsidence is a good example. To date, the ability of geothermal developers to accurately predict the likelihood, extent, location and rate of subsidence has been shown in NZ to be limited. Further to this the time lag between cause and effect may be decades. Prediction of future subsidence, which is only a very recent development in NZ, relies largely on extrapolation of past subsidence and is therefore inherently incapable of predicting, for example, new areas of subsidence. Even the causes of subsidence are often not well understood.

These distinctions from other types of resources necessitate different approaches. For example, management of geothermal resources is much more reliant on iterative approaches whereby information gathered over time is fed back to inform future decisions. Consent decisions must therefore ensure that this is catered for by way of monitoring, reporting and other process requirements through resource consent conditions.

The inaccessibility of geothermal resources applies in another sense as well. The complex workings of geothennal systems can, in many cases, almost defy understanding particularly for the lay person. The range of sciences that are called upon to explain the nature and behaviour of geothermal systems is extensive – geology, stratigraphy, hydrology, geophysics, geochemistry, reservoir engineering, computer modelling, civil engineering – to name the obvious ones. The effective and coherent communication of these sciences to decision-makers in a hearing context, which is where important decisions are usually made, is a real challenge.

Ultimately, the limited understanding of how geothermal systems behave and the lack of good quantifiable information on effects, represent significant obstacles for regional councils in undertaking their regulatory and policy functions. How can a resource be effectively managed when there is only a limited understanding of its nature and behaviour? How can uncertainty and environmental risk in consent and planning processes be addressed? An understandable approach to uncertainty is to take extra caution and I am well aware that some past consent decisions by regional councils have been criticised as being overly cautious. Decisions on development at Ngawha and exploration at Reporoa come to mind.

The inherent complexity of geothermal systems is also reflected, at least to some extent, by an apparent suspicion or mistrust by the public generally toward geothermal developments. This, in combination with the general perception that geothermal developments in NZ have had a somewhat chequered history, together conspire to create a backdrop of resistance toward new developments that may be perceived to be out of proportion with the real risks involved. If this is so, then perhaps this is more of an issue for the geothermal industry itself rather than regional councils, but, in the end, everyone pays whether it is in terms of additional hearing time, overly cautious decision-making or direct costs to applicants and participating parties.

Which brings me to the consent decision-making process itself. There is no question that the consent process can be difficult and costly. Its very nature is such that it can and does produce odd outcomes and inconsistencies. And, in the nature of any statute that provides for public participation and rights in public policy and regulatory decision-making, it stands on a presumption of people acting reasonably. Clearly, there are instances where that presumption has not held. But, while few would argue that the consent process is perfect, it is nevertheless a process that is at least capable of providing the right level of scrutiny of proposals and arriving at a reasonable, balanced decision within reasonable time and cost. Contrary to the beliefs of some industry commentators, success stories are not rare events. Amongst recent geothermal developments in the Waikato Region, I would put both the Mokai and Rotokawa developments in that category.

The issue of consistency (whether in terms of process, judgements or outcomes) is one that

Councils perennially face and, while no-one can really dispute its merits at a general level, the actual achievement of consistent outcomes in the regulatory environment is fraught with difficulty. Previous commentators have pointed to inconsistencies between the consent conditions of geothermal projects around NZ and cited that as evidence of councils not doing their jobs properly or problems with the Act itself But this overlooks the obvious facts that, rightly or wrongly, the Act is premised on local authorities making local decisions, that it is a public process not a solely technical decision and that the facts or variables of every case are different. And the variables are extensive – the state of understanding of the resource, the scale of the proposal, the size and manner of discharges, the scale of the potential adverse effects, the presence or absence of features requiring protection, the extent of mitigation proposed, the sensitivity of the affected environment, the presence or absence of iwi issues, other field users and potentially affected landowners, the degree of opposition, the range of concerns expressed, the environmental standards that exist at the time and the state and content of policies and plans.

Any of these can lead to so-called "inconsistencies".

In my experience, Councils endeavour to bring as much consistency into their processes, policy interpretation and decision-making as possible.

However, given the variables of each case and the nature of the consent process, non-identical outcomes are as inevitable as night following day.

To conclude, geothermal resources in the Waikato Region are highly prized due to their rarity, fragility, beauty, and the scientific, cultural and economic values they possess. Within Maori culture they are regarded as "taonga" or treasured property. Significantly, they are also very much a finite resource. Environment Waikato has therefore a strong obligation to ensure that robust policy and regulatory decisions are made concerning their use, development and protection. The development of policy is still evolving and recent changes to previous policy have come in for close attention from industry, conservation and local body interests. Much of the industry comment to date has been critical of a perceived overly-cautious approach. Other interests have been sharply critical that the policy is too soft on developments and their effects. These opposing but strongly-held opinions reflect the difficulties inherent in managing geothermal resources in a way which accommodates the whole range of uses and values held within our society. Finding a balance between these values which both achieves the law's requirement for sustainable management, and which parties on all sides of the debate can live with, is the most pressing challenge facing Environment Waikato right now.