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POWERING A BETTER NEW ZEALAND TOGETHER

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Ministry of Business, Innovation and Employment (MBIE)

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Submission on draft Geothermal strategy

Introduction

1. Energy Resources Aotearoa is New Zealand's peak energy sector advocacy organisation. We represent participants from across the energy system, providing a strategic sector perspective on energy issues and their adjacent portfolios. We enable constructive collaboration to bring coherence across the energy sector through and beyond New Zealand's journey to net-zero carbon emissions by 2050.

2. This document constitutes our submission on From the Ground Up: A draft strategy to unlock New Zealand's geothermal potential ('the strategy'). In our submission, we provide high-level views on geothermal energy and its role in the energy system, how this should be reflected in the draft strategy and feedback on the key elements, those being the 'Strategic Outcomes', 'Action Plan Goals' and 'Action Plan'. The submission addresses most of the questions posed in the draft strategy, but we have elected to use our own format.

Key messages

3. We fully support the further development of geothermal energy, as we do all energy sources, and planning for this through a strategy. A diverse energy system with a mix of reliable sources is critical to future energy resilience. We should prioritise drawing on our abundant natural resources such as geothermal, but also oil and gas. However, the draft strategy should only include proposals that are systems-based and fuel agnostic (e.g., any adjustments to the national direction) and should not preference geothermal - we see this as 'picking winners'.

4. The key elements of the strategy are pitched about right, particularly the focus on improving data and regulatory settings, but it should do more to situate geothermal energy and the proposals made within the wider energy system. This system is complex and interconnected, so changes to one part of it will have impacts on others.

5. We see a clear example of the synergies between sectors in the shared specialist skills and expertise required for the energy workforce. There are opportunities, particularly in relation to drilling, for the growing geothermal and petroleum sectors to coordinate to ensure that this workforce is not lost any further overseas. These workforce issues and plans to address them should be more prominent in the draft strategy.

6. We agree that geothermal has a range of uses across the heat spectrum that should be utilised more, but conversion to geothermal will not always be possible or affordable. For some industries, particularly covered food production in greenhouses, gas is in fact the optimal fuel.

7. We also have views on two specific aspects of the strategy:

    a it is not clear how the energy system goal to "double geothermal energy use by 2040" will be delivered, particularly if it is reliant on commercial supercritical geothermal, or even if it is appropriate to set such an ambitious goal; and

    b the 'Action Plan' seems to be proposing that government will fund an initial drilling programme for that supercritical geothermal. The strategy needs to clearly define the scope of the role of government in doing this and set out a pathway for it to exit and for industry to take over once a commercial opportunity has been demonstrated.

Submission

Our views on geothermal energy and its role in the energy system

8. Our general view is that a diverse, well-functioning energy sector is essential for New Zealand's wealth, well-being and resilience. Making use of our abundant natural resources such as geothermal energy, as well as oil and gas, is a way to drive economic growth without relying on offshore resources, labour or technology.

9. There is great potential for further development and wider application of New Zealand's geothermal resources. A resilient energy system must provide energy choices to suit different needs, and geothermal should be one of those choices, along with natural gas. It also has the benefit over other renewable

energy sources of always being available. This means itact as baseload power while gas contributes to firming and peaking. There is a global trend for the oil and gas sector to invest in geothermal as part of a broader energy transition. We fully support the Government's efforts to promote, facilitate and plan for the development our geothermal resources through this strategy. Releasing a strategy will also contribute to the domestic debate on the future role of geothermal energy in New Zealand.

10. However, the strategy does not adequately canvas the role of geothermal within the wider energy system and the implications of its expansion on that system. This system is complex and interconnected, in terms of generation, distribution and transmission, but also in relation to the wider ecosystem of services that support it and the expertise and capabilities required for this.

11. There are close connections and interdependencies between the geothermal and oil and gas sectors. Suppliers of subsurface equipment are often shared (e.g., Todd's Big Ben drilling rig is often used for geothermal wells), as are the skills, expertise and experience required by the workforces. If the development of the workforce is not properly planned for, the doubling of geothermal output encouraged in this strategy could draw on the limited pool of specialist resources and have implications for the exploration and production of oil and gas at a time when the Government is trying to revitalise the sector.

12. If the synergies between the two sectors are identified and supported, expansion in both sectors could be mutually beneficial and pursued in harmony. For example, in relation to drilling, contractors and equipment could be employed on geothermal projects in periods of lower activity in upstream.

13. The strategy does not explore potential consequences of more geothermal activity for other parts of the system, and the opportunities and trade-offs. There should be better alignment between the Government's policies for the different parts of the energy sector.

The challenges of shifting to geothermal

14. Geothermal energy is described as having potential in supporting parts of the economy to move to lower emissions energy sources. As the draft strategy sets out, it has industrial applications and could replace coal and gas in some processes. However, the strategy has not adequately covered off the geographical and technical barriers that are likely to present in these applications.

15. The strategy refers to the possible decarbonising of the covered crop industry through geoheat and use in glasshouses. Gas is currently widely used in these industries, particularly in the North Island. We consider that the potential for

geothermal to replace it and the benefits of doing this are somewhat overstated in the strategy.

16. Gas is used not only for heating greenhouses but also for CO_2 enrichment to boost plant growth, with the CO_2 captured from the gas burning process itself[1]. This is effectively a closed loop system with very low emissions making it the optimum fuel for this purpose. When geothermal is used for the same purpose, the CO_2 needs to be supplemented and, as we have seen in the past, the supply chain for CO_2 is fragile and reliant on a few players.

17. Furthermore, access to geothermal resources is dependent on geography and technology. For those businesses outside the central North Island, this would require relocation, and the strategy suggests exploring incentives for manufacturers and other businesses to do this and cluster together. Those close to the resource would have to invest in technologies for conversion to geothermal, which in some cases may be emerging and/or unproven.

18. In all cases, shifting from gas would involve significant capital costs and may not be feasible. This will inevitably force some participants out of the market and put cost pressures on the horticultural goods for consumers of those that remain, further exacerbating the cost-of-living crisis.

Strategic Outcomes

19. The proposed 'Strategic Outcomes' seem laudable on the face of it, particularly improving energy resilience. There are, however, some problematic elements.

Concerns about doubling geothermal use by 2040

20. The energy system goal is to "double geothermal energy use by 2040". This is highly ambitious but is also somewhat arbitrary in terms of scale and timeframe. These parameters do not seem to be directly connected to the 'Actions' identified in the 'Action Plan'. It would be useful if there was some form of intervention logic plan that showed how they will deliver the desired outcome.

21. Then there is a question as to whether this is realistic. The draft plan notes that the current combined generation capacity from geothermal power plants is 1,207 MW. MBIE's Electricity Demand and Generation Scenarios (EDGS) model[2] only identifies around 700 MW of new potential geothermal electricity generation, some of which is not expected to be built before 2050. Achieving this goal would therefore require significant new exploration and investment and, if a large

1 See Horticulture New Zealand, Tomatoes New Zealand, Vegetables New Zealand and New Zealand Plant Producers Incorporated submission on *Phasing out fossil fuels in process heat* at https://www.hortnz.co.nz/assets/Environment/National-Env-Policy/Climate-Change/HortNZ-Submission-Phasing-out-process-heat-31-May-2021.pdf.

2 https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-modelling/electricity-demand-and-generation-scenarios.

proportion of this increase relies on the commercial application of 'supercritical geothermal', it may not be achievable. There should also be more clarity about how it will be measured.

22. A number of other countries are exploring or conducting field studies on supercritical geothermal systems including Iceland, Japan, the United States and Mexico. None have yet successfully harnessed this ultra-hot, high-pressure energy source for commercial power generation and it may not be feasible here. The extreme conditions, including high temperatures, pressures, and corrosive fluids, pose significant challenges to well and power plant technologies and scalable projects would require a challenging mix of scientific steps forward and technological advances.

23. Even if it can be done, there is a further question about the desirability of setting such a specific and ambitious goal for one part of the energy system. Previous New Zealand Governments have set energy policies that favour particular technologies or have unrealistic targets. These include the ban on exploration and the "100% renewable electricity by 2030" target. These policies have had extremely detrimental impacts on the market including loss of investor confidence in the gas sector due to sovereign risk and a shortfall in thermal generation that have contributed to the current energy shortage. Government support to achieve this target may end up distorting the market by suppressing or displacing cheaper and more efficient energy sources.

Should we be aiming to be a 'world-leader'?

24. The first outcome refers to New Zealand as a world-leader in geothermal innovation. New Zealand's early adoption could have laid claim to this title when the technologies were emerging, but other countries have now taken great strides forward. It is questionable whether we should even aspire to this. It may be preferable to be a fast-follower and adopt technologies that emerge from larger and better resourced countries as there is less risk in this approach.

Action Plan Goals

25. The 'Action Plan Goals' seem sensible in terms of fixing existing problems and barriers and trying to move the sector forward through research and development and enhanced technology.

There are benefits to improving access to data…

26. A paucity of reliable and robust data is a problem across the energy system. This acts as a barrier to investment and development of resources. Any initiatives to enhance the gathering, analysis and dissemination of this information within parts of the system will have wider benefits. We therefore fully support the goal of improving access to geothermal data and insights. The requirement in the

Crown Minerals Act 1991 for incumbent petroleum operators to release data after a period of confidentiality could be replicated.

27. We also see a clear role for the newly established *Earth Sciences New Zealand* agency in achieving this goal. The agency already has a research programme on better understanding supercritical resources[3], but there may be scope for a greater contribution such as administering a dedicated geothermal database or other ways in which New Zealand's geothermal potential can be identified and explored.

…and an enabling regulatory environment…

28. In our view, an enabling regulatory environment is needed for the development of the new technologies that will drive the expansion of renewable energy sources such as geothermal. Regulatory settings should be current and fit-for-purpose, which requires them to be reviewed and updated regularly, so this is a useful goal. These should not, however, give favourable or preferential treatment, as regulatory settings should be neutral and agnostic in terms of energy sources. If they are not, this disrupts the natural functioning of the market leading to distortions and inefficient resource allocations that can hinder competition.

…but there may be overlaps

29. There does seem to be some overlap between the goals, particularly for the third and fifth one on 'technologies' and 'science, research and innovation'. It may be that the third is seen to be focussing on making better use of existing technologies (e.g., heating) and the last on new technologies (e.g., supercritical). Unless they are more clearly defined, there is a risk of duplication of effort.

Action Plan

30. We have feedback on specific aspects of the 'Action Plan' under 'Regulatory and system settings' and driving 'science, research and innovation' goals.

More emphasis needed on workforce issues

31. There could be greater emphasis in the strategy on the workforce and skills that will support the achievement of the outcomes the Government seeks. While there are references to building and retaining "expertise," and the Action Plan highlights strengthening geothermal "career pathways to support an ongoing talent pipeline" under the regulatory and system settings' goal, these themes could be developed further and elevated into a standalone goal. As mentioned above, the synergies between the geothermal and petroleum workforce and

[3] See https://www.gns.cri.nz/research-projects/geothermal-the-next-generation/

opportunities for better coordination as they grow together should also be explored.

32. A workforce focussed goal should explicitly address the full range of factors that contribute to a thriving energy workforce, such as programmes that connect with schools and inspire future talent; strong vocational and tertiary training pipelines and close, ongoing engagement with industry to ensure alignment between skills demand and supply.

33. This proposed approach is consistent with the work we are leading alongside the Electricity Engineers Association, the *Re-energise 2025 Workforce Report*, which is incorporating feedback from the entire energy portfolio, including geothermal, oil and gas, electricity generation and distribution, renewables, hydrogen and large energy users to inform a comprehensive national energy workforce plan.

Proposals for the national direction

34. We note that there is a proposal to look at the 'national direction' in terms of policy settings. We have strong views that this should be fuel and technology agnostic and would not support a National Policy Statement (NPS) specifically on geothermal (as there already is for renewable electricity generation, which covers geothermal, and transmission), as this also risks preferencing parts of the energy system. A National Environmental Standard (NES) for geothermal energy addressing sector-specific technical matters may, however, be appropriate.

The role of government in exploration

35. The 'Action Plan' seems to be proposing that government will fund an initial drilling programme for supercritical geothermal. We support this in principle as a public good, as the risks may be too high for private investment otherwise, but there needs to be a pathway for government to handover to industry once a commercial opportunity has been demonstrated. The strategy should clearly set out the scope of the government's role and when and under what circumstances government exits the project as otherwise the public funding may be open ended. *Earth Sciences New Zealand* may have a part to play in this programme.

36. Government could also consider other mechanisms for de-risking and stimulating investment in exploration for geothermal energy (e.g. tax incentives).

Concluding comments

37. We support the further development of geothermal energy as part of a diverse and resilient energy system. We also applaud the efforts to plan for this development through this draft strategy.

38. The strategy needs to better address the role of geothermal in the wider energy system, the implications of the proposals on that system and how it could be better aligned with other Government policies, particularly for oil and gas. We should also be cautious about setting overly ambitious goals for the geothermal sector that may exacerbate problems in the energy system. We encourage strategic solutions that bring more energy into the system, harmoniously, across all fuels.

39. There is scope for greater use of geothermal across the heat spectrum, but there are limitations to this. Conversion from gas may not be the best, or most feasible, response for all industries. More thought needs to be given to the role of government in the strategy, particularly the scope of its activities in relation to exploration and when it should hand over to industry.

40. We would welcome the opportunity to engage further with officials on the feedback in this submission and the refinement of the draft strategy. We are especially keen to share our learning, expertise and evidence from our many workforce initiatives. By working in partnership with government, education and industry stakeholders, we can strengthen the geothermal strategy and ensure the workforce dimension is fully integrated as a cornerstone of New Zealand's energy future.