12 April 2022

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RE: INSTITUTE OF GEOLOGICAL AND NUCLEAR SCIENCES TE PŪ AO SUBMISSION ON RENEWABLE ENERGY ZONES NATIONAL CONSULTATION 2022

1.0 SUBMITTER DETAILS

Name of Organisation:	Institute of Geological And Nuclear Sciences Te Pū Ao
Email	j.burnell@gns.cri.nz
Capacity of response:	Public sector
Confidentiality and Disclosure:	Not commercially sensitive
Publication of response:	Consent provided to publish the content of this submission

2.0 INTRODUCTION

The Institute of Geological and Nuclear Sciences Te Pū Ao ("**GNS**") welcomes the opportunity to submit on Renewable Energy Zones National Consultation.

Context

GNS Science, Te Pū Ao, is New Zealand's national institute of geological and nuclear sciences. As a Crown Research Institute, GNS Science is strongly mission-led. Through world-class science, we are focused on delivering economic, environmental and social benefits for Aotearoa New Zealand. As a Crown Research Institute, we take seriously our role as a partner to the Crown in the delivery of science that benefits Aotearoa / New Zealand.

GNS' strategic research is divided into four science themes, Land and Marine Geoscience, Natural Hazards and Risk, Environment and Climate and Energy Futures. Of most relevance

to this feedback is our work in Environment and Climate and Energy Futures. GNS has undertaken decades of research in: the climate system to understand drivers and pace of change of the integrated ocean-atmosphere-hydrosphere; the discovery, exploration, and development of geothermal energy; monitoring and understanding of the carbon cycle; groundwater resources; Carbon Capture and Storage; mapping critical minerals and more recent research into materials for hydrogen production.

GNS has an important role to provide expert scientific input into policy, regulation, standards and guidance. It is from these strategic directives that this submission has been developed.

First and foremost, the GNS Science community would like to congratulate Transpower on working collaboratively to explore and potentially enable investment infrastructure in Renewable Energy Zones, as Aotearoa New Zealand moves to decarbonise its energy system.

Our organization is currently undertaking active research across the energy futures sector as the 'Energy CRI'. We have capability in providing a range of support toward; technical research in geothermal energy, applying social & behavioural science, social & infrastructure research, and planning and risk management support; so as to assist with understanding the needs for non-network solutions. As the energy system in Aotearoa changes to meet our emissions goals we will need to consider the impact of natural events (earthquakes, landslides, volcanic eruptions, tsunami, storms and flooding) on that system. This is an area where GNS has a unique capability in Aotearoa.

In particular: *GNS Science is leading a comprehensive, multi-year research programme into the question of how we can make the production, storage and use of green hydrogen a viable energy option for Aotearoa New Zealand as we work toward a low-carbon future.*

The purpose of this letter is to highlight matters that GNS believe could hinder Aotearoa New Zealand's efforts to make a meaningful impact on changes to our energy systems. Below are our responses to the questions outlined in the "Renewable Energy Zones National Consultation 2022" document. Please note we have only responded to questions where we feel we can add value.

3.0 SPECIFIC GNS COMMENTS TO QUESTIONS

Q2.

Do you think the concept of a Renewable Energy Zone could be beneficial in a New Zealand context?

GNS has a Vision of a Sustainable zero-carbon energy future with enhances economic and wellbeing outcomes for Aotearoa New Zealand. We believe that immediate action throughout our society is required to achieve these goals.

We also believe that considerable care needs to be taken in developing concepts such as renewable energy zones to avoid unintended consequences. This is likely to require robust models of the New Zealand energy system.

Q4.

What benefits do you think should be considered in the decision-making process for Renewable Energy Zones in New Zealand?

GNS believes that benefits for New Zealand should be considered in different lenses, from economic, sociocultural, and technological.

Economic

According to the National Consultation report that these questions are a part of, case studies such as Texas and preliminary results in Australia show the economic benefits of a REZ and that they can increase the rate of renewable generation. Provided any required regulatory hurdles are overcome, and if the cost benefits of generating electricity show that they are suitable or lower the costs of bringing new projects online, then this is a benefit for New Zealand.

Sociocultural

From a sociocultural aspect, ensuring a Just Transition is a part of REZ consultation and implementation can bring benefits to our communities. The path to net zero emissions by 2050 will only be achieved if there is societal commitment to the cause. New Zealanders need to consider electricity generation and usage in everyday decisions they make; commit to continually advancing the net zero agenda; alter their consumer behaviour and accept that aspects of the 'Kiwi way of life' will change. GNS believes that it is important to consider a social license and wellbeing in the decision-making process for Renewable Energy Zones.

Technology and Innovation

Plans for renewable energy generation most mostly based on technologies that can be practically used over the coming years. That is appropriate as plans built on future inventions are inherently less robust. But new technologies will be needed, with the IEA suggesting that 50% of the technologies that will be required to reach the world's 2050 emissions targets are not currently on the market.

The benefits of new technologies and the prospects of developing new industries should be factors that are considered related to Renewable Energy Zones.

In addition to considering the potential benefits of Renewable Energy Zones, it is important that robust assessments are done of any potential negative consequences.

Q5.

Do you agree with the proposed guiding principles? Are there any that you would change or add?

GNS agrees with the guiding principles outlined in the document. We support principles that highlight the need for expanding Renewable Generation that helps New Zealand meet its climate goals, which is an urgent need. We also agree with principles that are a benefit for all of New Zealand through a Just Transition. Lastly, we agree that collaboration with local iwi and stakeholders will ensure that the community as a whole has a net benefit.

We suggest that a further guiding principle be considered. Namely that Renewable Energy Zones deliver net benefits to Aotearoa's energy system that support the goal of a low carbon energy future.

Q8.

Who should be involved with co-ordinating and undertaking the various steps within a REZ development process?

GNS cannot comment on which stakeholders should be included in the various points in the process, however we would welcome the opportunity to engage with relevant stakeholders in the process.

Q10.

Do you agree with the challenges we have identified?

From our perspective, one of the challenges of our energy transition involves energy resilience. Increasing resilience is listed under the benefits of REZ (3.3) and Selecting Regions (4.3) sections of the REZ National Consultation document.

Aotearoa New Zealand faces many natural hazards, some which are related to our geological environment, and some are related to our changing climate. These hazards should be considered as risks to Renewable Energy Zones. Building resilience into current and evolving energy systems requires accurate identification of characteristics of hazards in terms of their intensity and likelihood as well as potential damage and risks to infrastructure assets. There is expertise within New Zealand in modelling natural hazards risks to distributed infrastructure, including some aspects of climate change.

These zones could also play a role in improving the resilience of resilience of local communities in a way that contributes to the wellbeing and prosperity of all New Zealanders.

Q11.

What are some of the ways to overcome these challenges and who should be involved?

From GNS's goals related to risk and resilience outlined above, our Science across the full value chain will support development of good practise natural hazard risk management through the development of strong and enduring partnerships. Moreover, with our partners NIWA and the Earthquake Commission (EQC), we are further developing a world-leading software tool for modelling natural hazard risks. Known as RiskScape, the open access software enables users to assess risk to buildings, infrastructure, and people from natural hazards such as earthquakes, tsunamis, and floods. We would welcome further conversations on leveraging our capabilities and tools to reduce the risk from Natural Hazards on Renewable Energy Zones as a part of the selection or planning processes.

Concluding remarks

It is our position that changes to our electricity generation mix is important and timely. Our comments are intended to improve the future planning and bolster the chances of success. **GNS Science would welcome the opportunity to engage** to further develop any of these ideas if required.

Should you wish to discuss any of the content of this submission please contact Dr. John Burnell (j.burnell@gns.cri.nz).

Yours sincerely

John Burnell
Theme Leader, Energy Futures