Introduction
Name:

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Privacy of natural persons

Business name or organisation (if applicable):

Institute of Geological & Nuclear Sciences

Position title (if applicable):

Earth Resources and Materials Department Manager

Is this an individual submission or on behalf of a group or organisation?

Privacy of natural persons

Please indicate which group you most identify with or are involved in?
Please specify the group that you most identify with.
Please indicate which type of group your submission represents.

Research institute

Please specify the group or organisation that your submission is on behalf of.
Vision
Do you agree or disagree with the overall vision for the minerals and petroleum sector in New Zealand?

Agree

Why?

New Zealand's future prosperity depends upon a healthy and dynamic minerals and petroleum sector, both to enable the transition to a carbon neutral economy and to provide the country with the raw materials required to sustain a carbon neutral economy into the far future. Unlocking further potential from our renewable geothermal energy resources and enabling a future "hydrogen economy" are also key for enabling New Zealand to transition to a carbon neutral economy. GNS Science is working closely with the energy sector, iwi and regional development interests to help develop New Zealand's energy future. GNS Science understands and acknowledges that there will be a range of views on accessing mineral and petroleum resources in New Zealand. Our expertise lies largely within the realm of the acquisition, interpretation, and provision of geoscience data and information that has, and will continue to be used by government and industry alike to make evidence-based decisions. GNS Science is also investing in developing new capabilities in social science, reflecting the changing nature of the real-world issues that we apply to our science enabling a greater focus on people-centred and interdisciplinary research.

What is your vision for the minerals and petroleum sector in New Zealand?
How can New Zealand sustainably derive value from its petroleum and minerals resources?

GNS Science considers that New Zealand can sustainably derive value from its petroleum and minerals resources by: • Ensuring there is sufficient and effective exploration to discover new economic deposits. New Zealand has the potential to

benefit enormously from its petroleum and mineral estate in terms of the transition to a low-carbon energy, economic and infrastructure development, and employment. However, our geographic location, distance from markets and small industry base have been, and will continue to be, major barriers to entry for major industry players. In addition, as new resources become harder and more expensive to find, at our current low amounts of exploration investment and low rate of discovery, New Zealand's petroleum and high-value / critical mineral resource base will eventually end. GNS Science considers that maintaining a sustainable and sizable exploration industry over long time frames is vital for New Zealand's economy, and that we play an important role for New Zealand in sustaining that future through the provision of high-quality geoscience information and expert knowledge – as we have done for over 150 years as New Zealand's Geological Survey. Exploration and development of new resource projects entails high risks and takes many years. New Zealand must have a healthy "pipeline" of resource projects, from the grass-roots prospecting and exploration level, through to advanced resource assessment and feasibility studies, to ensure sufficient resources are discovered and developed to sustainably deliver value for New Zealanders. The Australian Governments Energy Council has developed a strategy that addresses their mineral exploration challenge, and although there are major differences with New Zealand, there are aspects of this strategy that New Zealand could learn from – see: http://www.coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/National%20Mineral%20Exploration%20Strategy%202017-22.pdf • The Crown taking a more proactive "Asset Management" approach to the Petroleum and Mineral estate. For Crown-owned natural resources, the Crown could take a more proactive and holistic "asset management" approach, especially for more strategic resource assets, to ensure greater and sustained value over long time frames. This would include obtaining a much greater understanding in the level of detail of the resource and reserves base held under Crown production and exploration permits. Greater interest in, and oversight of, on-going production practices and reservoir depletion (e.g., gas fields) would assist in a well-planned and managed transition to a carbon-neutral future while ensuring optimal security of energy supply in the meantime. GNS Science is well-positioned to advise and support the Crown in this regard through its Energy Futures research theme. • Greater investment by the government and industry in high-tech Critical Minerals ('Green minerals') – both onshore and offshore. The reality is, more not less mining will be required to make this clean, green, zero-carbon future a reality. For instance, to build one 3 MW wind turbine requires about 300 tonnes of steel, 4.7 tonnes of copper, 1000 tonnes of concrete, 3 tonnes of aluminium, and 200 kg of REEs. Other uses for clean-tech minerals include electric vehicles, aerospace components, solar panels, consumer electronics, steel and glass additives, sonar systems, batteries, and ceramics. GNS Science, together with NZPAM MBIE, has only begun researching the potential onshore and offshore prospectivity of such minerals in New Zealand, as we envisage a future where greater exploration investment in these minerals needs to occur to help support our transition to a green, high-tech economy. The alternative is that New Zealand instead relies on importation of these minerals and technologies powered by these minerals, either from countries such as the Congo, where environmental degradation from and human rights violations are widespread, or from other countries whereby supply could be withheld due to national and political factors. Direct access to such high-tech minerals in New Zealand could be an important cornerstone of a high-tech, materials science-based industry here. • Greater investment in Data and

Geoscience Knowledge and supporting ICT infrastructure Increasingly difficult decisions around resource development versus other land uses and conservation will increase as our economy develops and our city centres grow. As New Zealand's custodian of New Zealand's earth science data, information and knowledge of petroleum and minerals, GNS Science's perspective is centred around the growing importance of high-quality geoscience information and expertise for improved decision-making regarding land use. Improved access to information by government and industry players would reduce information asymmetry between parties and result in balanced outcomes. We commend the efforts undertaken by Energy and Resource Markets in progressing their Knowledge Investment work through improving their systems to make minerals data more accessible.

Objectives for the minerals and petroleum sector
Objective for a sector that: "Responsibly delivers value for New Zealand (a) Supporting a productive, sustainable and inclusive economy (b) Supporting New Zealand's transition to a carbon neutral economy".

Agree

Why?
Objective for a sector that: "Is productive and innovative".

Agree

Why?
Objective for a sector that: "Is effectively regulated".

Agree

Why?
Are there any other objectives for the minerals and petroleum sector that you would like us to consider in the strategy?
Guiding principles
Principle: The environment, ecosystems, and biodiversity are respected now and in the long term.

Strongly agree

Why?
Principle: Māori cultural interests are understood and respected.

Strongly agree

Why?
Principle: Support the transition to a carbon neutral economy by 2050.

Agree

Why?
Principle: The impact on people, communities and regions are managed in a just and inclusive way.

Strongly agree

Why?
Principle: Support a circular economy by meeting resource needs through resource efficiency, recycling and reuse.

Agree

Why?

Principle: Actions taken within the mineral and petroleum sector should align with the strategic direction of other related sectors and Government strategies.

Agree

Why?

Do you agree or disagree with each of the following principles for the Crown?

Principle: The Crown honours its duty towards Māori as a Treaty partner, adheres to the Principles of the Treaty of Waitangi and its duty to meet settlement commitments.

Strongly agree

Why?

Principle: The Crown receives a fair financial return for its minerals and petroleum.

Agree

Why?

Principle: The Crown regulates in a way that is fair, transparent, reasonable and proportionate.

Agree

Why?

Principle: The Crown honours the rights of current permit holders to continue production or exploration activities under existing permits.

Strongly agree

Why?

Principle: The Crown makes policy decisions based on the best evidence, and accounting for the foreseeable need for minerals and petroleum, both now and for future generations.

Strongly agree

Why?

Principle: The Crown proactively engages and consults with relevant stakeholders and decisions are communicated in a clear and transparent way.

Agree

Why?

Do you agree or disagree with each of the following principles for Industry?

Principle: Pursue continuous improvements in health and safety.

Agree

Why?

Principle: Strive to implement industry best practice in operations.

Agree

Why?

Principle: Seek innovative ways to improve the resource efficiency of extraction operations; and minimise the negative impacts of these operations.

Why?

Principle: Engage with stakeholders and implement management systems to understand and manage impacts, and realise opportunities for redress where needed.

Agree

Why?

Are there any other principles you would like us to consider in the strategy?

We would suggest an amendment to the guiding principle for industry, "Strive to implement industry best practice in operations", to: Strive to implement industry best practice in exploration and mining operations. Other guiding principles for the Crown could include: • Ensure New Zealand remains an important exploration destination on the global stage through the provision and dissemination of quality Geoscience information.

Action areas intro

Action Area: Modernising the Crown Minerals Act

Agree

Why?

What future actions would you like us to consider under this Action Area?

Action Area: Securing affordable resources to meet our minerals and energy needs

Strongly agree

Why?

GNS Science has played a key role with NZPAM MBIE in recent years to improve the information on New Zealand's critical minerals, as well as making resources data more accessible. GNS Science has undertaken a number studies identifying areas of critical mineral resource potential using current geoscience knowledge and state-of-the-art computing methodologies. There is a real need to conduct further studies of this nature (see below) to reduce investment risks of exploration, and to improve the effectiveness of exploration programs. Other joint initiatives between GNS Science and NZPAM MBIE have included the planning, completion and interpretation of aeromagnetic geophysical surveys and regional geochemical soil sampling programmes. This work should continue (see below). GNS Science has commenced preliminary research to assess the national potential of our aggregate resources and has submitted a research proposal to the Provincial Growth Fund (PGF). There is scope to expand such an initiative. GNS Science has also completed the New Zealand Atlas of Petroleum Prospectivity to assist exploration companies in deciding where to explore in New Zealand's basins. From a fundamental geoscience perspective, GNS Science researchers, together with co-researchers, have recently demonstrated that New Zealand is part of the largely submerged continent Zealandia. This has huge, as yet unknown, implications for the future exploration and potential exploitation of our offshore natural resources. This new knowledge greatly enhances New Zealand's prospectivity for critical minerals due to their close affinity with continental geologic processes. GNS Science continues to undertake world-leading research through the International Ocean Discovery Program (IODP) into the geological processes behind the formation of marine Volcanogenic Massive Sulphide VMS) deposits. These deposits contain critical minerals such as copper. Obtaining a greater understanding of how these deposits form on the sea floor in "real time" can be used to help explore for ancient VMS deposits that are now onshore. This research has high impact and international relevance through publication in Nature Geoscience, key note addresses

at international conferences, and extensive media coverage. GNS Science is leading an innovative Endeavour fund research programme on the economic opportunities and environmental implications of gas hydrates. Gas hydrates are ice-like substances that contain natural gas that occur in marine sediments beneath the ocean at water depths over about 700 m. The research that has shown New Zealand has a large potential resource of methane gas is now addressing environmental and societal implications of exploiting the resource. The mining sector can derive greater value from its petroleum and mineral estate through better access to, and public provision of, relevant data and geoscience information. Such information underpins strategic planning, sector monitoring, legislation and policy management, sector regulation and compliance. Both GNS Science and NZPAM MBIE hold large volumes of pre-competitive and open file petroleum and mineral data. Synergies between the organisations should be developed and exploited to make more efficient and effective use of this data for resource asset management and compliance monitoring by the Crown. Adoption of new ICT tools by both organisations, such as predictive modelling and machine learning would help further release the value locked up in these data.

What future actions would you like us to consider under this Action Area?

• New mineral potential studies for other critical minerals that may be present in New Zealand; • "Ground-truthing" through sampling and geologic mapping, the results of the above mineral potential studies to better determine potential economic viability; • Obtaining a greater understanding of Zealandia's offshore critical mineral potential through compilation and interpretation of existing datasets and the development of mineral potential maps; • Better understanding of petroleum systems (including gas hydrates) to enhance exploration success for industry; • Understanding the underground storage resource as part of feasibility studies for carbon capture and storage (CCS); • Soil geochemical surveys to provide environmental baseline data as a basis for monitoring any impact of future mining activities; • Completion of onshore aeromagnetic coverage of New Zealand; • Targeted coverage of airborne electromagnetic methods in areas such as Otago; • Onshore seismic transects across key regions of mineral potential to better understand structural and regional controls on mineral deposition; and • Greater collaboration, sharing and dissemination of geoscience and resources data and information between GNS Science and MBIE.

Action Area: Improving Treaty partnership

Strongly agree

Why?

GNS Science considers its overall approach to engagement with iwi and hapū as the foundation for strong and enduring relationships. Through our work GNS Science has observed that iwi and hapū are increasingly faced with questions about the use and management of our natural resources, and how to build resilience to natural hazards and climate change. Scientific research helps to guide decision-making by providing important information but is often difficult to understand. Programmes delivered by both GNS Science and iwi partners such as Te Kura Whenua has helped bridge the gap between Western science and Mātauranga Māori, and it fosters dialogue on these important issues. For example, Te Kura Whenua was developed as a joint initiative between Ngāti Kahungunu Iwi Incorporated and GNS Science. It aimed to strengthen partnerships and foster knowledge exchange between Māori and earth scientists on issues identified as critically important to iwi development: geological hazards,

climate change, petroleum exploration and water resources. Ngāti Kahungunu recognise the importance of having an informed understanding of these issues. Marae-based wānanga, including practical exercises and dialogue based around geological excursions, will be used to build iwi understanding of the science behind these topics and increase understanding of Mātauranga-a-Iwi among scientists. Our research into Pounamu and Aotea with Ngāi Tūhoe has provided greater understanding into the sustainability of these resources and as a result has greatly increased their cultural and commercial value to the Rūnanga. GNS Science is also the custodian for over 1500 Pounamu gifted by New Zealand Pounamu and Jade expert Russell Beck. This is a collection for all New Zealanders to be cared by GNS Science and to support further research. Whilst GNS Science's interaction with iwi and hapū is predominantly a result of funding application requirements (Vision Mātauranga component). GNS Science is starting to look past this and seeking relationships outside of funding regimes.

What future actions would you like us to consider under this Action Area?

• Clarity on the role of Crown Entities with regard to the Treaty of Waitangi • Clarity not only on settlement obligations but also legislative obligations.

Action Area: Improving stakeholder and community engagement

Agree

Why?

What future actions would you like us to consider under this Action Area?

• Government and Industry work together to develop best-practice guidelines for effective community engagement.

Action Area: Improving industry compliance

Agree

Why?

What future actions would you like us to consider under this Action Area?

• The Crown receives the geoscience data and information it is owed in return for the allocation of prospecting and exploration rights.

Action Area: Research and investment in better mining and resource use

Strongly agree

Why?

The mining industry is going through a period of rapid change and disruption at a global scale due to changing expectations of communities, climate change, resource scarcity, and the emergence of new technologies. There is an opportunity for New Zealand to embrace these changes and develop disruptive technologies and practices that have the potential to fundamentally change the resource development paradigm. Achieving this goal helps to make New Zealand a safe, clean, and productive mining countries. In addition, if industry and government collaboratively invest in new pathway technologies that have the potential to greatly reduce the environmental and social impact of resource development, the potential to move away from current "zero-sum" or "win-lose" outcomes may become a reality and help support our high-tech, zero carbon future. An area of importance to New Zealand as it moves to a net-

zero carbon future is energy storage. GNS Science is looking at research links between minerals and new materials to find improved ways of storing energy. Our Materials for a Low Carbon Future programme includes research and development on processes that target new green ways of harvesting and storing energy, in which a consideration of locally sourced minerals will play a role. GNS Science is a research partner member of Australia's Future Battery Industries Cooperative Researchers Centre – FBICRC. This is an industry-focussed research partnership supporting efforts to secure Australia an expanded place in the rapidly transforming global battery value chain. Successful research from this endeavour will also have applications in New Zealand.

What future actions would you like us to consider under this Action Area?

• Collaborative R&D initiatives into disruptive technologies and mining practices between government, universities and industry.

Are there any other action areas you would like us to consider as part of advancing this Strategy?
Other
Are there any other comments you would like to make about the "Minerals and Petroleum Strategy for Aotearoa New Zealand: 2019-2029"?

Suggest that a strategic adaptive management approach be considered.

If you wish to, attach a document to this submission.

GNS-feedback-to-Draft-MBIE-Resources-Strategy-19-September.pdf - Download File

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Can we include your business name or organisation?

Yes

Can we include your position title?

Yes

Can we include the group you most identify with (if submitting as an individual)?
Can we include the group your submission represents (if submitting on behalf of a group or organisation)?

Yes

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