



15 November 2019

By email: feedback@ICCC.mfe.govt.nz

ICCC Call for evidence on options to reduce greenhouse gas emissions 2022-2035

Please find the submission by Elemental Group for ICCCs consideration of the option to store carbon dioxide in depleted petroleum reservoirs.

Contact details

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Submissions on similar topics

<i>Please indicate any other submissions you have made on relevant topics, noting the particular material or information you think we should be aware of.</i>
<i>Answer: N/A</i>

Commercially sensitive information

<i>Do you have any objection to the release of any information contained in your response, including commercially sensitive information?</i>
<i>If yes, which part(s) do you consider should be withheld, together with the reason(s) for withholding this information.</i>
<i>Answer: No</i>

Questions for consideration:

Section A The first three emissions budgets

Under the proposed Zero Carbon Bill, the proposed Commission will have to provide advice to government on the levels of emissions budgets over the coming decades.

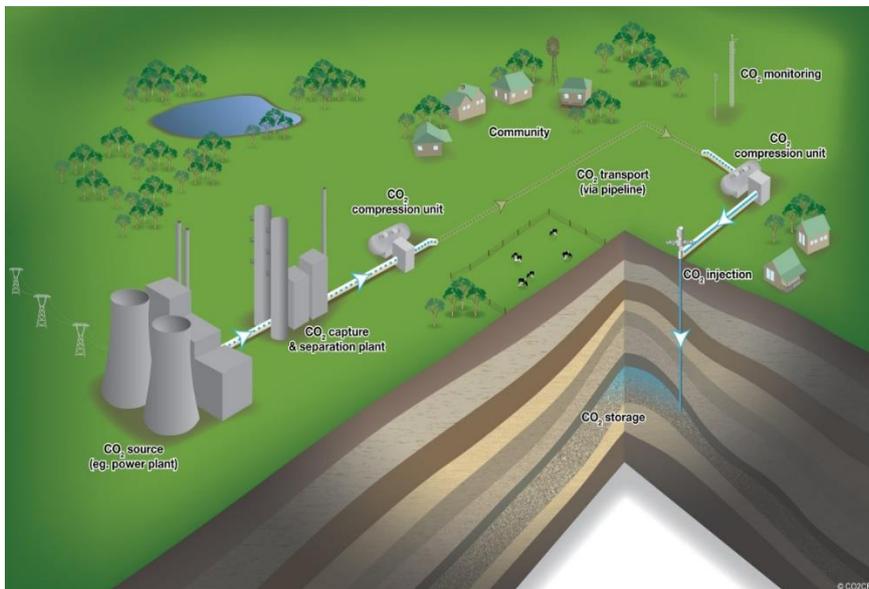
Currently, the Zero Carbon Bill requires budgets to be set from 2022-2035 (three separate budgets covering 2022-2025, 2026-2030, and 2031-2035). When preparing this advice the proposed Commission will have to consider the implications of those budgets for meeting the 2050 target. The Commission will also need to consider the likely economic effects (positive and negative) of its advice.

Question 1:

In your area of expertise or experience, what are the specific proven and emerging options to reduce emissions to 2035? What are the likely costs, benefits and wider impacts of these options? Please provide evidence and/or data to support your assessment.

Answer:

Carbon Storage in depleted underground petroleum reservoirs has the potential to store 190 million tonnes of carbon dioxide gas in Taranaki.



Carbon storage involves the removal of carbon dioxide at source, transport to a facility, where it is compressed, injected and stored (see graphic above from CO2CRC.com). Carbon storage has been completed at 18 large sites globally and injection and storage of carbon dioxide has reached 240 million tonnes (Global CCS Institute 2018 report). Carbon storage represents the next best abatement option after tree planting and over the next 80 years would cover 4 years of NZ's equivalent net carbon dioxide emissions. This is material with regards to New Zealand's carbon budgets. Depending on the capital investment and the carbon sources applied to carbon storage, carbon storage costs will range from \$70/tonne (based on US best practice EOR CO₂ storage) to

\$250/tonne for gathering far-away carbon sources such as those from steel making and cement plants. To store carbon dioxide on this scale would require field life investments in the order of \$13-48 billion. In the period 2022-2035, 11 million tonnes may be stored (see Answer 2).

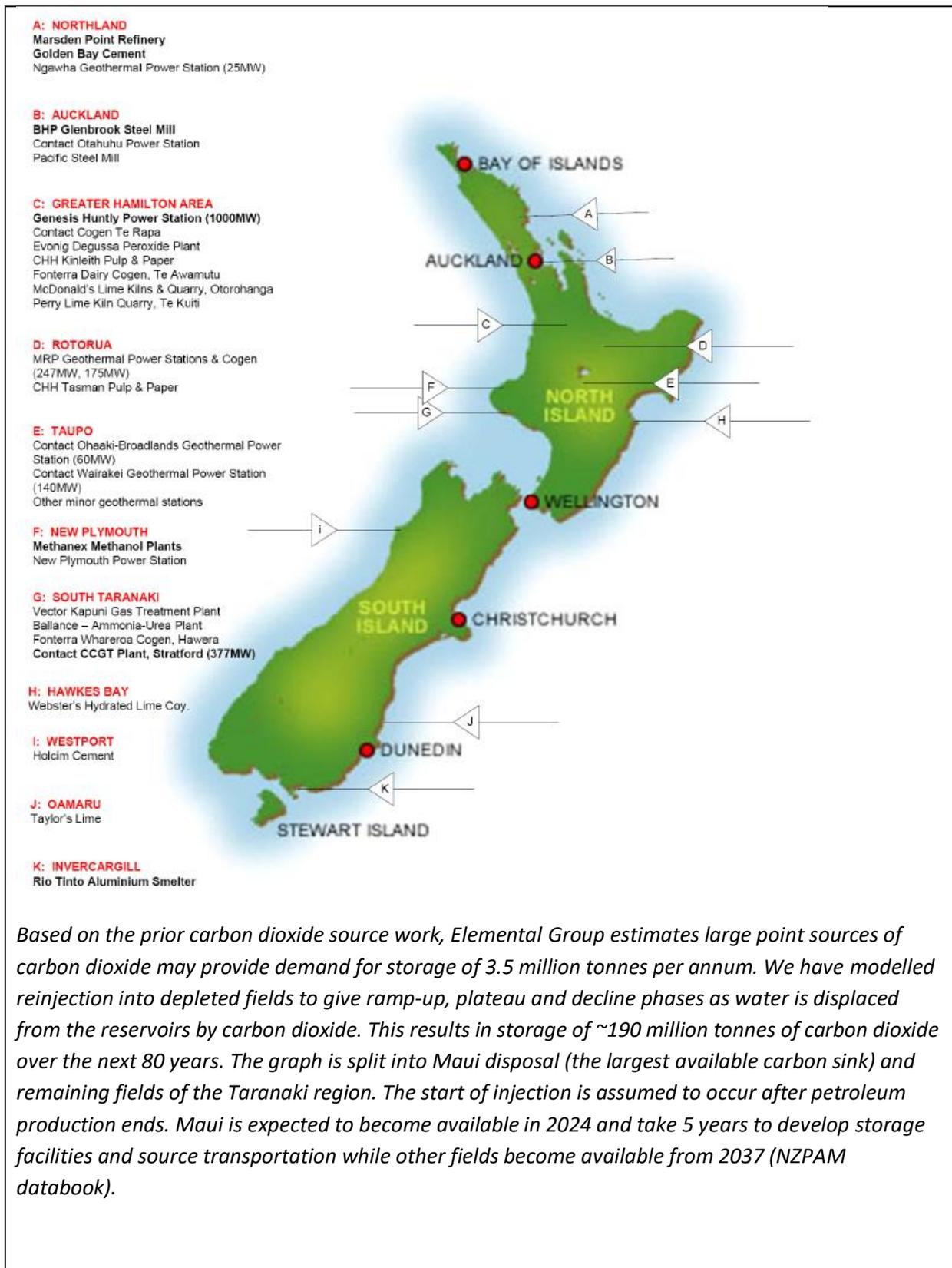
Question 2:

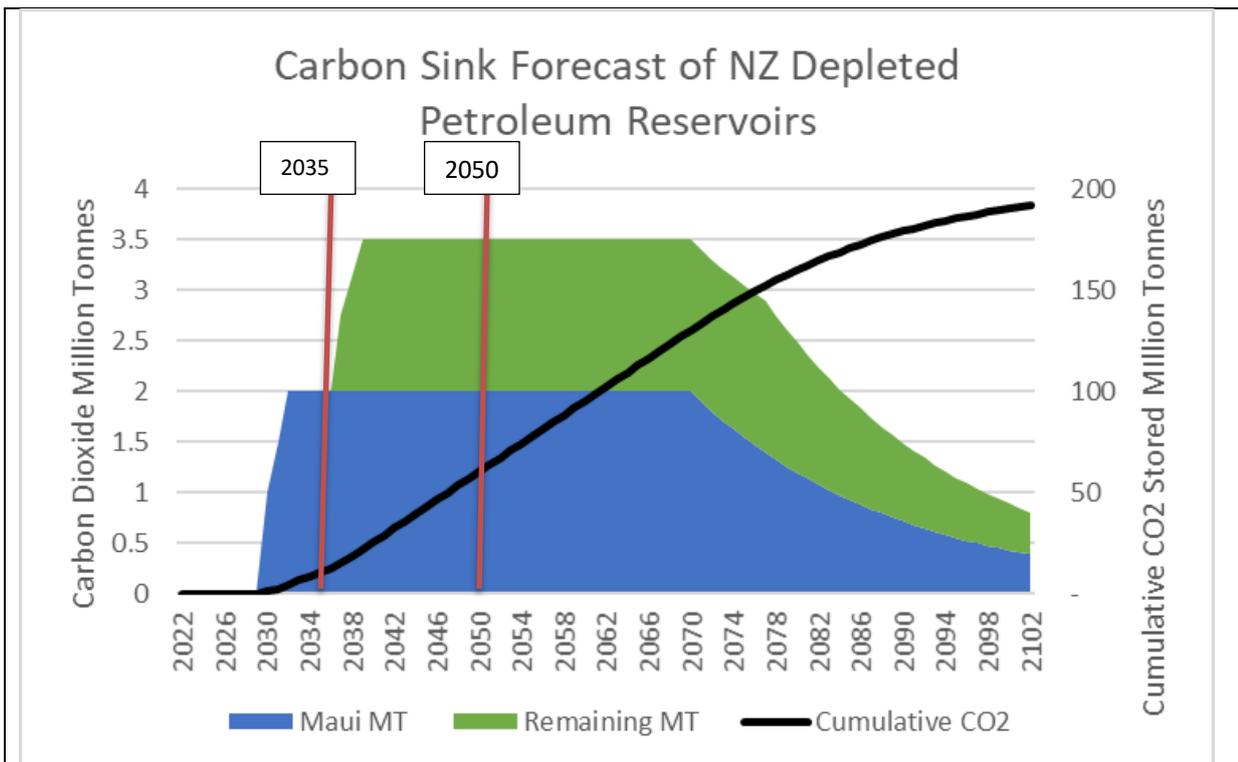
In your areas of expertise or experience, what actions or interventions may be required by 2035 to prepare for meeting the 2050 target set out in the Bill? Please provide evidence and/or data to support your assessment.

Answer:

An overview of the main NZ carbon emission sources are shown in the table below (taken from WP CCS study 2012). This equates to more than 8 million tonnes per annum, or 15% of New Zealand's annual emissions.

Location & Industry	Existing CO ₂ Separation?	Fewer Stacks/Vents?	CO ₂ above 1MMT/y?
Marsden Point Oil Refinery	Y	N	Y
Glenbrook Steel Mill	N	N	Y
Golden Bay Cement Mill	N	N	Y
Huntly Power Station	N	Y	Y
Motunui Methanol Plants	N	Y	Y
Stratford Power Station (incl Peaker Plant)	N	Y	Y
Tiwai Point Aluminium Smelter ⁴	N	Y	Y
Kapuni Urea Plant	Y	Y	N
Kapuni Gas Treatment Plant	Y	Y	N





As can be seen in the graph, 11 million tonnes of carbon dioxide is stored by 2035, 60 million tonnes of carbon dioxide is stored by 2050 and 190 million tonnes of carbon dioxide is stored by 2100. This represents just under half of the potential storage but is constrained by carbon dioxide sources and reservoir performance.

Question 3:

In your areas of expertise or experience, what potential is there for changes in consumer, individual or household behaviour to deliver emissions reductions to 2035? Please provide evidence and/or data to support your assessment.

Answer: N/A

Question 4:

When advising on the first three emissions budgets and how to achieve the 2050 target, what do you think the proposed Commission should take into account when considering the balance between reducing greenhouse gas emissions and removing carbon dioxide from the atmosphere (including via forestry)?

Answer: The carbon price needs to be factored into the cost for abating carbon dioxide emissions or the economic cost of shutting in the emitting activity. Some options will not be cost effective and abatement of carbon should be based on a creaming curve whereby easiest and cheapest

options are implemented first, moving to options that are more expensive in later parts of the carbon budget phasing. Tree farming of carbon dioxide must recognise the short time period (25 years) of abatement versus the longer term (thousands of years) impact from carbon storage in depleted petroleum reservoirs.

Question 5:

What circumstances and/or reasons do you think would justify permitting the use of offshore mitigation for meeting each of the first three emissions budgets? And if so, how could the proposed Commission determine an appropriate limit on their use?

Answer: N/A

Section B Emissions reduction policies and interventions

The proposed Commission will also need to consider the types of policies required to achieve the budgets it proposes. This consideration should include:

- sector-specific policies (for example in transport or industrial heat) to reduce emissions and increase removals, and
- the interactions between sectors and the capability of those sectors to adapt to the effects of climate change.

Question 6:

What sector-specific policies do you think the proposed Commission should consider to help meet the first emissions budgets from 2022-35? What evidence is there to suggest they would be effective?

Answer: Conversion of the available oil and gas fields assets/ infrastructure associated with to storage activities prior to their decommissioning may enable infrastructure to be available at a lower cost, and enable an earlier start of carbon storage. Managing this opportunity can bring down the cost of carbon storage. This would also be attractive as repurposing would reduce petroleum operators and the Crown's petroleum decommissioning liabilities.

Question 7:

What cross-sector policies do you think the proposed Commission should consider to help meet the first emissions budgets from 2022-35? What evidence is there to suggest they would be effective?

Answer: See 6. Crown minerals act and decommissioning of facilities to involve a repurposing review.

Question 8:

What policies (sector-specific or cross-sector) do you think are needed now to prepare for meeting budgets beyond 2035? What evidence supports your answer?

Answer: See 6.

Section C Impacts of emissions budgets

The proposed Commission will need to consider the potential social, cultural, economic and environmental impacts of emission budgets on New Zealanders, including how any impacts may fall across regions and communities, and from generation to generation. Potential impacts may be either positive or negative.

Question 9:

What evidence do you think the proposed Commission should draw upon to assess the impacts of emissions budgets?

Answer: N/A

Question 10:

What policies do you think the proposed Commission should consider to manage any impacts of meeting emissions budgets? Please provide evidence and/or data to support your assessment.

Answer: N/A

Section D Other considerations, evidence or experience**Question 11:**

Do you have any further evidence which you believe would support the future Commission's work on emissions budgets and emissions reduction policies and interventions?

Answer: *The Crown should commission a tender to plan conversion of existing petroleum fields to carbon storage fields and allow interested parties to show their commitment to using, converting or developing new infrastructure for carbon storage. This would include carbon source emitters, carbon dioxide subsurface operators and pipeline companies.*

The insights for the ICCC are that:

- 1. 190 million tonnes of carbon dioxide could be stored in existing petroleum reservoirs over the next 80 years*
- 2. Storage could ramp up to 3.5 million tonnes/a by 2040*
- 3. 11 million tonnes of carbon dioxide could be permanently sequestered by 2035*
- 4. 60 million tonnes of carbon dioxide could be permanently sequestered by 2050 and*
- 5. 190 million tonnes of carbon dioxide could be permanently sequestered by 2100*
- 6. This would cost \$13-48 billion.*
- 7. The economics improve if storage commences prior to end of field life.*

Nga mihi

Elemental Group



Brett Rogers

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