Call for evidence

We are calling for evidence on options available to reduce greenhouse gas emissions over the period 2022 to 2035.

Why are we doing this?

The Interim Climate Change Committee is the precursor to the proposed Climate Change Commission, expected to be established in late 2019 under the Zero Carbon Bill[1]. The Bill provides a framework to help New Zealand deliver on the objectives of the Paris Agreement.

A key part of the proposed Commission's work will be to advise the Government on emissions budgets.

Emissions budgets set the total emissions of all greenhouse gases permitted in the relevant budget period. The Government will set emissions budgets based on the proposed Commission's advice.

Why are we doing this now?

We are running this call for evidence now as foundation work for the proposed Climate Change Commission to enable it to start work immediately as soon as it is set up.

It will help identify relevant information for developing these emissions budgets, and to maintain a broad, robust and transparent approach in developing the proposed Commission's evidence base.

We have been asked to do this through our Terms of Reference. This work is also outlined in our letter to the Minister for Climate Change on 7 May 2019 here.

What are we looking for?

We are looking for high-quality, credible, evidence that will support the proposed Commission's work on emissions budgets. This is likely to include knowledge and evidence of technologies and options to reduce emissions, and the economic, environmental, cultural and social impacts of them. We are not looking for personal views or opinions.

What if I have already made submissions on similar topics?

If you have already submitted evidence as part of consultation run by Government agencies, such as the Zero Carbon Bill or the Ministry of Transport's Clean Car Standard and Discount, then we are happy for you to point us to those submissions, noting the key information or material that relates to our call for evidence.

[1] Climate Change Response (Zero Carbon) Amendment Bill: http://www.legislation.govt.nz/bill/government/2019/0136/latest/LMS183736.html.

What will we do with the evidence we gather?

We will use this information to inform our initial work on emissions budgets and add to the evidence base the proposed Commission will draw upon.

Confidentiality and data protection

All or part of any written response (including the names of respondents) may be published on our website www.iccc.mfe.govt.nz. Unless you clearly specify otherwise, we will consider that you have consented to both your name and response being published.

Please be aware that any responses may be captured by the Official Information Act 1982. Please advise us if you have any objection to the release of any information contained in your response, including commercially sensitive information, and in particular which part(s) you consider should be withheld, together with the reason(s) for withholding the information. We will take into account all such objections when responding to requests for copies of, and information on, responses to this document under the Official Information Act.

The Privacy Act 1993 applies certain principles about the collection, use and disclosure of information about individuals by various agencies, including the Interim Climate Change Committee. It governs access by individuals to information about themselves held by agencies. Any personal information you supply to the Committee in the course of making a response will be used by the Committee only in relation to the matters covered by this document. Please clearly indicate in your response if you do not wish your name to be included in any summary of responses that the Committee may publish.

Call for evidence: response form

We are looking for responses that are evidence-based, with data and references included where possible. Please limit your response to each question to a maximum of 400 words, plus links to supporting evidence, using the template provided. Please answer only those questions where you have particular expertise or experience.

We recommend that you refer to the Climate Change Response (Zero Carbon) Amendment Bill when considering your answers, which can be found here.

If you have any questions about completing the call for evidence, please contact us via feedback@ICCC.mfe.govt.nz. Please include a contact number in case we need to talk to you about your query.

Please email your completed form by **12 noon, Friday 15 November 2019** to feedback@ICCC.mfe.govt.nz. We may follow up for more detail where appropriate.

Contact details

Name and/or organisation	Dr Jurgen H Thiele, Senior Principal, Waste Value Recovery, Calibre
Postal Address	
Telephone number	
Email address	

Submissions on similar topics

Please indicate any other submissions you have made on relevant topics, noting the particular material or information you think we should be aware of.
Answer: The key material with relevant evidence made on this topic and submitted to NZ government agencies, Crown research and industry bodies were **(a)** JH Thiele (2018). ***Calibre submission to the NZ Productivity Commission Low Emission Economy DRAFT report***; **(b)** JH Thiele (2012). ***Future proofing our wastewater treatment infrastructure.*** Water New Zealand Annual Conference. 2012; **(c)** J H Thiele (2008). ***High Level Life Cycle Analysis Report for Anaerobic Digestion of DAF Sludge from a Meat Processing Plant***. 29 pages. Energy Scape Project Report for SCION and Foundation for Research, Science & Technology; **(d)** J H Thiele (2007). ***National Putrescible Waste Biofuel Potential Assessment***. 44 pages. Energy Scape Project Report for SCION and Foundation for Research, Science & Technology; **(e)** J H Thiele (2005) ***Estimate of the Energy Potential for Fuel Ethanol from Putrescible Waste in New Zealand*** Technical Report prepared for the Energy Efficiency and Conservation Authority. June 2005, 87 Pages

Commercially sensitive information

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

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: Please see the numbered list of relevant evidence sources from peer reviewed technical reports and biogas system application notes listed at the end of Section C. Proven options described in **evidence 1-5** as summaries are based on the use and combination of 4 key technology families for cost effective diversion of organic waste from landfills: (a) Treatment capacity upgrade of existing anaerobic digestion waste treatment assets in existing NZ municipal wastewater treatment plants. Upgrade by using proven systems to double waste throughput and quadruple biogas production from co-digestion of liquid trade waste. Biogas use to produce power or heat. Proven payback period < 4 years (PNCC and HCC WWTPs; total of 12 additional suitable sites in NZ today. **Evidence 1-5**). (b) Construction of a limited number (6-8) of new WWTP digesters in selected existing municipal WWTP to generate new biogas from WWTP biosolids and liquid trade

waste. Biogas use to produce power or heat. Proven payback period < 7 years (sites with sewage load > 80,000 ep; **Evidence 1-5**).

(c) Diversion of a large proportion of current pre-consumer food waste from food industries (WWTP DAF sludge) to the facilities under (a) and (b).

(d) Construction of new centralised agricultural biogas plants to (i) process dairy shed effluent with food industry processing waste and (ii), process piggery manure with food industry processing waste.

(e) Construction of new dedicated food waste based digestion plants for solid food waste from primary processing industries and post consumer waste collections.

(f) Extension of measures under (a) – (d) to smaller existing municipal WWTP (20,000 – 80,000 ep) with potential to increase cost effective organic waste diversion to existing municipal WWTP by a factor of about 1.5

(g) Use of the biogas from (c) to (f) as gaseous transport fuel (biomethane; local transport and scale dependent, on farm) or as industrial heating fuel and/or for peak power production in dedicated facilites.

(h) Use facilities under (a) – (g) to produce combined emission reductions in the order of . >1,000 kt CO2-e/annum with investment payback periods of < 8 years

(i) Complement measures (a) – (h) with increased use of council operated EV's and electric buses to maximise biogas capture for emission reduction.

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: The use of purpose grown additional biogas crops on less than 10 % of the arable and pastoral farming area can quadruple the biogas potential from municipal organic waste and animal manure (on a similar total area as the NZ farming land area German example, **evidence 3**). Groundwork for NZ applications of this precedent has in the past 10 years. Biogas upgrade to natural gas pipeline quality (biomethane) and distribution. Applications including carbon capture and storage (Hazer process and steam reforming) can create emission savings in the order of 20,000 kt CO2-e/annum with the proven technical potential to produce significant amounts of decarbonised transport fuel (electricity and/or hydrogen). The adaptation to and integration into NZ farming systems needs now to be fully developed, tested and demonstrated to prepare to harness additional emission savings in the order of 20,000 kt CO2-e/annum by 2050.

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: The transition to a circular economy approach to organic waste management by households and consumers is stimulated by the country-wide implementation and application of anaerobic digestion based waste management solutions. This is clearly demonstrated by the international energy agency (**evidence 1-5**). The technical and commercial robustness of this approach is shown by countries like Sweden, certain USA states and Germany who practice this since decades (**evidence 6- 10**).

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 sustainability of the emissions budgets and underlying technical tools should be assessed in social, economic and ecological dimensions including new export opportunities for NZ businesses. The opportunities created in an emissions abatement economy need to be taken into account. Especially those that constiture world leading agriculture based NZ solutions for removing carbon dioxide from the atmosphere. Integrated biogas crop farming regimes with average carbon capture yields of 12-15 t CO2-e/ha/yr (**evidence 1-5**) exist and offer new social and economic growth opportunities for NZ agriculture while maintaining todays social fabric in the rural areas.

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: Use of offshore emission mitigation is an unproductive measure because NZ has a large treasure trove of economical emission mitigation opportunities to achieve lower cost mitigation than purchased credits. Offshore emission mitigation should thus not be considered as a legitimate tool.

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: Enable now public investments to create by 2025 for establishing a growing network for decarbonised fuel distribution infrastructure for EVs (charging stations) and for heavy transport such as fuel stations for biomethane based natural gas vehicles and hydrogen vehicles. The Swedish example today is evidence for effective use of this tool.

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: Energy policy focus needs to be immediately on the farming sector and local authorities need to be encouraged for organic waste diversion, circular economy thinking and establishment of demonstration projects for cost effective biogas technology based (anaerobic digestion) emission reduction solutions. Public transport infrastructure growth needs to complement that in the urban environment. Rail needs to become an attractive and cost effective/convenient system for heavy transport, long distance people transport and goods distribution. A liquid biofuels industry needs to develop with drop-in biofuels in addition to a biomethane based heavy transport infrastructure. Convincing evidence for the success of this approach can be seen in Sweden and Europe today as examples.

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: I believe it is too early to answer this question now. It should be re-addressed after 2030 but the evolution of NZ farming practices for lower emissions and higher biofuel

yields is already crystallising in my view as a critical element of future policies. In my professional opinion, forestry is not such an attractive answer. Demonstration projects are needed now to learn and understand better options than forestry based solutions.

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: Outcomes of NZ specific scenario based impact assessments using climate models, socioeconomic models and energy and raw materials security of supply considerations.

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: In my view, the questions can only be answered after better understanding and more experience with the NZ specific constraints and requirements. This information should be used to assess the impacts of emissions budgets. Maybe this question needs to be raised again in 2025.

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: Not yet. In my view, the question can only be answered after better understanding and more experience with the NZ specific constraints and requirements to assess the impacts of emissions budgets. Maybe needs to be raised again in 2025.

Evidence Sources used:

1. JH Thiele (2018). The biogas production potential from municipal wastewater treatment facilities. BANZ website: biogas.org.nz/documents/memberresource/Biogas-production-potential-from-municipal-WWT-facilities.pdf
2. JH Thiele (2018). Calibre submission to the NZ Productivity Commission Low Emission Economy DRAFT report.
3. JH Thiele (2019a). Climate protection with anaerobic digestion – options and opportunities. Proceedings of the Bioenergy Association Workshop. 30 October 2019. The Evidence for Processing Organic waste to biogas. Bioenergy Association website: www.bioenergy.org.nz/event/evidence-for-processing-organic-waste-to-biogas
4. JH Thiele (2019b). The potential for processing dairy shed effluent as part of a circular economy business. Proceedings of the Bioenergy Association Workshop. 30 October 2019. The Evidence for Processing Organic waste to biogas. Bioenergy Association website: www.bioenergy.org.nz/event/evidence-for-processing-organic-waste-to-biogas
5. JH Thiele (2019c). Digester efficiency upgrades – how to double throughput and quadruple revenues. Proceedings of the Bioenergy Association Workshop. 30 October 2019. The Evidence for Processing Organic waste to biogas. Bioenergy Association website: www.bioenergy.org.nz/event/evidence-for-processing-organic-waste-to-biogas
6. Thiele et al (2016).Improved Trade Waste Co-digestion. Water e-journal 1 (3): 1-5
7. Long Nghiem et al. 2017. Full scale co-digestion of wastewater sludge and food waste: Bottlenecks and possibilities. Renewable and Sustainable Energy Reviews 72: 354-362 (2017)
8. US-EPA (2014). Food Waste to Energy: How Six Water Resource Recovery Facilities are Boosting Biogas Production and the Bottom Line. US-EPA Report, EPA/600/R-14/240 September 2014
9. Edwards et al (2017). Anaerobic co-digestion of municipal food waste and sewage sludge: A comparative life cycle assessment in the context of a waste service provision. Bioresource Technology 223: 237 -249
10. K Koch et al (2016). Co-digestion of food waste in a municipal wastewater treatment plant: Comparison of batch tests and full-scale experiences Waste Management. 2016 Jan;47(Pt A):28-33.
11. Bioenergy Association Information Sheet IS45: Actions to reduce methane emissions from waste. www.bioenergy.org.nz
12. Bioenergy Association Information Sheet IS47: Role of biogas in transition to low carbon economy. www.bioenergy.org.nz
13. Bioenergy Association Technical Guide 08: Production and use of digestate as fertiliser. www.bioenergy.org.nz

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