**Call for evidence**

 **Contact details**

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| *Name and/or organisation* | *Alzbeta Bouskova, Ph.D.**BPO Ltd.**As Convenor and on behalf of the Biogas Interest Group of the Bioenergy Association. This submission is to be read in the context of the wider submission of the Bioenergy Association provided by Brian Cox* |
| *Postal Address* |  |
| *Telephone number* |  |
| *Email address* |  |

**Submissions on similar topics**

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| *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:*Reducing methane and carbon dioxide emissions by processing of residual food waste to produce biogas and biofertilizer and avoid disposal to landfillSubmissions to: Productivity Commission Inquiry into Low Carbon Economy <https://www.bioenergy.org.nz/documents/resource/submissions/Productivity-Commission-Submission-180608a.pdf>MBIE Process heat discussion documentMfE Zero carbon Bill*Parallel submissions submitted on behalf of the Bioenergy Association:*1. Replacing combustion of fossil fuels by solid, gaseous and liquid biofuels to produce heat
2. Reducing methane and carbon dioxide emissions by best practice anaerobic digestion at waste water treatment facilities.
3. Assisting agriculture and horticulture farms adoption of circular economy principles and practices to reduce net farm greenhouse gas emissions
4. Reducing carbon dioxide emissions by replacement of fossil fuels by gaseous and liquid biofuels for transport.
5. Reducing carbon dioxide emissions by use of wood pellet fuel for space and water heating.

All relevant evidence which is available to support the Association’s submission is available from reports, workshop presentations and webinars available from the Bioenergy Knowledge Centre <https://www.bioenergy.org.nz/bioenergy-knowledge-centre> and the Association websites:[www.bioenergy.org.nz](http://www.bioenergy.org.nz)[www.biogas.org.nz](http://www.biogas.org.nz) [www.usewoodfuel.org.nz](http://www.usewoodfuel.org.nz)[www.liquidbiofuels.org.nz](http://www.liquidbiofuels.org.nz) Open access to all material can be made available to ICCC staff. |

**Commercially sensitive information**

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| *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 |

**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.

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| *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:* Reducing methane and carbon dioxide emissions by processing of residual organic waste to produce biogas and biofertilizer and avoid disposal to landfillAs demonstrated in the Information sheet 47 (link below), an encouraged uptake of anaerobic digestion has a potential to reduce the GHG emissions currently generated from treatment or disposal of industrial organic waste by 365 kt CO2e/year by 2035. If a more aggressive approach is taken, leading to a complete diversion of organic waste from landfill and treatment of the putrescible fraction of municipal waste in anaerobic digesters, the total GHG reduction would increase to 1,545 kt CO2e/year by 2035.[www.bioenergy.org.nz/resource/is47-role-of-biogas-in-transition-to-low-carbon-economy](http://www.bioenergy.org.nz/resource/is47-role-of-biogas-in-transition-to-low-carbon-economy)Further emissions would be avoided by using the liquid residue from anaerobic digestion, the digestate, as a substitute to mineral fertilisers. According to literature, digestate originating from processing of organic waste in an anaerobic digester has a potential to reduce GHG emissions by 26-36 kg CO2-e per tonne of wet waste processed. For a regional facility, such as the Ecogas Reporoa site treating 75,000 tonnes of waste per year (project supported by PGF with expected construction during 2020), the additional emissions reduction from application of digestate as a substitute of mineral fertiliser account to 2,700 kt. Anaerobic digestion can be implemented using existing (upgraded) digesters at municipal wastewater treatment plants, by retrofitting existing treatment facilities at industrial site or by constructing new dedicated treatment facilities either at industrial sites or regional waste recovery facilities. A new regional AD facility for treatment of organic waste has a typical capital investment cost of $10m - $20m with an Internal Rate of Return highly dependent on the avoided cost of other waste treatment/disposal alternatives (e.g. landfill) and the revenue from utilisation of AD products, i.e. biogas and digestate. Based on case studies (details presented to ICCC at the workshop on 30 Octover 2019), IRR of 20% or higher can be typically achieved if the avoided disposal cost (or gate fee) is higher than $30/tonne of waste and the digestate is valued as a replacement for mineral fertiliser. Benefits of using anaerobic digestion for processing of organic waste:* Reduction of the ultimate waste disposal volume and organic load when finally disposed of back into the environment.
* Eliminating or minimising the amount of waste disposed on landfills extends the disposal facility life and complies with the Waste Minimisation Act.
* Production of energy-rich biogas, which can be used for heat, electrical energy, cooling, or as a replacement transport fuel.
* In comparison to its conventionally used aerobic counterpart, anaerobic wastewater treatment requires considerably lower energy input and most of the energy is retained in the produced biogas. Reduction in the energy requirements of wastewater treatment plants leads to a secondary reduction of GHG emissions not accounted for in the above analysis.
* Anaerobic wastewater treatment processes generate substantially lower amount of waste sludge. This offers large operating cost (transport) savings for treatment plant operators.
* Digestate is a good, stable fertiliser substitute. The use of digestate closes the nutrient loop cycle by returning nutrients back into the environment and reduces the use of carbon-intensive mineral fertilisers.
* Production of pathogen free high grade fertiliser.
* Generation of electricity for on-site use avoiding retail price electricity.
* With biogas storage the generation of high value quick start or peaking electricity.
* Reduction of the odours associated with waste disposal facilities, which reduces the social unacceptability of disposal facilities.
* Reduction of vermin at disposal facilities (rats, mice, birds, hedgehogs).
* Reduction of disposal facility land instability post facility closure.
* Deals with organic wastes accountability with a quick treatment (typically 21 days) as opposed to 20 years or so in landfill disposal facility (long term methane leakage) with consequently much harder accounting for GHG emissions.
* Provides new employment opportunities and increase of regional growth.
* CO2, the by-product of biogas combustion in boilers or generators, can be further used for CO2 enrichment in horticulture hothouse crops, hence further increasing the benefits of using anaerobic digestion.

Further to that, the use of anaerobic digestion for processing of organic wastes aligns with the Global Sustainability Development Goals and the New Zealand’s Living Standard Framework. Anaerobic digestion contributes to at least nine of the 17 Sustainable Development Goals agreed by the countries of the United Nations to be achieved by 2030 (<http://www.worldbiogasassociation.org/wp-content/uploads/2018/12/WBA_SDG_Biogas_Report.pdf>)The oral evidence provided to ICCC at the workshop on 30 October 2019 forms part of this submission. <https://www.biogas.org.nz/resource/wshop191030-evidence-for-processing-organic-waste-to-biogas> |

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| *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 attached Information sheet 45 (link below) lists the actions required to enhance a wider uptake of anaerobic digestion for treatment of organic waste. The proposed actions are (please refer to Information sheet 45 for more detailed discussion on the listed actions):* Implementation of a nation-wide zero organic waste to landfill policy
* Government to introduce of policies to encourage early investment in processing of waste to product energy and biofertilizer
* Provide guidance, demonstration and assistance to business and territorial authorities for the planning, assessment and implementation of single or multi-stream treatment of food and organic liquid and solid waste to produce energy and other products.
* Provide guidance, demonstration and assistance to territorial authorities for upgrading and optimising WWTP for beneficial treatment of trade wastes providing reduction of emissions and operating costs.
* Assistance to agricultural organic waste producers to reduce methane emissions
* R&D into the high value uses of biogas such as a vehicle fuel and as a feedstock for the manufacture of bio-based materials

[www.bioenergy.org.nz/resource/is45-actions-to-maximise-reduction-of-methane-emissions-from-waste](http://www.bioenergy.org.nz/resource/is45-actions-to-maximise-reduction-of-methane-emissions-from-waste)  |
| *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:* International experience demonstrates that anaerobic digestion is most effectively carried out on source segregated waste with low requirement for pre-processing contaminants removal. Improved collection of waste with increased focus of business and communities on separation at source has proven to increase the level of recycling and reuse of organic waste which would otherwise have gone to landfill. The residual waste after separation for recycling and reuse is however able to be either treated by anaerobic digestion (for the wet portion of the waste); made into compost; or used as a fuel for the production of heat from combustion of the dry material. The waste hierarchy concept promoted by the Waste Minimisation Act is starting to drive waste policy in many communities. Businesses, in particular, are finding that beneficial use of production residues can improve business sustainability.There is significant potential for all members of the community and business to change behaviour and adopt many of the wide range of bioenergy and biofuels solutions.Several councils have trialled segregating organic waste for separate collection. The outcome of these trials is that substantial effort and investment needs to be provided for education and engagement of the public sector on the benefits and implications of separate collection of food waste. This has to be supported by a strong signal from the government with large emphasis on demonstration projects and support to local authorities to deliver suitable tailored education campaigns and programmes.. |

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| *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:* A regional waste treatment facility with a footprint of 2 Ha and processing 75,000 tpa of organic waste diverted from landfill has a potential to reduce GHG emissions equivalent to planting 15 million trees or a 30,000 ha of forest.There are currently 21 sites identified for future regional anaerobic digestion facilities. Together these facilities will deliver a GHG reduction equivalent to between 323 million and 1.29 billion trees​.The above assessment demonstrates the clear advantage of the bioenergy solution over the use of forestry.The additional benefits of diverting organic waste from landfills are discussed in Question 1. |

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| *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:* The Bioenergy Association does not under any circumstances support the use of offshore mitigation because with proactive planning and management each of the emission budgets can be met from domestic initiatives. Because the Commission has the opportunity to set appropriate budgets and the long lead times if these are not achieved then this is an indictment on the effectiveness of implementation. When setting the budgets if there is a likely shortfall during any period so that the 2050 target may not be met then there is adequate lead time prior to that period for investigation of how the possible gap can be filled, and action taken to ensure the gap does not occur.Analysis has shown that collectively there are adequate possible initiatives that can be taken to meet the 2050 targets so if the targets are not met this will be due to a failure of governance. |

**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.

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| *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:* The Bioenergy Association proposes the adoption of zero organic waste to landfill target introduced at the national level. There is substantial evidence that demonstrates the effectiveness and benefits of policy driven diversion of organic waste from landfill including:* WRAP UK Landfill Bans: Feasibility Research <http://www.wrap.org.uk/sites/files/wrap/Landfill%20Bans%20Feasibility%20Research%20Final%20Report%20Updated.pdf>
* EEA Report No 7/2009: Dvierting Waste From Landfill. Effectiveness of waste‑management policies in the European Union <https://www.eea.europa.eu/publications/diverting-waste-from-landfill-effectiveness-of-waste-management-policies-in-the-european-union>
* Waste management policies and policy instruments in Europe

<https://www.ecologic.eu/sites/files/publication/2015/holiwastd1-1_iiiee_report_2__0.pdf> Additional strategies and policies are discussed in the generic Bioenergy submission provided by Brian Cox. |

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| *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:* The Bioenergy association proposes to (Information Sheet 45):* Allow for accelerated depreciation of renewable energy, waste to energy and energy efficiency capital investments to recognise that renewable energy and energy efficiency equipment is more capital intensive but often has lower on-going operating costs than alternatives.
* Central Government to introduce procurement policies so that:
	+ utilisation of waste and renewable energy options must be considered as a priority when making capital investment decisions on waste,
	+ all costs and benefits are included in a full life cycle analysis of options, and
	+ if investment recommendations do not lead to a renewable energy solution that the reasons for not adopting such a solution are explicit.
* Government's project appraisal model uses a CO2-eq emission cost profile assumption published by MfE from time to time. This profile takes account of assumed movement over time as a result of the ETS (This approach/modelling will also demonstrate that the Government is taking clear long-term decisions that reflect the likely real price of carbon over the life of the methane-fuelled plant i.e. 20 years plus).
* Local councils be required to introduce life-cycle based procurement policies similar to those adopted by central Government.
* Extend the period of Crown Loans for biogas facilities beyond the current 5 years to better reflect the economic lifecycle costs and benefits of a waste processing facility.
* Use the proposed Green Fund to assist territorial councils invest in projects that wouldn’t otherwise get done because of competition for capital.
	+ Encourage use of anaerobic rather than high operating cost aerobic WWTP.
	+ Encourage waste treatment solutions which integrate multi-waste streams from municipal, industrial and agricultural sources
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| *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:* The policies and programmes pre and post 2035 should be the same. The separate budget periods are simply a means of establishing priorities. Some emission reduction initiatives can have a quick effect and should be implemented immediately while other initiatives are longer term and will not produce emission reductions until later budget periods.*The evidence is that utilisation of waste for production of biogas can be used immediately. The technology is well established and proven as demonstrated through thousands of anaerobic digestions plants globally. The bioenergy and biofuels markets will take time to evolve and may require significant large scale capital investment, both of which take time so emission reductions from these will not occur until later budget periods.* |

**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.

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| *Question 9:* *What evidence do you think the proposed Commission should draw upon to assess the impacts of emissions budgets?*  |
| *Answer:* The current emissions accounting system (GHG emissions inventory) from waste relies heavily on generic values and estimates. More data needs to be collected and monitored to establish a clear base line and the effects any solutions provide. There is also currently no recognised framework for calculating the GHG emissions offset from biogas and biofertilizer projects. This will need to be established. The Bioenergy Association has the expertise to develop a suitable methodology based on overseas examples and experiences. |
| *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 line with the ETS, producers of GHG emissions will need to monitor their contribution. This information will need to be processed centrally and used for assessing progress. |

**Section D Other considerations, evidence or experience**

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| *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 Bioenergy Association invites and would welcome the opportunity to work with ICCC the central government of developing a sustainable strategy for establishing, meeting and accounting the emissions budgets*.*  |

Please email your completed form to feedback@ICCC.mfe.govt.nz by **12 noon, Friday 15 November 2019.**

If you have any questions about completing the call for evidence, please contact us via feedback@ICCC.mfe.govt.nz.