

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 Bill¹. 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	Hannah Ritchie New Zealand Pork Industry Board
Postal Address	
Telephone number	
Email address	

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>
Answer: Submission to the Environment Select Committee on the Climate Change Response (Zero Carbon) Amendment Bill

With reference to Section 3: Protecting Domestic Pork Production in a Low Emissions Economy, for information on the pressure imported products are having on the domestic pork industry.

Submission to the Ministry for the Environment on the Action on Agricultural Emissions Discussion Document

With reference to Sections 5: Feedback on Proposals: Long Term Options for 2025 and beyond and Section 6: Feedback on Proposals: Interim Options until 2025, for background information on pork industry emissions and domestic vs imported pork trends

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

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:

In 2017, greenhouse gas emissions from pigs totalled 74.9kt CO₂-e². This accounted for just 0.2% of total agricultural emissions. This small contribution is due to the industry's size when compared against the dairy, beef and sheep industries in New Zealand. Additionally, as pigs are monogastric animals, they contribute relatively limited CH₄ emissions through enteric fermentation.

The emissions profile of pigs is different to that of the ruminant livestock sector. Within the pig farming sector, manure management accounted for almost 70% of emissions (CH₄ and N₂O) in 2017. Enteric fermentation accounted for less than 10% of emissions.

As an industry we are fortunate that mitigation options already exist to significantly reduce emissions from the pork sector to 2035 and beyond. However, some options may be cost prohibitive to farmers, and more research is needed on the effects of some options on pig productivity. There are also knowledge gaps in greenhouse gas emissions and mitigation options specific to the New Zealand pork sector, due to their being limited or no New Zealand-specific research available in some instances.

Reducing emissions from manure management practices

Most emissions from manure management from the pork sector are from CH₄ produced during the storage and treatment of manure. In 2017, CH₄ from manure management accounted for 53% of total emissions from the pork sector, with a further 15% from N₂O². The production of CH₄ from animal effluent depends largely on the concentration of volatile solids excreted by the animal and the environmental conditions by which each animal waste management system stores or treats the effluent (e.g. anaerobic or aerobic environments). Modelling undertaken by the Massey Monogastric Research Centre indicates there are limited opportunities available to decrease VS excretion rates while keeping feed cost viable³. However, there is scope to manage the environmental conditions as well as retention time of the system which relate to the quantity of emissions released from the animal waste management system.

CH₄ emissions from manure management can be broken down according to the various animal waste management system being used (see Figure 1 below). In 2017, anaerobic ponds treated 20% of manure, but contributed 75% of the industry's CH₄ emissions from manure management.

² New Zealand's Greenhouse Gas Inventory 1990-2017.

³ Prof. P. Morel, Massey University, unpublished work 2011

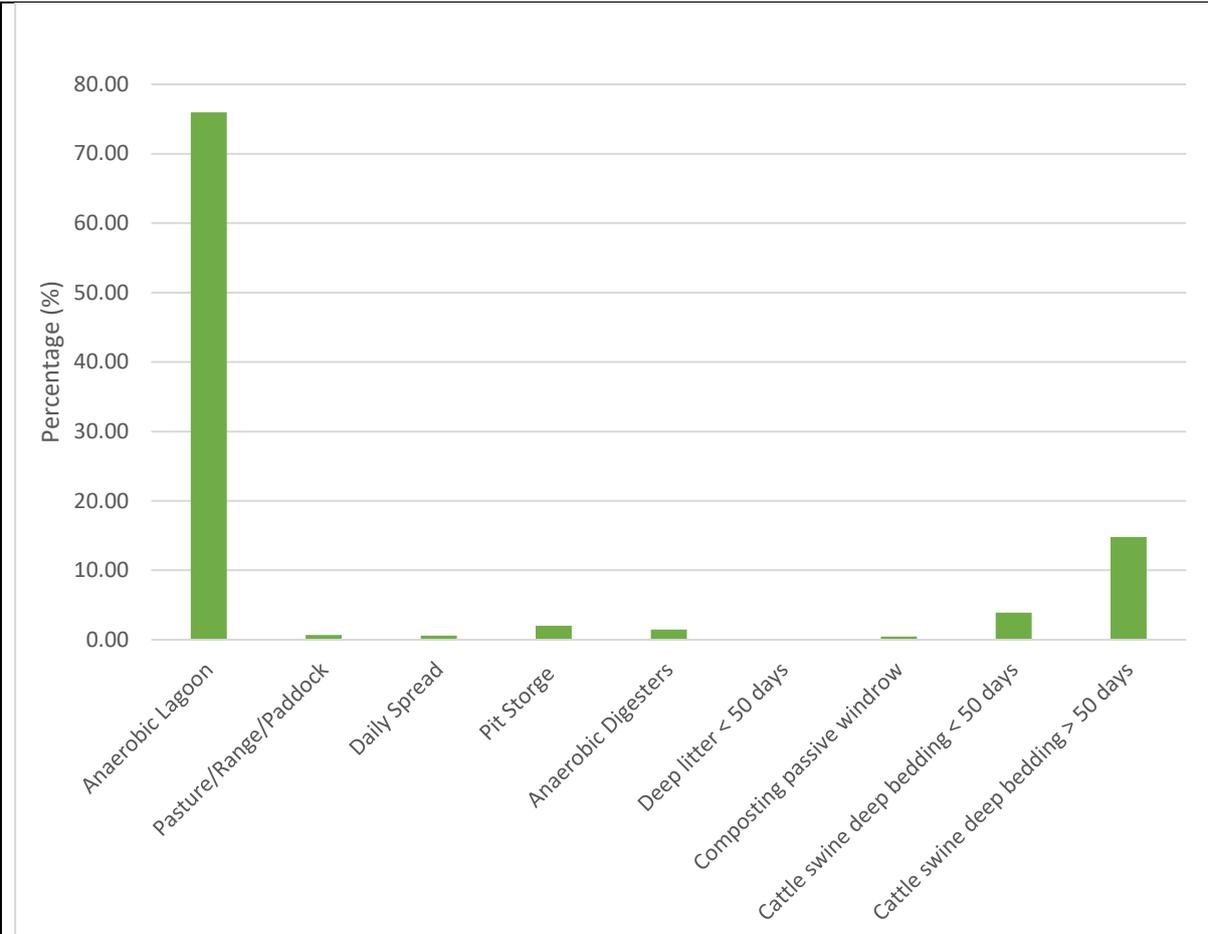


Figure 1: Distribution of CH₄ emissions by percentage from animal waste management systems for the 2017 calendar year.

There are several available methods of reducing emissions from anaerobic ponds including covering ponds, reducing quantity of volatile solids entering ponds by a solid's separation process, and reducing retention time of waste in ponds.

Covering ponds and burning methane substantially reduces CH₄ emissions and provides an opportunity to offset emissions by converting methane to biogas for use within the piggery. There is currently some uncertainty around emission factors applied to covered pond systems in New Zealand. Default Methane Conversion Factors (MCFs) in the Intergovernmental Panel on Climate Change (IPCC) guidelines for anaerobic digesters range from 1.00% to 12.97% for temperate climates, dependent on the quality of the technology and potential for leakage. Using a worst-case scenario MCF of 12.97%, we estimate that if all anaerobic ponds were covered, CH₄ emissions would reduce by approximately 21.45kt CO₂-e⁴, representing an overall emissions reduction for the sector of 29% (not accounting for potential offsets for the utilisation of methane as biogas for energy use on the farm). There is also an environmental co-benefit of reducing odour produced by the anaerobic digestion process within the covered pond.

⁴ Based on % breakdown of manure management systems for pigs used in the NZ Greenhouse Gas Inventory 2017 calculations.

This represents a significant opportunity to reduce emissions from the pork sector to 2035. However, capital costs for the covered pond biogas recovery systems are in the range \$100,000 - 200,000, which is a significant barrier to uptake, particularly in the current economic climate, and will put this option out of reach for many farmers unless co-funding opportunities such as grants are made available.

The removal of solids from the effluent stream before it enters the pond system has the potential to reduce the amount of CH₄ that will be emitted, by lowering the amount of volatile solids entering the anaerobic environment. A literature review undertaken by NZPork to determine the effects of solid separation techniques on the volatile solids and nitrogen loading rates into various animal waste management systems treating piggery effluent indicated that use of solid separation systems could result in on-farm emissions reductions from animal waste management systems by 20-30%, equating to 10-15kt CO₂-e based on 2017 emissions.

Another option for reducing CH₄ emissions from animal manure management systems is to remove or reduce the storage requirement of the manure. The removal of the anaerobic lagoon component within a waste management system and instead applying daily direct to land would significantly reduce the CH₄ emissions from a piggery. The IPCC 2006 guidelines note that this practice has an MCF of 0.5%, compared with 75% for an anaerobic lagoon. However, this is not likely to be a practical option year-round in New Zealand, as direct application of manure to land can cause adverse environmental impacts under certain conditions. In NZ, there are periods of time throughout the year where soil moisture content is at or close to saturation. The application of irrigated waters to the soils at this time would result in high nitrogen loss through overland flow or leaching. Nationally, nutrient concentrations in receiving water bodies are a concern for regional councils and nutrient application to land is carefully managed through regional planning and provisions. Therefore, we don't anticipate this being a viable option for many farmers.

Reducing emissions through dietary manipulation

Reductions in N₂O emissions from manure management are possible through feed manipulation. Tailoring diets to correctly meet the nutritional requirements of pigs at various stages of growth to reduce excreted nitrogen appears to be a feasible solution to reduce N₂O emissions. However, formulating more specialised diets will have an economic cost because the use of better-quality ingredients will lead to more expensive diets. Using improved genotypes selected for improved growth rate and feed utilisation further reduces the losses. This improvement in genetics is ongoing with Pig Breeding Companies actively selecting for faster growing pigs that utilise feed more efficiently. Research by Massey University's Monogastric Research Centre have indicated that altering standard diets fed to NZ pigs could reduce the quantity of excreted nitrogen by approximately 33%⁵

Diet variability also has the potential to affect the concentrations of CH₄ emitted from an animal and can result in a range of emissions. Dietary fibre intake is the main source of CH₄ emissions from enteric fermentation. Feeds that ferment rapidly to produce a high

⁵ pers comm. Prof Patrick Morel, Massey University 2011

proportion of propionic acid (e.g. cereals) produce less CH₄ than fibrous feeds (e.g. grasses). Therefore, the enteric CH₄ production may be reduced by altering the feed composition of the diet. However, feeding pigs is a complex issue, and feed composition and feeding strategies should satisfy a number of various aspects, including welfare, health, productivity and environmental impacts. Further work is required to examine the feasibility of these diet changes as well as their effects on productivity on farms, so we do not yet know the extent to which these mitigation measures could be expected to reduce emissions to 2035.

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 targets set out in the Bill are zero net CO₂ and N₂O and 24-47% net reduction in CH₄ by 2050. Actions and interventions which may be required by 2035 to prepare the pork sector for meeting the 2050 target include:

Funding for farmer uptake of available mitigation technologies

Reductions in CH₄ to the lower extent required by the bill are already technically feasible for the pork sector through the covering of effluent ponds, however in many cases this will be cost prohibitive for farmers to implement, as described in Q1 above. Action to incentivise the covering of effluent ponds and capturing biogas, such as a contribution to costs, will likely be required to facilitate uptake of this option. Piggery owners in NZ have made use of grant schemes from the Energy Efficiency and Conservation Authority in the past to contribute to the capital costs of installing biogas recovery systems. Similar funds or grant schemes should be made available to pig farmers prior to 2035 for the implementation of this and other emissions reduction technologies.

Pork producers in New Zealand are able to make use of food waste and by-products, such as bakery products and dairy processing by-products, for pig feed. This practice has increased in recent years, from approximately 12% of total feed in 2006 to 20% in 2019⁶. The disposal of food waste poses a large environmental problem, with New Zealanders throwing away 157,389 tonnes of food a year⁷. A UK study into the environmental and health effects of using food waste as animal feed found that converting municipal food wastes into pig feed would lead to lower environmental and health impacts than processing waste by composting or anaerobic digestion⁸. However, this may be

⁶ pers comm. Ian Baurgh, Massey University, 2019

⁷ According to Love Food Hate Waste New Zealand, <https://lovefoodhatewaste.co.nz>

⁸ Environmental and health impacts of using food waste as animal feed: a comparative analysis of food waste management options, Journal of Cleaner Production, Volume 140, Part 2, 1 January 2017, Pages 871-880. Ramy Salemdeeb, Erasmus K.H.J.zu Ermgassen,,Mi Hyung Kim, Andrew Balmford, Abir Al-Tabbaa, 2017.

confounded by the nature of the food waste in that less digestible feed ingredients will have a higher volatile solids content.

Feeding more waste food to pigs could also yield other benefits, including improving the profitability of pig farming by taking pressure off feed costs. Feeding waste food to pigs safely can be a win-win for farmers and the environment.

However, reutilising food waste and by-products requires capital input from the farmer for the on-farm infrastructure required to support waste and by-product feeding. Food waste systems are based on computer controlled wet feed systems, feeding into a trough. Additional costs are associated with transporting food waste, which requires scale of production and for this reason it is often not an economically viable option for smaller producers. Because a lot of these waste food ingredients are perishable, they have to be processed on farm, blended to make up a balanced diet and fed to pigs as soon as possible. This requires large numbers to consume the processed feed. The commercialisation of food waste processing and reuse for piggeries is complicated by quality control issues: food must remain uncontaminated and fit for consumption by pigs, which can be difficult to manage on a large scale.

Funding or other incentives made available to farmers to remove some of the barriers associated with waste food reutilisation and support uptake beyond 20% would reduce food waste volumes to landfill and offset emissions from the pork sector to contribute to meeting the 2050 emissions reduction target.

Funding for industry led research

To better understand the extent to which mitigation methods can be implemented by the pork sector to meet the 2050 target set in the bill, and the likely environmental, economic and social effects of these methods, more research is needed prior to 2035, including in the following areas:

- Verification of the emissions factors of animal waste management systems in the NZ environment, particularly where current emissions factors are derived from international data or from the ruminant sector. This includes emissions factors for anaerobic ponds, anaerobic digesters and deep litter bedding.
- To improve understanding of the emissions profile of manure management where more than one animal waste management system is in operation.
- To test the effect of manipulating diets to reduce N₂O and CH₄ emissions on animal productivity.
- To identify and trial new opportunities and emerging technologies for emissions mitigation. For example, the Australian Pork Cooperative Research Centre (Pork CRC) have undertaken a research programme to establish pork production systems that are carbon neutral through novel use of nutrient sources such as algae.

The pork industry is committed to leading and funding research in these areas, but as a small industry with a correspondingly small levy base, co-funding opportunities for research will be needed prior to 2035 to enable progress in these areas.

Incentivising pork production as a low emission animal protein source

Pork is a naturally low emission protein source. Total emissions per kg of product for New Zealand pork are less than 2kg CO₂e/kg meat⁹, compared with 23 CO₂e/kg meat for sheep, 29 CO₂e/kg meat for deer and 10 CO₂e/kg meat for beef cattle¹⁰. As such, pork has the potential to play a significant role in consumer diets in a low emissions economy, as discussed further in Q3. However, the domestic pork industry in New Zealand is under significant pressure from imported pork products.¹¹ In the wake of the spread of African Swine Fever across the globe, New Zealand should not rely on the availability of imported pork products. Maintaining domestic pork production is therefore essential to maintaining the availability of pork in New Zealand.

Government led policy or programmes which incentivise pork production would help to ensure the viability of the domestic pork industry and potential it offers as a low emission animal protein. These could include:

- Pricing mechanisms to encourage consumption of New Zealand pork over imported products.
- Incentives to diversify land use to include pigs – e.g. as part of a mixed model farming system.
- Increased focus on pork production in agricultural industry training and tertiary institutes.
- Driving consumer demand for lower emission food products – e.g. through mandatory emissions food labelling

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 potential for consumer behaviour to deliver emissions reductions to 2035 is significant for the food industry, particularly if consumers are encouraged to make food choices that are lower in greenhouse gas emissions.

⁹ Recalculate Pork Industry emissions inventory, MAF Technical Paper No: 2012/05, J Hill, 2012.

¹⁰ Rural Workshop Background Material, Interim Climate Change Committee, 2019.

¹¹ Refer NZPork submission to the Action on Agricultural Emissions discussion document for further details.

In New Zealand, a transition toward a plant-based diet is often emphasised to consumers as a method of mitigating the climate impacts of their dietary choices¹². However, swapping consumption of high emission intensity meat such as lamb for a low emission intensity meat such as pork, would also provide significant emissions reductions and may be a more palatable suggestion to those for whom vegetarianism does not appeal, or those following a flexitarian diet.

CO₂e emissions per kg of pork meat are significantly lower than emissions from the red meat sector (see answer to Q1). In 2018, on average New Zealanders consumed 11.9kg beef and veal, 4.7kg sheep meat and 18.9kg pork¹³. Based on these figures, if consumers were to replace just half of red meat consumption with pork, emissions would reduce by approximately 100kg CO₂-e per person per year¹⁴.

Data from the most recent OECD and Food and Agriculture Organisation of the United Nations Agricultural Outlook shows in the 10 years to 2017, New Zealand's pork consumption per capita has grown. But this increase in consumption has been met through increasing imports (refer Figure 2).

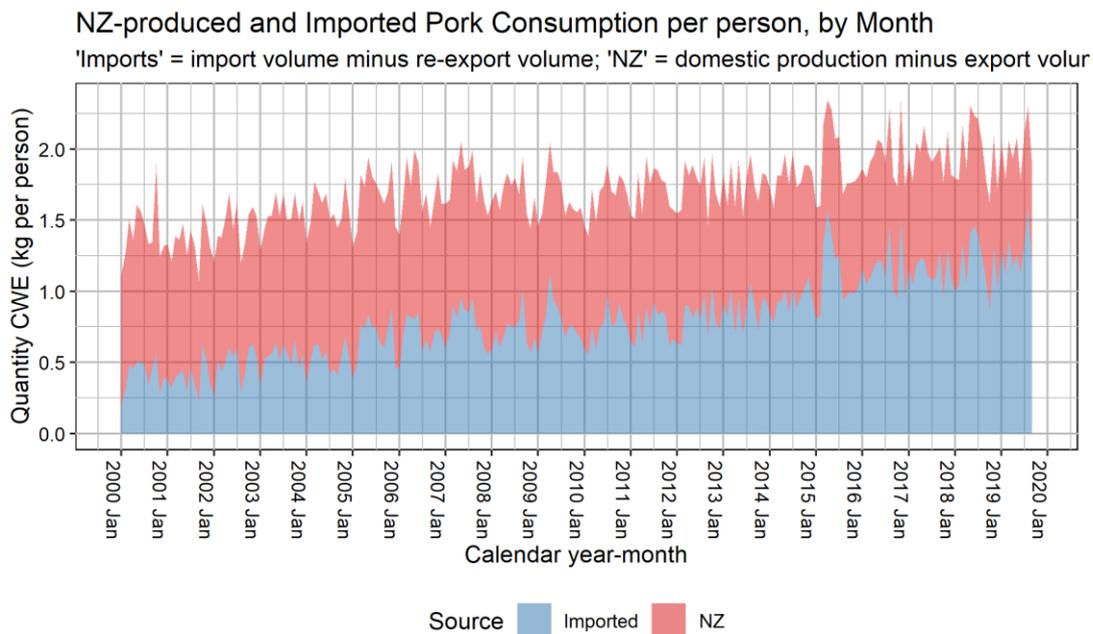


Figure 2: NZ produced and imported pork consumption per person, by month.

The domestic pork industry is significantly trade exposed with respect to imported pork products. NZ pork producers cannot compete with imported products on price for several reasons¹⁵. The increasing consumption of imported pork by New Zealanders is contradictory to Government advice to 'eat local' to reduce greenhouse gas emissions¹⁶,

¹² The Ministry for the Environment's advice on mitigating climate change is to 'eat less meat': <https://www.mfe.govt.nz/climate-change/we-all-have-role-play/what-you-can-do-about-climate-change>

¹³ <https://data.oecd.org/agroutput/meat-consumption.htm>

¹⁴ Based on IPCC figures for emissions per kg product as defined in Q2 response.

¹⁵ Refer to the NZ Pork submission on Action on Agricultural Emissions for more details.

¹⁶ <https://www.mfe.govt.nz/climate-change/we-all-have-role-play/what-you-can-do-about-climate-change>

and contributes to global emissions associated with maritime shipping, estimated to be 1 billion tonnes CO₂-e/yr¹⁷.

Therefore, substituting red meat for pork will have the most benefit to consumer greenhouse gas mitigation only if consumers value, and consciously choose, New Zealand produced pork over imported products.

Further costs incurred to NZ pork producers, which will occur if livestock emissions from pork are priced as intended under the Climate Change Response (Emissions Trading Reform) Amendment Bill, will further accentuate the price disparity between domestic and imported pork and lead to further reliance on imported pork products to meet consumer demand as the most affordable option. To address this, a policy or regulatory framework to support domestic food production and reduce price disparities between domestic pork and imports may be required.

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:

No response

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:

No response

¹⁷ Trimmer, C. and Godar, J. (2019). Calculating Maritime Shipping Emissions per Traded Commodity. SEI Brief. Stockholm Environment Institute. <https://www.sei.org/publications/shipping-emissions-per-commodity/>

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:

No response

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:

No response

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:

No response

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:

No response

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:

No response

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:

No response

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

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