SUBMISSION

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To:	Environment Select Committee
Submission on:	Climate Change Response (Zero Carbon) Amendment Bill
Date:	12 July 2019
From:	**Federated Farmers of New Zealand**

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SUBMISSION TO THE ENVIRONMENT SELECT COMMITTEE ON THE CLIMATE CHANGE RESPONSE (ZERO CARBON) AMENDMENT BILL

1. INTRODUCTION

1.1 Federated Farmers of New Zealand welcomes the opportunity to submit to the Environment Select Committee on the Climate Change Response (Zero Carbon) Amendment Bill (ZCB). Federated Farmers supports New Zealand playing its part in addressing climate change by pursuing action consistent with the goals of the 2015 Paris Agreement, including the need to safeguard food security. *This is elaborated on Sections 1 and 2 of Appendix 1*

1.2 Federated Farmers represents sheep, beef and dairy farming families that play a significant part in rural and provincial communities and economies and their products make a significant contribution to New Zealand's exports and employment.

1.3 This Bill has significant implications for the economic and social viability of our country's farming families and, if enacted and enforced in its current form would, given a lack of cost-effective options to reduce methane emissions (other than continual retrenchment), ultimately destroy New Zealand's livestock sectors.

1.4 The economic, social and employment repercussions of the 2050 24-47% reduction target for biogenic methane are eye watering for farmers and New Zealand with the current tools farmers have at their disposal.

- Costs on sheep farmers could be as high as 123% of their profits (*BERG report)*
- Average dairy farmers' profits cut by up to 60% and between 7% and 12% of dairy farmers are unable to meet their annual debt obligations by 2030 and 2040, respectively (*DairyNZ report)*
- Reductions in factory gate income from the dairy and red meat industries reaching as much as $14 billion per annum and climbing – this equates to the estimated total loss to New Zealand's GDP (as at June 2012) of a Foot and Mouth outbreak similar to the one that struck Europe in 2001.

1.5 That is not to say that there is no hope – just that the livestock sectors should be treated equitably and must be provided with the ability to thrive while the concerted effort to find technologies that reduce emissions, methane emissions in particular, that both enable reductions to occur and production to continue, are developed.

1.6 The other big risk associated with overly ambitious biogenic methane reduction targets is that New Zealand's reduced production will be replaced with production in countries that have higher emissions per unit of output and are often subsidised. This is internationally known as "emissions leakage" and results in higher food costs and higher greenhouse gas emissions.

1.7 Our farmers want to do their bit, and this applies to achieving methane reductions. They are prepared to work hard to do their fair share – but what is being asked of them is much more. Reduction targets for biogenic methane should be based on the same premise as the reduction targets for carbon dioxide – all targets should equate to what is required of each gas for it to equate to zero carbon – to stop contributing to additional warming.

1.8 Farmers are proud to be amongst the most efficient producers in the world and, unlike many of their overseas competitors essentially stand on their own two feet, as their animals stand on their own four feet, largely unsubsidised by consumers (by way of inflated prices) or taxpayers and have done so for over 30 years. Give our farmers a problem and they will find a solution. However, telling them that they must respond to a price on methane when there are limited tools in the toolbox is a bridge too far.

1.9 Despite the overwhelming challenge, New Zealand farmers accept the need to further reduce their greenhouse gas footprint. Our farmers support the need to reduce gross long-lived gases (carbon dioxide and nitrous oxide emissions). On the same basis they support the need to reduce biogenic methane (a short-lived gas) so that its effect on global temperatures is warming neutral.

EXECUTIVE SUMMARY

2.1 Federated Farmers supports aspects of the ZCB, including provision for the Climate Change Commission, emissions budgets, taking a split gases approach to emissions reduction, and adaptation measures. While we support the split gases approach we strongly oppose the ZCB's proposed implementation of a split gases approach, particularly the resulting proposed emission reduction targets.

2.2 The 2030 and 2050 biogenic methane reduction targets outlined in the ZCB (gross 10% by 2030 and gross 24-47% by 2050) go well beyond what is required for biogenic methane emissions to be 'zero carbon equivalent' and to achieve 'no additional warming' by 2050 (the basis for the 'net zero' target for all other gases).

2.3 Note that neither of the proposed 2030 or 2050 targets in the ZCB relate directly to achieving the zero carbon objective of the Bill:

- Federated Farmers has been informed by the government that the 10% 2030 target is based on the past increased efficiency gains made by the pastoral sector of 1% per year. As well as not measuring the same objective, continued efficiency gains of 1% per year are by no means guaranteed; and
- Federated Farmers understands that the 24-47% 2050 target is based on modelled greenhous gas reduction scenarios in the, international, IPCC Special Report in which the the report's author, Myles Allen, warned New Zealand policy makers against using this global target in national policy. *(refer paragraph 6.7).*

2.4 Methane is a short-lived greenhouse gas that flows in and out of the atmosphere over a short time frame and therefore does not accumulate in the atmosphere like many other greenhouse gases. There is however, a slight lingering warming effect from methane and an annual 0.3% reduction is required to account for this slight but persistant waming effect in order for total methane emissions to achieve no additional warming and so be zero carbon equivilant. These figures are based on current atmospheric conditions and the most up to date peer reviewed research. *This is further elaborated on in Section 1 and 3 of Appendix 1*

2.5 The current biogenic methane reduction targets in the ZCB require farmers to reduce methane at a three to four times greater rate than what is required it no longer contribute to additional global warming and to achieve zero carbon equivilant and three times what is required for other greenhouse gases to reach carbon zero by 2050 .

2.6 The biogenic methane reduction targets outlined in the ZCB not only go beyond what is required in order for the gas to be equivalent to zero carbon, but this additional burden will also have a devastating impact on the livestock farming sector, rural New Zealand and provincial economies. This is because at present (and for the short-to-medium term) there is a fixed relationship between the feed consumed by livestock and the methane produced.

2.7 Since 2003 the Pastoral Greenhouse Gas Research Consortium (PGGRC) has directed about $75 million of industry and Crown funding to the challenge of lowering New Zealand agricultural emissions, including by attempting to decouple the relationship between the feed consumed by a ruminant animal and methane produced. Much valuable knowledge has been gained, but the program has yet to be successful in finding a breakthrough technology.[1]

2.8 Therefore at the present time, and for the short-to-medium term, the required gross methane emissions reductions can only be achieved by feeding proportionally less forage to ruminant livestock (cattle, sheep and deer) with equal, if not greater, reductions in livestock production. There remains a constant of about 22 grams of methane for every one kilogram of dry matter consumed by a cow, sheep, goat or deer.[2] These relationships are shown in figures 1 and 2 below.

Figure 1: Sheep input/output

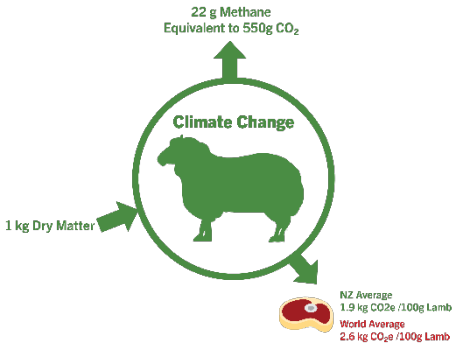
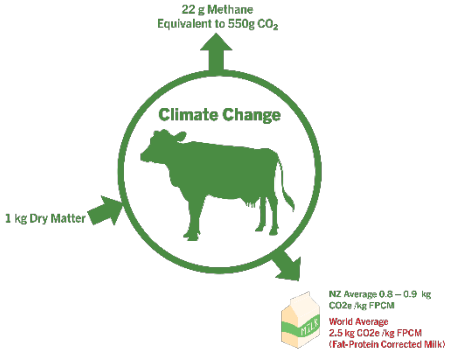


Figure 2: Cow input/output



2.9 *This is further elaborated on in Section 5 of Appendix 1.*

2.10 As a result of this direct relationship between methane emissions and livestock production, a 1% gross biogenic methane target (based on the 10% 2030 target) would result in a minimum direct cost of close to **$300 million** to the New Zealand livestock sector. Likewise, approximately an annual 1.0-2.0% biogenic methane reduction target (based on the 24-47% 2050 target) will directly cost the New Zealand livestock sector **$300 to $600 million** from 2020, compounding to an annual cost of **$7.2 billion to $14 billion** in today's dollars.

2.11 Put simply the cost of each 1% reduction equates to close to $300 million lower direct factory gate income each year compounding – the majority of the impact being felt in the provinces by way of increasingly lower incomes and increasingly lower employment opportunities.

[1] PGGRC & NZAGRC, 'Reducing New Zealand's greenhouse gas emissions: How We are getting there', 2019.
[2] Clark, H., I. Brookes, and A. Walcroft, 2003, "Enteric methane emissions from New Zealand ruminants 1990–2001 calculated using an IPCC Tier 2 approach. Report prepared for the Ministry of Agriculture and Forestry, Ministry of Agriculture and Forestry."

2.12 Along with this direct cost to livestock farming, the Regulatory Impact Statement for the ZCB estimates the total **annual** cost to the New Zealand economy as **$5-12 billion.** This cost will not be shouldered evenly across New Zealand society, with certain groups, sectors and regions expected to be disproportionately affected. While it is impossible to know with certainty which groups will be unevenly impacted, it is highly likely to include provincial agricultural communities. *This is further elaborated on in Section 8 of Appendix 1.*

2.13 The detail of Federated Farmers' policy position on the biogenic methane reduction targets outlined in the ZCB is included as *Appendix 1 and contains eight sections.*

2.14 Federated Farmers has been actively engaged in a large number of government and industry climate change forums and has thoroughly consulted our membership on numerous occasions, particularly in recent months. Most recently Federated Farmers' submission has been informed by a member survey, undertaken in June 2019 which received 1,277 responses. We also consulted closely with the Federation's nationally and provincially elected representatives. We are confident that the positions in our submission are not only backed by sound national and international studies but that we have strong support from pastoral farmers. *The results of the Federated Farmers member survey are included as Appendix 2.*

2.15 The remainder of this submission makes general comments on climate change policy before commenting specifically on the Bill's key provisions.

2.16 Federated Farmers looks forward to presenting this submission to the Environment Select Committee.

3. SUMMARY OF RECOMMENDATIONS

3.1 Federated Farmers recommends that the Climate Change Response (Zero Carbon) Amendment Bill should proceed subject to the following amendments:

3.2 Clause 8's new section 5D should make provision for at least one member to have knowledge and expertise in the agricultural sector, and in a wide range of farm and orchard systems.

3.3 All references in relation to the Climate Change Commission submitting reports and advice to the Minister should be amended to ensure that the reports and advice are made publicly available and tabled by the Minister in the House of Representatives 'on receiving it' (rather than 'after').

3.4 In the case a biogenic methane emission reduction target(s) figure is not required to be stated in the ZCB (Federated Farmers' first preference), clause 8's new section 5O should be amended to read as follows:

5O Target for 2050

(1) The target for emissions reduction (the 2050 target) requires that -

(a) net emissions of greenhouse gases in a calendar year, other than biogenic methane, are zero by the calendar year beginning on 1 January 2050 and each subsequent calendar year; and

(b) net emissions of biogenic methane in a calendar year are set at a level of impact on atmospheric temperature equivalent to zero carbon (zero carbon equivalent), as for the other gases, by 1 January 2050 and for each subsequent calendar year. The Climate Change Commission will advise the Minister on the appropriate level of biogenic methane emissions required to meet zero carbon equivalent using the most up-to-date, relevant, accurate and credible scientific evidence available.

(2) In this section "zero carbon equivalent" is determined by a science based assessment of the impact different additional greenhouse gases have on average global temperatures

3.5 If Parliament decides a biogenic methane emission reduction target(s) figure is required to be stated in the ZCB (Federated Farmers does not support biogenic methane targets in the ZCB), then the biogenic target(s) should be net not gross and the biogenic target should be based 0.3% reductions per year that equates to 3% by 2030 and about 10% by 2050.

3.6 The Committee should recommend that the Government provide local government with support, including funding, to comply with the Bill's adaptation provisions.

4. FEDERATED FARMERS AND CLIMATE CHANGE

4.1 Federated Farmers supports New Zealand playing its part to address climate change by pursuing action consistent with the goals of the 2015 Paris Agreement.

4.2 The Paris Agreement is a commitment in "Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels."[3] Crucially the Paris Agreement recognises the "fundamental priority of safeguarding food security" and that policies to address climate change "not threaten food production".[4] 92.1% of respondents to our member survey would not support the adoption of emissions reduction targets at the cost to food production.

4.3 We support transitioning the economy to a point where all New Zealand greenhouse gas emissions achieve zero carbon equivalent by 2050. To achieve this we must treat all gases equally relative to their contribution to additional warming. This means it is fully appropriate to take a split gases approach where short-lived gases (e.g., methane) have different emissions reduction targets from long-lived gases (e.g., carbon dioxide and nitrous oxide).

4.4 Federated Farmers supports the New Zealand agriculture sector and government continuing to jointly invest in cutting edge agricultural emissions mitigation research, which has the potential to deliver breakthrough results worldwide without threatening food production. We also support efforts to encourage the uptake of sustainable farm practices that have the potential to reduce on-farm net emissions while improving additional outcomes such as for water quality, biodiversity, biosecurity and animal welfare.

4.5 However, Federated Farmers does not support the inclusion of agricultural biogenic emissions into the New Zealand Emissions Trading Scheme (ETS) or other charging mechanisms (such as a processor levy) until the following two conditions are met:

- Farmers have cost effective mitigation technologies available to them; and
- International trading partners are also taking action to reduce their agricultural biogenic emissions.

4.6 95.7% of respondents to our member survey either oppose agricultural emissions being included in the ETS (42.3%) or would only support their inclusion if the above two preconditions are met (53.4%). Only 3.4% supported the proposition without preconditions.

4.7 The New Zealand livestock sector is among the most efficient in the world, and emissions intensity has reduced by about 1% per year since 1990. 67.5% of respondents to our member survey believed that climate change policy should account for emissions efficiency. Emissions intensity is however fundamentally distinct from absolute emissions reductions, which are required by the ZCB. Currently achieving absolute emission reductions without forgoing production remains difficult for nitrous oxide and is extremely difficult to achieve for methane. Without lowering the dry matter intake of livestock, methane can only be reduced by a very limited amount without the use of a (yet to be developed or proven safe) breakthrough decoupling technology.

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[3]Paris Agreement, United Nations Treaty Collection. 8 July 2016. Archived from the original on 21 August 2016, available at <https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf>

4 Paris Agreement". United Nations Treaty Collection

4.8 A major and growing concern of Federated Farmers members is the social, environmental and economic impact of climate change and wider environmental and economic policies (including the One Billion Trees program, the ETS and recent changes to overseas investment rules) on rural communities. The imposition of these wider policies are creating unintended perverse outcomes and are distorting the rural land market and driving substantial land-use change from pastoral farming to plantation forestry. Many farmers are deeply worried about the economic, environmental and social impacts of forestry conversions on their rural communities. 89.1% of respondents to our member survey said that they were concerned about this development.

4.9 It is common for farmers to have small forestry blocks (exotic and native), and/or aspire to plant parts of the farm in forestry. Most farmers also plant trees for aesthetics, animal welfare (sun and shelter) and water quality purposes (erosion control and riparian management). Farmers are generally very supportive of tree planting initiatives and would willingly plant more of the right trees if they could guarantee a reliable and decent income off the land that remains, plus know that their regions and local communities will continue to survive and thrive.

4.10 However, farmers are concerned about myriad of forestry-related matters, economic, social and environmental. These concerns are listed in *Appendix 3* to this submission. They need to be carefully considered as the ZCB's emissions reduction targets will accelerate this trend and exacerbate the genuine concerns about the economic, social and environmental wellbeing of rural communities.

4.11 Overall, 97.6% of respondents to our member survey were concerned about climate change policy and its impact on rural New Zealand and only 10.8% of respondents agreed that the direction of climate change policy leaves them feeling optimistic about the future of farming. Mostly this is due to economic and social impacts.

5. COMMENT ON THE ZERO CARBON BILL: CLIMATE CHANGE COMMISSION

5.1 Part 1A of the ZCB makes provision for the Climate Change Commission (CCC).

5.2 Federated Farmers supports the establishment of the CCC and its proposed functions of providing independent expert advice, fostering public confidence in climate change policy, and holding the Government to account. We have two improvements to suggest however.

5.3 The first suggestion is in relation to membership of the CCC, where we consider that for it to do its job effectively in providing expert advice it needs knowledge and expertise of the sectors its advice will impact upon. This includes the agricultural sector as well as farm and orchard systems.

5.4 **Recommendation: Federated Farmers recommends that clause 8's new section 5D should make provision for at least one member to have knowledge and expertise in the agricultural sector and in a wide range of farm and orchard systems.**

5.5 The second suggestion would help the CCC hold the Government to account and foster enduring public confidence in relation to reports it makes to Ministers. We believe it should make its reports publicly available when (rather than after) it provides them to the Minister. Increased transparency throughout the CCC and in the setting of emissions budgets will support the CCC in fostering mainstream enduring support from New Zealand society in the decades-long fight against climate change.

5.6 **Recommendation: All references in relation to the Climate Change Commission submitting reports and advice to the Minister should be amended to ensure that the reports and advice are made publicly available and tabled by the Minister in the House of Representatives 'on receiving it' (rather than 'after').**

5.7 As an example Clause 8's new section 5K(4) would be amended to replace the word 'after' with the word 'when' and its new section 5K(5) would be amended to replace the words 'as soon as practicable but within 12 weeks after receiving to' with the words 'on receiving it'.

6. COMMENT ON THE ZERO CARBON BILL: EMISSION REDUCTION

6.1 Part 1B of the ZCB makes provision for emission reduction. There are five sub-parts:
(a) Subpart 1 – 2050 target
(b) Subpart 2 – Setting emissions budgets
(c) Subpart 3 – Role of Commission in setting emissions budgets.
(d) Subpart 4 – Monitoring
(e) Subpart 5 – Effect of 2050 target and emissions budgets

(A) Subpart 1 – 2050 target

6.2 The ZCB's 2050 target (set out in clause 8's new section 5O) implements a split gases approach. Emissions of greenhouse gases, with the exception of biogenic methane, are to be net zero by 2050, while emissions of biogenic methane are assigned gross reduction targets of 10% by 2030 and 24% to 47% by 2050.

6.3 Federated Farmers supports a split gases approach, which acknowledges the fundamentally distinct manner in which short and long-lived gases behave in the atmosphere. As discussed in our detailed policy position attached as *Appendix 1*, taking a split gases approach enables the inherent differences, in their effect on global average temperatures, between short lived gasses (methane) and long lived gasses (nitrous oxide and carbon dioxide)

6.4 The ZCB's 2050 net zero nitrous oxide target has been accepted by Federated Farmers and the wider New Zealand agriculture sector, despite being much more difficult to achieve than the more conservative range outlined in the *IPCC 1.5 Degree report*.[5] This is also regardless of the target being impossible to currently achieve without offsetting, and although the 2018 PCE report described nitrous oxide as a "biological gas" that should be treated differently to fossil carbon dioxide.[6] However, despite the difficulty inherent in the New Zealand agriculture sector achieving net-zero nitrous oxide by 2050 Federated Farmers agree with the target as, unlike the 2030 and 2050 methane targets, it is science-based and logically consistent with the aims of the ZCB.

6.5 What is less scientifically credible is how the ZCB implements a split gases approach. The ZCB's biogenic methane reduction targets go well beyond what is required for net zero carbon equivalent. The industry is eager to embrace the challenge of being a nation of climate friendly farmers, but the biogenic methane target in the ZCB will make it impossible for industry groups to foster farmer support for the Bill.

6.6 There is concern that the biogenic methane reduction targets outlined in the ZCB were based on a misreading of both the BERG and IPCC 1.5 Degree reports. Unlike what has been incorrectly reported the reports do not state that the targets will be achievable without cutting food production, and do not state that the current targets in the ZCB are equivalent to zero carbon.

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[5] IPCC, 2018: Chapter 2 - Mitigation pathways compatible with 1.5°C in the context of sustainable development In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty World Meteorological Organization, Geneva, Switzerland, pp.118

[6] New Zealand Parliamentary Commissioner for the Environment, 2019, Farms, forests and fossil fuels: The next great landscape transformation?

6.7 The IPCC 1.5 Degree report explicitly states that as the economic modeling was done for the global economy it was recommendated that the conclusions not be applied to individual countries and noted that world methane reductions will predominantly come from non-agricultural sources. The report also modeled partial reductions for nitrous oxide (35%) rather than a net a net zero as in the ZCB. A lead author of the 1.5 Degree report, the earlier referenced *Myles Allen*, also warned New Zealand policy makers against using this global target in national policy. In an article after his 2019 visit to New Zealand *Allen* wrote;

"One thing I would urge, as an author of the recent IPCC Special Report on 1.5°C, don't justify targets simply by following what happens in the IPCC's 1.5°C scenarios. Those scenarios are based on economic models of the relative cost of different ways of reducing emissions. Some of the inputs to these models, like the estimated "cost" of a large fraction of the population turning vegetarian, are deeply subjective. The scenarios provide background information, but I would not rely on them as a basis for national policy."[7]

6.8 *This is further elaborated on in Section 4 of Appendix 1.*

6.9 The 2018 report of the Biological Emissions Reference Group (BERG) stated that "overall biological emissions in the future could potentially be reduced between 10-21% by 2030, and by 22-48% in 2050, relative to MPI baseline projections."[8]

6.10 As stated in its terms of reference BERG's task intentionally excluded developing policy advice or providing recommendations. BERG did, however, commission analysis to estimate the costs and barriers of hypothetical policy options to reduce emissions. The analysis did not consider how biogenic methane emissions from agriculture could be treated within a domestic emissions target.

6.11 There are a number of critical difficulties with inferring that the predictions made in the BERG report support the ZCB's biogenic methane reduction targets being somewhat achievable without cutting livestock production:.

(a) The BERG predictions are based on MPI baselines which assume (inaccurately) that sheep numbers will continue to decline at a liner rate – ultimately to zero...

(b) The predictions in the BERG report also refer to overall agricultural emissions, not singularly biogenic methane emissions. Federated Farmers supports the net-zero nitrous oxide target, and this must be subtracted from the total predictions (as done in the table in *Section 5* of *Appendix 1*).[9]

(c) The predictions in the BERG report also allow for the planting of trees (beyond those currently provided for in the ETS) to offset net agricultural emissions, and do not limit farmers to gross reductions as is the case in the ZCB.

(d) Most problematically, a number of potential and unproven technologies are included in the BERG's calculations and none of the mitigation technologies currently available actually change the relationship between feed in/methane out (22g Methane/kg dry matter of forage).

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[7] Allen Myles, "A climate-neutral NZ? Yes, it's possible", Newsroom, March 29 2019, available at <https://www.newsroom.co.nz/@ideasroom/2019/03/29/510792/a-climate-neutral-nz-yes-its-possible>

[8] Report of the Biological Emissions Reference Group, December 2018, the Biological Emissions Reference Group, available at < https://www.mpi.govt.nz/protection-and-response/environment-and-natural-resources/biological-emissions-reference-group/> pp.6

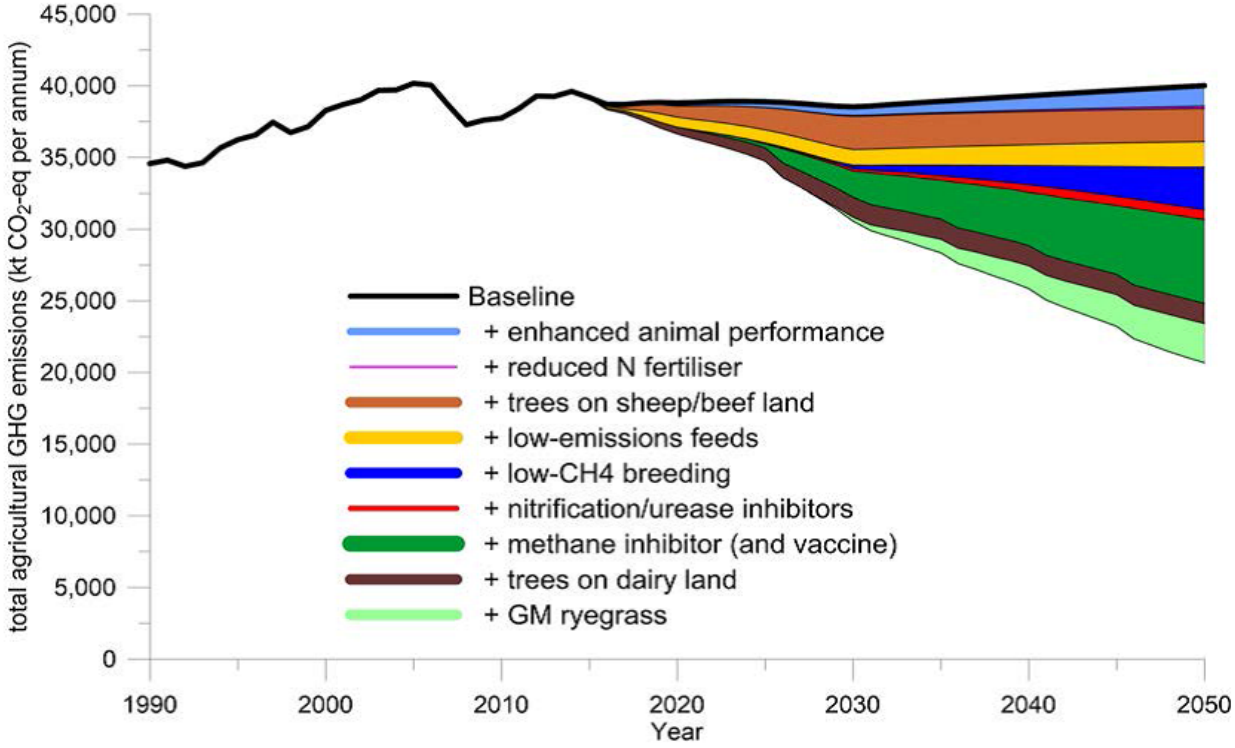
[9] Ministry for the Environment, "New Zealand's Greenhouse Gas Inventory 1990-2017

6.12 The risk in relying upon the rollout of possible future technology is clearly stated in the BERG report, with the New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC) assessment of the potential of mitigation technologies being heavily qualified:

> *"The mitigation approaches with the largest potential impact on emissions, e.g. methane inhibitors and vaccines, nitrification inhibitors, and genetically modified ryegrass, are not yet commercially available. Some have proof of concept (e.g. a methane inhibitor for feedlot animals), or proven benefits (e.g. nitrification inhibitors). Others are at various stages of development. An example of the latter is genetically modified ryegrass, which exists, but its efficacy in reducing emissions is yet to be demonstrated. Similarly, a methane vaccine is in development but is yet to demonstrate an effect in live animals. Bringing such options to market suitable for use on-farm will require further development, with timelines of 5–20 years, and uncertain outcomes."*[10]

6.13 The potential contribution of the interventions referenced in the BERG report to reduced methane emissions is illustrated in *Figure 3* below, with each intervention assessed in *Table 1*.

Figure 3: Potential contribution of BERG report's interventions to reduced methane emissions



[10] Report of the Biological Emissions Reference Group, December 2018, the Biological Emissions Reference Group pp.26

Table 1: Assessment of BERG report interventions

Intervention	Reduce on-farm Methane Emissions?	Reduce on-farm Nitrous Oxide Emissions?	Available	Regulatory Barriers
Enhanced animal performance	Only if feed is reduced	Possibly – depends on mechanism	Yes	No specific
Reduced N fertiliser	Only via reduced production	Potentially	Yes	No specific
Trees on sheep/beef land	Just an offset	Just an offset	Yes	No specific
Low-emissions feeds	Potentially	Potentially	No	Potentially
Low-CH_4 breeding	Sheep with lower emissions identified. Further work on verification, ability to multiply up and effect on other attributes required	Potentially	Yes – verification required	Not unless involves Genetic Modification
Nitrification inhibitor Urease inhibitors	No No	Proven Proven	No Yes	Potential residue and market Access issues
Methane inhibitors (and vaccine)	Potentially but unproven	No	No	Potential residue/ regulatory issues
Trees on dairy land	Just an offset	Just an offset	Yes	No specific
GM ryegrass	Potentially but unproven	Potentially but unproven	No	GE - so highly unlikely to be available in NZ

6.14 *This is further elaborated on in Section 5 of Appendix 1*

6.15 It is therefore Federated Farmers first preference for the biogenic methane reduction target to be set by the relevant Minister, after receiving advice from the CCC. The CCC should have strict terms of reference and base its advice to the Minister regarding a biogenic methane target upon the following considerations:

(i) The most up-to-date, relevant, accurate and credible scientific evidence available.

(ii) The reduction in New Zealand biogenic methane levels required in order for it to no longer contribute to additional global warming by 2050 – its target to be based on the equivalent of net zero for long-live gas target (as outlined in Clause 8's 5O(1)(a))

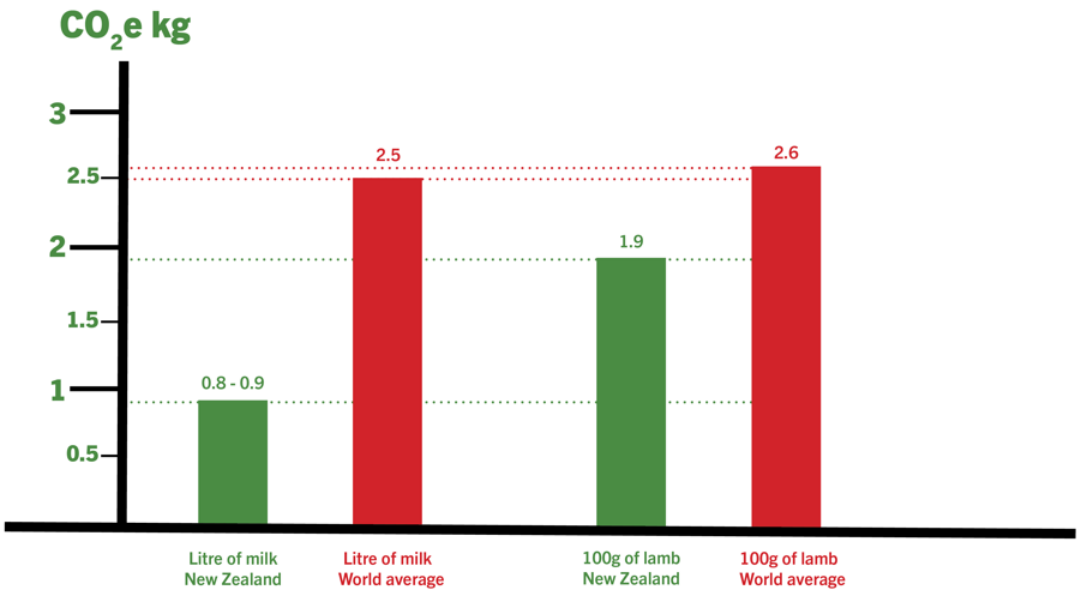
6.16 If Parliament decides a figure for a biogenic methane reduction target must be should be included the Zero Carbon Bill, the best science currently available based on current atmospheric conditions for methane to no longer contribute to additional atmospheric warming from today is 0.3% per year. This equates to around 3% by 2030 and 10% by 2050. The 10% by 2030 and 24-47% by 2050 targets in the Bill are much greater than required and would contribute to global cooling. The current ZCB Bill targets cannot be achieved without reducing production. This could change if one, or more, safe, proven breakthrough technologies become available and gain regulatory approval. (refer *Appendix 1)*

6.17 Since 2003 the agricultural industry and government have committed $75 million to the Pastoral Greenhouse Gas Research Consortium (PGGRC); a joint government and industry body established in order to develop such a breakthrough technology. Since 2003, the PGGRC has led the world in in developing scientific knowledge on reducing agricultural emissions but has yet to be successful in developing a commercially available mitigation breakthrough technology.

6.18 The Select Committee needs to be acutely aware that the ZCB's significant methane reduction target will harm New Zealand livestock sector and provide an advantage for New Zealand's foreign competitors to the detriment of the planet

6.19 The New Zealand dairy, beef and sheep meat sectors are trade dependent and highly exposed to fluctuations in international market conditions. New Zealand's main foreign livestock competitors include Australia, the United States, India, the United Kingdom and Brazil, none of which have legislated gross biogenic methane reductions, despite recommendations to do so by various domestic independent commissions. Many of these countries also subsidise their producers, resulting in less innovative (and therefore less emissions efficient) agricultural sectors. The impressive emissions efficiency of New Zealand milk and lamb meat is elaborated on in Section 7 of *Appendix 1* and highlighted in the graph below.

Figure 4: Global and New Zealand greenhouse gas intensity of dairy milk and sheep meat.[11]



[11] Climate Change and the Global Dairy Cattle Sector: The role of the dairy sector in a low-carbon future, the Food and Agriculture Organisation of the United Nations and the Global Dairy Platform Inc, Rome 2019, pp.26
Clune, Stephen, Enda Crossin, and Karli Verghese. "Systematic review of greenhouse gas emissions for different fresh food categories.
Ledgard, S.F., Chobtang, J., Falconer, S.J. and McLaren, S., 2016. Life cycle assessment of dairy production systems in New Zealand, Integrated nutrient and water management for sustainable farming. (Eds L.D. Currie and R.Singh). http://flrc.massey.ac.nz/publications.html. Occasional Report No. 29. Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand. 8 pages. 1 LIFE CYCLE ASSESSMENT

6.20 As covered in *Appendix 1*, it is likely that if New Zealand's milk and meat export volumes reduce as a result of lower production resulting from the ZCB's emission reduction targets, the gap will be filled by less efficient producers resulting in higher global emissions. This process is known as "emissions leakage" and will ultimately increase food costs and increase global emissions.

6.21 Federated Farmers supports action to address climate change but we are concerned that the methane target in the ZCB will unnecessarily overburden the agricultural sector to the detriment of the economic and social wellbeing of farmers, rural communities, and the provinces. 96.2% of respondents to our member survey either did not support there being a methane reduction target (56.9%) or believed it should be equal to that of other greenhouse gases (39.3%). Only 1.0% believed it should be tougher than that for other greenhouse gases, which is in effect the ZCB's approach.

6.22 To address this, our second preference would be to delete the 2030 methane target and change the 2050 methane target to a 10% reduction, based on average year on year reductions of 0.3% from 2020 to 2050 and allow the Climate Change Commission to determine the interim methane emission targets and emission budgets that are necessary in order to achieve the 2050 target – just as it will for other gases.

6.23 If it is considered essential that the ZCB has a 2030 target for Biogenic Methane reductions then it should be set at 3%.

6.24 Furthermore, we consider it inequitable and economically inefficient for farmers to not get credit for initiatives that offset their on-farm methane emissions. Indeed, 91.5% of respondents to our member survey disagreed with the ZCB's approach of preventing methane from being offset by forestry. We therefore submit that the ZCB should also be amended to allow methane emissions to be offset so the reductions would be in net rather than gross terms.

6.25 This approach would be consistent with biogenic methane achieving zero carbon equivalent and would ensure that the burden of achieving New Zealand's overall emissions reduction will be spread more equitably and ease concern about policies that are distorting land-use and resulting in conversion of pastoral farmland to plantation forestry and the economic, social and environmental impacts that result (as discussed in section 3 above).

6.26 **Recommendation: In the case a biogenic methane emission reduction target(s) figure is not required to be stated in the ZCB (Federated Farmers' first preference), clause 8's new section 5O should be amended to read as follows:**

5O Target for 2050

(1) The target for emissions reduction (the 2050 target) requires that -

(a) net emissions of greenhouse gases in a calendar year, other than biogenic methane, are zero by the calendar year beginning on 1 January 2050 and each subsequent calendar year; and

(b) net emissions of biogenic methane in a calendar year are set at a level of impact on atmospheric temperature equivalent to zero carbon (zero carbon equivalent) for the other gases by 1 January 2050 and for each subsequent calendar year. The Climate Change Commission will advise the Minister on the appropriate level of biogenic methane emissions required to meet zero carbon equivalent using the most up-to-date, relevant, accurate and credible scientific evidence available

(2) In this section "zero carbon equivalent" is determined by a science based assessment of the impact of different additional greenhouse gases on average global temperatures

6.27 **If Parliament decides a biogenic methane emission reduction target(s) figure is required to be stated in the ZCB (Federated Farmers does not support biogenic methane targets in the ZCB), then:**

- **the biogenic target(s) should be net not gross**
- **the biogenic target should be based 0.3% reductions per year that equates to 3% by 2030 and about 10% by 2050**

(B) Subpart 2 – Setting emissions budgets

6.28 Federated Farmers generally supports the provisions for setting emissions budgets and we have no specific amendments to suggest.

(C) Subpart 3 – Role of Commission in setting emissions budgets.

6.29 Federated Farmers generally supports the provisions for the CCC's role in setting emissions budgets. However, as mentioned and recommended previously, in the interests of helping the CCC hold the Government to account and in in order to foster enduring public support for the CCC, we suggest that it should make its advice publicly available when (rather than after) it provides its advice to the Minister.

(D) Subpart 4 – Monitoring

6.30 Federated Farmers generally supports the provisions for monitoring. However, as mentioned and recommended previously, in the interests of helping the CCC hold the Government to account, and in order to foster enduring public support for the CCC we suggest that it should make its reports publicly available when (rather than after) it provides them to the Minister.

(E) Subpart 5 - Effect of 2050 target and emissions budgets

6.31 Federated Farmers generally supports the provisions for the effect of 2050 target and emissions budgets and we have no specific amendments to suggest.

7. COMMENT ON ZERO CARBON BILL: ADAPTATION

7.1 Part 1C of the ZCB makes provision for adaptation measures, including a national climate change risk assessment, a national adaptation plan, progress reports, and power to request provision of information.

7.2 Farmers are significantly exposed to the expected impacts of climate change in New Zealand. Pastoral farmers are directly affected by extreme weather events and such events are expected to become increasingly damaging and common as a result of climate change. The effects of climate change will make farming more unpredictable and difficult, all while farmers are facing increased input costs, regulations and global competition. Farmers have a long history of innovation and adapting to seasonal and annual variability in climate-related conditions, including coping with extreme events.

7.3 The Stocktake report of the Climate Change Adaptation Working Group found that while some New Zealand farmers are already taking proactive actions to adapt to the impacts of climate change, more work is required.[12]

7.4 Federated Farmers agrees that it is important to have plans in place to help New Zealand adapt to the impacts of climate change and transition to a low-emissions future. We agree with the need to establish a range of climate change adaptation measures to make sure New Zealand understands the risks we face, and has a plan to address them.

7.5 Federated Farmers supports the provisions to require a national climate change risk assessment and a national adaptation plan. However, we understand that these could impose significant costs on local government. Federated Farmers has long taken the position that central government should assist local government when imposing new or stronger regulatory obligations on local government. This includes working with local government to develop cost-effective ways to comply and providing funding to councils. This is consistent with recommendations about the cost of regulation made by the Productivity Commission's recently released draft report on Local Government Funding and Financing[13].

7.6 Recommendation: Federated Farmers recommends that the Committee should recommend that the Government provide local government with support, including funding, to comply with the Bill's adaptation provisions.

7.7 In the interests of helping the CCC hold the Government to account we suggest that, as mentioned and recommended previously, it should make its reports publicly available when (rather than after) it provides them to the Minister.

[12] Adapting to Climate Change in New Zealand, Stocktake report of the Climate Change Adaptation Technical Working Group, 2017, available at <https://www.mfe.govt.nz/climate-change/climate-change-and-government/adapting-climate-change/climate-change-adaptation>, Pp.80

[13] Local Government Funding and Financing Draft Report, New Zealand Productivity Commission, July 2019, in particular recommendations 6.9 and 6.10.

8. COMMENT ON ZERO CARBON BILL: OTHER PROVISIONS

8.1 Part 2 of the ZCB makes provision for consequential amendments and the Bill also contains two schedules.

8.2 Federated Farmers has no comment to make on these provisions or amendments to suggest.

9. ABOUT FEDERATED FARMERS

9.1 Federated Farmers of New Zealand is a member-based organisation representing farming and other rural businesses. Federated Farmers has a long and proud history of representing the needs and interests of New Zealand farmers.

8.2 The Federation aims to add value to its members' farming business. Our key strategic outcomes include the need for New Zealand to provide an economic and social environment within which:

- Our members may operate their business in a fair and flexible commercial environment;
- Our members' families and their staff have access to services essential to the needs of the rural community; and
- Our members adopt responsible management and environmental practices.

ENDS

APPENDIX 1: FEDERATED FARMERS POLICY POSITION ON THE ZERO CARBON BILL'S BIOGENIC METHANE TARGETS

Appendix 1 contains a detailed explanation, with references, of how and why we have come to our policy position on the Zero Carbon Bill's treatment of methane emissions. It covers the following questions:

1. How are New Zealand's agricultural emissions measured?

2. What does the Paris Agreement mean for agriculture?

3. How should a long-term methane reduction target be reached?

4. Are the proposed methane reduction targets consistent with the IPCC 1.5 degrees report?

5. Are the ZCB biogenic methane reduction targets expected to be achievable without decreasing livestock production?

6. Why the need for methane reduction targets to be net and not gross?

7. How do New Zealand's ZCB methane reduction targets compare to international competitors?

8. What is the economic impact of the targets currently outlined in the ZCB?

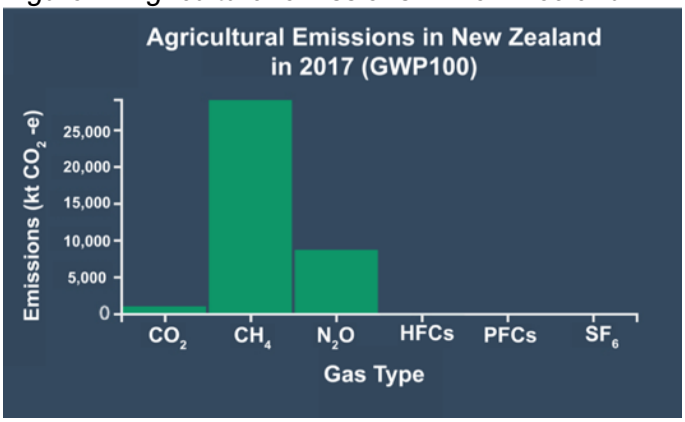
1. HOW ARE NEW ZEALAND'S AGRICULTURAL EMISSIONS MEASURED

1.1 The widespread use of renewable energy along with a large livestock industry has resulted in agriculture making up 48% of New Zealand's greenhouse gas (GHG) emissions under the current, and **inaccurate**, GWP_{100} metric used to compare the warming potential of different gases.[14] Agriculture is therefore seen as an important source of reductions.

1.2 The greenhouse gas emissions from New Zealand agriculture in 2017 (the most recent year in which figures are available) were[15]:

Methane (CH_4): 29,141.06 kt CO_2-e (75%)
Nitrous Oxide (N_2O): 8,691.80 kt CO_2-e (22%)
Carbon Dioxide (CO_2): 1,047.86 kt CO_2-e (3%)

Figure 1. Agricultural emissions in New Zealand in 2017 (GWP_{100})[16]



1.3 However, the above figures and graph do not show the real amount of each gas emitted, or even an accurate estimate of each gases impact of atmospheric warming. In order to compare the impact on the atmosphere by different greenhouse gases a metric called the *Global Warming Potential* or GWP_{100} is used. GWP_{100} gives the following values for the three main greenhouse gases[17]:

Carbon dioxide:1
Methane: 28
Nitrous oxide: 265

1.4 GWP_{100} works well for comparing nitrous oxide and carbon dioxide, which remain in the atmosphere for 121 and 5-200,000 years respectively. It is very difficult to calculate the exact lifetime of a molecule of carbon dioxide but it is treated as a long-lived stock gas.[18] Methane however only lasts in the atmosphere for 12 years and the GWP100

[14] Ministry for the Environment, "New Zealand's Greenhouse Gas Inventory 1990-2017",published in 2019, available at <https://www.mfe.govt.nz/climate-change/state-of-our-atmosphere-and-climate/new-zealands-greenhouse-gas-inventory>
[15] Ministry for the Environment, "New Zealand's Greenhouse Gas Inventory 1990-2017"
[16] Ministry for the Environment, "New Zealand's Greenhouse Gas Inventory 1990-2017"
[17] Allen, Myles R., Vicente R. Barros, John Broome, Wolfgang Cramer, Renate Christ, John A. Church, Leon Clarke et al. "IPCC fifth assessment synthesis report-climate change 2014 synthesis report." (2014) pp.
[18] Allen, Myles R., Vicente R. Barros, John Broome, Wolfgang Cramer, Renate Christ, John A. Church, Leon Clarke et al. "IPCC fifth assessment synthesis report-climate change 2014 synthesis report." (2014). Pp.103

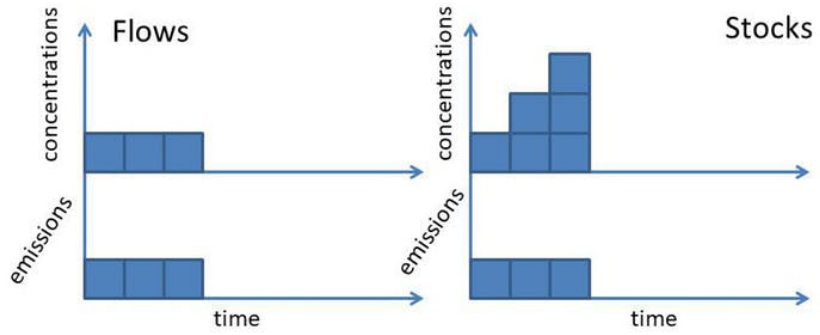
value does not accurately take into account this shorter lifetime. This is noted by the recent UK Climate Change Commissions' Net Zero report;

"GWP100 over-states the importance of methane for long-term temperature. This is particularly relevant once emissions are constant or falling."[19]

1.5 Carbon dioxide and nitrous oxide are long-lived, so every kg produced today will have a warming effect every year for centuries to come, this is why they are also referred to as stock pollutants, as the effects constantly build up in a stock.

1.6 Methane, however, is a short-lived gas and can be described as a flow pollutant as the effects need to take into account the flow of methane in and out of the atmosphere.[20]

Figure 2. Flow (methane) and stock (carbon dioxide) pollutants over time[21]



1.7 The stock nature of carbon dioxide and the flow nature of methane was acknowledged of the Productivity Commission in its *Low Emissions Economy* report in May 2018;

"The Commission's approach to identifying opportunities to transition to a low-emissions economy recognises that GHGs have different atmospheric lifetimes. Some are long-lived and accumulate in the atmosphere, such as carbon dioxide which is the dominant driver of temperature. Others are short-lived such as methane, and only influence temperature in relation to their flows in and out of the atmosphere."[22]

1.8 GWP_{100} was put in place as a stop-gap solution in 1990. It was never intended to be used permanently by the IPCC as a standard metric for comparing greenhouse gases. This was noted in the first IPCC Assessment Report;

"The Global Warming Potential (GWP) remains a useful concept but its practical utility for many gases depends on adequate quantification of the indirect effects as well as

[19] Net Zero, The UK's contribution to stopping global warming Committee on Climate Change May 2019, available at <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/> pp.14
[20] Frame Dave, Allen Myles R, Macey H Adrian, "Why methane should be treated differently compared to long-lived greenhouse gases", The Conversation, June 12 2018, available at < https://theconversation.com/why-methane-should-be-treated-differently-compared-to-long-lived-greenhouse-gases-97845>
[21] Frame Dave, Allen Myles R, Macey H Adrian, "Why methane should be treated differently compared to long-lived greenhouse gases"
[22] New Zealand Productivity Commission. (2018). Low-emissions economy, pp.19

the direct. We now recognize that there is increased uncertainty in the calculation of GWPs,"[23]

1.9 GWP_{100} has however persisted as the standard metric to the present day. The unusual makeup of New Zealand's greenhouse gas emissions has forced New Zealand to consider the failure of GWP_{100} to accurately represent the fundamental difference between long and short lived greenhouse gases before many other similar developed nations

"The emissions profiles of most other developed countries are dominated by CO_2. As such, the focus is on mitigating long-lived gases. In comparison, New Zealand has a high proportion of short-lived gases (mainly biogenic CH_4 from livestock production). This distinctive emissions profile means that the relative priority of mitigating short- and long-lived gases is of special interest."[24]

1.10 One method of addressing the problem of the inability of GWP_{100} to accurately estimate the warming impact of methane is to change the metric used to one which more accurately factors in the diminished accumulative impact of stable methane emissions (such as GWP*).[25] This was acknowledged in the 2018 Productivity Commission report;

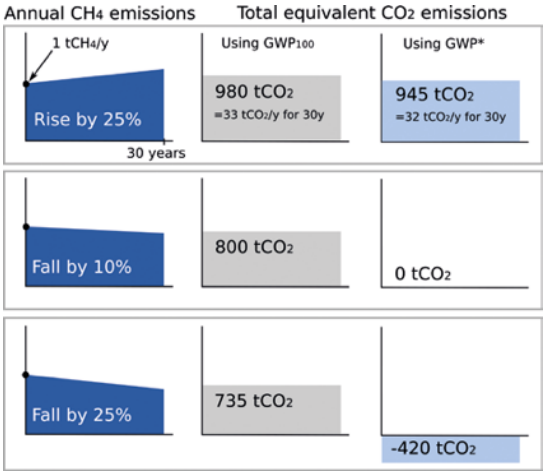
"A newly-proposed metric, GWP, is different in approach and better captures the warming effects that arise from the different dynamics of short- and long-lived gases. It can thereby help people make better decisions about mitigation."*[26]

1.11 However, GWP_{100} is currently the standard metric used internationally. If a new metric was adopted domestically, New Zealand regulators would be obligated to maintain one set of data for international reporting and another set for domestic reporting.

1.12 The issue of regulatory redundancy can be avoided if New Zealand climate change negotiators begin to lead the way in advocating for the international adoption of a new metric such as GWP*. The potential of GWP_{100} to greatly distort international climate change policy is demonstrated in *figure 3*.

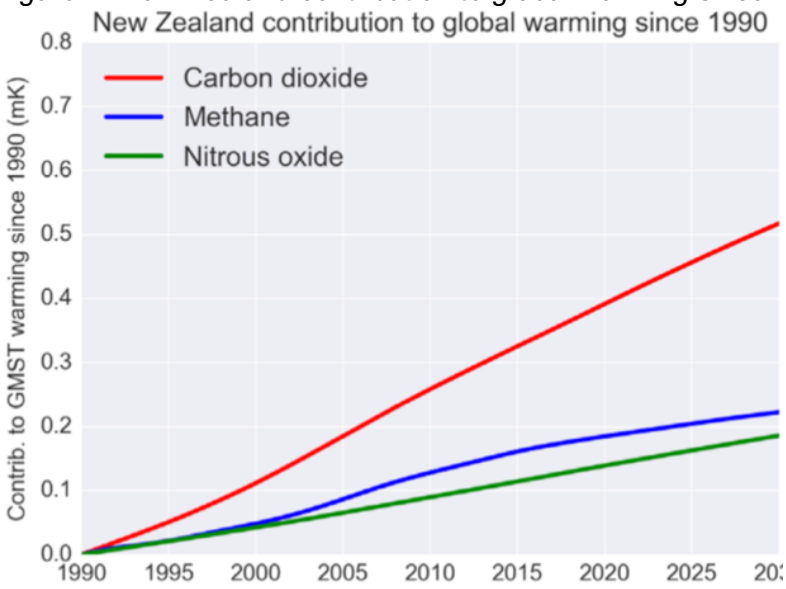
[23] IPCC, June 1992, Climate Change: The IPCC 1990 and 1992 reports, available at <https://www.ipcc.ch/report/climate-change-the-ipcc-1990-and-1992-assessments/> pp.7
[24] New Zealand Productivity Commission. (2018). Low-emissions economy, pp.224
[25] Allen, Myles R., Keith P. Shine, Jan S. Fuglestvedt, Richard J. Millar, Michelle Cain, David J. Frame, and Adrian H. Macey. "A solution to the misrepresentations of CO 2-equivalent emissions of short-lived climate pollutants under ambitious mitigation." *npj Climate and Atmospheric Science* 1, no. 1 (2018): 16.
[26] New Zealand Productivity Commission. (2018). Low-emissions economy, pp.19 , pp. 244

Figure 3. The impact of future emissions alterations over a 30 year timespan[27]



1.13 The GWP* metric is much more accurate than GWP_{100} in providing a proxy for the atmospheric warming occurred as a result of the emission of distinct greenhouse gases. This is demonstrated in the below *figure 4, 5 and 6*:

Figure 4: New Zealand contribution to global warming since 1990[28]



[27] Allen Myles, Cain Michelle, Lynch John, Frame David, Climate metrics for ruminant livestock, July 2018, Oxford Martin Programme on Climate Pollutants. Available at https://www.oxfordmartin.ox.ac.uk/downloads/reports/Climate-metrics-for-ruminant-livestock.pdf pp. 3

[28] The Meaning of Net Zero for Agriculture, 2018, Michelle Cain, Oxford Martin School available at < https://www.oxfordmartin.ox.ac.uk/publications/achieving-net-zero-metrics-and-policies-aligning-energy-industry-and-agriculture-with-1-5-degrees/

Figure 5: Cumulative emissions since 1990 under GWP_{100}[29]

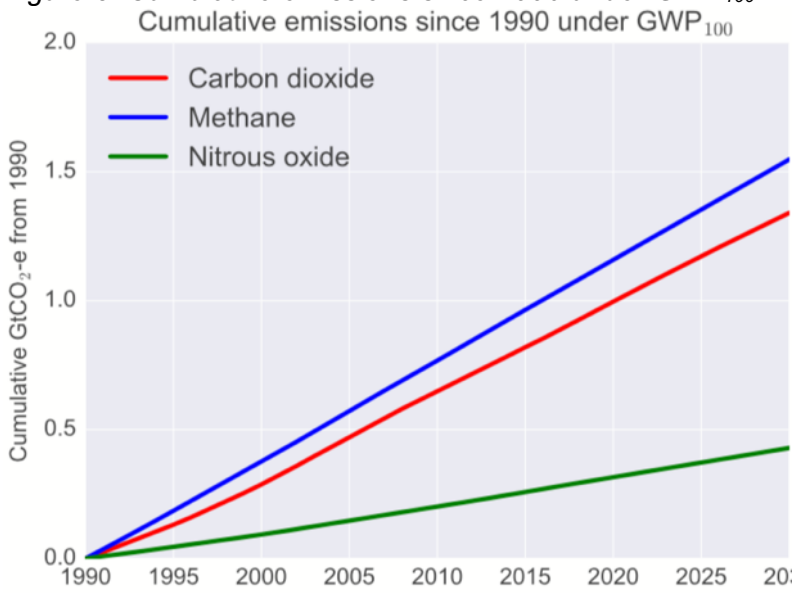
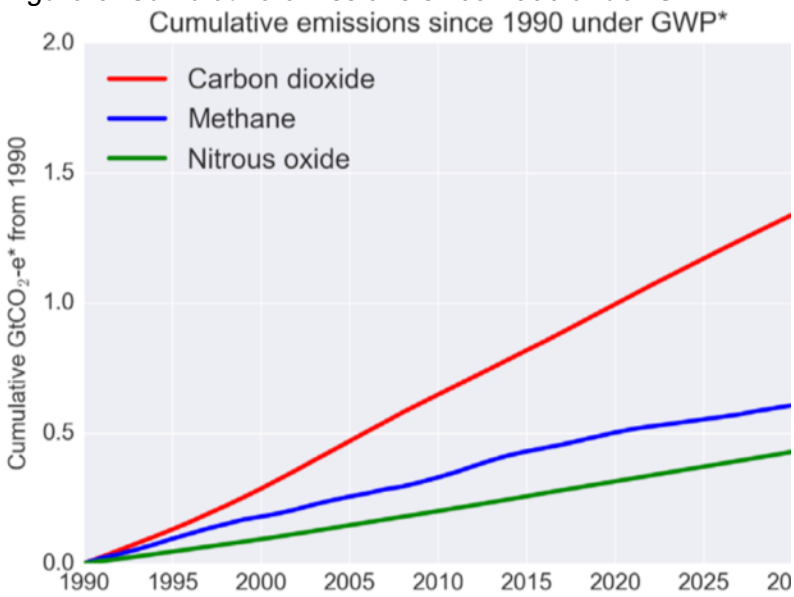


*Figure 6: Cumulative emissions since 1990 under GWP**[30]



1.14 Another available method to address the inability of GWP_{100} to accurately estimate the warming impact of methane is to change the long term reduction target of methane to one which is set at the level equivalent to net-zero carbon dioxide. This is the reason for the separate methane targets in the ZCB. This split gas approach taken by the ZCB was recommended by the Productivity Commission and is welcomed by the agriculture sector. However it is critically important that this target accurately reflects what long term methane emissions reduction targets are needed to reach net zero carbon equivalent.

[29] The Meaning of Net Zero for Agriculture, 2018
[30] The Meaning of Net Zero for Agriculture, 2018

2. WHAT DOES THE PARIS AGREEMENT MEAN FOR AGRICULTURE?

2.1 The 2015 Paris Agreement[31] entered into force in November 2016 after reaching the required number of ratifications. As of May 2019 the agreement had been signed by 195 countries and 185 were parties to the agreement[32]. This is notwithstanding the United States' decision in June 2017 to cease participation in the agreement and to withdraw from it once it is able to in November 2020.

2.2 The Paris Agreement recognises:

- The need for an effective and progressive response to the urgent threat of climate change on the basis of the best available scientific knowledge.
- The fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to adverse impacts of climate change.
- Taking into account the imperatives of a just transition of the workforce and the creation of decent and quality jobs in accordance with nationally defined development priorities.
- Sustainable lifestyles and sustainable patterns of consumption and production, with developed country Parties taking the lead, play an important role in addressing climate change.

2.3 The Paris Agreement agrees:

- Holding the increase in the global average temperatures to well below 2C above pre-industrial levels and pursuing efforts to limit the temperature increases to 1.5C above pre-industrial levels recognising that this would significantly reduce the risks and impacts of climate change.
- Increasing the ability to adapt to the adverse impacts of climate change and foster climate change resilience and low greenhouse gas emissions development, in a manner that does not threaten food production.
- Making finance flows consistent with the pathway towards low greenhouse gas emissions and climate resilient development.

2.4 The Paris Agreement is intended to be implemented as follows:

- Prepare, communicate and maintain successive nationally determined contributions consistent with the goals, and pursue domestic mitigation measures with the aim of achieving the objectives of such contributions.
- Base nationally determined contributions on the highest possible level of ambition, reflecting its common but differentiated responsibilities and reflective capabilities, in the light of national circumstance.
- Developed country parties should continue taking the lead by developing economy-wide absolute emission reduction targets.

2.5 The Paris agreement provides countries with flexibility on their commitments, their emissions reduction targets, and how policy should be implemented. Its strong emphasis on the need to safeguard food production is relevant for New Zealand when setting the biogenic methane reduction targets demanded under the ZCB, and wider domestic agriculture emissions mitigation policy.

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[31] The Paris Agreement, United Nations Treaty Collection. 8 July 2016. Archived from the original on 21 August 2016. Available at https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf

[32] https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=_en

3. HOW SHOULD A LONG-TERM METHANE REDUCTION TARGET BE REACHED?

3.1 The long-term methane reduction targets should be based on the principal of achieving a net zero carbon dioxide equivilant.

3.2 As a short-lived flow greenhouse gas, it is logical that a stable rate of emission by methane would result in no additional warming, as every new quantam of methane emitted would merely be taking the place of one released twelve years ago and about to fully break down. However, peer reviewed academic research outlines that due to a slight but lingering long-term warming impact by biogenic methane a 0.3% annual reduction is required in order for methane to have no aditional impact on atmospheric warming and to be equivilant to net zero carbon.[33]

3.3 Extending these results to the 2030 and 2050 biogenic methane emissions reduction targets proposed in the ZCB, a 3% and 9% target is reached.

3.4 The 3% and 9% target differ considerably from the current ZCB targets of 10% and 22-47%. But while helpful and theoretically directly applicable, the Allen et al research is international, and not specifically tailored to New Zealand.[34] As a part of the 2019 report *Farms, Forests and Fossil Fuels* the Parliamentary Commissioner for the Environment (PCE) commissioned academic work into what reduction in New Zealand biogenic methane, if any, is needed in order to be net zero carbon equivalent.[35]

3.5 This report carried out by Dr Andy Reisinger of the New Zealand Agricultural Greenhouse Gas Research Centre (NZAGGRC) and published in 2018, provided a 2050 methane reduction target range of 10-22% in order for the gas to achieve net zero carbon equivalent;

"If New Zealand wished to ensure that methane from livestock caused no additional contribution to warming beyond the current level, emissions would need to be reduced by at least 10-22 per cent below 2016 levels by 2050"

"The 22 per cent level in 2050 reflects a scenario in which other countries take strong action and meet the Paris Agreement goals. The 10 per cent level reflects a scenario in which other countries take some action, but not enough to achieve the Paris Agreement goals."[36]

3.6 The 10-22% range reflects the varied radiative potential of a unit of methane depending on the amount of carbon dioxide in the atmosphere. This range is therefore dependent upon the actions other nations take in reversing the trend of increasing annual rates of carbon dioxide emissions.

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[33] Allen et al, 2018, A solution to the misrepresentations of CO 2-equivalent emissions of short-lived climate pollutants under ambitious mitigation

[34] Allen et al, 2018, A solution to the misrepresentations of CO 2-equivalent emissions of short-lived climate pollutants under ambitious mitigation

[35] New Zealand Parliamentary Commissioner for the Environment, 2019, Farms, forests and fossil fuels: The next great landscape transformation?, available at <https://www.pce.parliament.nz/publications/farms-forests-and-fossil-fuels-the-next-great-landscape-transformation>

[36] New Zealand Parliamentary Commissioner for the Environment, August 2018, A note on New Zealand's methane emissions from livestock, available at <https://www.pce.parliament.nz/publications/a-note-on-new-zealand-s-methane-emissions-from-livestock> pp. 11

3.7 A 3% 2030 and a 10% 2050 methane reduction target is therefore science-based as it factors in the current warming potential of a quantum of methane and demands a reduction based on methane reaching net zero carbon immediately.

3.8 A 3% 2030 and 10% 2050 New Zealand methane reduction target should be regularly reviewed and adjusted. A continued focus on climate change policy internationally will result in a change in global greenhouse gas emissions, which will therefore change the chemistry of the atmosphere, which ultimately determines the warming potential of methane. In order to maintain the credibility of any New Zealand methane emission reduction target it is critical that any target uses the most up to date scientific evidence to determine what level of methane emissions is equivalent to net zero carbon. This was noted by the work commissioned by the PCE in 2018;

"The lifetimes and potencies of greenhouse gases are not fixed; they respond to the constantly changing background composition of the atmosphere. For instance, the amount of warming a greenhouse gas causes depends on how much of that gas is already in the atmosphere. As a result, emissions of methane gradually become less potent as its concentration in the atmosphere increases, and vice versa."[37]

3.9 The range given by the PCE does not reflect a level of uncertainty in the science, but rather a level of uncertainty in the levels of carbon dioxide in the atmosphere in 2050. The current target should be set at a level which reflects current predictions, currently being 10%. But, if global carbon dioxide emissions diverge significantly there should be scope for the Climate Change Commission to recommend the relevant Minister adjust the target accordingly, such as up to 22% if other countries take strong action and meet the Paris Agreement goals as outlined by the PCE.[38]

3.10 The newly formed Climate Change Commission should not be limited by the modelling undertaken by the PCE, but should be constantly adopting the most accurate and up to date research available. The CCC should have strict terms of reference and base advice to the Minister regarding a biogenic methane target upon the following considerations:

(i) *net emissions of biogenic methane in a calendar year are set at a level of impact on atmospheric temperature equivalent to zero carbon (zero carbon equivalent), as for the other gases, by 1 January 2050 and for each subsequent calendar year. The Climate Change Commission will advise the Minister on the appropriate level of biogenic methane emissions required to meet zero carbon equivalent using the most up-to-date, relevant, accurate and credible scientific evidence available.*

(ii) *In this section "zero carbon equivalent" is determined by a science based assessment of the impact different additional greenhouse gases have on average global temperatures*

3.11 However, it may be politically determined that not all gases and/or industries should make the same contribution to mitigating greenhouse gas emissions in New Zealand. In this case, it remains critical for the CCC to transparently answer the question detailed in paragraph 3.10 above, to ensure an objective evidence-based foundation is formed for the subjective political discussion of what level of change should each gas make. The 2019 PCE report made this same point on page 108:

[37] New Zealand Parliamentary Commissioner for the Environment, August 2018, A note on New Zealand's methane emissions from livestock, pp. 10

[38] New Zealand Parliamentary Commissioner for the Environment, August 2018, A note on New Zealand's methane emissions from livestock

"Regardless of the level of ambition of the targets chosen, the rationale behind the choice of national emissions reduction targets and their expected economic and temperature impacts should be made clear and explicit. If there are reasons why the temperature objectives and emissions reduction targets for fossil emissions and biological emissions are different, these should also be clearly stated."[39]

4. ARE THE PROPOSED METHANE REDUCTION TARGETS CONSISTENT WITH THE IPCC 1.5 DEGREES REPORT?

4.1 The 2015 Paris agreement commits signatory nations, including New Zealand, to keep a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius[40].

4.2 However, a 1.5 degree temperature increase is predicted to be the point in which many Pacific nations begin to experience the most devastating impacts of climate change. As a Pacific nation with many historic, cultural, economic and strategic connections to small Pacific island nations it is right for New Zealand climate change policy to commit to preventing any increase in global warming above the 1.5 degree threshold, and not to settle for the less ambitious target of 2 degrees.

4.3 The 2018 IPCC 1.5 Degree report was commissioned to provide pathways for the global economy to reduce its emissions in order to limit global warming to 1.5 degrees. The report widely recommends reducing global methane and black carbon levels by 35% by 2050. This 35% reduction recommendation is not specifically for agriculture, and the report explicitly warns against using this figure to set national targets;

"These pathways illustrate relative global differences in mitigation strategies, but do not represent central estimates, national strategies, and do not indicate requirements…National and sectoral characteristics can differ substantially from the global trends shown above."[41]

4.4 A lead author of the 1.5 Degree report, the earlier referenced *Myles Allen*, also warned New Zealand policy makers against using this global target in national policy. In an article after his 2019 visit to New Zealand *Allen* wrote;

"One thing I would urge, as an author of the recent IPCC Special Report on 1.5°C, don't justify targets simply by following what happens in the IPCC's 1.5°C scenarios. Those scenarios are based on economic models of the relative cost of different ways of reducing emissions. Some of the inputs to these models, like the estimated "cost" of a large fraction of the population turning vegetarian, are deeply subjective. The scenarios provide background information, but I would not rely on them as a basis for national policy."[42]

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[39] New Zealand Parliamentary Commissioner for the Environment, 2019, Farms, forests and fossil fuels: The next great landscape transformation?, available at <https://www.pce.parliament.nz/publications/farms-forests-and-fossil-fuels-the-next-great-landscape-transformation> pp. 108

[40] Paris Agreement". United Nations Treaty Collection. 8 July 2016

[41] IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. pp.16

[42] Allen Myles, "A climate-neutral NZ? Yes, it's possible", Newsroom, March 29 2019, available at <https://www.newsroom.co.nz/@ideasroom/2019/03/29/510792/a-climate-neutral-nz-yes-its-possible>

4.5 The 1.5 Degree report recommended a 35% global agricultural short lived greenhouse gas reduction, including methane and black carbon. However, as well as explicitly stating that this is not a recommendation for individual countries, the report is also clear that methane reductions will predominantly come from non-agricultural sources and as short-lived greenhous gases are reduced from sources such as mining and waste the proportion of these gases emitted from agriculture will increase;

"The AFOLU sector contributes an important share of the residual CH_4 emissions until mid-century, with its relative share increasing from slightly below 50% in 2010 to around 55–70% in 2030, and 60–80% in 2050 in 1.5°C-consistent pathways"[43]
Note the term 'AFOLU' refers to "Agriculture, forestry and other land use".

4.6 A decrease in New Zealand agriculture production will result in a global increase in agricultural greenhouse gases as less efficient producers meet this loss in supply, this is known as *emissions leakage*. Setting a national climate change policy which avoids emissions leakage is consistent with the IPCC 1.5-degree report as it avoids an increase in global atmospheric methane levels.

4.7 There are a wide range of pathways outlined by the IPCC 1.5-degree report, however only four are included in the report itself. The four modeled pathways in the report which have details provided include the following changes to 2050 agricultural biological emissions relative to 2010 levels;[44]

Figure 4, IPCC 1.5 Degree Report Modelled Pathways

Pathway	2050 methane change	2050 nitrous oxide change
1	-33%	-6%
2	-69%	-26%
3	-23%	-0%
4	+2%	-39%

4.8 The wide range in the options for reducing agricultural emissions highlight the inaccuracy in simply saying the report recommends a 35% reduction in New Zealand methane, methane could easily increase along with nitrous oxide and be consistent with the pathways modeled in the report.

4.9 The modelled scenarios in the IPCC 1.5 Degree report which model agricultural methane reducing by 24-48% (from which the 24-47% target in the ZCB was based upon) also envisage a 91-190% increases in global nuclear power generation.[45] This further illustrates that the IPCC report was clearly providing global scenarios that are not applicable to New Zealand's circumstances, as stated in the report itself and by its author Myles Allen subsequently.

4.10 Along with a 2050 methane reduction range of 24-48% and a nuclear power increase range from 91-190%, modeled pathways in the *IPCC 1.5 Degrees report* also outline

[43] IPCC, 2018: Chapter 2 - Mitigation pathways compatible with 1.5°C in the context of sustainable development In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty World Meteorological Organization, Geneva, Switzerland, pp.118
[44] IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. pp.16
[45] IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. pp.16

a 2050 agricultural nitrous oxide emissions range from +1% to -26%.[46] This modeled scenario range for agricultural nitrous oxide is much more conservative than the -100% (net zero) outlined in the ZCB.

4.11 However, despite being much more difficult to achieve than the range outlined in the *IPCC 1.5 Degree report*, the ZCB net zero nitrous oxide target has been widely welcomed by the New Zealand agriculture sector. This is also despite the target being impossible to currently achieve without offsetting, and despite the 2019 PCE report describing nitrous oxide as a "biological gas" that should be treated differently to fossil carbon dioxide.[47]

4.12 A 2050 net-zero nitrous oxide target, as outlined in the ZCB, will be very difficult for the industry to achieve and also goes above and beyond many of the modelled pathways in the IPCC 1.5 Degree report.[48] However, despite the difficulty inherent in the New Zealand agriculture sector achieving net-zero nitrous oxide by 2050 Federated Farmers agree with the target as, unlike the 2030 and 2050 methane targets, it is science-based and logically consistent with the aims of the ZCB.

4.13 Federated Farmers is eager to embrace the challenge of being a nation of climate friendly farmers, but the biogenic methane target in the ZCB will make it impossible for industry groups to foster farmer support for the Bill.

5. ARE THE ZCB BIOGENIC METHANE REDUCTION TARGETS EXPECTED TO BE ACHIEVABLE WITHOUT DECREASING LIVESTOCK PRODUCTION?

5.1 Since 2003 the Pastoral Greenhouse Gas Research Consortium (PGGRC) has directed about $75 million of industry and Crown funding to the challenge of lowering New Zealand GHG emissions, including by attempting to decouple the relationship between the feed consumed by a ruminant animal and methane produced. Much valuable knowledge has been gained, but the program has yet to be successful in finding a breakthrough technology.[49] There remains a constant of about 22 grams of methane for every one kilogram of dry matter consumed by a cow, sheep, goat or deer.[50]

5.2 The New Zealand agriculture sector is committed to continuing to fund this research and is hoping for a breakthrough that can significantly reduce methane emissions from the industry. However, scientific breakthroughs are unpredictable and face a number of economic farm system, domestic regulatory, international regulatory and consumer willingness challenges even if made technologically possible.

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[46] IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. pp.16

[47] New Zealand Parliamentary Commissioner for the Environment, 2019, Farms, forests and fossil fuels: The next great landscape transformation?

[48] IPCC, 2018: Chapter 2 - Mitigation pathways compatible with 1.5°C in the context of sustainable development In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty World Meteorological Organization, Geneva, Switzerland, pp.118

[49] PGGRC & NZAGRC, 'Reducing New Zealand's greenhouse gas emissions: How We are getting there', 2019,

[50] Clark, H., I. Brookes, and A. Walcroft, 2003, "Enteric methane emissions from New Zealand ruminants 1990–2001 calculated using an IPCC Tier 2 approach. Report prepared for the Ministry of Agriculture and Forestry, Ministry of Agriculture and Forestry."

5.3 The 2018 report of the Biological Emissions Reference Group (BERG) stated that "overall biological emissions in the future could potentially be reduced between 10-21% by 2030, and by 22-48% in 2050, relative to MPI baseline projections."[51]

5.4 However, it should not be inferred that the predictions made in the BERG report support the ZCB biogenic methane reduction targets.

5.5 The BERG predictions are based on MPI baselines which assume (inaccurately) that sheep numbers will continue to decline at a linear rate consistent with the decline seen since 1990

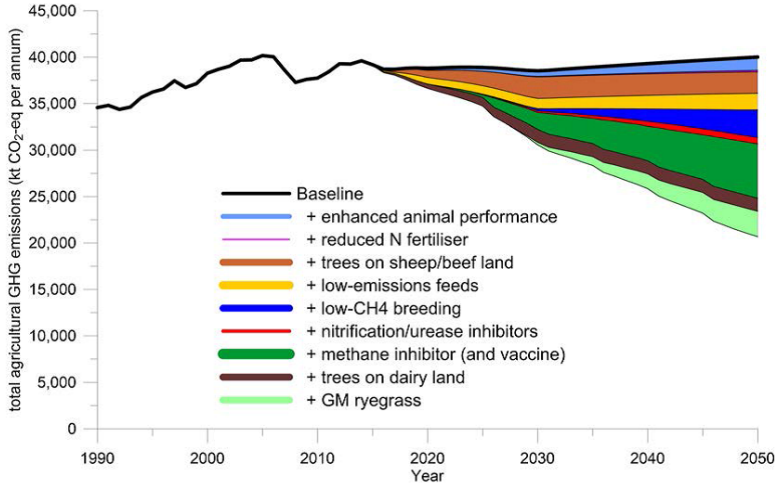
5.6 The predictions in the BERG report also refer to overall agricultural emissions, not singularly biogenic methane emissions. When the net zero nitrous oxide target is subtracted from the predictions the following possible methane reductions are reached (using GWP_{100}):[52]

Figure 5. 24-48% Emissions Reductions by 2050

		24% 2050			48% 2050		
2017 Emissions	**2017 CO2-e (GWP100)**	**Absolute reduction**	**% reduction**	**Absolute number**	**Absolute reduction**	**% reduction**	**Absolute number**
Total	37,834	9,080	24%	28,754	18,160	48%	19,674
Nitrous Oxide	8,693	8,693	100%	0	8,693	100%	0
Methane	29,141	387	**1.3%**	28,754	9,468	**32.5%**	19,674

5.7 The predictions in the BERG report also allow for the planting of trees in order to offset net emissions and do not limit farmers to gross reductions. There are also many unpredictable future technologies included in the BERG figures, demonstrated in figure 6 below.

Figure 6. Possible impacts of future mitigation technology on agricultural emissions[53]



[51] Report of the Biological Emissions Reference Group, December 2018, the Biological Emissions Reference Group, available at < https://www.mpi.govt.nz/protection-and-response/environment-and-natural-resources/biological-emissions-reference-group/> pp.6

[52] Ministry for the Environment, "New Zealand's Greenhouse Gas Inventory 1990-2017

[53] Report of the Biological Emissions Reference Group, December 2018, the Biological Emissions Reference Group pp.28

5.8 The issues faced with the nitrogen inhibitor *DCD* by the dairy industry shows that adoption of new technologies is not just a matter of scientific development, but can have significant unintended consequences and customer rejection. Other important technologies (such as ryegrass) involve genetic modification which is currently unacceptable to the New Zealand Government. The NZAGRC assessment of the potential of mitigation technologies is heavily qualified and needs to be treated with considerable caution.

"The mitigation approaches with the largest potential impact on emissions, e.g. methane inhibitors and vaccines, nitrification inhibitors, and genetically modified ryegrass, are not yet commercially available. Some have proof of concept (e.g. a methane inhibitor for feedlot animals), or proven benefits (e.g. nitrification inhibitors). Others are at various stages of development. An example of the latter is genetically modified ryegrass, which exists, but its efficacy in reducing emissions is yet to be demonstrated. Similarly, a methane vaccine is in development but is yet to demonstrate an effect in live animals. Bringing such options to market suitable for use on-farm will require further development, with timelines of 5–20 years, and uncertain outcomes."[54]

"The actual mitigation potential and adoption rates of options are as yet uncertain, and will also depend on policy incentives. Lower rates of adoption, or lower mitigation of individual options, will result in lesser total mitigation."[55]

5.9 This research by BERG was also a qualitative survey of a group of technical experts from participating organisations within the BERG, giving the survey a very small sample size. While the predictions of the individuals would be welcomed by New Zealand farmers, they are merely the hopeful predictions from the survey participants and should not be used to drive sound public policy.[56] While it is currently not possible, we simply do not know if the 2030 and 2050 biogenic methane reduction target can be met without cutting agricultural production. The development of safe biotechnology is simply very unpredictable.

6. WHY THE NEED FOR METHANE REDUCTION TARGETS TO BE NET AND NOT GROSS?

6.1 If a scientific breakthrough is not made commercially available to New Zealand livestock farmers before the 2030 and 2050 methane emissions reduction targets are reached farmers will be forced to reduce the feed eaten by their stock, and therefore forced to reduce stock numbers.

6.2 It is irrational to force productive New Zealand livestock farmers to reduce their stock numbers if they are both willing and able to offset their methane emissions that are contributing to the additional warming of the atmosphere.

6.3 Preventing farmers from offsetting their methane emissions will unnecessarily harm the livestock sector, provincial communities, the New Zealand economy and ultimately, through emissions leakage, the atmosphere and climate.[57]

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[54] Report of the Biological Emissions Reference Group, December 2018, the Biological Emissions Reference Group pp.26

[55] Report of the Biological Emissions Reference Group, December 2018, the Biological Emissions Reference Group pp.27

[56] Report of the Biological Emissions Reference Group, December 2018, the Biological Emissions Reference Group pp.26

[57] Research that shows emissions intensity of NZ

6.4 The *2018 IPCC 1.5 Degree* report is clear that significant reductions to carbon dioxide are needed to prevent a 1.5 degree warming scenario. The report states that cuts in short-lived greenhouse gases, such as Methane, cannot be used to delay real action in reducing long-lived greenhouse gases, as is the case in the ZCB;

"SLCF emissions ranges of 1.5°C and 2°C pathway classes strongly overlap, indicating that the main incremental mitigation contribution between 1.5°C and 2°C pathways comes from CO_2"[58]

"Any scenario that fails to reduce CO_2 emissions to net zero would not limit global warming, even if SLCFs are reduced, due to accumulating CO_2-induced warming that overwhelms SLCFs' mitigation benefits in a couple of decades."[59]

Note: SLCFs is used to refer to short-lived climate forces, which includes methane emissions.

6.5 In stark contrast to the ZCB, the 2019 PCE report accepted the findings of the IPCC 1.5 degree report. The PCE report accepts the danger in using cuts in short-lived greenhouse gases (such as methane) to buy time for long-lived gases (such as carbon dioxide) to be reduced. In an attempt to prevent the nation delaying reductions in long-lived emissions by reducing short-lived emissions, the PCE recommended an alternate policy framework which makes a distinction between biological and fossil emissions.

6.6 The PCE alternative policy framework surprisingly (but helpfully) limits forestry offsets to biological emissions, such as those from agriculture;

"Fossil emissions need to be reduced to zero by the second half of the century. That should be the aim. Reducing them by only half that and claiming to have managed the problem by planting forest sinks to cover the rest is a poor alternative. Not only would the sinks need to be maintained in perpetuity, planting would have to continue as long as there were any residual emissions."[60]

"Different considerations apply to biological methane and nitrous oxide. Because they do not accumulate in the atmosphere in the same way that carbon dioxide does, they do not necessarily need to be cut to zero. This is fortunate because no proven negative emissions technologies currently exist that could do so. And critically, any food production, no matter how efficient, will result in some emissions of these two gases."[61]

6.7 Troublingly, New Zealand's long-lived carbon dioxide emissions from transport and electricity represent a dominant proportion of the growth in greenhouse gas emission since both 1990 and 2007, as outlined by the Productivity Commission and Statistics NZ respectively in figures 7 and 8 below

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[58] IPCC, 2018, Chapter 2 - Mitigation pathways compatible with 1.5°C in the context of sustainable development In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°CPp.118

[59] IPCC, 2018: Chapter 4 – Strengthening and implementing the global response In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty World Meteorological Organization, Geneva, Switzerland, pp.341

[60] New Zealand Parliamentary Commissioner for the Environment, 2019, Farms, forests and fossil fuels: The next great landscape transformation?,pp. 9

[61] New Zealand Parliamentary Commissioner for the Environment, 2019, Farms, forests and fossil fuels: The next great landscape transformation? Pp. 10

Figure 7. Absolute change in gross emissions across sources and gases, 1990–2016[62]

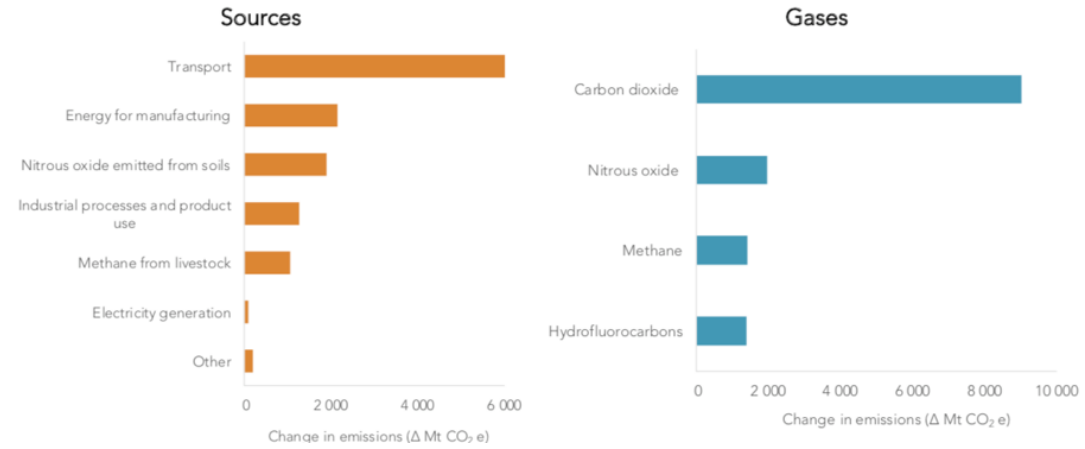
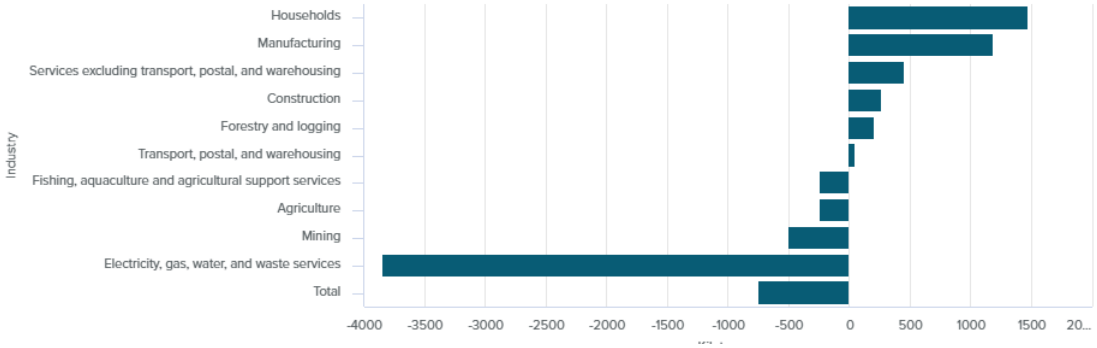


Figure 8: Change in CO_2-e emissions, by industry and households, 2007-17[63]



6.8 Despite being included in an Emissions Trading Scheme (ETS) since 2008, transport carbon dioxide emissions have been the clear source of growth in New Zealand's greenhouse gas emissions since 1990, growing by 84% from 1990 to 2017. In contrast methane emissions from livestock in New Zealand have increased 7.5% since 1990 and have been stable since 2000.[64]

6.9 The net/gross distinction in the ZCB directly contradicts the recommendations of the PCE and undermines the clear advice of the IPCC. While the sector acknowledges the difficulties in implementing the full alternate approach of the PCE, at the very least the PCE recommendations should not be directly contradicted.

[62] New Zealand Productivity Commission. (2018). Low-emissions economy: Final report pp. 23

[63] Environmental-economic accounts: 2019 (data to 2017), Stats NZ, 2019
Available at < https://www.stats.govt.nz/information-releases/environmental-economic-accounts-2019-data-to-2017> Pp.10

[64] Ministry for the Environment, "New Zealand's Greenhouse Gas Inventory 1990-2017"

6.10 A large reduction in carbon dioxide emissions represents a significant challenge to New Zealand farmers. The agricultural sector in New Zealand is dependent upon carbon dioxide intensive activities in order to consistently and efficiently produce a large amount of high quality product. Meat and milk processors are reliant upon coal boilers, dairy farms depend upon stable electricity in order to regularly milk cows and sheep and beef farmers do not have access to evenly placed electric vehicle charging stations. These, along with many others, are actions farmers take for granted, and justly transitioning to a net zero carbon dioxide economy will be a tremendous challenge that the sector is eager to embrace. This transition away from carbon dioxide should not be delayed by cutting short-lived emissions such as methane.

6.11 The growth in New Zealand's greenhouse gas emissions since 1990 is due to the increase in transport carbon dioxide emissions and not due to livestock methane. While the PCE recommended limiting forestry offsets to biological emissions, the ZCB explicitly prevents biological methane from being offset. This will perversely provide an incentive to delay action on long-lived stock greenhouse gases by reducing short-lived flow emissions. Limiting offsetting to long-lived gases is counterproductive to the recommendations of the IPCC, Productivity Commission and PCE and should be reversed.

7. HOW DO NEW ZEALAND'S ZCB METHANE REDUCTION TARGETS COMPARE TO INTERNATIONAL COMPETITORS?

7.1 The current ZCB methane reduction targets will quickly put New Zealand agriculture at a disadvantage relative to our competitors in the major export dependant livestock sectors, namely dairy, beef and sheep meat.

7.2 The world's ten largest exporting nations of dairy, beef, and sheep and goat meat products are shown in *figure 8*, *figure 9*, and *figure 10* respectively.

Figure 8, Top Dairy exporters in 2018[65]

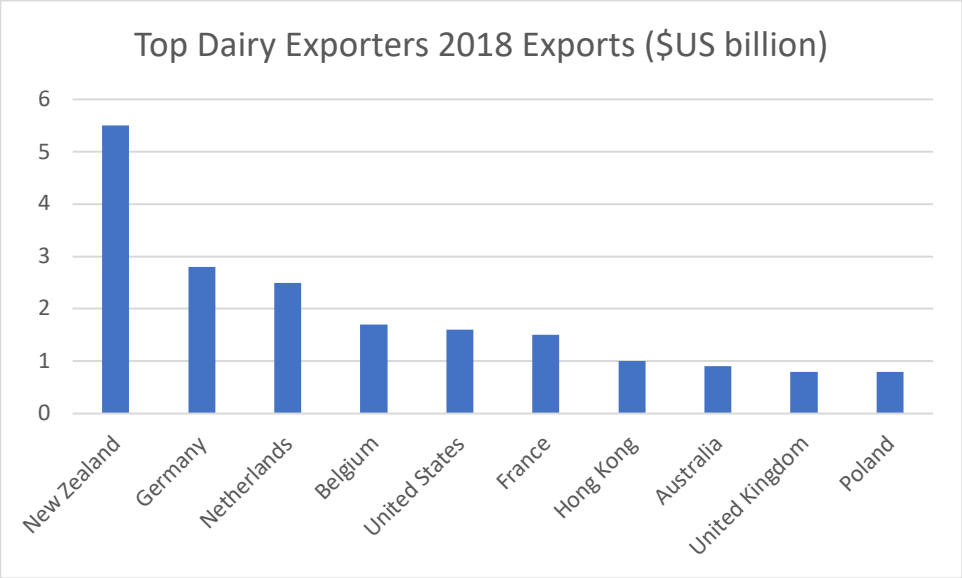


Figure 9 Top Beef Exporters in 2018[66]

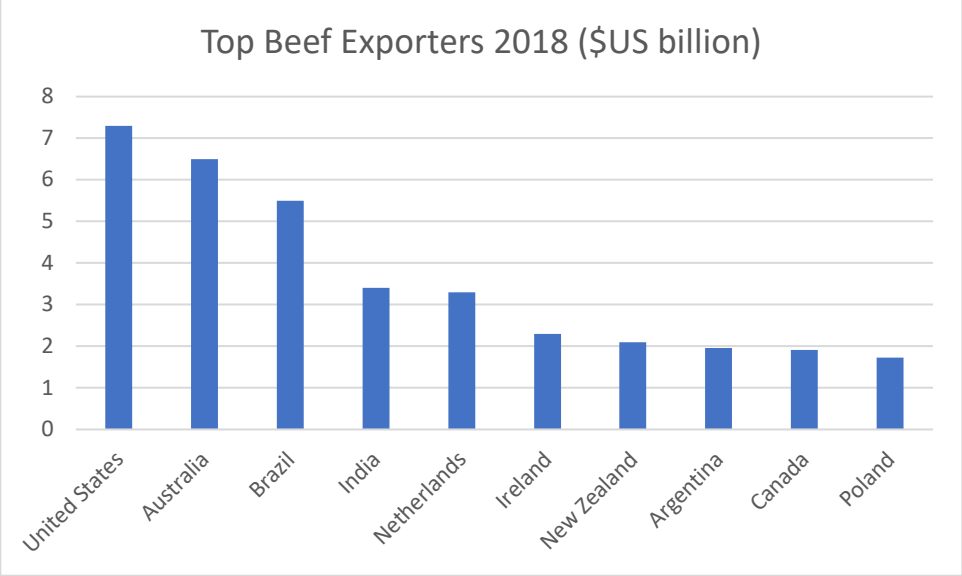
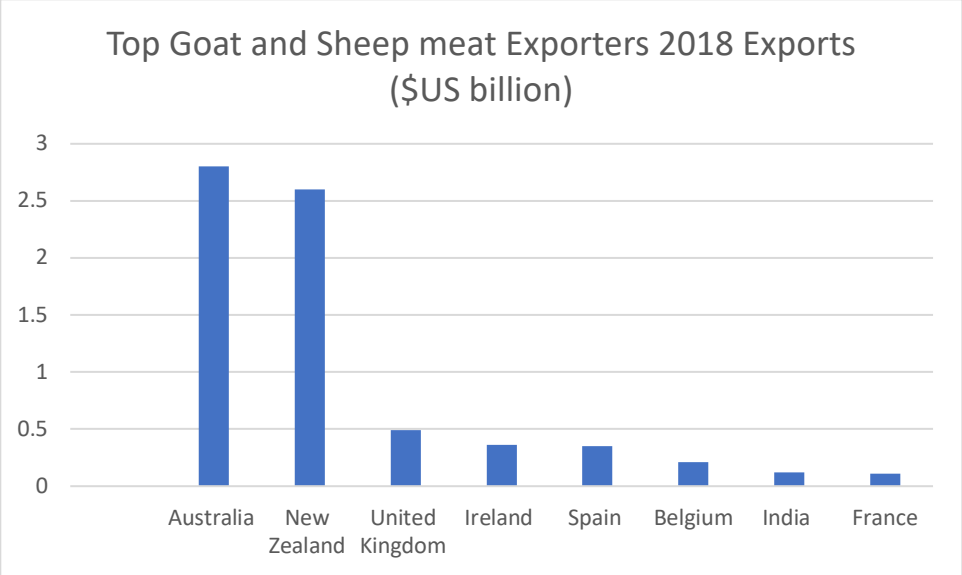


Figure 10 Top Sheep and Goat meat exporters in 2018[67]

[65] International Trade Centre, Trade Map, International Trade Centre. Accessed on May 2, 2019, available at <https://www.trademap.org/Index.aspx>
[66] International Trade Centre, Trade Map, International Trade Centre.
[67] International Trade Centre, Trade Map, International Trade Centre.



7.3 As well as being a major exporter of high-quality and world renowned livestock products, New Zealand dairy and red meat production is much more emissions efficient than the global average.

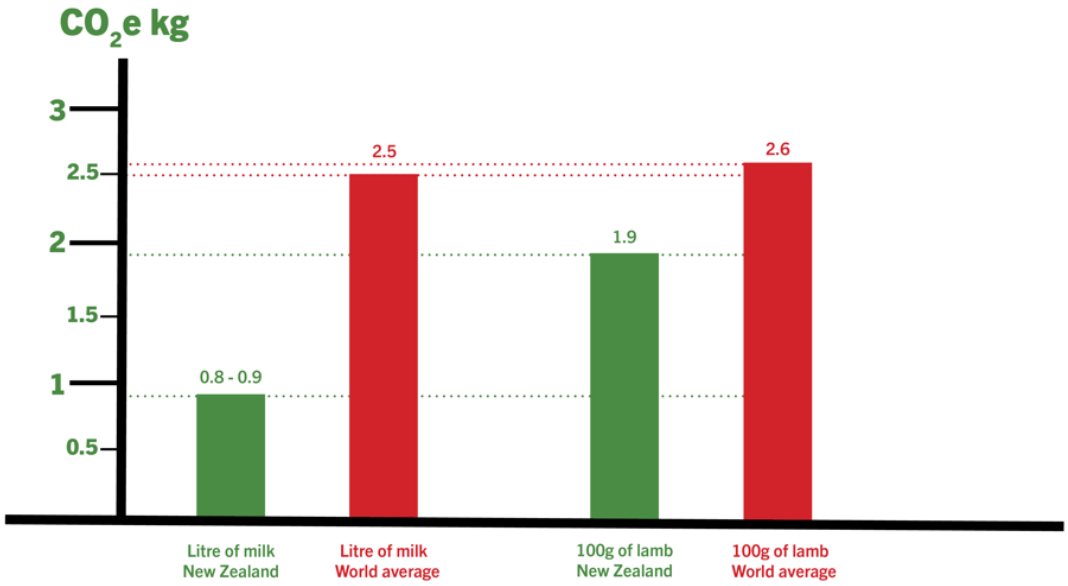
7.4 For example, the global average GHG per litre of milk is **2.5 kg CO_2e /kg fat and protein corrected milk (FPCM).**[68] Yet, New Zealand milk is in the range of just **0.8-0.9 kg CO_2e /kg FPCM.**[69]

7.5 Also, the global average for the greenhouse emissions produced for 100g of lamb is **2.6 kg CO_2e.**[70] Yet 100 grams of New Zealand lamb produces just **1.9 kg CO_2e.**[71]

7.6 The impressive emissions efficiency of New Zealand milk and lamb meat is illustrated in *Figure 11* below.

[68] Climate Change and the Global Dairy Cattle Sector: The role of the dairy sector in a low-carbon future, the Food and Agriculture Organisation of the United Nations and the Global Dairy Platform Inc, Rome 2019, pp.26
[69] Ledgard, S.F., Chobtang, J., Falconer, S.J. and McLaren, S., 2016. Life cycle assessment of dairy production systems in New Zealand, Integrated nutrient and water management for sustainable farming. (Eds L.D. Currie and R.Singh). http://flrc.massey.ac.nz/publications.html. Occasional Report No. 29. Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand. 8 pages. 1 LIFE CYCLE ASSESSMENT
[70] Clune, Stephen, Enda Crossin, and Karli Verghese. "Systematic review of greenhouse gas emissions for different fresh food categories.
[71] Ledgard, S.F., Lieffering, M., McDevitt, J., Boyes, M. and Kemp, R. 2010 A Greenhouse Gas Footprint Study for Exported New Zealand Lamb, Agreserch, available at <https://www.mia.co.nz/assets/MIA-Publications/Greenhouse-gas-footprint-study-for-exported-NZ-lamb.-March-2010.pdf>

Figure 11: The global and New Zealand greenhouse gas intensity of dairy milk and sheep meat. [72]



7.7 It is likely that as New Zealand agricultural exports reduce from lower production induced by the ZCB's emission reduction targets, less emissions efficient producers will fill the gap in supply left in the global market, resulting in higher global emissions. This is known as *emissions leakage.*

7.8 Emissions leakage can only be avoided if New Zealand's major, and less emissions efficient, trading partners also legislate similar biogenic methane reduction targets to those outline in the ZCB. This would prevent New Zealand exporters incurring a competitive disadvantage, and prevent emissions leakage resulting in an overall increase in atmospheric greenhouse gas emissions. However, despite domestic independent commissions making calls to do so, none of the significant exporters of livestock products, demonstrated in *figure 8, figure 9* and *figure 10* have legislated gross reductions to biogenic methane emissions.[73] The UK and Ireland are often held up as examples of progressive agricultural climate change policy, but the policies of these two nations are much less damaging to their agricultural industries than the ZCB will be for New Zealand's.

[72] Climate Change and the Global Dairy Cattle Sector: The role of the dairy sector in a low-carbon future, the Food and Agriculture Organisation of the United Nations and the Global Dairy Platform Inc, Rome 2019, pp.26
Clune, Stephen, Enda Crossin, and Karli Verghese. "Systematic review of greenhouse gas emissions for different fresh food categories.
Ledgard, S.F., Chobtang, J., Falconer, S.J. and McLaren, S., 2016. Life cycle assessment of dairy production systems in New Zealand, Integrated nutrient and water management for sustainable farming. (Eds L.D. Currie and R.Singh). http://flrc.massey.ac.nz/publications.html. Occasional Report No. 29. Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand. 8 pages. 1 LIFE CYCLE ASSESSMENT
[73] Paris 2015: Tracking country climate pledges", Carbon Brief, published 2 June 2017, available at < https://www.carbonbrief.org/paris-2015-tracking-country-climate-pledges>

7.9 The UK Climate Change Commission (CCC) has been promoted as a template for New Zealand's equivalent. The UK CCC has commissioned many reports, most recently in May of 2019, which have made various recommendations.[74] However, the UK Parliament is under no obligation to respond to these reports, let alone adopt the recommendations. Thus far, the UK government has not set a gross biogenic methane reduction target, and the already subsidised and less greenhouse gas efficient, farmers from the UK will enjoy a considerable comparative advantage to New Zealand farmers under the ZCB.

7.10 Ireland has an unusually similar emissions profile to New Zealand. Under GWP_{100} agriculture represents the single largest contributor to overall emissions, with 33.3% of the total. The transport and energy sectors are also the second and third largest contributors at 19.8% and 19.3% respectively.[75]

7.11 Ireland is similar to New Zealand, in being a developed nation with a large proportion of its emissions coming from agriculture. However, in a manner similar to the UK, there are also no gross biogenic methane targets under legislation in Ireland;

"The (Irish) Climate Change Advisory Council has repeatedly pressed the Government to outline how carbon neutrality will be achieved. How feasible is it to tell farmers to produce more milk and beef but reduce their emissions?"[76]

7.12 Meanwhile, large trading competitors such as Australia, the United States, Brazil, Argentina, and India fundamentally prioritise food security and output based efficiency gains over gross methane reduction targets.[77] The New Zealand agriculture sector is willing to demonstrate real global leadership and embrace the challenge of meeting gross biogenic methane reduction targets, despite having no cost-effective commercial mitigation options available. However, the methane reduction targets outlined in the ZCB unnecessarily go beyond zero carbon equivalent, and represent a lost opportunity for widespread agricultural industry buy-in.

7.13 In contrast, a 2030 and 2050 methane reduction target of 3% and 10% respectively would be met with industry support, whilst commiting New Zealand agriculture to achieving carbon zero equivalant by 2050. A biogenic methane reduction target based on the principal of carbon zero equivalant goes above and beyond what is required under the Paris Agreement, and what is required in order to avoid the most damaging effects of climate change.

[74] Net Zero, The UK's contribution to stopping global warming Committee on Climate Change May 2019,
[75] Ireland's Final Greenhouse Gas Emissions 1990-2017, Environmental Protection agency, published 9, available at <https://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/>
[76] Ella McSweeney, Aug 9, 2018, Ireland's agriculture emissions are hurtling in the wrong direction, The Irish Times, available at <https://www.irishtimes.com/news/science/ireland-s-agriculture-emissions-are-hurtling-in-the-wrong-direction-1.3583142>
[77] Paris 2015: Tracking country climate pledges", Carbon Brief

8. WHAT IS THE ECONOMIC IMPACT OF THE TARGETS CURRENTLY OUTLINED IN THE ZCB?

8.1 The current biogenic methane reduction targets outlined in the ZCB will have a large direct economic impact on farmers and have the potential to have an even larger indirect impact on rural communities.

8.2 The 2030 biogenic methane target outlined in the ZCB demands an annual 1% reduction in biogenic methane, likewise the 2050 biogenic methane target also demands an annual reduction of 0.8-1.6%.

8.3 According to the June 2019 MPI Situation & Outlook for Primary Industries report, for the year ended June 2019 the livestock sector (dairy, meat and wool) is forecast to have contributed $27.8 billion to the New Zealand economy.[78] As outlined in section 5, there is currently a fixed relationship between the feed consumed by a ruminant animal and the methane produced.[79] Therefore, any mandated reduction in biogenic methane will require New Zealand livestock farmers to reduce the amount of dry matter fed to ruminant livestock by a corresponding amount, and to therefore either reduce production or to forgo additional production. Consequently, if the livestock sector is required to reduce gross methane emissions, a subsequent reduction in (or forgoing of additional) production of the same amount is also required.

8.4 As a result of this direct relationship between methane and livestock production, a 1% gross biogenic methane target would (at current export prices, which are relatively high) result in a minimum direct cost of **$278 million** to the New Zealand livestock sector. Likewise, an annual 0.8-1.6% biogenic methane reduction target will directly cost the New Zealand livestock sector **$222 to $445 million** annually.

8.5 The above figures estimate the decrease to livestock production In New Zealand due to a gross methane reduction target, based on an optimistic assumption of a direct relationship between a decrease in feed consumed on a farm and the total production. However, in the absence of a decoupling technology being developed, a methane reduction target may result in a greater reduction (or forgoing of additional) direct production. The resultant reduction in livestock production (or forgoing of growth) may be greater than the target outlined in the ZCB, due to the importance of supplemental feed which is necessary to fill feed deficits and buffer seasonal conditions. Access to high quality supplementary feed prevents animal welfare concerns and has contributed to the very high emissions efficiency of New Zealand milk and meat production (as demonstrated in *Figure 11*).

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[78] Situation & Outlook for Primary Industries, June 2019, Ministry for Primary Industries, available at < https://www.mpi.govt.nz/news-and-resources/economic-intelligence-unit/situation-and-outlook-for-primary-industries/sopi-reports/>

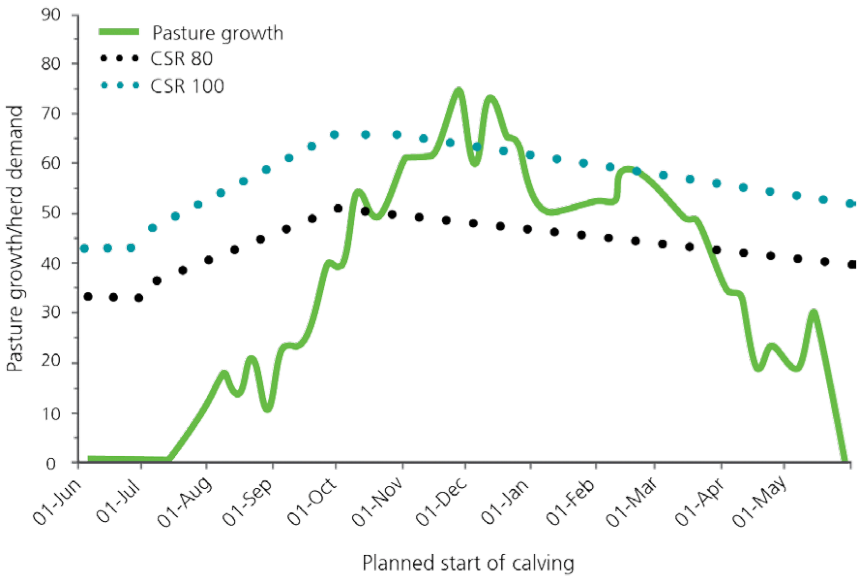
[79] PGGRC & NZAGRC, 'Reducing New Zealand's greenhouse gas emissions: How We are getting there', 2019

8.7 The on-farm demand for feed from livestock varies throughout the year, and this variation is not aligned with the seasonal variation of feed production on-farm. This gap between on-farm feed demand and supply is particularly pronounced for New Zealand dairy farms, whose demand is driven by the lactation cycle, and whose supply is dictated by weather seasonality.

8.8 Reducing the supplemental feed at a period in which the on-farm demand for feed is high and the on-farm supply of feed is low (such as September in *Figure 12*) will have a negative impact on productivity and therefore on emission efficiency. This variation can be overcome, and on-farm efficiency maximised, by livestock farmers importing supplemental feeds at times where feed is in highest demand and is in lowest supply.

8.9 The methane reduction targets outlined in the ZCB will place pressure on livestock farmers in New Zealand to reduce the feed consumed by livestock as a means of reducing agricultural methane emissions and meeting the gross methane targets. This pressure has the potential to limit the ability of livestock farmers to import supplemental feed. Supplemental feed is important for efficient livestock farming in New Zealand for caring for livestock (such as breeding ewes and dairy herds) through periods when feed is low, such as in the case of winter or in an adverse weather event. The importance of supplemental feed to New Zealand dairy farms is demonstrated in *Figure 12*.

Figure 12: The variation that can exist between herd demand and pasture supply at any chosen comparative stocking rate (CSR).



8.10 These concerning figures merely represent the direct cost to the livestock sector, however significant cuts in livestock production would have a large flow on effect to the New Zealand economy, and particularly the economies of provincial New Zealand. Agriculture is the economic foundation for most New Zealand towns, with many other businesses (and local councils) relying upon the income provided from farmers. A severe cut in livestock production would result in a large loss in the income of milk, meat and wool processors, local retailers, and local councils. This would result in both higher unemployment nation-wide, and a central government with less income (after tax from the livestock sector is reduced) to help assist with the resulting adverse social impacts.

8.11 An October 2018 report by NZIER explores the important role dairy farming plays in New Zealand as a key primary industry which serves as the backbone for many rural economies.[80] As demonstrated in Figure 11, the benefits of the dairy industry in New Zealand go well beyond the direct impact to the national economy.

Figure 11: Dairy processing uses more than just raw milk, 2017; $m of expenditure [81]

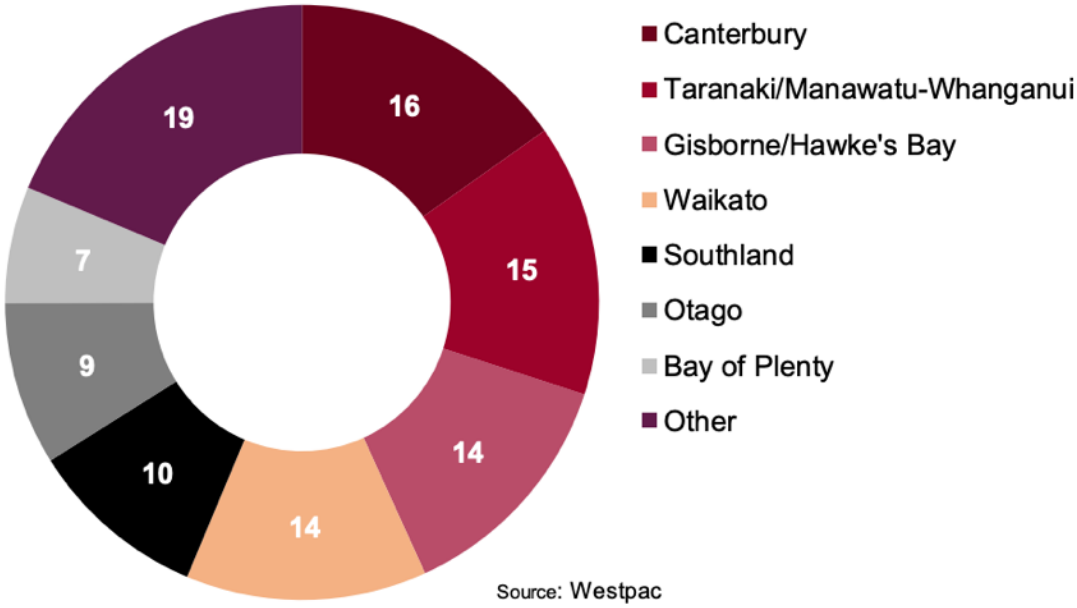
8.12 The dairy sector is by no means alone in providing an economic foundation for the sustainable growth of rural New Zealand, with other livestock sectors (such as sheep, deer, cattle and goats) playing a critical role in many provincial economies. A 2016 Industry Insights report by Westpac highlights the importance of the meat and wool industries to New Zealand employment and economic growth.

8.13 According to the 2016 Industry Insights report; the meat and wool sector is the largest primary sector employer in New Zealand, employing over 100,000 people full time. This employment is concentrated in provincial New Zealand, as demonstrated in *Figure 12*, with Auckland and Wellington being the only regions with a lower proportion of employment in the meat and wool sector than the national average.

[80] How does the dairy sector share its growth? An analysis of the flow-on benefits of dairy's revenue generation NZIER final report to Dairy Companies Association of New Zealand October 2018, available at <https://nzier.org.nz/static/media/filer_public/9f/0e/9f0e40ea-0178-4ef9-950f-5546ef483eec/dcanz_2018_final.pdf>

[81] How does the dairy sector share its growth? An analysis of the flow-on benefits of dairy's revenue generation NZIER pp. 2

Figure 12: Meat and wool employment by region (000), 2014



8.14 A report commissioned by the Ministry for the Environment and undertaken by NZIER also highlights the large economic cost inherent in achieving the biogenic methane targets outlined in the ZCB.[82] While a 2050 gross biogenic methane reduction target of 47% was not modelled, a target of 50% was, and the results are alarming:

"The non-fungible target that considers net zero carbon and stabilises methane at 50% of 2016 levels would result in real GDP being $49.0 billion below the status quo by 2050."[83]

8.15 However, as outlined in the NZIER report, allowing the offsetting of methane emissions will reduce the harmful impact of the ZCB on the New Zealand economy. If a 2050 biogenic methane reduction target is amended from gross 50% to net 50%, the cost to the economy will be $38.3 billion less.

"Allowing fungibility has a material moderating impact on economic costs. A fungible stabilisation target equivalent to net zero carbon and stabilisation of methane at 50% of 2016 levels would lead to real GDP being $11.7 billion below the status quo by 2050."[84]

[82] Economic impact of meeting 2050 emissions targets: Stage 2 modelling, NZIER final report to Ministry for the Environment, 9 November 2018, <available at https://www.mfe.govt.nz/publications/climate-change/economic-impact-of-meeting-2050-emissions-targets-stage-2-modelling

[83] Economic impact of meeting 2050 emissions targets: Stage 2 modelling, NZIER final report to Ministry for the Environment, 9 November 2018, pp. iv

[84] Economic impact of meeting 2050 emissions targets: Stage 2 modelling, NZIER final report to Ministry for the Environment, 9 November 2018, pp.iv

8.16 The regulatory impact statement (RIS) undertaken for the ZCB also makes the deleterious impact the bill is expected to have on the economy clear, stating that:

"…The recommended target option could slow economic growth by 0.07-0.18 percentage points compared to the current 2050 target, which is $5-12 billion per year over 2020-2050"[85]

8.17 An annual cost to the New Zealand economy of $5-12 billion will have a tangible impact on the high standard of living currently enjoyed by New Zealand citizens. It will also reduce the income available to central government that can be used to reduce the resultant harm incurred by the most vulnerable members of New Zealand society through social welfare programs.

8.18 The cost to the economy as a result of the ZCB's large gross methane reduction targets will not be shouldered evenly across New Zealand society, with certain groups, sectors and regions expected to be disproportionately affected. While it is impossible to know with certainty which groups will be unevenly impacted, it is likely to include working class farmers, as supported by the RIS which expects with medium to high confidence:

"Uneven distributional impacts on lower-income households and regions/communities that are reliant on emissions-intensive, trade-exposed (EITE) activities: exact costs unknown and dependant on policy interventions"[86]

8.19 As a small developed nation that contributes 0.17% of the global total of greenhouse gas emissions, any action undertaken by New Zealand must serve as an example to the world in order to be truly effective. The current ZCB biogenic methane targets will have a large impact on the New Zeeland economy and pose a serious risk to food production. The negative impact of the ZCB's high methane reduction targets on both New Zealand's economy, standard of living and food productivity will serve as a cautionary warning to other nations. In order to demonstrate real international climate leadership, New Zealand should show to the world how to farm smarter, and not simply farm less.

APPENDIX 1 ENDS

[85] Regulatory Impact Assessment: Zero Carbon Bill, 3 May 2019, Ministry for the Environment, available at <https://treasury.govt.nz/publications/risa/regulatory-impact-assessment-zero-carbon-bill> pp. 10

[86] Regulatory Impact Assessment: Zero Carbon Bill, 3 May 2019, Ministry for the Environment, pp. 11

APPENDIX 2: RESULTS FROM FEDERATED FARMERS MEMBER SURVEY ON THE ZERO CARBON BILL

To help inform its submission on the Zero Carbon Bill Federated Farmers conducted a member survey. The internet survey was conducted over the period 15-24 June 2019 and received 1,277 responses.

The results for each question follow.

1. What Federated Farmers industry group(s) are you a member of?

Industry Group	Number	Percentage
Arable	59	4.62%
Dairy	568	44.48%
Goats	9	0.70%
High Country	41	3.21%
Meat and Wool	595	46.59%
Rural Butchers	5	0.39%
Total	**1,277**	**100.00%**

2. Are you concerned about climate change policy and its impact on rural New Zealand?

Answer	Number	Percentage
Yes	1,246	97.57%
No	22	1.72%
Not answered	9	0.71%
Total	**1,277**	**100.00%**

3. Should NZ climate change policy account for the emissions efficiency of livestock farmers?

Answer	Number	Percentage
Yes	862	67.50%
No	389	30.46%
Not answered	26	2.04%
Total	**1,277**	**100.00%**

4. The Government is pursuing an emissions reduction target of 'net zero by 2050'. In meeting that target, do you agree that all greenhouse gases should be reduced?

Answer	Number	Percentage
Yes, all greenhouse gases should be reduced	387	30.31%
No, the focus should be on carbon dioxide	703	55.05%
No, we shouldn't be looking to reduce any greenhouse gases	173	13.55%
Not answered	14	1.09%
Total	**1,277**	**100.00%**

5. Should greenhouse gas emissions be able to be offset by planting trees?

Answer	Number	Percentage
Yes, all greenhouse gases should be able to be offset	720	56.38%
Yes, but only long-lived greenhouse gases like carbon dioxide and nitrous oxide	251	19.66%
Yes, but only short-lived greenhouse gases like methane	119	9.32%
No, offsetting should not be allowed for any greenhouse gases	160	12.53%
Not answered	27	2.11%
Total	**1,277**	**100.00%**

6. The Bill allows for all greenhouse gases except for methane to be offset by forestry. Do you agree with this approach?

Answer	Number	Percentage
Yes	92	7.20%
No	1,169	91.54%
Not answered	16	1.26%
Total	**1,277**	**100.00%**

7. The Zero Carbon Bill will set a specific emission reduction target just for methane which will be separate to all other greenhouse gases. What should the methane target be?

Answer	Number	Percentage
There should be no methane target	726	56.85%
A level that is equal to that of other greenhouse gases	502	39.31%
A target which is tougher than that set for all other greenhouse gases	13	1.02%
Not answered	36	2.82%
Total	**1,277**	**100.00%**

8. Do you support New Zealand adopting targets for reducing agricultural emissions at the cost of food production?

Answer	Number	Percentage
Yes	92	7.20%
No	1,176	92.09%
Not answered	9	0.71%
Total	**1,277**	**100.00%**

9. The Government is considering bringing agricultural emissions (methane and nitrous oxide) into the New Zealand Emissions Trading Scheme. Do you agree with this approach?

Answer	Number	Percentage
Yes	44	3.45%
Yes, but only once farmers have cost effective mitigation technologies to reduce their emissions without reducing productivity and only once other countries are looking to price their agricultural emissions	682	53.41%
No, non-pricing options should be used to help farmers reduce their emissions	316	24.75%
No, farmers shouldn't have to reduce their emissions at all	224	17.54%
Not answered	11	0.86%
Total	**1,277**	**100.00%**

10. As an alternative to being brought into the ETS would you prefer farmers to instead have to pay a levy on their production regardless of their emissions?

Answer	Number	Percentage
Yes	248	19.42%
No	1,009	79.01%
Not answered	20	1.57%
Total	**1,277**	**100.00%**

11. Are you concerned livestock farming is being replaced by forestry, and the impact this may have on rural economies and communities?

Answer	Number	Percentage
Yes	1,138	89.12%
No	132	10.34%
Not answered	7	0.56%
Total	**1,277**	**100.00%**

12. Does the direction of climate change policy leave you feeling optimistic about the future of farming?

Answer	Number	Percentage
Yes	138	10.81%
No	1,128	88.33%
Not answered	11	0.86%
Total	**1,277**	**100.00%**

APPENDIX 2 ENDS

APPENDIX 3: FEDERATED FARMERS CONCERNS ABOUT FORESTRY

1. Federated Farmers is not in the business of telling farmers how to manage their farm, but we are concerned to see forestry replace farms, to see forestry risk damaging neighbouring farms, and to see afforestation risk the viability of rural communities.

2. Trees play a valuable role on most farms

2.1 Many of our members have small forestry blocks (exotic and native), and/or aspire to plant parts of the farm in forestry. Most farmers also plant trees for aesthetics, animal welfare (sun and shelter) and water quality purposes (erosion control and riparian management).

2.2 Farmers are generally very supportive of tree planting initiatives that support the farm, and would willingly plant more trees if they could guarantee a reliable and decent income off the land that remains, plus know that their regions and local communities will continue to survive and thrive.

3. Trees on farms not a straightforward proposition

3.1 The challenge here is to ensure the right trees are planted in the right place for the right purpose on farms. This requires:

3.2 Understanding how much of the farm could be planted in trees without affecting viability of the farm business. Farmers still want to be farmers at the end of the day.

3.3 Understanding which tree species are best planted and where on the farm. This varies farm-by-farm depending on topography, farm management as well as location and extent of 'marginal land' on the farm.

3.4 Understanding how many trees of what type planted in what manner can cover off environmental concerns. Climate change requires trees planted within rigid criteria for ETS eligibility. Freshwater requires riparian and other plantings for water quality. Biodiversity requires preservation of existing Significant Natural Areas. Erosion control requires investment in and retention of trees on erodible land.

3.5 Understanding whether the farmer will be able to harvest the trees when mature. Small woodlot owners frequently face problems securing forestry crews to harvest trees on farms. This is likely to get worse as increasing number of woodlots puts additional pressure on already-stretched forest support services (pruning crews, harvest crews, logging trucks, etc.). Also, National Environmental Standards for Plantation Forestry establish orange and red zone overlays on erodible land with restrictions on the ability to harvest trees in those zones.

4. Planting trees on farms may not always have been a good idea

4.1 Planting trees on farms is not a short-term investment, with tree species requiring upwards of 20-25 years to reach maturity (longer for native species), and there are risks that planting trees on farms may not always have been a good idea.

4.2 Essentially, will planting this area in trees mean this environmental concern is well and truly dealt with? Under the ETS, there is limited capacity to earn emission units from a planted area (a forest can only sequester so much carbon), raising the question of how much of the farm needs to be planted in trees over time.

4.3 It is important to avoid or minimise regrets from planting trees if other mitigation options of environmental concerns emerge while trees are maturing. If there emerges a vaccine that significantly reduces methane emissions, a farmer may have planted more trees than they needed to offset those emissions. It the same situation for DCD possibly becoming available again for use on farms to reduce nitrous oxide emissions.

4.4 25-30 years is a long time and market conditions for trees could be very different than they are today, so forestry is still a bit of a gamble. ETS price ceiling of $25 a tonne will be repealed in the next year or so, which creates uncertainty around the value of emission units in years to come.

5. Farmer concerns with forestry

5.1 Farmers are concerned about a myriad of forestry-related matters, which affects their relationships with forestry companies and their support for further afforestation policies at both central and regional level. These concerns include but are not limited to:

5.2 Government policy seeming to go out of its way to prefer forestry over farming. Climate change reports promote trees in the place of livestock, climate change policy proposals seem to prefer afforesting farms over reducing absolute carbon dioxide emissions, and ETS emission units make forestry more attractive than drystock farming in many parts of the country and is seen by farmers to support the purchase of farms for conversion to forestry. One Billion Trees Fund subsidises the planting of trees and is seen by farmers to support the purchase of farms for conversion to forestry. Overseas Investment reforms make it easier for overseas investment in forestry and is seen by farmers to support the purchase of farms for conversion to forestry.

5.3 Lack of regional economic and social impact analysis by MPI / Te Uru Rakau of One Billion Trees, reforms into requirements of overseas investment in forestry, and ETS emission unit incentives for post-1989 forests. It does not appear that any economic analysis accounts for the impact of forestry on local infrastructure, nor compare increase in forestry employment opportunities against loss of local processing plants and use of travelling forestry gangs. Clean-up costs of slash (both public and private) not included. Opportunity cost of pastoral land conversion to forestry not evaluated etc. Regional councils concerned about the impacts but do not have the budget to fund necessary research themselves.

5.4 Seeing a diminished future for farming. One Billion Trees programme and ETS seen by farmers as clear signals the Government prefers forestry over farming. Climate change methane and nitrous oxide targets that can only be met right now by reducing feed to livestock / reducing stock numbers on farms. Nutrient limits being set at levels where the farm is no longer viable.

5.5 Effective land-use lock-in as farmland is kept in forest to avoid incurring ETS deforestation liabilities. Farmer concerns around legacy especially on multi-generational family farms and being the one to make the call to fundamentally change the nature of the family farm.

5.6 Perceiving negative economic and social implications of mass conversion of productive farmland to forestry, with many regions seeing good sheep and beef stations being purchased for full conversion to plantation forestry. One Billion Trees Fund funding and ETS emission units seen as pushing farm purchases beyond the reach of farmers. Real Estate Institute of New Zealand data indicates the value of North Island forest land has effectively doubled to $13,128 per ha.

5.7 Carbon sequestration on the farm that goes unrecognised under the ETS. Pre-1990 natives earn no credits despite continuing to grow and sequester carbon. Shelterbelts and riparian plantings are generally excluded from the ETS for not complying with eligibility criteria. Pre-1990 exotics earn no emission units and the farmer has to replant or pay huge deforestation liabilities for changing land-use away from forestry. Expectation that farmers will have to pay for their methane and nitrous oxide emissions, despite the carbon that continues to be sequestered in vegetation on farms and farm soils.

5.8 Forestry on farmland risking the viability of farming in the regions. Lower production on farms seen as threatening the viability of existing processing capacity and ability to satisfy customer demand / contracted volumes.

5.9 Harvest residue and slash risk to downstream / downhill farms will only get worse as more trees are planted on marginal / slopes. More trees on slopes leads to greater risk of damage to neighbouring / downhill properties with incidents of heavy rain or snow fall and periods of high fire risk. Concerns around harvest residue and slash risk have been exacerbated by lack of response, acceptance of responsibility and compensation from forestry companies for damage caused by slash events in Tolaga Bay and elsewhere.

5.10 Already-struggling rural services becoming less viable with fewer farms / less income from farm production to support towns and rural businesses. Observed falls in rural school rolls, banks moving branches out of rural towns, health spend focused on major centres, limited rural post delivery, poor landline service / mobile coverage / internet connections to many farms across the country.

5.11 Road safety concerns with congestion and degradation of many rural roads from logging trucks during harvest periods. At the moment, these costs are socialised through rates, and in some cases assisted by Provincial Growth Fund funding. In Gisborne, some farmers have had to buy RTs to get kids to school, degraded roads are damaging farm vehicles, congested and degraded roads have increased the risk of accidents.

5.12 Impact of harvesting, trimming and re-planting on fresh water quality and the contribution this makes to sediment loads. This raises equity issues with a permissive National Environment Standard for Plantation Forestry and more prescriptive land-use rules for farming activities.

5.13 The impact of forestry on water allocation is not well understood or captured in regional plans. In contrast, water takes on farms is often strictly regulated.

5.14 Afforestation policy for water quality and climate mitigation purposes is developing in silos at both central and local government-level, which is a problem because they are intricately linked. A few obvious examples include: wetland regulation and methane emissions, agricultural discharge restrictions and nitrous oxide emissions, climate change adaptation and water take restrictions.

APPENDIX 3 ENDS