



Summary of *Scientific aspects of New Zealand's 2050 emission targets* (Reisinger & Leahy)

Date Submitted:	26/6/2019	Tracking #: 2019-B-05734	
Security Level	██████████	MfE Priority:	Non-Urgent

	Action sought:	Response by:
To Hon James Shaw, Minister for Climate Change	None	

Actions for Minister's Office Staff	Return the signed report to MfE.
Number of appendices and attachments 1	Titles of appendices and attachments (ie separate attached documents): 1. <i>Scientific aspects of New Zealand's 2050 emission targets</i>
Note any feedback on the quality of the report	

Ministry for the Environment contacts

Position	Name	Cell phone	1 st contact
Principal Author	Sarah Deeble		
Responsible Manager	Scott Gulliver	9(2)(a)	
Director (Acting)	Lewis Stevens-Rembe		✓

Summary of Scientific aspects of New Zealand's 2050 emission targets (Reisinger & Leahy)

1. This briefing summarises a note by Andy Reisinger and Sinead Leahy (New Zealand Agricultural Greenhouse Gas Research Centre) on scientific and technical issues related to the Zero Carbon Bill published on 24 June 2019.
2. The note draws on the same expertise that led Andy to be consulted by the Parliamentary Commissioner for the Environment (PCE) and Productivity Commission, and employed by the Interim Climate Change Committee. Because of this, there is a risk that this will be seen as "the Government view" rather than independent commentary, however, Andy has not been a direct advisor to the Government regarding the 2050 target.
3. The note has two aims:
 - a. to calculate the temperature implications of the emission targets in the Zero Carbon Bill
 - b. to provide additional explanation of the findings from the recent IPCC special report on global emission pathways that would limit warming to 1.5°C relative to pre-industrial levels, with a focus on agriculture.

Comments on key points in the note

4. The following paragraphs are copied from the Executive summary of the note followed by our comments on each point.
 - a. New Zealand's total gross greenhouse gas emissions to date (fossil carbon dioxide, nitrous oxide, and biogenic methane) are estimated to have contributed a little over 0.0028°C to the observed global warming of about 1°C above pre-industrial levels. While small in absolute terms, New Zealand's share in global warming to date is more than 4 times greater than its share of the global population and about 1.5 times greater than its share of the global land area.
 - These are simple scientific facts. They suggest arguments for New Zealand's level of ambition compared to other countries, although that is not a matter of science.
 - b. New Zealand's biogenic methane emissions currently make a bigger estimated contribution to global warming than cumulative emissions since 1840 of fossil carbon dioxide and nitrous oxide combined. If gross emissions of those three gases continued at current rates, biogenic methane would remain New Zealand's largest single contributor to global warming for the next six decades despite its relatively short lifetime in the atmosphere compared to carbon dioxide and nitrous oxide.
 - This conclusion depends on assessing emissions since 1840. Limiting it to 1990 onwards, carbon dioxide is the biggest contributor.
 - c. Reducing net emissions of long-lived greenhouse gases to or below zero as quickly as possible is essential to support the temperature goal of the Paris Agreement. The net-zero target proposed in the Zero Carbon Bill could be achieved in different ways, such as reducing all gases individually to zero, or offsetting nitrous oxide emissions with additional carbon dioxide removals. The climate outcomes under different approaches would be very similar if the Global Warming Potential is used to compare nitrous oxide and carbon dioxide emissions.
 - This is a very helpful demonstration of how carbon dioxide and nitrous oxide

fungibility is well justified within the net zero target.

- d. Reducing New Zealand's biogenic methane emissions creates unambiguous and substantial benefits to the climate, in addition to the benefits of reducing long-lived gases. However, methane reductions should occur only *in addition, not as a substitute* to reducing emissions of long-lived greenhouse gases to net zero. Otherwise the cumulative warming from long-lived gases could eventually outweigh any benefit from methane reductions. The Zero Carbon Bill's provision of a separate target for biogenic methane emission helps avoid perverse outcomes that could occur from trade-offs between those gases under an all-gases target.

- This provides support for the split-gas approach.

- e. Climate science cannot tell us how much New Zealand should reduce its emissions: the lower all emissions including methane can go, the better for the climate. The question for agriculture is what methane emission reductions are possible while still helping to sustain and support New Zealand's economy and maintaining viable and vibrant rural communities and businesses.

- f. The IPCC identified a range of 24-47% global agricultural methane emission reductions by 2050, relative to 2010, in emission pathways that keep warming to 1.5°C. This wide range reflects different scenarios, strategic choices, and economic assumptions to achieve the temperature limit at the least cost globally. While this range can serve as reference point, it does not in itself prescribe a specific target for methane emissions reduction by any individual country. A national target necessarily depends on national value judgements around what is an appropriate contribution by New Zealand and the economic cost of reducing emissions in New Zealand.

- s9(2)(g)(i)

- g. Some stakeholders have advocated an alternative methane target, with reductions set such that future methane emissions do not create additional warming above current levels. For this goal to be met, New Zealand's biogenic methane would need to be reduced by 10-22% below current levels by 2050, depending on future changes in global methane emissions. Whether this approach is more equitable depends on whether equity is defined as causing the same additional warming or as making the same effort to reduce future emissions. The two are not the same. For short-lived gases like methane, a target based on 'not causing additional warming' amounts to a grand-parenting approach, i.e. an entitlement to continue to emit methane in future at a level that is determined solely by past emissions regardless of abatement potential or cost. Like all grand-parenting approaches, this raises equity issues that cannot be resolved by climate science.

- This aligns with the Ministry's view. We have been anticipating making similar statements in response to questions from the Environment Committee.

Other comments on the note

5. The temperature calculations in the note are particularly helpful as the Ministry for the Environment does not have the capability to do this. We expect similar calculations to be published soon by Dave Frame.
6. The note acknowledges the concerns in the PCEs *Farms, forests and fossil fuels* report about the effect of carbon forestry on the New Zealand landscape, but separates scientific evidence

for setting emissions targets from the "broader social, economic and risk management perspective" for achieving them.

7. Regarding the agricultural methane pathways in the IPCC 1.5°C scenarios, the note says -

"Reductions of agricultural emissions in these scenarios are thus significantly less stringent than for other sectors. This reflects an assumption common across most integrated assessment models that it is significantly more expensive and less feasible to make deep emission reductions in the agriculture sector than in most other sectors. *None of these scenarios assume novel mitigation technologies for agriculture such as methane inhibitors or vaccines, or nitrification inhibitors for nitrous oxide.*" (emphasis added)

8. Regarding the fairness of the methane target, the note says -

"From a societal perspective, the question is whether we consider that the goal of 'treating sectors equally' is best served by ensuring that all sectors do not create additional warming above whatever warming they are contributing currently, or by undertaking similar effects to reduce their emissions."

This seems to directly address statements from agriculture sector leaders and Dave Frame, among others.

9. A final quotation worth noting: "How fast and how deep New Zealand can reduce its emissions is a question of economics, social and distributional impacts, not of climate science."

Signature



Lewis Stevens-Rembe
(Acting) Director
Climate Change

26/6/19

Hon James Shaw
Minister for Climate Change

Date

Appendix 1: *Scientific aspects of New Zealand's 2050 emission targets*

Withheld s18(d)