

“Cow-nting Down”: Regulatory Measures to Reduce New Zealand’s Biogenic Methane Emissions

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Climate change poses an existential threat to life on earth. Methane emitted by animal agriculture substantially speeds the pace of global warming. Agriculture is a major industry in New Zealand, occupying approximately one third of all land in the country. Methane released by cattle is the single largest contributor to New Zealand’s greenhouse gas emissions, being almost half of all greenhouse gas emissions. Current legislation and policy are inadequate to sufficiently reduce methane emissions from cattle. Given New Zealand’s economic reliance on agriculture, particularly dairy, it is unsurprising that the sector has avoided significant emissions reduction regulation to date. It is essential that the challenge of reducing methane emissions from animal agriculture is tackled now. This article analyses some regulatory mechanisms which could be implemented to reduce methane emitted by cattle in New Zealand.

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1. INTRODUCTION

Climate change¹ poses an urgent threat to all life on earth.² It is clear that “serious and prompt global action is required if dangerous consequences for the planet and its inhabitants are to be prevented”.³ Almost all nations have agreed to reduce greenhouse gas (GHG) emissions by their commitment to the Paris Agreement in 2015.⁴ The objective of the Paris Agreement being to keep global warming at less than 2°C compared with pre-industrial levels, with efforts to limit the increase to 1.5°C (Paris warming target).⁵ The devastating impacts of exceeding the Paris warming target are undeniable,⁶ including increases in land and sea temperatures, rising sea levels, ocean acidification, increased wildfires, drier soil and drought, melting glaciers, changes in ecological communities and species interactions, more extreme weather events, and increased flooding.⁷

Methane (CH₄) is a potent GHG. It is exponentially more powerful than carbon dioxide (CO₂) at warming the atmosphere, albeit it persists for a substantially shorter period.⁸ While there are various sources of methane emissions,

- 1 “Climate change” is used in this article to refer to change in climate that is attributed directly or indirectly to human activity which alters the composition of the global atmosphere, also called anthropogenic global warming.
- 2 United Nations Framework Convention on Climate Change (2015) Adoption of the Paris Agreement, 21st Conference of the Parties, Paris: United Nations [Paris Agreement], preamble.
- 3 *Thomson v Minister for Climate Change Issues* [2018] 2 NZLR 160 at [2].
- 4 There are currently 191 parties to the Paris Agreement: United Nations Framework Convention on Climate Change *Paris Agreement — Status of Ratification* <<https://unfccc.int/process/the-paris-agreement/status-of-ratification>>.
- 5 Paris Agreement, art 2. This commitment being reaffirmed in United Nations Framework Convention on Climate Change (2021), Glasgow Climate Pact, 26th Conference of the Parties, Glasgow: United Nations, FCCC/PA/CMA/2021/L.16 at [20].
- 6 Intergovernmental Panel on Climate Change [IPCC] *The Special Report on Global Warming of 1.5 °C (SR15) — Summary for Policy Makers* (October 2018) <<https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/>>.
- 7 Ministry for the Environment and Stats New Zealand *Environment Aotearoa 2019* (ME 1416, April 2019) <<https://www.mfe.govt.nz/publications/environmental-reporting/environment-aotearoa-2019>> at 101.
- 8 He Pou a Rangi Climate Change Commission *Ināia tonu nei: a low emissions future for Aotearoa — Advice to the New Zealand Government on its first three emissions budgets and direction for its emissions reduction plan 2022–2025* (Final Report, 31 May 2021) <<https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/Inaia-tonu-nei-a-low-emissions-future-for-Aotearoa/Inaia-tonu-nei-a-low-emissions-future-for-Aotearoa.pdf>> [CCC Report] at 186; United Nations Environment Programme and Climate and Clean Air Coalition *Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions* (UNEP, Nairobi, 2021) <<https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions>> [Global Methane

methane released by ruminant animals dominates.⁹ On a global scale, animal agriculture currently accounts for 14.5 per cent of all GHG emissions.¹⁰ This is no meagre contribution. The amount of methane in the atmosphere is expected to continue to increase.¹¹ That increase is driven by demand to feed a growing human population, resulting in higher livestock numbers and more methane-emitting burps.¹² So extensive is the scale of emissions from animal agriculture, a recent study suggests that the emissions from some meat and dairy producers could surpass emissions of fossil fuel companies by 2050.¹³

The recent *Global Methane Assessment* by the United Nations Environment Programme and Climate and Clean Air Coalition states that cutting methane emissions urgently is vital to slow the pace and extent of global warming.¹⁴ Growth in methane emissions is “the largest contributor to the departure from an idealized path to the 2°C target” of the Paris Agreement.¹⁵ While carbon dioxide has rightly been the predominant focus of global GHG reduction, without reducing methane emissions global warming cannot be kept within 2°C.¹⁶ Further, unlike carbon dioxide, there are limited offset solutions available to “sink” methane already in the atmosphere.¹⁷

Assessment] at 8: the impact of methane on climate change over 20 years is 84 times greater than carbon dioxide; over a 100-year period, the impact of methane on climate change is 28 times greater than carbon dioxide.

- 9 *Global Methane Assessment*, above n 8, at 6.
- 10 O Lazarus, S McDermid and J Jacquet “The climate responsibilities of industrial meat and dairy producers” (2021) 165(1–2) *Climatic Change* (30) at 2.
- 11 David Williams “New Zealand farmers avoid methane pile-on” *Stuff* (online ed, 10 June 2021) <<https://www.stuff.co.nz/environment/climate-news/300329583/new-zealand-farmers-avoid-methane-pileon>>.
- 12 *Global Methane Assessment*, above n 8, at 18–19; CCC Report, above n 8, at 387; Jonathan Verschuuren “Climate change and agriculture under the United Nations Framework Convention on Climate Change and related documents” in M Angelo and A Du Plessis (eds) *Research Handbook on Climate Change and Agricultural Law* (Edward Elgar, Cheltenham, 2017) 21 at 21–22; Michelle Nowlin and Emily Spiegel “Much ado about methane: intensive animal agriculture and greenhouse gas emissions” in M Angelo and A Du Plessis (eds) *Research Handbook on Climate Change and Agricultural Law* (Edward Elgar, Cheltenham, 2017) 228 at 235.
- 13 Lazarus, McDermid and Jacquet, above n 10, at 3.
- 14 *Global Methane Assessment*, above n 8, at 12.
- 15 At 20.
- 16 At 5 and 7; Justin Rowllatt “Cutting methane gas ‘crucial for climate fight’” *BBC* (online ed, 6 May 2021) <<https://www.bbc.com/news/science-environment-56933443>>; S Frank, P Havlík, E Stehfest and others “Agricultural non-CO₂ emission reduction potential in the context of the 1.5°C target” (2019) 9 *Nature Climate Change* 66 at 66.
- 17 *Global Methane Assessment*, above n 8, at 11.

Aotearoa New Zealand has a unique emissions profile. Methane emissions from animal agriculture (biogenic methane) are the largest single GHG emission source, being nearly half of all New Zealand's GHG emissions.¹⁸ In fact, New Zealand has the highest per person methane emissions in the world.¹⁹ Cattle produce the majority of biogenic methane emitted — in the order of 59.1 per cent.²⁰ Fonterra, the New Zealand dairy industry giant, is one of the top 10 GHG emitting agricultural companies in the world.²¹ Lazarus and others estimate that on a business-as-usual scenario emissions produced by Fonterra alone could be 100 per cent of New Zealand's emissions target in its nationally determined contribution (NDC) under the Paris Agreement by 2030.²² Due to its high methane emissions, New Zealand is an interesting case study as a country that cannot give a “free pass” to the agricultural sector.

High biogenic methane emissions are symptomatic of agriculture being a major industry in New Zealand,²³ functioning as the “engine room of the New Zealand economy”.²⁴ Recent decades have seen extensive expansion of the dairy industry in large parts of the country.²⁵ The vast majority of the meat and dairy produced is exported, with one third of New Zealand's exports being dairy

18 Adopting the definition of “biogenic methane” in s 4 of the Climate Change Response Act 2002 (NZ) [CCRA]: “*biogenic methane* means all methane greenhouse gases produced from the agriculture and waste sectors (as reported in the New Zealand Greenhouse Gas Inventory)”; Ministry for the Environment *New Zealand's Greenhouse Gas Inventory 1990–2019* (ME 1559, May 2021) <<https://environment.govt.nz/publications/new-zealands-greenhouse-gas-inventory-1990-2019/>> at 1; Mark Bracey “New Zealand's Emissions Trading Scheme: An In-depth Examination of the Legislative History” (2017) 21 NZJEL 133 at 134.

19 Williams, above n 11.

20 CCC Report, above n 8, at 382.

21 Lazarus, McDermid and Jacquet, above n 10, at 3.

22 At 13.

23 Employing 92,000 people: Beef and Lamb New Zealand *Economic and social contribution of the New Zealand red meat industry* (June 2020) <<https://www.mia.co.nz/assets/MIA-Publications/Economic-and-Social-Contribution-of-the-NZ-Red-Meat-Industry-Overview.pdf>> at 2.

24 (21 May 2019) 738 NZPD (Climate Change Response (Zero Carbon) Amendment Bill — First Reading, Nathan Guy); Shaun Fluker “A comparison of carbon emission trading systems in New Zealand and Canada: Diversity is not a virtue in carbon law and policy” (2015) 11(2) McGill International Journal of Sustainable Development Law and Policy 219 at 231.

25 Climate Action Tracker *New Zealand* (30 July 2020) <<https://climateactiontracker.org/countries/new-zealand/>> “Agriculture”; Stats New Zealand *Livestock Numbers* (15 April 2021) <<https://www.stats.govt.nz/indicators/livestock-numbers>>: dairy cattle numbers have increased from 3.4 million to 6.3 million between 1990 and 2019.

products.²⁶ As a result, the beef and dairy industry holds substantial political influence.²⁷

New Zealand has made international commitments to reduce biogenic methane emissions by its NDC under the Paris Agreement, and its recent commitment to the Global Methane Pledge.²⁸ A commitment to reduce biogenic methane emissions has been enshrined in domestic legislation. The Climate Change Response Act 2002 (NZ) (CCRA) sets a specific biogenic methane reduction target for 2030 and 2050.²⁹ The CCRA reduction targets were inserted in 2019 by a Labour/Green coalition government.³⁰ However, the CCRA biogenic methane target is not presently supported by policy and regulatory measures. Methane is currently excluded from the Emissions Trading Scheme (ETS), New Zealand's primary regulatory mechanism to reduce GHG emissions.³¹ Regulatory and policy measures aimed at reducing methane emissions have been limited, as even left-leaning politicians have avoided confronting the powerful agricultural lobby.³²

The independent He Pou a Rangi Climate Change Commission (the Commission) has concluded that at present policy settings New Zealand will fail to meet the CCRA target for biogenic methane emissions.³³ According to

26 CCC Report, above n 8, at 383; Williams, above n 11.

27 D Tisch and N Hamilton-Hart "An affective explanation of climate beliefs: Evidence from dairy farmers in New Zealand" (2019) 25(1) *The Australasian Journal of Regional Studies* 115 at 116.

28 New Zealand's Nationally Determined Contribution — Submission under the Paris Agreement, 22 April 2020 <<https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/New%20Zealand%20First/NEW%20ZEALAND%20NDC%20update%2022%2004%202020.pdf>> [NZ NDC]; European Commission and United States of America, Official Statement *Global Methane Pledge* (2021) <<https://www.ccacoalition.org/en/resources/global-methane-pledge>>; James Shaw "NZ Joins Global Initiative to Tackle Methane" (press release, 3 November 2021) <<https://www.beehive.govt.nz/release/nz-joins-global-initiative-tackle-methane>> [Methane Pledge]: committing to a collective global reduction of methane emissions by at least 30 per cent from 2020 levels by 2030.

29 CCRA, s 5Q(1)(b): 10 per cent less than 2017 emissions by 2030, and 24 per cent to 47 per cent less than 2017 emissions by 2050.

30 Climate Change Response (Zero Carbon) Amendment Act 2019 (NZ) which came into effect on 14 November 2019.

31 Climate Action Tracker, above n 25, "Agriculture".

32 Noting that at the time of writing Labour has not followed through on the election promise to price methane: Henry Cooke "Election 2020: Labour promises to make public buses emissions-free by 2035" *Stuff* (online ed, 7 October 2020) <<https://www.stuff.co.nz/national/politics/300126301/election-2020-labour-promises-to-make-public-buses-emissionsfree-by-2035>>; Lazarus, McDermid and Jacquet, above n 10, at 17; Tisch and Hamilton-Hart, above n 27, at 116.

33 Jamie Morton "Fewer cows, mass EVs: what New Zealand must do to hit climate targets" *The New Zealand Herald* (online ed, 31 January 2021) <<https://www>.

Climate Action Tracker, New Zealand is currently taking insufficient action to achieve the Paris warming target.³⁴ Evidently, there is a pressing need for New Zealand to reduce biogenic methane emissions in order to achieve domestic and international commitments to mitigate climate change. Specific regulatory mechanisms seeking to reduce biogenic methane emissions ought to be implemented. Continuing with business as usual is no longer an option in the face of the looming climate emergency.³⁵ While finding political will to implement measures affecting agriculture may be difficult, the majority of New Zealanders support bold action to mitigate climate change.³⁶

This article analyses four regulatory mechanisms which could be employed by the government to tackle biogenic methane emissions from cattle:³⁷ inclusion of agriculture in the ETS, a biogenic methane tax, a cap on the number of cattle, and an incentive for land conversion out of beef and dairy farming.

The analysis is focused on these nominated tools, recognising that other options including voluntary mechanisms and planning controls might also be utilised. It is beyond the scope of this article to conduct an exercise in the application of economic theory, detailed cost benefit analysis, or social and economic impact assessment. Any regulatory mechanism must give effect to the principles of the Treaty of Waitangi Te Tiriti o Waitangi (the Treaty) and consider the interests of Māori.³⁸ This article proceeds on the basis that application and assessment of the Treaty principles are integral to implementation of any mechanism, but that undertaking that assessment is beyond the scope of this discussion.

[nzherald.co.nz/nz/fewer-cows-mass-evs-what-nz-must-do-to-hit-climate-targets/K6CGQD36LFLPJ6CRDGMVNGTWZ4/](https://www.nzherald.co.nz/nz/fewer-cows-mass-evs-what-nz-must-do-to-hit-climate-targets/K6CGQD36LFLPJ6CRDGMVNGTWZ4/).

34 Climate Action Tracker, above n 25.

35 Phillip Taylor “New Zealand declares a climate change emergency” *The Guardian* (online ed, 2 December 2020) <<https://www.theguardian.com/world/2020/dec/02/new-zealand-declares-a-climate-change-emergency>>.

36 Jamie Morton “Climate change: Survey suggests support for commission’s bold ideas” *The New Zealand Herald* (online ed, 22 April 2021) <<https://www.nzherald.co.nz/nz/climate-change-survey-suggests-support-for-commissions-bold-ideas/Z2H5WXE7QJDRWSXNNFQ6CEOMNA/>>.

37 Noting that nitrous oxide (N₂O) is also emitted by agriculture, and that a share of biogenic methane is emitted by sheep; however, these two issues are outside the scope of this article.

38 CCC Report, above n 8, at 304–305; Treaty of Waitangi Act 1975 (NZ): the Treaty principles being partnership, protection, participation and equity.

2. CURRENT APPROACH IS LACKING

New Zealand has recently enshrined GHG reduction targets into law,³⁹ seeking to be on “the right side of history”.⁴⁰ The CCRA sets a target of net zero emissions of all GHGs (other than biogenic methane) by 2050.⁴¹ For biogenic methane the target is 10 per cent less than 2017 emissions by 2030, and 24 per cent to 47 per cent less than 2017 emissions by 2050 (and for each subsequent calendar year).⁴² It is notable that not only is biogenic methane subject to “special treatment” by substantially less aggressive reductions, those reductions are expressed as a range rather than a specific numerical target. New Zealand has updated its NDC under the Paris Agreement to reflect these targets, thus making the same reduction commitment internationally.⁴³ In November 2021, New Zealand committed to the Global Methane Pledge along with 109 other countries.⁴⁴ The Pledge commits to a collective global reduction of methane emissions by at least 30 per cent from 2020 levels by 2030.⁴⁵ While this target is substantially greater than that of the CCRA, it is a collective global target which applies across all sectors. The present New Zealand government has made it clear that it considers New Zealand’s share of that commitment could be met by achieving the lower CCRA biogenic methane reduction target.⁴⁶

While a step in the right direction, the biogenic methane target of the CCRA is not consistent with the reductions required to achieve the Paris warming target.⁴⁷ Even with the CCRA, New Zealand’s current policy settings would result in up to 3°C of warming if adopted by all countries in the world.⁴⁸ As to the extent of biogenic methane reduction required, the *Global Methane Assessment* found that “the Paris Agreement’s 1.5°C target cannot be achieved

39 The Climate Change Response (Zero Carbon) Amendment Act 2019 (NZ) amended the CCRA to insert emissions reductions targets for 2050 on 14 November 2019.

40 Eleanor Ainge Roy “Ardern says New Zealand on ‘right side of history’ as MPs pass zero-carbon bill” *The Guardian* (online ed, 7 November 2019) <<https://www.theguardian.com/world/2019/nov/07/ardern-says-new-zealand-on-right-side-of-history-as-mps-pass-zero-carbon-bill>>.

41 CCRA, s 5Q(1)(a).

42 Section 5Q(1)(b).

43 NZ NDC, above n 28.

44 Methane Pledge, above n 28; Climate and Clean Air Coalition Secretariat “Participants” Global Methane Pledge <<https://www.globalmethanepledge.org/>>.

45 Methane Pledge, above n 28.

46 Methane Pledge, above n 28; Hamish Cardwell “Environment groups criticise govt’s decision to avoid methane cuts” *Radio New Zealand* (online ed, 3 November 2021) <<https://www.rnz.co.nz/news/national/454881/environment-groups-criticise-govt-s-decision-to-avoid-methane-cuts>>.

47 CCC Report, above n 8, at 18.

48 Climate Action Tracker, above n 25.

at a reasonable cost without reducing methane emissions by 40–45 per cent by 2030”.⁴⁹ This level of reduction could avoid nearly 0.3°C of warming by 2040.⁵⁰ Similarly, the United Nations Intergovernmental Panel on Climate Change (IPCC) has stated that a reduction of methane emissions of more than 35 per cent by 2030 compared to 2010 levels is required to limit global warming to 1.5°C.⁵¹ Other countries have taken up reduction figures close to these figures, with the European Union proposing to reduce methane by 29 per cent of 2005 levels by 2030.⁵² The CCRA target of a 10 per cent reduction by 2030 falls well short.⁵³

Even if meeting the CCRA target was adequate, New Zealand is not on track to meet those reduction targets.⁵⁴ There is presently a glaring gap in specific regulation and policies seeking to achieve the biogenic methane reduction targets in the CCRA. New Zealand’s primary policy for reducing GHG emissions is the ETS. The ETS was first implemented in 2008,⁵⁵ intended to encompass all GHGs and all sectors on the basis that this would be the most equitable approach.⁵⁶ However, the entry of agriculture into the ETS was subsequently delayed indefinitely.⁵⁷ Legislative reforms in 2020 require agriculture to be brought into the ETS by 2025, unless subject to an alternative pricing scheme for farm-level agriculture emissions. The alternative pricing scheme is to be developed by the government by December 2022.⁵⁸ As such, biogenic methane emissions have escaped any pricing to date.⁵⁹

49 *Global Methane Assessment*, above n 8, at 11.

50 At 8.

51 IPCC, above n 6, at C1.2.

52 Williams, above n 11.

53 CCC Report, above n 8, at 398: noting that New Zealand’s biogenic methane emissions in 2010 and 2017 differed by less than 1 per cent so the scale is relatively equivalent.

54 CCC Report, above n 8, at 12; Morton “Fewer cows”, above n 33.

55 Climate Change Response (Emissions Trading) Amendment Act 2008 (NZ).

56 Bracey, above n 18, at 138 and 142.

57 Climate Change Response (Emissions Trading and Other Matters) Amendment Act 2012, s 96; Bracey, above n 18, at 160.

58 Climate Action Tracker, above n 25; CCRA, s 215.

59 Bracey, above n 18, at 146.

3. IMPERATIVE AND OBJECTIVE OF REGULATORY MEASURES

There is a clear imperative for additional regulation in order to achieve domestic and international GHG emissions reductions targets.⁶⁰ Meeting (or even exceeding) these targets is critical,⁶¹ as “mitigation of methane emissions is very likely to be the most powerful lever in reducing near-term warming”.⁶² Given the impending climate crisis, the agricultural sector can no longer avoid emissions regulation.⁶³

The Commission recently released a comprehensive report to government providing advice on emissions budgets and a GHG reduction plan (Commission Report).⁶⁴ The Commission Report includes recommended policies to reduce biogenic methane emissions, without significantly reducing (if at all) agricultural production.⁶⁵ Environmental interest groups have called the Commission Report a “free pass” and a “bit of an easy ride” for agriculture.⁶⁶ The Commission’s recommended policies do include “effective pricing of agricultural emissions” as a priority.⁶⁷ How this will be achieved is for the government to determine in accordance with the CCRA, which requires that by the end of December 2022 the government must outline a proposed system for pricing agricultural emissions at the farm level.⁶⁸ As such, some time will continue to pass before regulation pricing agricultural emissions is in place.

The Commission Report concludes that the low end of the CCRA 2050 biogenic methane target (ie 24 per cent less than 2017 emissions by 2050)

60 Katy Milne and Paul Latimer “The Market Model for Carbon Reduction: Planning for Success Post-Paris” (2018) 35 EPLJ 142 at 152; Frank, Havlík and Stehfest, above n 16, at 72; CCC Report, above n 8, at 353; noting that the Commission finds that the reductions in emissions of biogenic methane that New Zealand needs to make as part of a global effort to limit temperature increase to 1.5°C are 37–60 per cent below 2010 levels by 2100.

61 CCC Report, above n 8, at 304.

62 *Global Methane Assessment*, above n 8, at 21.

63 Nowlin and Spiegel, above n 12, at 229.

64 CCC Report, above n 8, at iv.

65 At 117 and 303: the Commission relevantly stating that policies for agriculture should include: implementation of a pricing mechanism to incentivise on-farm emissions reductions, develop advisory services to support farmers to adopt emissions-efficient practices and diversify land use, improve rural digital connectivity, remove barriers to deployment of emerging technology, support systems and infrastructure for alternative lower emissions land uses (such as providing infrastructure for horticulture), invest in research and development of technology.

66 Williams, above n 11.

67 CCC Report, above n 8, at 304.

68 At 309.

can be met through widespread adoption of improved farm management practices.⁶⁹ Granted, emissions intensity of beef and dairy farming has been reduced over the past 25 years by improvements in farming practices.⁷⁰ As discussed already, achieving the low end of the reduction target is not sufficient in light of the findings of the *Global Methane Assessment* and the IPCC.⁷¹ The Commission Report finds that meeting or exceeding the higher end of the CCRA 2050 biogenic methane target (ie 47 per cent less than 2017 emissions by 2050) will require *either* developing and widely adopting new technologies to reduce livestock methane emissions, *or* significantly reduced agricultural production from livestock and land use change.⁷² The Commission is hopeful about new “silver bullet” technologies.⁷³ While studies have investigated breeding programmes, feeding cattle “kow-bucha” or red algae, and methane inhibitors, these solutions are not presently ready for implementation.⁷⁴ Given this, regulatory and policy mechanisms must focus on achieving significantly reduced agricultural production from livestock in order to reduce methane emissions. New technologies cannot be relied on with certainty, and the low end of the CCRA target is not enough. For the purposes of this article, this is the policy goal.

69 CCC Report, above n 8, at 303 and 305: on-farm management changes required include adjusting stocking rates, managing supplementary feed and nitrogen inputs.

70 Interim Climate Change Committee *Summary Report for Agriculture* (30 April 2020) <https://www.iccc.mfe.govt.nz/assets/PDF_Library/d18cc398c2/FINAL-ICCC-Summary-report-for-agriculture.pdf> [*Summary Report for Agriculture*] at 4.

71 *Global Methane Assessment*, above n 8, at 11: 40–45 per cent reduction required by 2030.

72 CCC Report, above n 8, at 303 and 385.

73 Katie Todd “Climate Commission report falls short on dairy industry emissions — critics” *Radio New Zealand* (online ed, 9 June 2021) <<https://www.rnz.co.nz/news/national/444378/climate-commission-report-falls-short-on-dairy-industry-emissions-critics>>.

74 K Morrison “Towards greener grazing” (2009) 1 *Nature Climate Change* 104; Jess Shankleman and Agnieszka de Sousa “Cow cocktails join New Zealand’s battle to reach net zero emissions” *The Sydney Morning Herald* (online ed, 28 April 2021) <<https://www.smh.com.au/business/markets/cow-cocktails-join-new-zealand-s-battle-to-reach-net-zero-emissions-20210428-p57n18.html>>; Eleanor Ainge Roy “From red seaweed to climate-smart cows: New Zealand leads the fight against methane” *The Guardian* (online ed, 31 December 2019) <<https://www.theguardian.com/world/2020/jan/01/from-red-seaweed-to-climate-smart-cows-new-zealand-leads-the-fight-against-methane>>; Oliver Milman “Feeding cows seaweed could cut their methane emissions by 82 per cent, scientists say” *The Guardian* (online ed, 18 March 2021) <<https://www.theguardian.com/environment/2021/mar/18/cows-seaweed-methane-emissions-scientists>>.

The simplest way to reduce agricultural production from livestock is a change in dietary preferences.⁷⁵ The *Global Methane Assessment* recommends that part of the solution for reducing methane emissions is for consumers to limit dairy and meat.⁷⁶ Studies have shown that to achieve the level of reduction in methane emissions required to meet the Paris warming target, a vast reduction in global consumption of red meat and dairy is essential.⁷⁷ As such, any mechanism should consider driving consumer demand away from these products as a matter of principle in achieving the policy goal. In addition to mitigating climate change, reducing beef and dairy consumption will come with human health⁷⁸ and environmental co-benefits.⁷⁹ For example, the dairy industry has contributed to a decline in water quality with two-thirds of rivers in New Zealand “unswimmable”,⁸⁰ destruction of native habitats, and declining biodiversity.⁸¹

When seeking to achieve significantly reduced agricultural production from livestock, it is crucial that the regulatory mechanism employed provides for a “just transition”. Rural communities may be particularly vulnerable, bearing in mind that “agriculture-dependent communities are on average under more economic stress than non-dependent communities”.⁸² Farming communities are part of the social fabric of the country and may be at greater risk of mental health issues or suicide.⁸³ The measure should not undermine the economic

75 Frank, Havlík and Stehfest, above n 16, at 69–70.

76 *Global Methane Assessment*, above n 8, at 11 and 116; Rowllatt, above n 16.

77 M Springmann, M Clark, D Mason-D’Croz and others “Options for keeping the food system within environmental limits” (2018) 562 *Nature* 519 at 523; Damian Carrington “Huge reduction in meat-eating ‘essential’ to avoid climate breakdown” *The Guardian* (online ed, 10 October 2018) <<https://www.theguardian.com/environment/2018/oct/10/huge-reduction-in-meat-eating-essential-to-avoid-climate-breakdown>>.

78 M Springmann, D Mason-D’Croz, S Robinson and others “Mitigation potential and global health impacts from emissions pricing of food commodities” (2017) 7 *Nature Climate Change* 69 at 69.

79 Andrew McGregor and Donna Houston “Cattle in the Anthropocene: Four Propositions” (2018) 43 *Transactions of the Institute of British Geographers* 3 at 4.

80 Elanor Ainge Roy “‘Their birthright is being lost’: New Zealanders fret over polluted rivers” *The Guardian* (online ed, 4 March 2019) <<https://www.theguardian.com/environment/2019/mar/04/their-birthright-is-being-lost-new-zealanders-fret-over-polluted-rivers>>.

81 CCC Report, above n 8, at 388–389; IPCC, above n 6, at A.1.3.

82 Paul Martin “Climate change, complexity, agriculture and challenged governance” in M Angelo and A Du Plessis (eds) *Research Handbook on Climate Change and Agricultural Law* (Edward Elgar, Cheltenham, 2017) 74 at 99–100.

83 Beef and Lamb New Zealand, above n 23, at 3; Jo Moir “‘Ringing up in tears’: Canterbury farmers doing it tough” *Radio New Zealand* (online ed, 1 November 2019) <<https://www.rnz.co.nz/news/political/402250/ringing-up-in-tears->

livelihood of those currently committed to dairy and beef production, but rather assist them in moving away from it altogether, diversifying, or reducing in intensity in order to make a (ideally greater) profit. The “Just Transitions Unit” at the Ministry for Business, Innovation and Employment is specifically tasked with helping transition New Zealand to a low emissions economy.⁸⁴ Its role is to ensure the transition is fair, equitable and inclusive by working in partnership with the relevant communities.⁸⁵ So far the Unit has focused on fossil fuel transitions, but it could also assist with the transition away from dairy and beef production.

4. ANALYSIS OF REGULATORY MEASURES

When seeking to achieve substantially reduced beef and dairy production there are a wide variety of non-regulatory measures which could be employed.⁸⁶ Direct regulatory measures are an essential component of the policy response, particularly given the pace of change required.⁸⁷ The regulatory options include market mechanisms, direct regulation, and incentives. Market-based mechanisms assume the market will adjust to achieve “the lowest-cost means of abatement”.⁸⁸ They generally offer greater flexibility than direct “command and control” measures. This article discusses four potential regulatory measures of these types in turn:

- inclusion of biogenic methane from agriculture in the ETS;
- a biogenic methane tax;

canterbury-farmers-doing-it-tough>; Katie Wedell, Lucille Sherman and Sky Chadde “Midwest farmers face a crisis. Hundreds are dying by suicide” *USA Today* (online ed, 9 March 2020) <<https://www.usatoday.com/in-depth/news/investigations/2020/03/09/climate-tariffs-debt-and-isolation-drive-some-farmers-suicide/4955865002/>>.

84 Ministry for Business, Innovation and Employment [MBIE] *Just Transitions* <<https://www.mbie.govt.nz/business-and-employment/economic-development/just-transition/>>.

85 MBIE, above n 84.

86 Springmann, Clark, Mason-D’Croz and others, above n 77, at 523: such as “a combination of media and education campaigns; labelling and consumer information; fiscal measures, such as taxation, subsidies, and other economic incentives; school and workplace approaches; local environmental changes; and direct restriction and mandates”.

87 *Global Methane Assessment*, above n 8, at 118.

88 Lidia Xynas “Climate change mitigation: Carbon tax — Is it the better answer for Australia?” (2011) 26(3) *Australian Tax Forum* 339 at 353.

- a maximum limit on the number of cattle (ie a “cow cap”); and
- incentive for land conversion out of beef and dairy farming.

While this is not an exclusive list of possible measures, they are all worth considering. Given the scale of the challenge, it is acknowledged at the outset that no one policy or regulation may be sufficient, and a policy package may be preferable.

4.1 Inclusion in Emissions Trading Scheme

The ETS is the “main tool” for reducing GHGs in New Zealand.⁸⁹ It functions by requiring activities to pay to acquire and surrender New Zealand emission units or “carbon credits” to account for the GHG emissions associated with their products.⁹⁰ Credits can be traded within a maximum cap, creating a carbon market. By putting a price on emitting GHGs, emissions reductions are incentivised.⁹¹ Incorporation of the agricultural sector into the ETS by 2025 is presently the solution preferred by the government, pending the review of an alternative pricing mechanism in 2022.⁹² This approach is also consistent with the Commission’s recommendation that pricing of agricultural emissions is “essential”,⁹³ albeit the Commission does not specifically recommend biogenic methane should be included in the ETS.⁹⁴

Creating a “cap and trade” market for biogenic methane would have benefits. The ETS provides the certainty of a set cap on emissions (reducing over time). The model is economically efficient, as “reductions in emissions will be sourced where they cost the least and reductions will go where they are valued the highest”.⁹⁵ The ETS provides farmers flexibility to make changes that suit their specific circumstances,⁹⁶ while the reducing cap incentivises a behavioural shift.⁹⁷ The inclusion of agriculture in the ETS would also be an equitable approach, as emissions of GHGs across all sectors would be priced (rather than carbon-emitting industries currently carrying a disproportionate

89 Ministry for the Environment *New Zealand Emissions Trading Scheme* <<https://environment.govt.nz/what-government-is-doing/key-initiatives/ets/>>.

90 Environment Protection Agency *About the Emissions Trading Scheme* <<https://www.epa.govt.nz/industry-areas/emissions-trading-scheme/about-the-nzets/>>.

91 Ministry for the Environment, above n 89.

92 Climate Action Tracker, above n 25; CCRA, s 215.

93 CCC Report, above n 8, at 304.

94 At 15 and 243.

95 Milne and Latimer, above n 60, at 145.

96 CCC Report, above n 8, at 308. Climate Action Tracker, above n 25, “Agriculture”.

97 Bracey, above n 18, at 143.

burden).⁹⁸ There may be some administrative efficiency savings given the ETS is already well established. In addition, the revenue generated from pricing biogenic methane could be applied to further achieve the policy goal.⁹⁹

However, there are several issues with the incorporation of biogenic methane in the ETS as a policy solution.

First, ETS systems can be ineffective at reducing GHG emissions.¹⁰⁰ The New Zealand ETS has been criticised for not adequately incentivising or achieving a reduction in GHG emissions to date.¹⁰¹ Implementation difficulties can undermine effectiveness.¹⁰² Because the New Zealand ETS allowed for international credits to be used, this allowed domestic pollution to continue unabated.¹⁰³ The Commission Report recognises existing deficiencies in the ETS and recommends changes to ensure it is “fit for purpose”.¹⁰⁴ While some of the flaws in the NZ ETS may be able to be remedied, evidence of its effectiveness remains minimal to date. As such, inclusion of methane in the ETS may not actually reduce biogenic methane emissions.

Secondly, there may be difficulties in implementation due to the nature of the emissions coming from a number of small sources, which may vary per animal depending on various factors.¹⁰⁵ Measurement and verification of emissions at the farm level will have to proceed on the basis of farm management models rather than being directly assessed like emissions from energy or industrial processes.¹⁰⁶ There is a balance to be struck between “assigning

98 Samuel Leonard “Commitment Issues: A Critical Analysis of New Zealand’s Emissions Trading Scheme” (2015) 19 NZJEL 113 at 128.

99 Such as through an agricultural emissions fund as suggested by the Interim Climate Change Committee *Summary Report for Agriculture*, above n 70, at 7.

100 Milne and Latimer, above n 60, at 146 and 147.

101 Geoffrey Palmer “New Zealand’s defective law on climate change” (2015) 13(1) NZJPL 115 at 129 and 131. Leonard, above n 98; Fluker, above n 24, at 249; Ministry for the Environment *New Zealand Emissions Trading Scheme Review 2015/16: Discussion Document and Call for Written Submissions* (November 2015) <<https://environment.govt.nz/publications/new-zealand-emissions-trading-scheme-review-201516-discussion-document-and-call-for-written-submissions/>> at 9.

102 Xynas, above n 88, at 370.

103 Jorgen Wettestad “The EU Emissions Trading Scheme: Frontrunner in Trouble” in G Van Calster, W Vandenberghe and L Reins (eds) *Research Handbook on Climate Change Mitigation Law* (Edward Elgar, Cheltenham, 2015) 451 at 453; Xynas, above n 88, at 361.

104 CCC Report, above n 8, at 15 and 243.

105 Steven Geroe “Exclusion of agriculture from the (prospective) CPRS — good policy or good politics? A discussion of legal and policy options in the context of current political developments” (2010) 27 *Environment and Planning Law Journal* 202 at 202.

106 Urs Meier “Insights from New Zealand’s Attempt to Incorporate Agriculture into

a sector point of obligation that balances administrative simplicity (found at the processor level) with incentive maximisation (found at the farm level)".¹⁰⁷ Imposition of the obligation at the processor level may not achieve the same incentive for emissions reductions.¹⁰⁸ On the other hand, farmers may find understanding and navigating the ETS complex and difficult, which may affect the mitigation action they take.¹⁰⁹

Thirdly, achieving emissions reductions by way of an ETS takes a reasonable period of time.¹¹⁰ This is problematic given methane is a much more powerful GHG in the short term as compared to carbon dioxide. The measure should be aimed at achieving results as quickly as possible.

For these reasons, incorporation of biogenic methane into the ETS, while advantageous in a number of respects, may not be the "best fit".

4.2 Biogenic Methane Tax

Carbon taxes are a straightforward regulatory measure which has been implemented in many countries.¹¹¹ A carbon tax is generally imposed on a carbon-containing substance relative to the amount of carbon emitted.¹¹² Significantly, carbon taxes have been shown to achieve a reduction in carbon dioxide emissions. For example, the carbon tax in British Columbia, Canada, which was levied at the point of consumption of fossil fuels, has successfully reduced overall GHG emissions while the economy continued to grow.¹¹³

A biogenic methane tax could be imposed on a similar basis, operating as a market mechanism to incentivise emission reductions. Because the production of beef and dairy emits methane these products would be subject to the tax. The tax would be levied on the basis of the harm caused by the product (contributing

an Emissions Trading Scheme" (2009) 43(3) Air Quality and Climate Change 25 at 27.

107 At 27.

108 Interim Climate Change Committee *Action on agricultural emissions: Evidence, Analysis and Recommendations* (Report, 30 April 2019) <https://www.iccc.mfe.govt.nz/assets/PDF_Library/f15921453c/FINAL-ICCC-Agriculture-Report.pdf> at 58.

109 At 66.

110 Xynas, above n 88, at 363.

111 Shi-Ling Hsu "Carbon taxes" in Michael Faure (ed) *Elgar Encyclopedia of Environmental Law* (Edward Elgar, Cheltenham, 2016) vol 1 at 428; Xynas, above n 88, at 370: including South Africa, India, South Korea, Sweden, Denmark.

112 Hsu, above n 111, at 426.

113 At 429 and 432; Kathryn Harrison "Lessons from British Columbia's carbon tax" *Institute for Research on Public Policy* (online ed, 11 July 2019) <<https://policyoptions.irpp.org/magazines/july-2019/lessons-from-british-columbias-carbon-tax/>>.

to global warming), somewhat analogous to a tax on sugary drinks.¹¹⁴ While there may not be an existing global example of a biogenic methane tax, it is not a novel idea. A tax on red meat has been called for by health professionals, in order to deal with obesity and climate change.¹¹⁵ Taxes on red meat and cheese due to climate change concerns have been proposed in European countries.¹¹⁶ A so-called “burp tax” was proposed in New Zealand almost 20 years ago, but was scrapped after outrage by farmers.¹¹⁷

This measure has a number of potential benefits. A methane tax:

- would drive lower emissions according to economic modelling¹¹⁸ (a 2016 study demonstrated that a 40 per cent tax on beef based on its emissions footprint could reduce consumption by 13 per cent globally, substantially reducing emissions);¹¹⁹
- provides certainty to farmers through a constant price (in contrast to the fluctuating price in an ETS);¹²⁰
- is simple to administer (from both the farmer and government perspective), and it is likely to be easy to review and adjust the rate of the tax through the existing tax system;¹²¹
- can encourage innovation and provide flexibility to farmers to adjust as the market adapts;¹²²

114 Damian Carrington “UK health professions call for climate tax on meat” *The Guardian* (online ed, 4 November 2020) <<https://www.theguardian.com/environment/2020/nov/04/uk-health-professions-call-for-climate-tax-on-meat>>; Xynas, above n 88, at 368–369.

115 Clare Broughton “Expert panel calls for tax on red meat to help save the planet” *Stuff* (online ed, 28 January 2019) <<https://www.stuff.co.nz/national/health/110194081/expert-panel-calls-for-tax-on-red-meat-to-help-save-the-planet>>.

116 Damian Carrington “Meat tax ‘inevitable’ to beat climate and health crises, says report” *The Guardian* (online ed, 11 December 2017) <<https://www.theguardian.com/environment/2017/dec/11/meat-tax-inevitable-to-beat-climate-and-health-crises-says-report>>; Damian Carrington “EU urged to adopt meat tax to tackle climate emergency” *The Guardian* (online ed, 4 February 2020) <<https://www.theguardian.com/environment/2020/feb/04/eu-meat-tax-climate-emergency>>.

117 “Livestock burp tax sticks in throats” *The New Zealand Herald* (online ed, 20 June 2003) <<https://www.nzherald.co.nz/nz/livestock-burp-tax-sticks-in-throats/ILL5W4SSE4H4QQV3ZQXVDAIYM/>>.

118 Frank, Havlík and Stehfest, above n 16, at 67.

119 Springmann, Mason-D’Croz, Robinson and others, above n 78.

120 Hsu, above n 111, at 427.

121 Xynas, above n 88, at 353–354, 429–431 and 631. Interim Climate Change Committee, above n 108, at 68.

122 Xynas, above n 88, at 353–354 and 430.

- would promote equity by putting a price on emitting biogenic methane (as currently only carbon dioxide emissions are subject to a price);¹²³
- can operate as revenue neutral, reducing its economic impact.¹²⁴

The application of the revenue generated by the tax could assist in achieving the overall policy objective and muster political support for its implementation.¹²⁵ The revenue could be invested into technological research on solutions to reduce biological emission from agriculture (such as a methane inhibitor or methane vaccine). It could be paid to farmers as an incentive payment for conversion of land out of beef and dairy production, or as a subsidy to reduce the cost of fruit and vegetables (facilitating healthier diets, particularly for lower socio-economic groups).¹²⁶

On the downside, just like the ETS, a tax may be slower to achieve results than direct regulation.¹²⁷ Implementation will determine whether the tax is effective and how quickly it shifts the market. Experience with carbon shows that the price must be high enough and escalating in order to incentivise movement away from GHG-intensive products.¹²⁸ Further, a tax does not set a maximum cap on emissions, as an ETS does. Rather, the mechanism is entirely reliant on market adjustments.

The design of the tax measure will determine its effectiveness. A number of questions arise. Should the tax be imposed on farmers, producers (“upstream”) or consumers (“downstream”)?¹²⁹ Should the tax be on all beef and dairy products alike regardless of the conditions of the farm which produced them? Should the tax increase over time or remain fixed? What should the revenue from the tax be applied to?

While it is beyond the scope of this article to comprehensively design the methane tax measure, the measure must be able to be imposed in a way that effectively incentivises a transition in dietary preferences, leading to substantially reduced agricultural production. To promote change in dietary preferences, the tax would be best imposed on all beef and dairy products,

123 Leonard, above n 98, at 128.

124 Xynas, above n 88, at 353–354.

125 At 364–365.

126 Carrington, above n 116; Springmann, Clark, Mason-D’Croz and others, above n 77; Damian Carrington “Tax meat and dairy to cut emissions and save lives, study urges” *The Guardian* (online ed, 7 November 2016) <<https://www.theguardian.com/environment/2016/nov/07/tax-meat-and-dairy-to-cut-emissions-and-save-lives-study-urges>>.

127 Hsu, above n 111, at 432.

128 Karen Bubna-Litic and Natalie Stoianoff “Carbon pricing and renewable energy innovation: A comparison of Australian, British and Canadian carbon pricing policies” (2014) 31 EPLJ 368 at 381–382.

129 Hsu, above n 111, at 427.

falling to consumers to pay. This will encourage consumers to adjust their behaviour towards the food source as a whole, reducing demand.

However, it is important to consider New Zealand's unique circumstances. A methane tax at the consumption point of beef and dairy in New Zealand could only impact domestic consumption. This would fundamentally undermine the effectiveness of the measure given that the vast majority of beef and dairy is exported.¹³⁰ New Zealand's meagre five million inhabitants are not the target market. While the consumption tax could certainly be imposed on beef and dairy on export, this may be unlikely to sway global demand away from beef and dairy, but rather move consumption away from New Zealand beef and dairy products (as they are more expensive) and towards beef and dairy produced by other countries. Imposition of the tax on export might create a situation of "leakage" where the methane emitted in beef and dairy production is simply moved from New Zealand to another country as the market adjusts. Notably, any border tax adjustments made would need to be compliant with international trade law.¹³¹

There may be complications if the tax is adjusted for the methane actually emitted by the product and charged at the farm level (as some animals may emit more than others).¹³² Consistent with an ETS approach, issues might arise with measuring non-point source emissions. If the tax does not adjust based on the amount of methane actually emitted, such as being charged per cow, this could disincentivise farm management practices which play an important role in reducing emissions.¹³³ Similarly, applying the tax to the producer level — by amount of milk or beef processed — might equally disincentivise mitigation measures being taken on the farm. A comprehensive economic analysis would likely be required in order to determine the best point for imposition of the measure given the issues arising at each level (consumer, farmer, producer). In particular, the economic effectiveness of the measure may need to be carefully considered in circumstances where it is applied to a product predominantly exported rather than consumed domestically (in contrast to fossil fuels subject to a carbon tax).

130 88 per cent of beef is exported: Beef and Lamb New Zealand, above n 23; 95 per cent of milk is exported: Dairy Companies Association of New Zealand *About the NZ Dairy Industry* <<https://www.dcanz.com/about-the-nz-dairy-industry/>>.

131 General Agreement on Tariffs and Trade (Geneva, 30 October 1947) 55 UNTS 194 (in force provisionally since 1 January 1948 under the 1947 Protocol of Application, 55 UNTS 308).

132 Springmann, Mason-D'Croze, Robinson and others, above n 78, at 69.

133 CCC Report, above n 8, at 303 and 305: on-farm management changes required include adjusting stocking rates, managing supplementary feed and nitrogen inputs; *Summary Report for Agriculture*, above n 70, at 4.

There is work to be done in designing a tax measure to ensure that it will achieve the policy goal. Nonetheless, the mechanism is preferable to the ETS approach in its potential effectiveness, straightforward nature, and administrative efficiency.

4.3 Cow Cap

Reducing the number of cattle is the most obvious and straightforward way to reduce biogenic methane emissions. Without direct regulation, cattle numbers may continue to increase.¹³⁴ Despite beef and dairy farming becoming more emissions efficient in New Zealand, biogenic methane emissions have continued to increase due to increases in the number of cattle.¹³⁵ The Commission Report recognises a reduction in cattle numbers will need to occur — in the order of a 13 per cent reduction by 2030 on the Commission's proposed policy path.¹³⁶ The Commission prefers to achieve the reduction in cattle numbers with minimal reduction in the level of production, and only as a result of other policies.¹³⁷

A “cow cap” could be imposed in the form of direct regulation, capping the number of cattle allowed in the country at the present number, with reductions in cattle numbers required over time. Farmers could be entitled to have as many cattle as they do presently with reductions in numbers required moving forward. The reduction required in each case could be on the basis of stocking density (ie those with higher stocking densities would be required to reduce numbers more quickly), or as a percentage of total animal numbers per farm. The level of reduction and timescale would need to be clear and certain moving into the future.

Limits in the form of direct regulation on activities which produce GHGs have been utilised globally. For example, then President Obama's ban on coal mines on federal lands, or Prime Minister Ardern's ban on offshore oil and gas

134 McGregor and Houston, above n 79, at 4: global cattle numbers are predicted to almost double from 2000 to 2050.

135 Dileepa Fonseka “NZ's dairy industry passes ‘peak cow’” *Newsroom* (online ed, 25 October 2019) <<https://www.newsroom.co.nz/the-peak-cow-call>>.

136 CCC Report, above n 8, at 117; note that the Commission's draft report specifically referred to cattle and sheep numbers needing to be reduced from around 15 per cent from 2018 levels by 2030, in order to meet the 2030 target without new technologies: He Pou a Rangi Climate Change Commission *Advice Report* (Draft Report, 31 January 2021) <<https://www.climatecommission.govt.nz/get-involved/our-advice-and-evidence/>> at 65.

137 CCC Report, above n 8, at 117 and 303.

drilling.¹³⁸ The regulation of ozone-depleting substances (a class of GHG)¹³⁹ at the global scale under the Montreal Protocol (the Protocol) is a successful example of direct regulation.¹⁴⁰ Ozone-depleting substances were used as refrigerants, air-conditioner coolants, aerosol spray-can ingredients, and in the manufacture of styrofoam.¹⁴¹ The Protocol placed restrictions on the production and consumption of ozone-depleting substances, eventually requiring they be phased down to zero.¹⁴² The manufacturers of the substances started producing different products for the relevant uses rather than ones which contributed to global warming.¹⁴³ The Protocol has been very successful at reducing GHG emissions, as the clear and certain restrictions allowed markets to innovate and adjust while ozone-depleting substances were phased out.¹⁴⁴ Phasing down beef and dairy could similarly be achieved by direct regulation compelling a shift to consumption of food that does not release biogenic methane in its production.

The benefits of direct regulation are its potential effectiveness (targeting the source of emissions directly), the speed at which it could compel change, and simplicity. Imposing a maximum limit on cattle is a bold but justified measure in light of the transition urgently required, even if it might be “political

138 Joby Warrick and Juliet Eilperin “Obama announces moratorium on new federal coal leases” *The Washington Post* (online ed, 16 January 2016) <<https://www.washingtonpost.com/news/energy-environment/wp/2016/01/14/obama-administration-set-to-announce-moratorium-on-some-new-federal-coal-leases/>>; Audrey Young “Prime Minister Jacinda Ardern bans new offshore oil and gas exploration in New Zealand” *The New Zealand Herald* (online ed, 12 April 2018) <<https://www.nzherald.co.nz/nz/prime-minister-jacinda-ardern-bans-new-offshore-oil-and-gas-exploration-in-new-zealand/BADMZZOJ5AYNH4GWGIDLSWE5YY/>>.

139 Protocol on Substances that Deplete the Ozone Layer (Montreal, 16 September 1987, in force 1 January 1989) 26 ILM 154 (1987) [Montreal Protocol], under the Convention for the Protection of the Ozone Layer (Vienna, 22 March 1985, in force 22 September 1988) 26 ILM 1529 (1985), annexes A–F: ozone-depleting substances being chlorofluorocarbons, halons, carbon tetrachloride, methylchloroform, hydrochlorofluorocarbons, hydrobromofluorocarbons, methyl bromide, bromochloromethane, and hydrofluorocarbons.

140 Philippe Sands and Jacqueline Peel *Principles of International Environmental Law* (4th ed, Cambridge University Press, Cambridge, 2018) at 278 and 282–286.

141 At 282–286.

142 Montreal Protocol, above n 139, arts 2A–2J.

143 Sands and Peel, above n 140, at 282–286.

144 David Hunter, James Salzman and Durwood Zaelke *International Environmental Law and Policy* (5th ed, Foundation Press, New York, 2015) ch 10 at 605.

taboo".¹⁴⁵ The cow cap might also help to promote value over volume beef and dairy production.¹⁴⁶

The cow cap may face several hurdles. First, the measure may fail to incentivise on-farm emissions efficiency, as cattle numbers would be required to be reduced regardless of farm management practices. Given the direct style of regulation, on-farm efficiencies may not be as important in reducing biogenic methane emissions. Should a limit on the number of cattle be considered too blunt an instrument, the limit could be by emissions: "every farm could be required to reduce emissions by the same proportion relative to a base year, or there could be a maximum emissions limit per hectare, per tonne of product, or per stock unit".¹⁴⁷ If a reducing cap is set based on actual emissions this would incentivise efficient farm management practices, but the measure would encounter the same implementation and measurement challenges discussed earlier for both the ETS and the methane tax.

Secondly, issues of equity would need to be grappled with given the measure is controlling activities undertaken on private land. Some farmers will be entitled to higher numbers of cattle per hectare simply because they have higher stocking densities when the measure comes into effect. Farmers may have made financial commitments based on certain yield predictions and suffer hardship from no longer being able to carry out beef or dairy farming at the intensity they expected on their land. Further, farmers may be forced by the measure to dispose of cattle (albeit likely via sale to slaughter), which are their property. There may be Treaty issues arising in the application of the cap to Māori land. To address these issues the cow cap could be combined with the incentive payments for land conversion or other government pay-outs for compliance in certain circumstances (such as economic hardship). This would allow for lost income to be replaced or compensated for in the short term in order to facilitate a just and equitable transition.

Thirdly, the issue of methane "leakage" may need to be considered. Some might argue that if cattle numbers are reduced in New Zealand, this will not affect the global beef and dairy demand. Beef and dairy production will simply shift out of New Zealand to another country. This issue is particularly relevant as the production of beef and dairy in New Zealand is to feed an international demand. While there is no easy answer to this challenge, it is a matter which will need to be considered in the ETS, tax, and cap options.

145 Marc Daalder "Climate report sets up fight over herd sizes" *Newsroom* (online ed, 4 February 2021) <<https://www.newsroom.co.nz/climate-report-sets-up-fight-over-herd-sizes>>.

146 Such as organic dairy farming with lower stocking densities but higher returns: CCC Report, above n 8, at 306.

147 Interim Climate Change Committee, above n 108, at 53.

On the whole, the cow cap provides a strong, quick and targeted mechanism. While likely controversial, its implementation could be paired with an incentive scheme to ensure farmers are not left behind.

4.4 Incentive for Land Use Conversion

A regulatory incentive scheme would pay to facilitate land used for cattle and dairy farming becoming used for plant-based agriculture, forestry, or restoration of native flora. Land conversion out of beef and dairy production provides a significant opportunity to reduce biogenic methane emissions, as approximately one third of New Zealand is presently used for pastoral agriculture.¹⁴⁸ The Commission Report recognised that “switching some land that is currently in livestock agriculture to uses like horticulture or arable cropping could reduce emissions”.¹⁴⁹ There is an obvious opportunity for conversion to horticulture, as New Zealand has approximately 2 million hectares of land suitable for horticulture and currently the industry covers only about 120,000 hectares.¹⁵⁰ A conversion of land by afforestation for production of native forest could also help to absorb carbon dioxide.¹⁵¹

This mechanism is particularly appealing because it promotes farmers’ long-term economic livelihood, “as global markets increasingly seek low-emissions goods and synthetic proteins”.¹⁵² As the global plant-based industry has been booming and is predicted to only become more profitable,¹⁵³ it is clear that viable financial alternatives to meat and dairy production are available to farmers.¹⁵⁴ The incentive assists to encourage them in the right direction for a low emissions future. Widespread land use conversion will create social

148 CCC Report, above n 8, at 383: 9.7 million hectares of 26.8 million hectares.

149 At 311.

150 Interim Climate Change Committee, above n 108, at 34.

151 Frank, Havlík and Stehfest, above n 16, at 68.

152 CCC Report, above n 8, at 151.

153 Beef and Lamb New Zealand *Future of Meat: How should New Zealand’s red meat sector respond to alternative protein advancements?* (February 2018) <<https://beeflambnz.com/sites/default/files/levies/files/Alternative%20Proteins%20summary%20report.pdf>>; Bernhard Schroeder “Plant Based Food Products Started With Milk, Now Taking On Meat, What’s Next?” *Forbes* (online ed, 18 June 2019) <<https://www.forbes.com/sites/bernhardschroeder/2019/06/18/plant-based-food-products-started-with-milk-now-taking-on-meat-whats-next/?sh=21bc8a1421da>>.

154 Shimon Shuchat “Meet 7 Meat and Dairy Farmers Who Switched to Plants Instead!” *In Defence of Animals* (online ed, 25 July 2019) <<https://www.idausa.org/campaign/farmed-animal/latest-news/meet-7-meat-and-dairy-farmers-who-switched-to-plants-instead/>>.

impacts,¹⁵⁵ and an incentive scheme could assist in ensuring vulnerable communities are able to equitably transition.

There are existing payment for ecosystem services schemes operating in New Zealand to encourage transition of land into production forestry (the One Billion Trees Programme), which could be expanded more broadly or used as a model for the conversion incentive.¹⁵⁶ The existing forestry programme has demonstrated increased conversion of sheep and beef farms to production forestry.¹⁵⁷ As such, a broader mechanism targeted specifically at converting land *out of* beef and dairy, rather than *into* production forestry, is likely to be successful. Examples exist of land conversion incentive programmes run privately (rather than by regulatory intervention).¹⁵⁸ For example, the Swedish oat-milk brand Oatly helped a dairy farmer transition to growing oats for its products demonstrating a reduction of GHG emissions and increase in profits for the farmer.¹⁵⁹ Similar initiatives have been undertaken in other countries.¹⁶⁰ These programmes demonstrate the positive results of incentivising a transition of land use.

The only real disadvantage of this approach is the cost to government. The scheme could be funded by ETS profits, or revenue from a methane tax if combined with these measures. The incentive scheme would be well suited to combination with one of the other regulatory mechanisms discussed earlier, in order to provide both a “stick” and a “carrot”. In saying that, the incentive scheme could be implemented quickly in advance of other measures. Analysis

155 Motu Economic and Policy Research *Potential Social Impacts of Land use Changes 2020–2050* (Report, 2019) <https://www.iccc.mfe.govt.nz/assets/PDF_Library/04574b8650/FINAL-Motu-Potential-Social-Impacts-of-Land-use-Changes-2020-2050-Report-to-the-Interim-Climate-Change-Committee-Motu.pdf>.

156 A Thales, Juan West, Les Monge and others “Promotion of afforestation in New Zealand’s marginal agricultural lands through payments for environmental services” (2020) 46 *Ecosystem Services* (101212); Ministry for Business, Innovation and Employment *One Billion Trees Programme* <<https://www.mpi.govt.nz/forestry/funding-tree-planting-research/one-billion-trees-programme/>>.

157 Sally Rae “Government incentives sees 45 per cent rise in forestry farm prices” *The New Zealand Herald* (online ed, 5 June 2019) <<https://www.nzherald.co.nz/the-country/news/government-incentives-sees-45-per-cent-rise-in-forestry-farm-prices/6J775J27LQNHU32M4MCRGNABCE/>>.

158 See, for example, the Transformation Project <<https://thetransformationproject.org/>>.

159 Tom Levitt “Why Some Farmers Are Ditching Livestock and Growing Plants Instead” *Ecowatch* (online ed, 22 April 2020) <<https://www.ecowatch.com/farmers-plant-transition-2645785977.html>>.

160 Levitt, above n 159; Nadra Nittle “The Plant-Based Movement to Transition Farmers Away from Meat and Dairy Production” *Civil Eats* (online ed, 13 January 2020) <<https://civileats.com/2020/01/13/the-plant-based-movement-to-transition-farmers-away-from-meat-and-dairy-production/>>.

undertaken for the interim Climate Change Committee's Agriculture Inquiry indicates that land use change from agriculture to forestry would be more likely driven by a reward payment, rather than by pricing agricultural emissions.¹⁶¹

5. CONCLUSION

Reduction of biogenic methane emissions in New Zealand cannot wait "until the cows come home". Action must be taken as soon as possible to ensure that reductions are achieved in accordance with domestic and international reduction commitments. Achieving "peak" beef and dairy production in this decade is crucial in the fight to mitigate the disastrous outcomes of climate change.¹⁶² A transition away from consumption of food which inherently emits methane in its production is just as obvious as a transition away from fossil fuels which inherently emit carbon dioxide when combusted.

There is presently a lacuna in the regulation of biogenic methane in New Zealand. The arguably inadequate CCRA 2050 biogenic methane reduction target is an empty promise without regulatory and policy measures to compel reductions. Regulation is necessary to significantly reduce agricultural production from cattle.

Pricing of biogenic methane as part of a market mechanism could be achieved by inclusion in the ETS or by a biogenic methane tax. Both measures benefit from the flexibility and innovation inherent in market mechanisms which allow reductions to fall where they will cost the least.¹⁶³ The ETS and tax options are both straightforward and well-established regulatory tools. As a result, there may be administrative efficiencies in their utilisation. Both options could provide a revenue stream which could be applied to facilitate further reductions in biogenic methane (by way of payments for land conversion or development of new technologies). Hence, it is not surprising that the pricing of biogenic methane emissions is currently recommended by the Commission and preferred by government.¹⁶⁴ However, these market measures face consistent barriers to success:

161 Motu Economic and Policy Research, above n 155, at 4–5.

162 Damian Carrington "Reach 'peak meat' by 2030 to tackle climate crisis, say scientists" *The Guardian* (online ed, 12 December 2019) <<https://www.theguardian.com/environment/2019/dec/12/peak-meat-climate-crisis-livestock-meat-dairy>>.

163 Hsu, above n 111, at 436.

164 CCC Report, above n 8, at 304; CCRA, s 215.

- *Speed*: the measure may be too slow to achieve results given the pace of change required.
- *Effectiveness*: the measure may be ineffective at reducing biogenic methane emissions. For the ETS, this is indicated by the poor performance of the NZ ETS at achieving reductions in carbon dioxide. For the methane tax, the application of a tax to a predominantly exported product could undermine its effectiveness.
- *Implementation*: Unlike carbon dioxide, measuring methane emissions at the farm level may be difficult due to the nature of the emissions coming from a number of small sources, which may vary per animal.¹⁶⁵ This is a challenge for pricing under both the ETS and tax scheme (if the tax is levied “upstream”). This challenge may be able to be overcome by modelling using the relevant farm-specific datapoints.¹⁶⁶ The price could be levied at the producer level to avoid this complexity, but this would reduce the incentive on farmers to implement emissions mitigation measures.¹⁶⁷

Direct regulatory intervention could also be employed. A cow cap provides certainty and clarity by setting a limit on the source of biogenic methane emissions and reducing that limit over time, albeit in a potentially contentious manner. It could be implemented quickly. The cow cap treats beef and dairy as products which in principle must be scaled down, due to their harmful contribution to global warming.

An incentive scheme to facilitate land conversion out of dairy and beef production would be highly advantageous. The only disadvantage is the cost, and a revenue stream may be able to be generated from other regulatory measures seeking to reduce GHG emissions.

The measures discussed in this article are not the only options. It is acknowledged that the preference and ultimate design of the measure may turn on economic analysis or Treaty obligations. Inevitably the regulatory mechanisms will need to be accompanied by additional “softer” policies.¹⁶⁸ While the cow cap coupled with an incentive for land conversion would arguably be the strongest and most effective approach, any of the mechanisms discussed would be a significant improvement on the status quo.

165 Geroe, above n 105, at 202.

166 Interim Climate Change Committee, above n 108, at 62.

167 At 58.

168 CCC Report, above n 8, at 309.