THE NEXT AGE OF AGRICULTURE

By progressively taxing biological methane emissions, we can support agricultural R&D to transform how we farm.

John Lohrentz
Deloitte

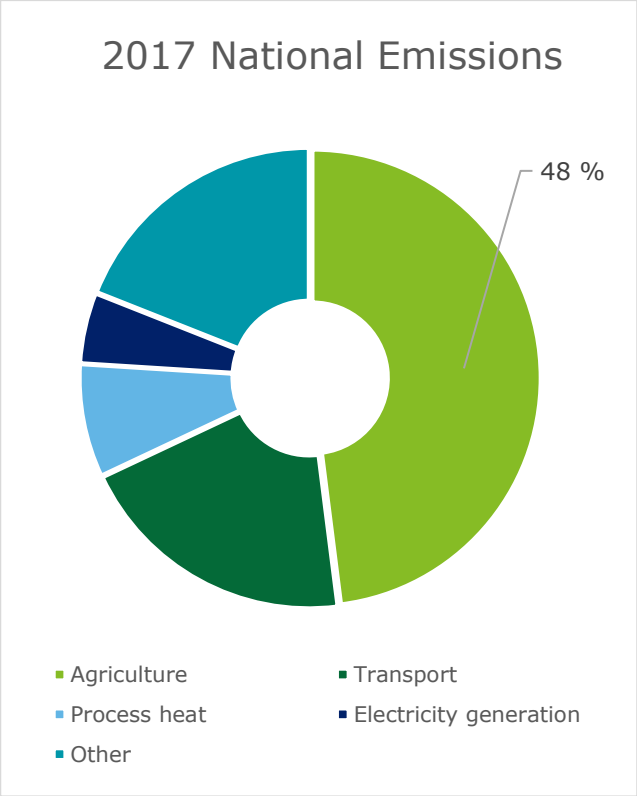
Te toto o te tangata he kai,
te oranga o te tangata he whenua

While food provides the blood in our veins,
our health is drawn from the land

Pretext[1]

Ministry for the Environment proposal

The Ministry for the Environment ("MFE") has released a proposal to price livestock emissions using a farm-level levy/rebate scheme (July 2019).[2] I was not aware of MFE's work when making my original submission and therefore will respond to it in this Proposal.



Wider policy environment

Following the Paris Agreement, the *Climate Change Response (Zero Carbon) Amendment Bill* proposes two "National Targets":[3]

1. Reduce gross biological methane emissions by 24-47% below 2017 levels by 2050 (& 10% below by 2030); and
2. Reduce net emissions of all other greenhouse gases ("GHGs") to net zero by 2050.

In this Proposal, I assume that if Agriculture meets the National Targets it has made a fair contribution to NZ's national emissions reduction journey.

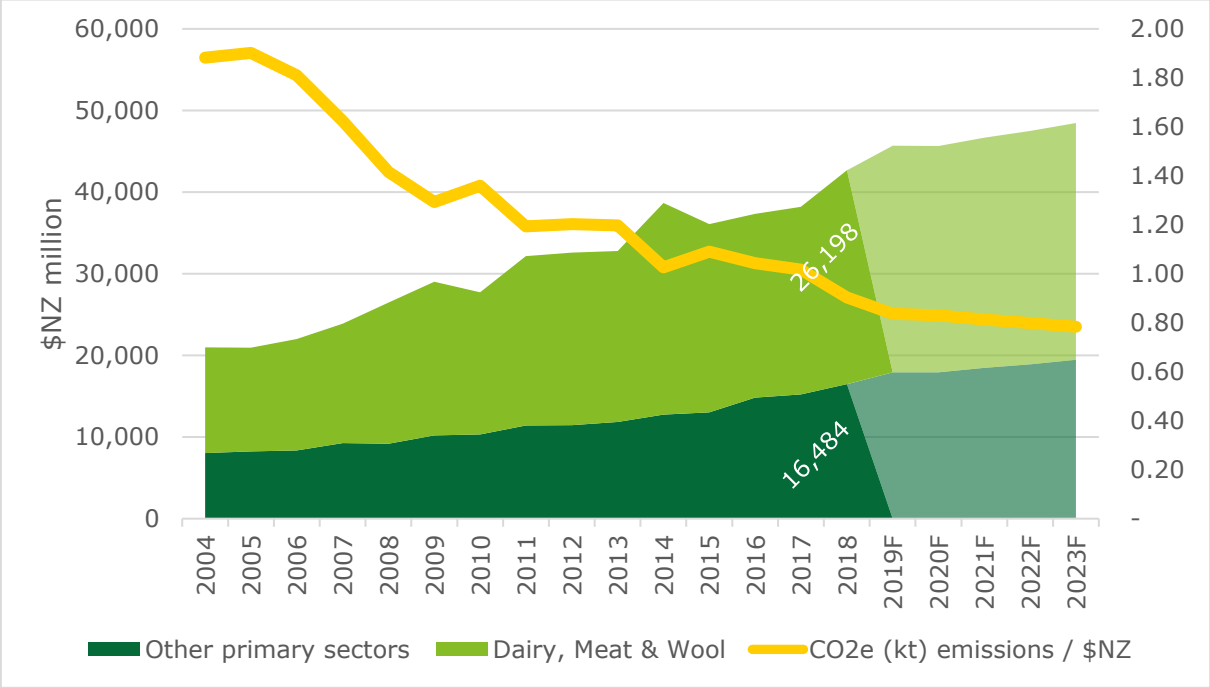
[1] *Words: 8,123, excluding Appendices and References.*
[2] The proposal is based on a report by the Interim Climate Change Committee ("ICCC"): Action on Agricultural Emissions (April 2019).
[3] Page 4 of Explanatory Note, Zero Carbon Bill 136-1.

The next age of agriculture

NZ's engine room[4]

Agriculture[5] is humankind's first and greatest revolution. Early in our development we mastered the art of systematically (re)producing everything from milk and meat to wood and wools. NZ Agriculture exports NZ$ 42,682m[6] (80% of our international trade) and employs 15% of the population (creating 11% of GDP).[7] Our farmers efficiently feed an estimated 50 million people.[8] And while value and production has grown over the last 25 years, farmers have also decreased GHG emissions intensity by 20%.[9]

Agricultural export revenue vs GHG emissions, 2004-2023(f)[10]



[4] MPI (June 2019) Situation and Outlook for Primary Industries, page 8.
[5] Agriculture generally includes dairy, meat and wool, forestry, horticulture, seafood and Arables; For this Proposal "Agriculture" emissions specifically refers to dairy and drystock.
[6] MPI (June 2019) Situation and Outlook for Primary Industries, page 5.
[7] MPI (June 2019) Situation and Outlook for Primary Industries, page 62.
[8] StuffNZ article.
[9] See Appendix 2; See ICCC (2019) Action on agricultural emissions, [3.3] and [14.1].
[10] MPI (June 2019) Situation and Outlook for Primary Industries; MFE (2019) New Zealand's Greenhouse Gas Inventory 1990–2017, CRF summary data; MFE (2017) New Zealand's Seventh National Communication, [5.3.4].

Transformational prospects

Consumer expectations are creating new markets for more sustainable products - zero-harm primary production is a modern differentiator! Danone, the global #1 retailer of fresh dairy products (2018: €5billion), has recently redesigned its strategic brand model to focus on preserving natural capital, with a 2030 goal of having a net-zero emissions supply chain.[11] Allied Market Research (US) indicates that the "organic dairy food and drinks market [is] expected to reach $36 billion by 2022 from $14.5b [2017], an annual growth rate of 14.25%."[12] And the businesses that voluntarily report to the Carbon Disclosure Project foresee up to US$ 2.1 trillion of business opportunities from the emerging sustainable economy.[13] For sustainable farming, there is a huge opportunity ahead.

Yet Fonterra notes that "the way the world is collectively producing food is depleting natural resources and creating waste faster than our planet can cope with".[14] Our imminent (and immense) challenge sits at the intersection of population growth (food security), ecological crisis and climate change (conditions for farming).[15] In response NZ Agriculture is "[shifting] from high-volume to high-value produce".[16]

"With New Zealand's natural environment and some of the world's most effective farmers, we're well positioned to lead change"[17] – a highly efficient, highly sustainable and highly innovative future for NZ Agriculture lies ahead.

This conviction is the fundamental basis for this Proposal.

[11] https://iar2018.danone.com/danone-in-2018/our-2030-goals-and-innovative-governance-model/; ICCC (2019) Action on agricultural emissions, [12.2].
[12] StuffNZ (March 2017).
[13] Bloomberg (June 2019).
[14] Fonterra (2018) Sustainability report, page 8.
[15] See Appendix 2.
[16] StuffNZ article.
[17] Fonterra (2018) Sustainability report, page 8.

Why use tax?

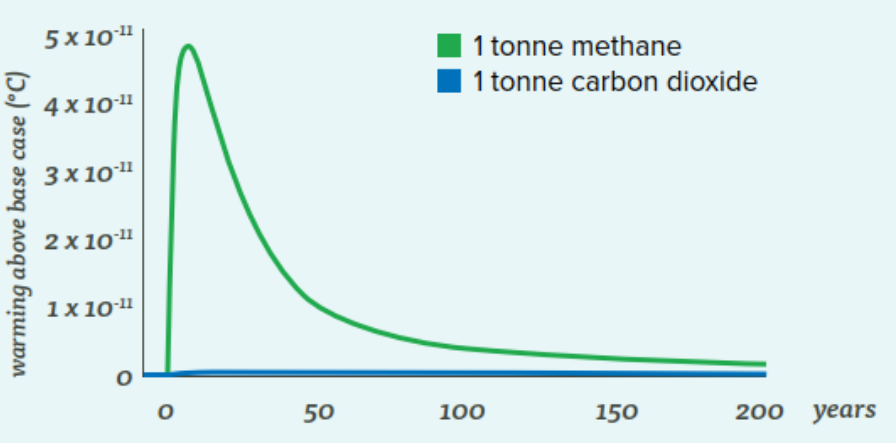
Tax is not a silver bullet for every problem. But while other options could reduce methane emissions, a tax-based policy approach will:

- Align better with methane's characteristics, especially that we need to maintain emissions above zero to sustain food production; and
- (If designed well) work efficiently, fairly and reliably

Methane is unique

Due to the warming effect of methane, good climate change policy must intelligently involve Agriculture. Tonne for tonne, methane's climate warming potential is higher than carbon dioxide ("CO2") for the first 200 years.[18] Yet CO2 can have a more damaging long-long term effect as its stays in the atmosphere, accumulating for several hundred years. We need to reduce CO2 emissions to zero by 2050 or soon after;[19] but methane, once reduced to a reasonable level, can be emitted at a constant rate.[20] Linking methane and CO2 under a universal price mechanism (i.e. NZ Emissions Trading Scheme, "ETS") will muddy the incentives for farmers so it needs to be treated differently in policy. What is a reasonable level of methane is a policy decision, an emissions budget allocation.

Warming potential



[18] ICCC (2019) Action on agricultural emissions, [3.2].
[19] The Guardian (October 2018).
[20] ICCC (2019) Action on agricultural emissions, [3.2].

Practical reasons

The Productivity Commission, Tax Working Group ("TWG") and Parliamentary Commissioner for the Environment ("PCE") all prefer a price mechanism to address biological methane. For the TWG, GHGs "meet the criteria of the Group's framework" for taxing negative environmental externalities (a wide range of existing abatement choices).[21] The Productivity Commission thinks price mechanisms are generally least-cost, fair and reliable.[22]

In reality, the other options are impractical. The main alternative to a tax is bringing all gases and all sectors into the NZ ETS – one emissions price for all (or maybe dual-caps). This is problematic because all GHGs and offsetting options are not substitutable actions;[23] so a universal price could compromise strategic reduction choices in order to get a "net zero accounting triumph" – i.e. we may overinvest in forestry and not sufficiently reduce GHG emissions in the right places.[24]

[21] See [37], Tax Working Group Final Report Volume 1.
[22] Productivity Commission Report, See R9.6 and page 110. While they ultimately preferred dual-capping the NZ ETS, the PC did consider tax.
[23] Parliamentary Commissioner for the Environment Report, page 9.
[24] Parliamentary Commissioner for the Environment Report, page 14.

1. Tax biological methane emissions

The MFE & Interim Climate Change Committee ("ICCC"), collectively "the government", recommends:[25]

- Applying a levy-rebate which integrates with the NZ ETS;
- Annually setting the levy rate using a single price or dual-price approach.

I propose:

- Separating policy for methane and CO2 / other gases;
- Progressively taxing biological methane;
- Setting and revising the tax rates based on the incentive farmers need to reach the National Targets.

Point of obligation

The government proposes to price "livestock emissions"[26] annually at farm-level from 2025.[27]

I propose to price biological methane emissions at farm-level from 2025.

Applying a tax at the farm-level means farmers make choices and directly experience the correlating outcomes.[28] This has several benefits:

Autonomy	Farmers' decide what is best for their farm and pocket.[29]
Least-cost	Farmers' balance investment, tax and compliance costs to decide on the best response.[30]

[25] ICCC (2019) Action on agricultural emissions, [14.1].
[26] This term includes more than methane – my policy focuses on biological methane only.
[27] MFE (2019) Action on agricultural emissions, page 10.
[28] ICCC (2019) Action on agricultural emissions, [7.1].
[29] ICCC (2019) Action on agricultural emissions, [4.1].
[30] ICCC (2019) Action on agricultural emissions, [6.3].

Innovation	Farmers' share wins as your neighbours' performance doesn't impact your tax obligation/credit.
Speed	Stronger incentive to adopt new technologies and practices quickly.[31] Direct periodic reward for strategic sustainable behaviours.[32]
Measurement fairness	The unique characteristics of each farm are reflected in the outcomes.
First-mover advantage	Early adopters are rewarded and there is no free-rider problem.
Unique targets	The tax rates can be set differently for different types of farming and geographies – depending on technical analysis from Treasury.

Participants

The government proposes to apply the levy/rebate to "farmers"

I propose to:

- Define "qualifying farmers" as economically significant dairy and drystock farmers.
- Use 'those required to be registered for GST' as a proxy for economic significance.
- Allow farmers to group: individuals, consolidated groups, or as a collection of taxpayers with joint and several liability, as preferred.

[31] ICCC (2019) Action on agricultural emissions, [7.1].
[32] ICCC (2019) Action on agricultural emissions, [6.3] and [7.1]; MFE (2019) Action on agricultural emissions, page 8.

Who is a "Qualifying Farmer"

Section YA 1 of the Income Tax Act 2007 does not currently have a sufficient definition of "farmer". I define a "**qualifying farmer**" as: *A person carrying on a farming or agricultural business on land in New Zealand, where the activity involves keeping ruminant livestock*.

- "A person" means the definition is agnostic on organisational model.
- Participants will be easily identifiable by tax identification number.
- Farmers must be "in business", in NZ.
- Intentionally includes multi-functional farms.

This definition should only apply to "economically significant"[33] dairy and drystock farmers (i.e. not micro-farmers, small lifestyle blocks or multi-functional farms with only a few ruminant livestock) – marginal benefit vs. cost. Exclude:

- Person's not required to register for GST;
- Other groups determined but the Commissioner, in the future.

Noting that some multi-functional entities will register for GST for reasons other than farming of ruminant livestock, and that conditions may change in the future, this definition is flexible. It is also better than excluding by land size as deer, beef, sheep and dairy farms can vary greatly in size by make similar revenues.

Grouping

I prefer allowing farmers to intuitively group to meet the tax obligation. The measurement tool (Overseer) may be more efficiently applied to a group of farms:

- Declare groupings in first supplementary return.
- Taxpayers must be able to separately identify their emissions profile; and
- Groups agree to joint and several liability.

[33] KPMG / MPI (2013) Reporting agricultural emissions at farm-level.

Pricing mechanism

The government proposes to:[34]

- Calculate net obligation = (emissions – free allocation) x levy rate.
- Give farmers a 95% free allocation for emissions.
- Reduce the free allocation over time by a pre-agreed process.

The government is also looking at allowing farmers to net off their emissions at the farm gate by counting sequestration from forestry that is and is not in the NZ ETS.[35]

I propose to:

- Set an annual target rate of methane emissions per unit of production (the "Threshold")
- Base the Threshold on our National Targets, and expected growth rates.
- Farmers that are below the Threshold pay no tax. Farmers above the Threshold have a tax obligation calculated using a system of progressive rates.
- The Threshold decreases annually based on a pre-determined schedule that is reviewed five-yearly as part of national emissions budget process.
- No sunset clause. But a review in 2050 to consider adding a termination date.

I will use the Dairy industry (2020 – 2030) to illustrate this Proposal (as more data is available). See Appendix 1 for model notes.

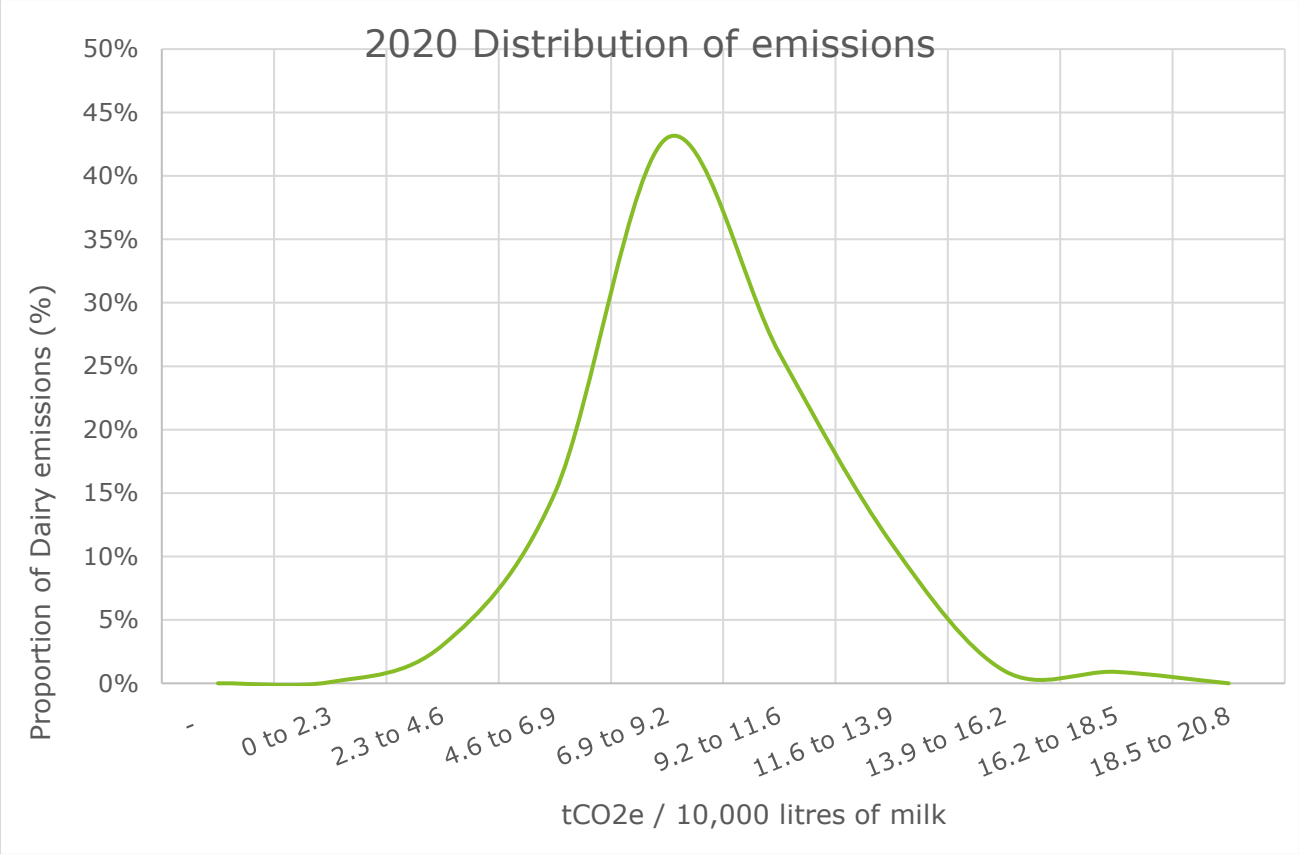
Key issues with the government's proposal include:

1. A highly effective farmer may still have to pay – the proposal therefore prefers forestry investment over emissions reductions (as you can only go negative emissions with forestry).
2. The flat levy rate does not recognise the compounding impact of additional methane emissions.

[34] ICCC (2019) Action on agricultural emissions, [14.4].
[35] ICCC (2019) Action on agricultural emissions, [11.4].

Design around a target

Carrots are better than sticks. Farmers' behaviour will more likely change if they're rewarded for hitting an annual target, relative to their units of production (fairer across all agricultural groups). Currently, the estimated distribution of methane emissions per 10,000L of milk production is roughly:



	2020
Average emissions per 10,000L milk	8.56
Total emissions (tCO2e)[36]	17,734,435
Production (litres of milk)	20,723,511,090

To reach our National Targets the above distribution needs to shift left, i.e. sufficient reductions so the average sector emissions decrease from 8.56 tCO2e / 10,000L milk to 7.36 in 2025, and 6.32 in 2030.

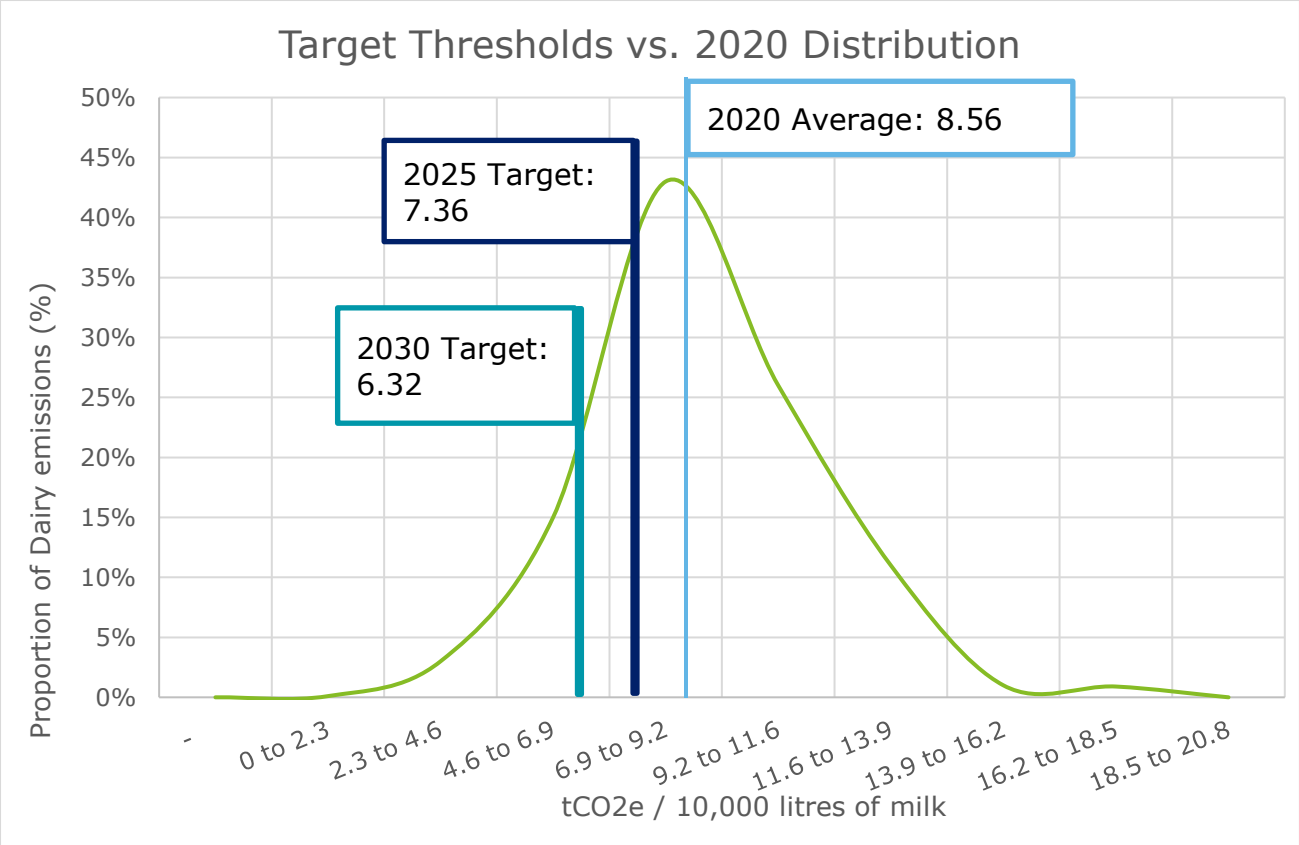
[36] "tCO2e": tonnes of CO2 equivalents (measure of methane).

"The Threshold"

I recommend that MFE/IRD set a target rate of emissions per unit of production (for Dairy and Drystock), starting in 2025 and then annually.

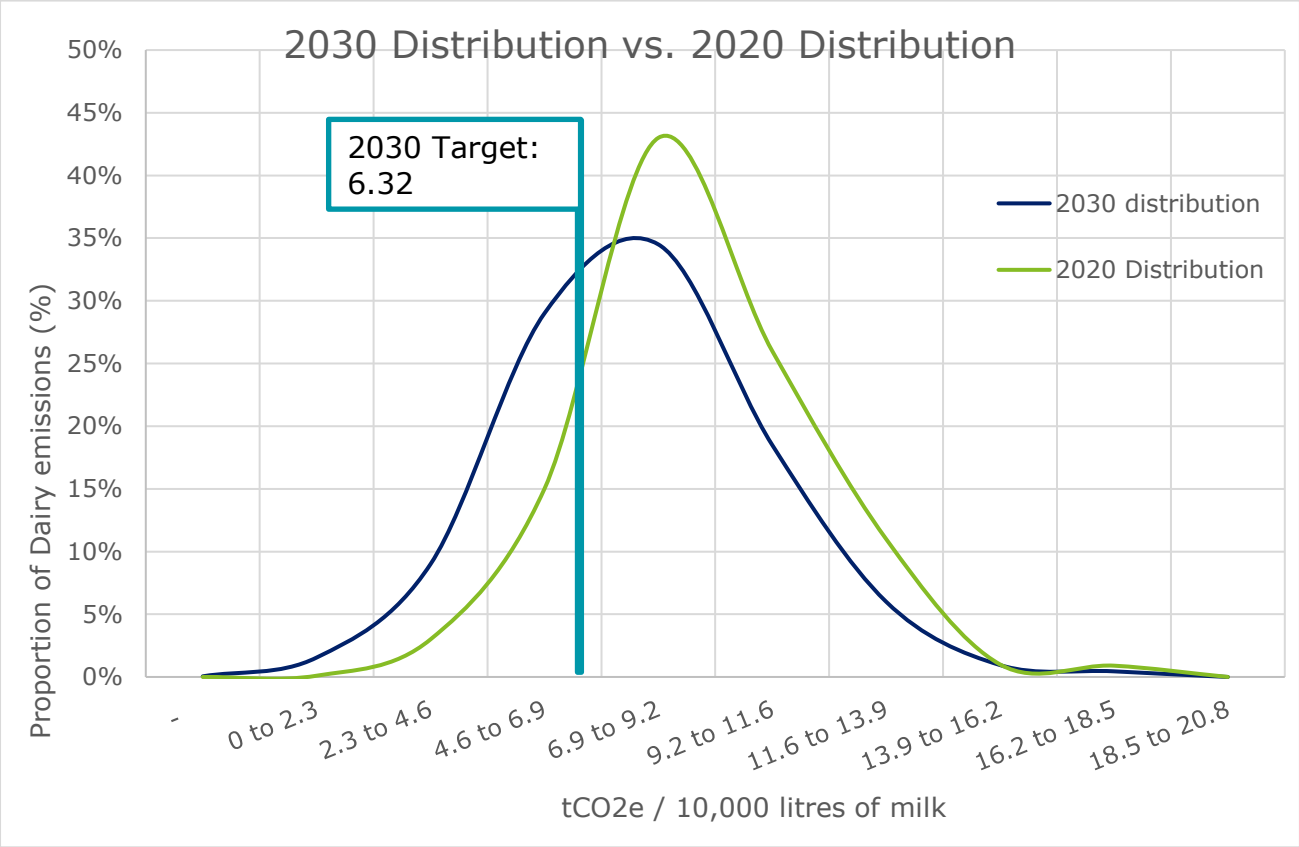
Note that in 2020

- 26% of farmers are already below the 2025 target;
- 14% are below the 2030 target.



Between 2025 and 2050, I recommend that "the Threshold" is lowered based on the national GHG inventory, growth rates and agricultural responsiveness. Align the rates every five years when the national emissions budget is set. Alternately, if behaviour change is expected to be more dynamic, review every three years.

Assuming a 50% activation rate in the 2020-2030 period, the emissions distribution will shift to the left, something like below:



Key Stats	**2030**
Average emissions per 10,000L milk	6.32
Total emissions (tCO2e)	15,960,991
Production (litres of milk)	25,261,844,381
	% of farmers
Below 2030 "the Threshold": 6.32	32%
0 to 20% above Threshold	17%
21 to 40% above Threshold	19%
41 to 60% above Threshold	13%
+60% above Threshold	19%

Under this scenario, the following outcomes occur:

- 32% of farmers will get below The Threshold (due a rebate)
- The number of farmers will decrease by 7.8% (with herd size increasing by 30%)

Progressive tax rate

I recommend progressive rates so that those emitting at a higher level per unit of production have a higher tax obligation. This reflects the reality that the warming effect of additional emissions compounds. For the Dairy scenario:

	Per tonne of methane	
0 to 20% above Threshold	Tax Rate A	$10
21 to 40% above Threshold	Tax Rate B	$20
41 to 60% above Threshold	Tax Rate C	$25
+60% above Threshold	Tax Rate D	$30

The tax rates must be set independently of the NZ ETS, using Treasury analysis of appropriate marginal price. As the carbon price fluctuates due to a number of non-Agricultural effects, taking this approach creates more certainty on annual obligations/outcomes. [37]

Applying a tax progressively creates a stronger incentive to lowering emissions to the next category, even if you can't quite get to the Threshold. Farmers also have incentive to beat the Threshold, but don't have to achieve negative emissions for a rebate. This is important as the level of investment required to move from average levels of emissions to very sustainable levels of emissions is higher than a very high polluting farmer moving to the middle of the road. It recognises the work already done by farmers.

Cost

$NZm	
R&D tax credit (60%)	$288.5
Farmer's Cash Credit (40%)	$192.3
Tax revenue from biological methane emissions tax	**$480.8**

Breakdown for dairy:

[37] ICCC (2019) Action on agricultural emissions, [8.3].

	Farmers		Tax Rate	Total cost / rebate ($)	Average cost to farmer ($)
Tax Rate A	17%	1,859	10.00	(27,773,845)	(14,937)
Tax Rate B	19%	2,016	20.00	(60,218,615)	(29,875)
Tax Rate C	13%	1,376	25.00	(51,374,389)	(37,343)
Tax Rate D	19%	2,028	30.00	(90,857,205)	(44,812)
		7,278		**(230,224,054)**	
Below the Threshold	32%	3,407		90,026,470	26,424
		10,685			

Flexibility

Using this approach there is a high degree of flexibility (eligibility, rates, progressiveness, differentiation by industry/geography) in how strongly the government tries to incentivise changes to the behaviours of farmers. With a just transition being a crucial element of a successful plan, this means that the government can manage the sector's outcomes.

Measurement

I propose to:

- Measure annual on-farm methane emissions using Overseer
- Align sequestration measurement with the protocols used under the NZ ETS
- Require processors to report annual units of farm-gate production (e.g. litres of milk).

I support the TWG's assessment that efficient and accurate Measurement is the biggest challenge for designing effective GHG taxes[38] - 98% of farmers do not know their emissions footprint.[39] But I argue that Overseer, a government-developed tool, is fit-for-purpose.

[38] See [40] to [42], Tax Working Group Final Report Volume 1.
[39] BERG (2018) Report of the Biological Emissions Reference Group, page 5.

Overseer examines "nutrient use and movement within a farm".[40] It is flexible to different farm-types[41] and multi-functional. Many farmers are already using the tool to restore water quality. It also measures many inputs so better reflects the 'levers' farmers can pull to change their practices (stock numbers, stock type, dry matter intake per animal, the nitrogen content of the feed, and the use of nitrogen fertiliser).[42] Overseer is free to access but you need a nutrient manager to implement it. After being critically examined by industry-body BERG, they have endorsed it as a "suitable" tool for measuring on-farm methane emissions.[43]

I propose that some further development is done so that by 2025 Overseer can automatically populate emissions information to a farmer's myIR.

Sequestration

The ICCC is exploring ways to net-off emissions at the farm-gate.[44] I support this approach.

In the meantime, I propose that forestry sequestration is counted using the NZ ETS rules. I suggest that this information should be able to be populated into IRD systems for ease of compliance.

Production

Given the fact there are about 38,300 farmers in NZ and only a limited number of processors, I propose that the information on units of production for each farmer / taxpayer are provided directly to IRD by the processors.

This should already be collected by Processors – a minimal additional compliance burden.

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[40] Agresearch (2015) Technical Description of OVERSEER for Regional Councils.
[41] NZAGGRC (2017) On-farm options to reduce agricultural GHG emissions in New Zealand, [2.1.2].
[42] NZAGGRC (2017) On-farm options to reduce agricultural GHG emissions in New Zealand, [2.1.2].
[43] BERG (2018) Report of the Biological Emissions Reference Group, page 6.
[44] ICCC (2019) Action on agricultural emissions, [11.4].

2. Credit sustainable farmers

The government proposes to:[45]

- Recycle all levy revenues back to Agriculture through an Agricultural Emissions Fund
- Fund programmes with a "direct" effect on emissions.
- Ensure a fair allocation to Māori land owners, plus representation in the Fund's governance.

I propose, from 2025, to annually recycle 40% of the tax revenues directly to "sustainable" farmers that achieve the annual Threshold, using a refundable tax credit.

Don't set up another fund!

A tax neutral government levy will seed NZ$ 47-95m to reduction initiatives, but is inefficient and involves unnecessary government control of the outcomes.[46] The fund will consume 5% of its value in running costs[47] and the approach does not guarantee that the funds are distributed to science-backed strategic priorities.

Give it back

I propose redistributing 40% of the tax revenue collected to "sustainable" farmers that achieve the annual Threshold. The funds can be distributed as a refundable tax credit[48] which will reduce farmer's tax bill (and provisional tax next year) or put cash in hand. By efficiently and predictably allocating resources to "sustainable" farmers, they have opportunities to implement new practices and make strategic investment decisions.

Allocation mechanism

One important challenge is how to allocate the credits to sustainable farmers. If a price per tonne of emissions is used then farmers are incentivised to maintain higher emissions, just below the Threshold.

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[45] MFE (2019) Action on agricultural emissions, page 7.
[46] ICCC (2019) Action on agricultural emissions, [13.1].
[47] ICCC (2019) Action on agricultural emissions, [13.2].
[48] This can be done simply by modifying s LA 6.

I propose a multiplier mechanism for taxpayers/groups:

[(Annual Threshold / 10,000 x farmer's actual units of production) – Actual total methane emissions] x credit rate

This approach means that the further below the Threshold a farmer gets, the greater their rebate. Analysis will be required to appropriately set the credit rate.

Example

Applying my Dairy scenario, here is a simplified example:

- 2030 Threshold = 6.32 tCO2e / 10,000L milk;
- Assume average 2.3m litres of milk produced per farm.
- Credit rate = $44.

2030 $NZ	**Number of Farmers**	**Actual tCO2e / 10,000L**	**Credit per farmer ($)**	**Total pay-out ($)**
Group 1	2,000	5	13,358	26,716,800
Group 2	1,000	3	33,598	33,598,400
Group 3	407	-1	74,078	30,148,658
	3,407			**90,463,858**

3. Target Agricultural R&D with a tax credit

Innovation is: Public and private investment in R&D + developing the ecosystem & pathways that allow efficient commercialisation. My proposal focuses on private R&D investment.

Innovation brings a have-our-cake-and-eat-it-too perspective, a potential agricultural "silver bullet".[49] Agricultural innovation may widen the constraints to allow more growth within our ecological and climate limits. For example BERG estimates that a methane vaccine could reduce biological methane emissions for an animal by 30%.[50] But the industry only has a medium-high confidence that a vaccine will be ready by 2050.

Current approach to private R&D

There are challenges in stimulating private innovation because R&D comes with high spill-overs.[51] While industry structure plays a part (few big companies, small R&D intensive industries like pharmaceuticals),[52] businesses don't invest because there's high risk, high capital requirements, cash flow issues and the rewards are often hard to capture (with technology making it easy to reverse engineer innovations).[53] This disincentives the behaviours that are good for the economy as a whole (positive externalities).

The government sees these externalities as a chance for positive intervention.[54] Based on international evidence,[55] the government has implemented a 15% R&D tax incentive as a replacement for the Callaghan Innovation growth grant (and a revival the 2008-09 scheme). The core difference is that Callaghan Innovation picked its winners whereas the tax credit is available to all that meet eligibility criteria.

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[49] Productivity Commission Report (2018), page 6.
[50] BERG (2018) Report of the Biological Emissions Reference Group, Table 3.
[51] Treasury (2018) RIA on R&S tax incentive, page 1: Business R&D is 0.64% of GDP (OECD average: 1.64%).
[52] Treasury (2018) RIA on R&S tax incentive, page 6.
[53] Treasury (2018) RIA on R&S tax incentive, page 1.
[54] ICCC (2019) Action on agricultural emissions, [12.4].
[55] Treasury (2018) RIA on R&S tax incentive, page 2.

Agricultural R&D tax credit

Allocating 60% of the tax revenue, from 2020 I propose to:

- Modify the R&D tax incentive to provide a 40% refundable credit to taxpayers with "Targeted Agricultural R&D" expenditure
- Empower the Climate Change Commission ("CCC") to define "Targeted Agricultural R&D" expenditure, so it targets work to reduce methane emissions or improve efficiency.
- Review the eligible expenditures list every five years.

Targeted Agricultural R&D

We already know some of the solutions we need to fast track for more responsible agriculture (e.g. a methane vaccine, low-emission feeds). By empowering the CCC to shortlist eligible expenditures for this scheme, there is increased certainty that the funds are being strategically allocated and IRD has clear filters for approval and review processes. It will also allow a degree of industry consultation on focus areas.

Technical changes

The main changes are through the definition of "Eligible research and development expenditure" in section LY 5 and Schedule 21, Part A:

- Insert wording into Part A so that "Targeted Agricultural R&D" is conceptually included in eligible expenditure.
- Define "Targeted Agricultural R&D" in section YA 1
- Empower the CCC to recommend the definitional coverage of "Targeted Agricultural R&D" expenditures to IRD/MBIE, and review periodically (every five years).
- Add a new subsection after section LY 4(2) to provide a separate, additional calculation process for total eligible R&D expenditure related to Targeted Agricultural R&D.
- The 40% refundable tax credit is subject to existing ordering rules.
- Some changes to the existing legislation will be required to ensure no expenditure is double counted (Part a, Schedule 21 and LY 4), and the new credit runs parallel to the R&D credit.

By inserting a separate, parallel process to calculate a tax credit for Targeted Agricultural R&D, the major protections designed into the R&D tax incentive remain intact and beneficial. There is no need to fundamentally change the definition of an eligible entity or eligible core activity. In this way the risk of abuse is, initially, comparative to the existing risk of the R&D tax credit.

Costing

The Treasury completed a Regulatory Impact Assessment of the R&D tax incentive between 2020 and 2022 (3 years). In its present form it is expected to incur the following costs each year:[56]

- NZ$ 384m in outlays to taxpayers;
- NZ$ 6.2m in administration costs; and
- NZ$ 37.5m for taxpayer engagement costs (for 1,500-2,000 people).

Based on a sample of two months from the 2017/18 cohort of growth grant recipients, about one third (32%) were for Agricultural projects. The projected costs for increasing the tax credit to 40% for Targeted Agricultural R&D depends on what proportion of agricultural projects are in the "targeted" areas. Assuming half are in the targeted areas, the costs are as follows:

NZ$ m	**2020**	**2025**	**2030**
Outlay	163.7	230	288.5
Administration	20.5	20.5	20.5
Engagement	37.5	66.1	82.9
	221.7	**316.6**	**391.9**

Between 2020 and 2025, I propose that government increases the R&D tax incentive budget to cover this cost, noting the significant benefits it could have for farmers and the economy generally (alternative is to implement from 2025). From 2025, the tax credit will be paid for by methane tax revenues from Agriculture.

[56] Treasury (2018) RIA on R&S tax incentive, page 12-15.

4. Administration and Implementation

Administration

I propose that IRD administers this Proposal, with collaboration from MFE and Ministry for Primary Industries ("MPI").

IRD has annualised and periodic engagements with every taxpayer. They have a new digital system and they are the right agency to lead the design and implementation of a new tax. Partnering with other Agencies for design and administrative support will ensure a high quality framework.

In terms of system design:

1. New 'tax base', new Tax Act
    - Natural Capital is a new tax 'base' therefore establish a new Tax Act for environmental taxation. Integrate the Act with the principles of the Climate Change Response Act 2002 and the processes of the Tax Administration Act 1994 (as a basis for collection, review and enforcement).
    - The new tax should not be income tax therefore it will not affect our DTA/FTA obligations.
2. Supplementary return form
    - Create a digital annual "supplementary return form" which is "attached" to a farmer/group's tax return.
    - Pre-populate the form with available information
        - Total units of production (from Processors);
        - Eligible offsets (MPI via NZ ETS); and
        - (with some development) Total farm emissions (Overseer plug-in to IRD).
    - Automatically calculate tax obligation or tax credits, and this flows through to the tax return form. This should increase simplicity. For paper-returns, provide comprehensive guidance for calculations.
    - Taxpayers will retain the ability to edit and correct their supplementary return.

Implementation

The government proposes that:

- The farm-level price mechanism be implemented from 2025.
- That processors be taxed in the interim.

Proposed timetable[57]

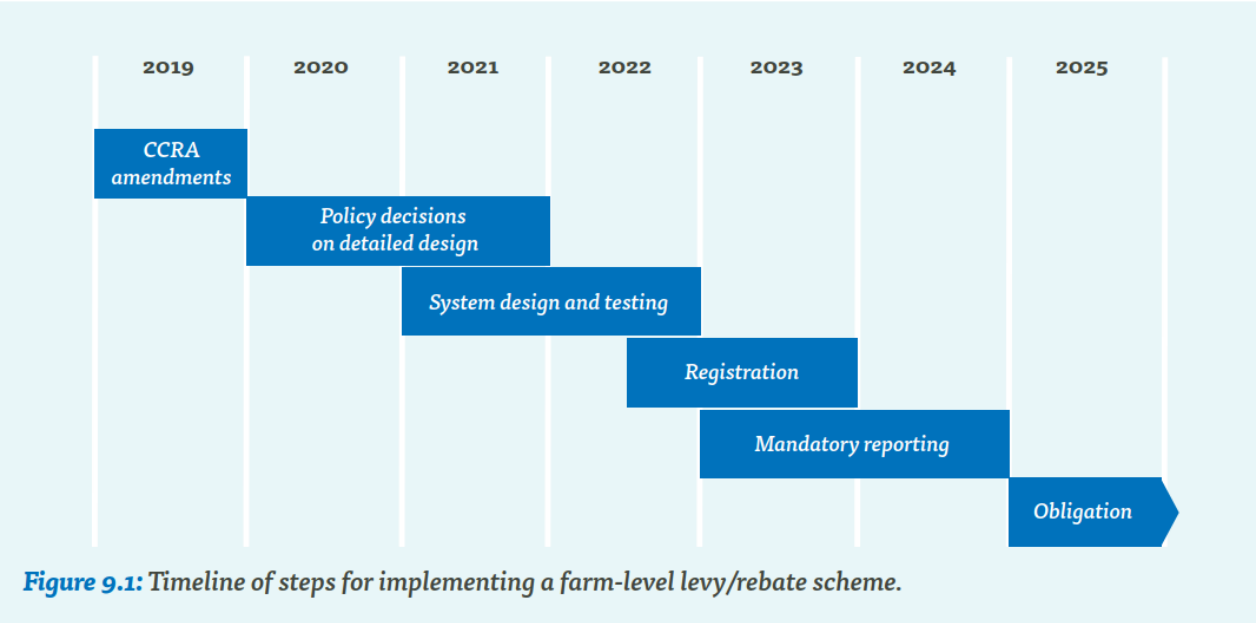


Figure 9.1: Timeline of steps for implementing a farm-level levy/rebate scheme.

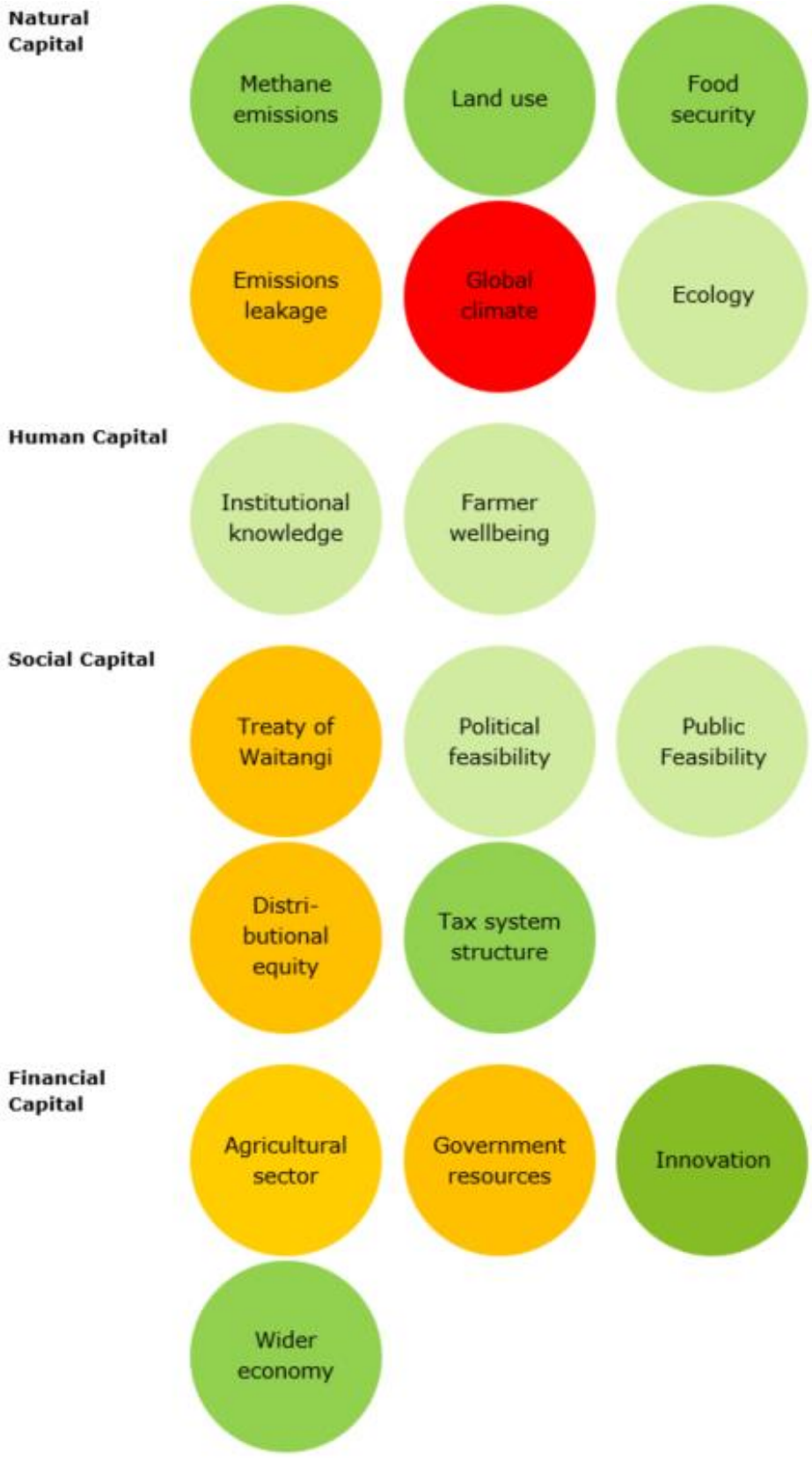
I support the government's suggested policy timetable as it gives farmers time to prepare, change practices and make some investment decisions.

In the 2020-2025 interim, I support a formal government-sector agreement which hands initiative to sector participants to make reductions, supported by government funding.[58] This would entail the sector developing and deploying integrated farm management plans prior to 2025.

[57] MFE (2019) Action on agricultural emissions, page 13; ICCC (2019) Action on agricultural emissions, [9.1].
[58] MFE (2019) Action on agricultural emissions, page 15-16.

Impact analysis

My analysis looks at medium-term outcomes (10 years) using the Treasury's Living Standard's Framework (see Appendix 2).



Treaty of Waitangi

Cultural Capital of the Treaty

Current performance: 

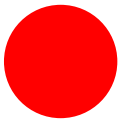
Proposal impact: 

In the last few decades NZ has addressed some Māori grievances regarding the land and her resources through settlements from the Waitangi Tribunal. But our agriculture and engagement with the land is not, for the most part, consistent with Te Ao (Māori worldview).

While this Proposal benefits the land long-term, I cannot affirm that it honours the spirit of the Treaty. My fundamental starting point – practically and philosophically – is within the euro-centric framework of property rights, markets and individualism. To grow Treaty social capital would require a starting point that subjects us to the land, not the reverse. Treating Natural Capital as a tax base might move some way towards re-orienting our thinking – it is a beginning, however small.

Natural Capital

Methane emissions

Current performance: 

Proposal impact: 

Currently methane emissions are unsustainably high largely due to the intensity of our farming practices (fertilizer + focus on maximising the productive output).

My proposal activates the transformation Agriculture needs to seize new opportunities. Recognising that the practices and technologies required to achieve a 10% reduction in methane before 2030 (National Target) already exist, I consider there is the likelihood of strong positive outcomes.[59] This is a risk because tax policy sets a price and intends

[59] BERG (2018) Report of the Biological Emissions Reference Group, page 28.

to change quantity of emissions.[60] My assumption is that there is good elasticity in the relationship between the price of methane and total emissions.

With a significant proportion of tax revenues (60%) going towards Targeted Agricultural R&D, there will also be a far higher likelihood of breakthrough solutions to make the transition journey of the entire sector easier and more affordable, compounding the sector wins.

Land use

Current performance: 

Proposal impact: 

From one big native forest, over the last 200 years we have de-forested and shifted to pastoral land.[61] Our current land use is unsustainable long-term based on soil degradation and emissions intensity indicators.[62] But the government's response is also problematic as it over-corrects towards forestry – 2.6m new hectares by 2050, and 2.8m more by 2075.[63] This land-use change is too rapid.

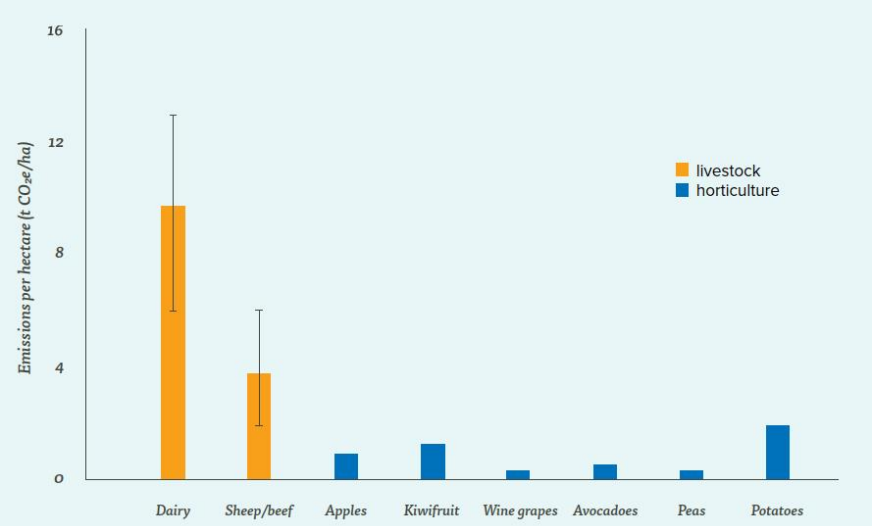


Figure 4.1: Different land uses have different levels of emissions. Dairy and sheep/beef emissions represent the average and range of data as provided by DairyNZ and Beef + Lamb New Zealand, respectively.
Source: DairyNZ, Beef + Lamb New Zealand, Thomas et al. (2019)

[60] Productivity Commission Report, page 114.
[61] Parliamentary Commissioner for the Environment Report, page 40.
[62] ICCC (2019) Action on agricultural emissions, [4.2].
[63] Parliamentary Commissioner for the Environment Report, page 126

Under this Proposal land-use change will still occur but at a more manageable rate. By giving a 5 year transition period from 2020, farmers can take time to evaluate their revised costs and opportunities, and make new decisions on investing their time and resources.

- Land diversification and increased (native) foresting[64] will have strong medium/long-term effects by increasing our resilience to climate shocks (different farms affected differently by same event).
- Fewer "mono-cultures" also reduces disease risk.
- If this Proposal creates financial pressure on farmers they may find it hard to secure funding to transition (it will be important for the banks to come on the journey and look at more long-term/sustainable finance options).[65]
- Farmers will need training from industry/government to assist in developing new farming skills and planning transitions.
- Transitions may mean decreases in direct employment in Dairy/drystock, but could create new jobs in other industries (i.e. horticulture). While employment changes might improve at a national level, there will be stronger and more diverse regional impacts – which need to be explored and managed.[66]

Food security

Current performance: 

Proposal impact: 

From a New Zealand food security perspective, this Proposal will have no impact. From a global perspective we profit from, but do not materially contribute to, the issue of food security.

[64] Newsroom (September 2019).
[65] RBNZ (May 2019) Financial Stability Report, page 12.
[66] MFE (2019) Action on agricultural emissions, page 24. BERG

Emissions leakage

Current performance: 

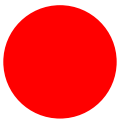
Proposal impact: 

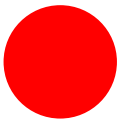
Emissions leakage occurs when production moves offshore to jurisdictions where emissions are not regulated and pollution can increase unbounded. The MFE have assessed that there is not a high level of risk of emissions leakage in the medium term due to the generous 95% free allocation in the government's plan.[67] This is because other economies are also adopting "economy-wide" approaches to GHGs – an equal playing field.

I disagree with this analysis. There is material risk of leakage in the short-medium term, and I think this Proposal likely increases this risk. My proposal puts a higher cost on farmers, so the incentive to shift oversees in the medium term is higher, if investors aren't patient for the longer-term payoff – international climate policy is spotty.

However, this risk needs to be balanced against the opportunity cost of failing to act and the risk of substitutable products competing for revenue share (e.g. vegan meat, nut milks). Moving early to differentiate our agriculture will position the sector effectively for these trends.

Global climate

Current performance: 

Proposal impact: 

In reality, we are a small part of the global picture. It is fair to assess that even a perfect transition to a sustainable Agriculture in NZ will not make a meaningful dent in global emissions. But agri-tech might.

[67] MFE (2019) Action on agricultural emissions, page 21.

Ecology (Soil and water quality)

Current performance: 

Proposal impact:

Any impacts on soil and water will be an indirect impact from farmers optimising their land inputs, especially fertilizer, and dealing with run-off.[68] We can expect improvements here as quality water and soil can improve land productivity, and reduced fertilizer purchasing saves costs – there is a clear business case.[69] These outcomes can be leveraged through integrated farm management plans that deal with emissions, water and soil together.[70]

Human Capital

Institutional knowledge

Current performance: 

Proposal impact:

Human Capital considers knowledge/skills, physical and mental health.

Currently farmers are not sufficiently prepared with the knowledge, skills and resilience to deal with future acute environmental shocks. While there might be some short-term financial stability, people's livelihoods can erode overnight from significant weather/disease events – which will impact isolated or low-wealth farmers worst.

Whether this proposal supports farmers' skills development and resilience depends on final design – but we can learn from history. When Agriculture rapidly deregulated in the 1980s, there was a high human cost:[71]

> "There were some suicides and some farmers were forced to draw on social welfare assistance for a time. Many small rural towns experienced reductions in population in the mid-1980s as farmers stopped spending and people left in

[68] MFE (2019) Action on agricultural emissions, page 25.
[69] https://www.ipcc.ch/2019/08/08/land-is-a-critical-resource_srccl/
[70] ICCC (2019) Action on agricultural emissions, [14.1].
[71] Vangelis Vitalis (2007) Agricultural subsidy reform and its implications for sustainable development: the New Zealand experience, page 30.

> search of jobs elsewhere. Public services like schools and small hospitals contracted in the wake of this rural downsizing".

We can observe that the policy changes were not supported by enough farmer-development to ensure a fair and manageable transition in the short term. While there were many positive long-term outcomes (international competitiveness, sector growth)[72] and only 1% had to sell-out,[73] the lack of preparedness made it a hard decade for many.

For a transition to be just it needs to consider "tools to mitigate unwanted impacts on regions, industries and lower-income households."[74] It will take further analysis to fully understand key vulnerable groups/geographies. Therefore I have create flexibility with several policy settings which can be changed to respond to human costs. Regardless, skills development will require more fiscal investment in existing farmer training and extension programmes.[75] I support the government to extend these initiatives as they crucially supplement the outcomes of this Proposal.

Farmer wellbeing

Current performance: 

Proposal impact:

The Mental Health Foundation has identified climate change, environmental sustainability and regulation as risk factors for farmers' mental health.[76] While the mental health outcomes have complex causes, ensuring design quality and flexibility should go some way to mitigating any immediate mental-health impacts – especially by ensuring farmers first report for a few years before the tax obligation takes effect in 2025.

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[72] Vangelis Vitalis (2007) Agricultural subsidy reform and its implications for sustainable development: the New Zealand experience, page 29 and 37.
[73] Vangelis Vitalis (2007) Agricultural subsidy reform and its implications for sustainable development: the New Zealand experience, page 30.
[74] MFE (2019) Zero Carbon Bill – Regulatory Impact Statement, page 57.
[75] ICCC (2019) Action on agricultural emissions, [5.3].
[76] Mental Health Foundation (2014), Table 1.

Social Capital

Political Feasibility

Current performance:

Proposal impact:

Some may argue that this Proposal has a low level of political feasibility based on the lobbying strength of industry groups opposed to environmental regulation or new taxation. For example, Federated Farmers[77] recently opposed water quality regulation[78] and prefer a marginal pricing mechanism that only applies to farmers not reducing emissions by 0.3% annually (i.e. 3% target reduction by 2030). Further:

- Taking a big bet on Agricultural R&D is a political risk (as it could fail) and the government currently does not have a high risk threshold.
- Generally the political environment is low trust, so bilateral support is unlikely, making it more likely to devolve into an election issue (delay is infeasibility).

In contrast, this Proposal is:

- Arguably, well-timed, with the government in the middle of executing a strong environmental action plan: Water quality, Zero Carbon Bill, NZ ETS fixes.
- Speaking to a strong silent majority in Agriculture and supporting industries (based on anecdotal evidence from MFE Officials).
- Tax neutral.
- Focused on driving R&D and on-farm innovations, not penalising farmers.

Public feasibility

Current performance: 

Proposal impact:

While support from Farmers may be mixed, this Proposal is a more feasible long-term pathway than government's plan. There should be a reasonable level of support from other parts of society that are advocating for climate policy, e.g. the Climate Leaders

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[77] Federated Farmers (July 2019) Farmers committed to reducing greenhouse emissions.
[78] Scoop (September 2019).

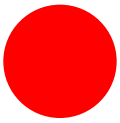
Coalition (business advocacy on climate change): including Fonterra, Ngai Tahu, Ravensdown, Synlait and Zespri.[79]

There could be some push-back (from a 'special treatment' perspective) from other industries that are subject to the carbon price, or from those that think that this proposal does not go far enough. Public support will continue to grow as we experience more natural disasters.

While there are times where public sentiment and bilateral consensus are important to our democratic stability, we do not elect our MPs to send everything back to a poll or referendum. MPs are entrusted with the duty to govern the country – to consult and debate – then to identify what good policy looks like and (collectively) legislate for the common good. Good policy isn't always popular and usually involves nuance. Political and public feasibility should ask:

Is this policy for the common good of our (intergenerational) stakeholders?

Distributional equity

Current performance: 

Proposal impact: 

Fairness is inherently subjective.[80] In this context, 'good' policy begs the question: Are actors experiencing fair outcomes according to the scientific consensus on climate change? This highlights several distortions:

- The Agricultural R&D tax credit will unfairly benefit a few entrepreneurs and scientists (but it may allocate funding more proportionately to our existential risks).
- The tax credit paid to "sustainable farmers" will benefit about 32% of economically significant farmers, while the rest will have tax burdens at different levels. This is intentional an investment in Natural Capital.

[79] https://www.climateleaderscoalition.org.nz/who
[80] Deloitte (2019) State of the State.

- The tax only applies to methane, so farmers will not have to pay for their fossil fuel emissions. Intentional: 92% of agricultural emissions are from ruminant livestock (CO2 will decrease with methane).
- Dairy and drystock farmers will be affected whereas horticulturalists, seafood and other farmers will not be affected. Intentional.
- 24,336 of over 38,300 farmers will bear the tax burden. This is 95% of dairy farms, 49% of beef/lamb farms and 46% of deer farms.[81] This is fair as all economically significant farms qualify.

Structure of the tax system

Current performance:

Proposal impact: 

Taxing the transfer of value

Economists mostly believe that the free market's invisible hand works best to allocate resources efficiently, provided economic actors are rational. Some have supplemented that the market can be inefficient where goods/services create externalities, so sometimes governments intervene to tax negative externalities and subsidise positive externalities. The Productivity Commissioner, TWG and PCE all draw on this worldview: That government action is justified in order to 'correct' the market in some instances.

The problem with this worldview is that it frames environmental damage as a pay-to-keep-playing issue, re-affirming the primacy of the growth assumption and failing to address the underlying business models creating negative externalities.

Going forward it may be more useful to (re)conceptualise interventions in a way that appraises the value of natural capital – a transaction tax, not an excise tax.

Earth is a closed system

Simplistically, first, there was only Natural Capital (See Appendix 2 for definitions).

[81] Beca (2018) Administration costs report: Appendix 2, [1.3.5].

DR			CR
Natural capital	100	Equity	100

Over time humans and social structures evolved. But as the earth is a closed system any new 'Human' or 'Social' Capital draws on Natural Capital (sometimes imperceptibly).

DR			CR
Natural capital	60	Equity	100
Human Capital	20		
Social Capital	20		

More recently we have developed market capitalism – the accumulation of tangible and intangible value which enables people to access a greater level of the other Capitals at will. As the concentration of Financial Capital accelerates, the pressure put on the other capitals grows.

DR			CR
Human Capital	30	Equity	100
Social Capital	10	*Natural Capital*	*20*
Financial Capital	60	*(liability)*	

While our economic system has raised many out of poverty, we now need an economic system that fully realises the value of non-financial capitals, seeing Natural Capital as the prime source from where we draw all things of value.[82] If Natural Capital is inherently valuable, able to accumulate and depreciate, it makes sense to treat it as a tax base. Pricing biological methane then becomes a tax on transfers of value between Natural Capital and Financial Capital. This positively reframes 'negative externalities' for the 21st century, equalising the importance of all Capitals and legitimising the use of economic mechanisms to efficiently allocate between a range of outcomes, not just economic growth.

[82] With reference to Kate Raworth's *Doughnut Economics*.

Simplicity

Using tax to mediate transfers between Natural and Financial Capital lays the groundwork for a more comprehensive programme of environmental taxation – a new Tax Act. But this should not increase complexity for most taxpayers.

For qualifying farmers there will be an increase in the complexity to the extent supplementary returns can't be pre-populated or taxpayers need to manually amend the supplementary return. Long term, this Proposal:

- Will not fundamentally alter the certainty or predictability of the tax system – alignment with the five-yearly national emissions budget process should ensure transparency and predictability of tax rates and eligibility criteria.
- Does not alter the fundamental concepts of residence and source - "Qualifying farmers" has been defined within the parameters.
- Builds on the existing R&D and tax credit regimes – so the outcomes should be more structurally sound in terms of processes and enforcement.

Financial Capital

Agricultural sector impacts

Current performance:

Proposal impact: 

Investment costs in reducing emissions

Currently, farmers are not compelled to invest in emissions-reducing technologies or new practices.

Medium-term, this Proposal will increase famers' cost and time as they re-evaluate future pathways and investment decisions. As the interventions do exist,[83] this work could have a disproportionately positive outcome in the medium-term. For example, a Dutch methane inhibitor will go to market this year for in-shed feeding herds (potential 30% reduction).[84] But farmers will need to evaluate the inhibitor's interaction with farm systems, consider practice changes (employment, training), and whether the product's cost is commensurate with reduced tax obligations. Technology adaption is timely and sometimes complex. There will likely be an increase upfront investment in the next five years as farmers prepare to avoid the tax obligation.

These costs could have a high return on investment in the long-term, but this is harder to accurately assess.

Compliance & Tax liability

Currently farmers do not have any compliance/tax costs from methane emissions; but regulatory compliance costs are growing (H&S, water quality).

This Proposal better allocates the tax obligation and compliance costs to those causing the majority of the damage. While the costs are higher, the results are fairer across the industry. The faster farmers adapt the lower the level of tax obligation applied.

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[83] NZAGGRC (2017) On-farm options to reduce agricultural GHG emissions in New Zealand, Figure 1.
[84] NZAGGRC (2017) On-farm options to reduce agricultural GHG emissions in New Zealand, page 18.

New tax obligation

This Proposal creates a new tax obligation for farmers. Using Dairy as an example, in 2030 the costs to farmers will be around:

Average farm	**Average cost**
Tax rate A	$14,937
Tax rate B	$29,875
Tax rate C	$37,343
Tax rate D	$44,812
Rebate to Sustainable farmers	$26,424

Under this scenario, the total cost borne by the Agriculture industry for the biological methane tax is:

$NZm	
R&D tax credit (60%)	$288.5
Farmer's Cash Credit (40%)	$192.3
Tax revenue from biological methane emissions tax	**$480.8**

This is high, compared to the levy/rebate proposed by the government which will cost $47-95m.[85] The worst affected are those with a very high emissions per unit of production. By contrast, about a third of farmers will receive a significant net benefit.

Cost of complying

Beca estimates that the government's plan will cost about $39m annually after implementation is complete.[86] About $30m of this cost will fall on 24,336 farmers ($1,200 or about 6% of the average tax obligation).

After reviewing Beca's cost analysis of the levy/rebate approach in-depth, I have identified some cost savings:

[85] ICCC (2019) Action on agricultural emissions, [13.1].
[86] Beca (2018) Administration costs report: Appendix 2.

- NZ ETS brokerage and compliance time - $11.4m + $2.5m:[87] It costs $500 a transaction to purchase NZ Units from the NZ ETS. Farmers will not need to pay brokerage or spend time registering, developing skills and engaging with the NZ ETS.[88]
- Registration with MPI/MFE: Farmers will not have to spend time registering as IRD already has taxpayers' information and works on a self-assessment basis.

This would bring the annual compliance costs down to $16.1m for farmers.

Nutrient managers

While Overseer is provided for free, farmers must hire a nutrient manager in order to implement the tool. Beca estimates the following costs to measure emissions with a nutrient manager.[89]

	Hours	**Cost**
Year 1	4	$700
Year 2	3	$525
On-going	2.5	$438

The government should subsidise nutrient managers and consider developing Overseer for self-assessment.

International competitiveness

Currently NZ agricultural products are strongly competitive overseas – our trading partners highly value our products.[90]

On balance, I consider that this Proposal will maintain/increase Agriculture's international competitiveness as this transition will differentiate our products as not contributing to global warming.[91]

[87] Beca (2018) Administration costs report: Appendix 2.
[88] ICCC (2019) Action on agricultural emissions, [8.1].
[89] Beca (2018) Administration costs report: Appendix 2, Table A4 and A5.
[90] MPI (2019) Situation and Outlook for Primary Industries, page 4
[91] Credit to Myles Allen for phrasing.

However there are other factors to consider:

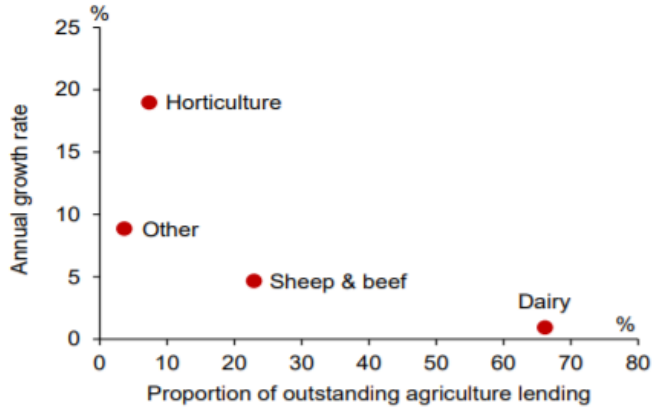
- The cost of goods will rise. Using my Dairy scenario, an average farmer will experience a 10.3c additional cost per kg of milk solids ($6.25-7.25);[92]
- The extent to which costs are absorbed by the farmer or processor, or passed on;
- International exchange rate movements; and
- International developments in agricultural climate policy.

The ICCC considers that Dairy competitiveness will be unaffected, but drystock may feel some impacts, due to differences in the markets and profit points.[93]

<u>Farmer debt</u>

Farmer debt is a current concern with 35% of dairy "farms with more than $35 of debt per/kg milk solids".[94] The RBNZ is concerned these highly indebted farmers are making low profits with a good price, and will thus be vulnerable to cost increases from "longer-term challenges, such as environmental and climate change policies."[95]

Figure 2.7 Stock and growth of agriculture debt, by sector *(March 2019)*



Source: RBNZ BBS.

Going forward, this Proposal is likely to put more pressure on some highly indebted farmers by increasing costs: "Options for addressing problems at financially stressed farms appear constrained at the moment, as demand for dairy farm land is low".[96] For others, the tax credits will allow them to reduce debt.

This discussion may be moot with the prospective of negative interest rates as the OCR continues to decrease, which may reduce pressure on those in debt.

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[92] MFE (2019) Action on agricultural emissions, page 26.
[93] ICCC (2019) Action on agricultural emissions, Box 10.2.
[94] RBNZ (May 2019) Financial Stability Report, page 7.
[95] RBNZ (May 2019) Financial Stability Report, page 2.
[96] RBNZ (May 2019) Financial Stability Report, page 12.

Government resources

Current performance:

Proposal impact: 

Administration and implementation costs

Currently government appropriations for reducing biological methane emissions are focused on public research funding and on farmer training and extension programmes.[97]

This Proposal relies on tax neutrality – that 100% of the revenue collected should go back into the sector. I therefore suggest that the Government's costs to manage the new tax should be met in the Crown Budget.[98] I do not think that the cost to administer will be particularly material in the overall Crown budget, though the transitional costs may be higher.

As discussed, the long-term administration cost is expected to sit at around $16.1m (down from $39m) for the government's plan, with $3.7-9m of this being government expenditures.

According to Beca analysis, between 2020 and 2025 the transition costs will be $166.5m (government and farmers).[99] This means that the government would expect to spend $38.4m in the first 5 years if administered by MFE/MPI – IRD may achieve cost savings on these numbers.

	On-farm point of obligation
Total cost over first five years	**$166,461,358**
Year 0	$4,102,248
Year 1	$15,548,775
Year 2	$21,357,011

[97] ICCC (2019) Action on agricultural emissions, [5.3].
[98] ICCC (2019) Action on agricultural emissions, [13.2].
[99] Beca (2018) Administration costs report: Appendix 2, Table A9.

Year 3	$45,087,842
Year 4	$40,601,184
Year 5 and out	$39,764,297

Assessing the Beca model

I have reviewed the Beca model and assessed potential amendments for this Proposal.[100]

- NZ ETS upgrade - $1m: NZ ETS will not need to be upgraded under this Proposal.
- New IT system - $1m + $0.2m p/a: While IRD system will need to be updated for the new supplementary return process, I think these estimates could be revised downwards as much of the necessary infrastructure already exists at IRD.
- Audit costs - $2.3m: IRD already has a comprehensive approach to resolving unexpected issues (binding rulings, public rulings, determinations, short-process rulings, interpretation statements), correcting errors (Commissioner's new powers to amend), and reviewing and auditing taxpayers. This Proposal can rely on pre-existing mechanisms to some extent.
- Beca has (intentionally) not included enforcement costs in their modelling.[101] It will be important to consider the extra resources required by IRD to enforce the tax. Noting that Beca's model assumes that 1% of nutrient consultants and farmers are audited every year (245), and that compliance rates are at 95% by 2025,[102] this will mean that IRD prosecutes about 12 people every year.

In summary, $9m in administration costs may be too high – I estimate $4-8m as some strategic savings should be achieved through this Proposal.

Administering R&D

This Proposal has additional costs in the form of administering the R&D tax credit. The cost of administration could be minor as the systems have just been set up and the changes suggested are not technically complex. Noting that the MFE has estimated

[100] Beca (2018) Administration costs report: Appendix 2, Table A8.
[101] Beca (2018) Administration costs report: Appendix 2, [1.2].
[102] Beca (2018) Administration costs report: Appendix 2, Table A5.

that it would spend 5% of the levy revenues in administering a distribution fund, therefore we might expect the R&D tax credit to cost $0-14.4m (additional) to administer.[103]

Overseer subsidy

Overseer needs development to be more accurate, tailor-able and automatic (i.e. link with IRD systems) – this will reduce compliance costs for farmers. To subsidise Overseer at $500 a year would cost the government $12m annually.

Nutrient managers

The government also needs to invest in increasing the number of nutrient managers. Currently there are only 45 nutrient managers working as independent consultants.[104] This needs to increase to 150 to facilitate full on-farm measurements by 2025.[105] The direct cost to fund this is less than $200,000 in course fees, but there will be many additional cost to create interest in pursuing this career. At a multiplier of x10 the government should allocate $2.2m over five years.

Other costs

Note that there will also be additional costs at developing the Proposal within the tax framework and then moving the Bill through the General Tax Policy Process.

Interest costs may also be saved by credits to farmers and R&D participants as these will initially offset against tax liability, reducing government cash flows.

Risk analysis

These costs will be strongly impacted by this Proposal's level of success. If the tax fails, the government will collect a significant amount more in tax revenues, have fewer 'sustainable' farmers to distribute to, and see a higher number of farms in financial distress due to the incidence of the tax. Conversely, if the tax is exceedingly successful and every farmer achieves the Threshold, the government will collect no revenue but 'owe' farmers a lot in tax credits.

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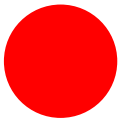
[103] ICCC (2019) Action on agricultural emissions, [13.2].
[104] Beca (2018) Administration costs report: Appendix 1.
[105] Beca (2018) Administration costs report: Appendix 1.

Comprehensive Treasury sensitivity analysis is needed to confirm the appropriate tax rates and credits.

Innovation

Current performance: 

Proposal impact: 

Misappropriation and Ineffectiveness

Currently the R&D tax incentive is vulnerable to (re)characterisation of expenditure and missing the strategic mark, despite having better controls than its predecessor. In developing the incentive, IRD put in multiple controls:

- The three tier approach to eligibility (entity, activity, expenditure) & clear definitions of ineligibility;
- Special treatment for potentially problematic areas, like internal software development;
- A minimum threshold and maximum cap (at NZ$ 120M);
- A limited refundability (you can only cash out an amount equal to payroll taxes);
- An in-year approval process (for core activities and for significant performers); and
- Audit powers of review.

In the backroom, IRD has also developed mechanisms to protect integrity: Systems-level monitoring, data collection and evaluation.[106] Yet there remains potential for abuse of the R&D tax incentive through (re)characterisation because not every participant can be audited yearly.

At issue is also whether the sorts of innovation supported by the R&D tax incentive hold the strategic prerogative desired.[107] In theory the market decides, but this may mean that commercialisation is prioritised over national strategic needs. It's not just that we won't take enough risks, it's that we may not take the right kinds of risks.

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[106] Treasury (2018) RIA on R&S tax incentive, page 21.
[107] BERG (2018) Report of the Biological Emissions Reference Group, page 25; Treasury (2018) RIA on R&S tax incentive, page 1.

Accelerating agricultural R&D

Behaviour change is more likely with a carrot and stick – pricing GHG emissions and subsidising R&D.[108] I assess that my Approach will radically increase the level of private agricultural R&D. International evidence indicates that for every $1 the government spends on a R&D tax credit, between $1 and $1.70 of spending is made by the private sector, or as high as $2.50 when SMEs get involved.[109]

More fundamentally, getting the CCC to target the exact types of agricultural R&D expenditure that will qualify will neutralise issues of misappropriation and ineffectiveness – increased scrutiny and specificity.

Wider economy

Current performance:

Proposal impact: 

Economic growth

GDP is dependent on consumption, investment, government spending and net exports. Over the medium I would expect:

- Consumption to grow as products become slightly more expensive. Milk and meat are inelastic staples in many people's diets.
- Investment will strongly increase as it follows government investment in R&D.[110]
- Government spending will increase as described.
- Net exports will grow as we add high-value agricultural products and reduce the export of purely primary products.

Monetary Policy

Effects on inflation in the medium term are unclear. I note that the RBNZ is watching farmer debt levels as a factor in national financial stability – so more farmer debt may reduce inflation. Conversely, increasing costs of household groceries may increase inflation.

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[108] Productivity Commission Report (2018), page 151.
[109] Treasury (2018) RIA on R&S tax incentive, page 14.
[110] Newsroom (2019) The economic heavyweight bout of the year. Though I agree with Kate's perspective, Arthur Grimes correctly argues that GDP growth depends strongly on innovation in NZ.

Conclusion

This Proposal advocates for a significant reform to the NZ tax system. My analysis indicates that in the medium-long term our Natural Capital and ecosystem of agricultural innovation can flourish, leading to improved financial, social and human capital. But this comes with a challenge: In the short-medium term, incentivise bold investment in emissions reductions, private R&D, land-use change and farmer training.

Tax can be instrumental in efficiently realising the next age of agriculture – an age marked by high innovation and sustainability. We've always punched above our weight on the world stage. Are we ready to get in the ring again?

Appendix 1 – Modelling Notes

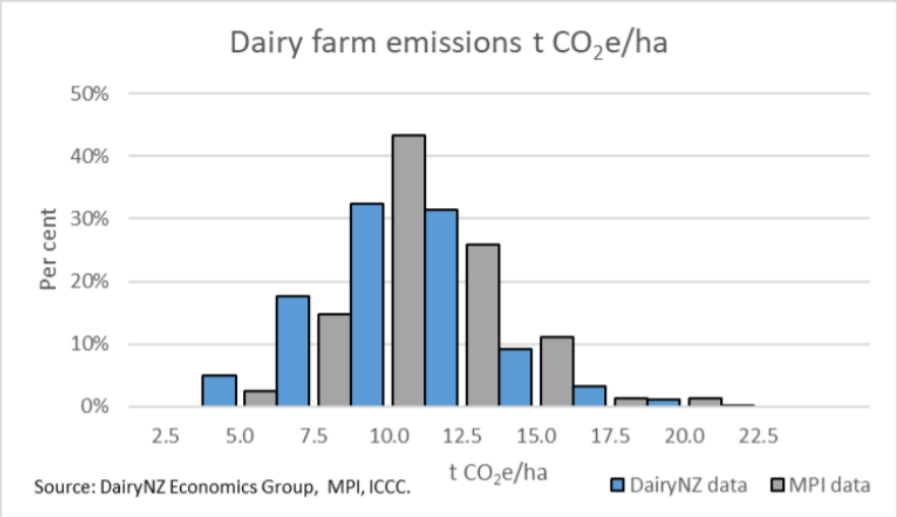
I am happy to provide my CSV model for review.

Pricing mechanism

Assumptions:

- Between 2020 and 2030, 50% of qualifying farmers move their emissions down by a "category".
- Distribution of emissions per unit of production follow a reasonably 'normal' distribution. There is strong evidence for this:[111]

Figure 1: *Dairy emissions profile t CO_2e/ha*



- Growth assumptions (Calculated from last 20 years of DairyNZ data)

Milk production	+2% annually
Average annual increase in number of cows	101,627
Change in number of herds (10 year)	-7.81%
Average annual increase in milk per cow	49.075 litres
Average annual increase in herd size	10.998

- Distribution per unit of production is the same as per hectare
- No adjustments have been made to net-out sequestration.

[111] ICCC (2019) Action on agricultural emissions: Technical Appendix 5, page 4.

- Assuming for simplicity that all farms are the 'average' size with the average number of cows and level of milk production.
- Assuming a decline in farms due to a mix of tax incentive pressure, increasing herd size and increasing efficiency.
- In some cases I have used pre-2020 figures for '2020' as these represent the most up-to-date data available.

	Current (2020)	***2030 (projected)***
(2017/18) Hectares of Dairy farms	1,915,695	*1,766,158*
(2017/18) Average cows per hectare	2.61	*3.40*
(2017/18) Milk production in litres	20,723,511,090	*25,261,844,381*
(2017/18) Total Dairy cows	4,992,914	*6,009,184*
(2017/18) Number of herds	11,590	*10,685*
Average milk per cow	4,150.58	*4,203.87*
Average milk per hectare	10,817.75	*14,303.28*
Average herd size	430.79	*562.38*
Economically significant (qualifying) dairy farmers	11,580	*10,685*
(2017) Total Agricultural emissions (tCO2)	38,880,715	
(2020) total agricultural emissions (projected)	37,888,000	*34,099,200*
(2017) Total Dairy emissions (tCO2)	18,199,100	*15,960,991*
Ratio - Dairy to Total emissions	46.81%	
Estimated dairy emissions	17,734,435	*15,960,991*
The Threshold: Average emissions per 10,000L	**8.56**	***6.32***
(2017/18) average farm milk production	1,788,051	*2,364,169*
(2017/18) Total emissions for average farm	1,530.15	*1,493.73*

Data sources:

- Dairy NZ (2018) New Zealand Dairy Statistics 2017-18.
- emissionstracker.mfe.govt.nz.
- ICCC (2019) Action on agricultural emissions: Technical Appendix 5.
- BECA - Appendix 2
- MFE (April 2019) New Zealand's Greenhouse Gas Inventory 1990–2017 – Volume 2 Annexes and CRF summary data.
- MFE (2017) New Zealand's Seventh National Communication.

R&D mechanism

Assumptions

- *R&D growth rate: 12%, which is what is required to achieve the government's target of 2% of GDP by 2027.*[112]
- *Constant administration costs (mechanics don't change)*
- *5% increase in cost to engage as number of participants grow*

Given there's likely about 1,500 taxpayers able to access the incentive, this equates to NZ$ 680,000 for each of the 240 taxpayers eligible for the targeted 40% tax credit in 2020. It is likely that this incentive will attract additional taxpayers to the area of agricultural R&D between 2020 and 2030. Conservatively, we might expect 391 eligible taxpayers by 2030 (5% annual growth), each receiving NZ$ 738,000. A substantial focus on this type of R&D.

[112] Treasury (2018) RIA on R&S tax incentive, page 6.

Appendix 2 – Evaluation framework

Living Standards Framework[113]

[113] Treasury website.

How are we doing?

Using the Living Standard Framework, I have assessed our current performance against key Agricultural outcomes.