He Waka Eke Noa Agricultural emissions pricing options

Consultation Document - February 2022

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Executive Summary

New Zealand's agricultural sector has a role to play in reducing greenhouse gas emissions while remaining profitable and internationally competitive.

Consumers are increasingly demanding products with a low environmental impact. While New Zealand is in the unique position of being among the most carbon-efficient farmers in the world, New Zealand farmers are determined to keep improving.

Pricing agricultural emissions is a priority for the Government and agriculture is the only sector that is not currently in the New Zealand Emissions Trading Scheme (NZ ETS). In 2019, the Government decided to price agricultural emissions and asked the Interim Climate Change Committee (ICCC) to advise on how this could be done through the NZ ETS.

Agricultural sector leaders didn't believe the NZ ETS proposal put forward by the ICCC was the best option. Sector leaders proposed that the Government work in partnership with industry and Māori to design an alternative that would achieve better outcomes for New Zealand and the agricultural sector. This proposal was called He Waka Eke Noa (we are in this together) – Primary Sector Climate Action Partnership (the Partnership). This was formally agreed in late 2019 by the Government, industry, and Māori.

New Zealand will be world leading as the first country to price agricultural emissions. The Partnership is committed to designing a pricing system that ensures New Zealand's agricultural products remain internationally competitive while reducing national and global emissions.

What is He Waka Eke Noa – Primary Sector Climate Action Partnership trying to achieve?

He Waka Eke Noa is developing a practical framework to support farmers to measure, manage and reduce agricultural emissions: biogenic methane (CH_4), nitrous oxide (N_2O), and carbon dioxide (CO_2). This includes an approach to recognising on-farm sequestration and other potential mitigations, and an effective system for pricing agricultural emissions from 2025.

The Partnership recognises that creating incentives and opportunities to reduce on-farm emissions requires a broader approach and framework than just focusing on a system for pricing emissions.

Te Aukaha, led by the Federation of Māori Authorities, provides input from a Māori farmer and grower perspective into the Partnership to ensure the support of the land-management aspirations of Māori farmers.

As part of He Waka Eke Noa, the Partnership will provide recommendations to the Government on a framework for an appropriate pricing system for agricultural emissions in April 2022. This will be an alternative to the default 'backstop' that agricultural emissions are priced through the NZ ETS.

What's important in a pricing system option?

He Waka Eke Noa is a partnership that builds on the experience and expertise of Māori, government, and the primary sector. Our goal is to design a system that is:

- Effective – reduces agricultural emissions in total and per unit of product
- Practical – clear and simple system that minimises administration costs
- Credible – scientifically robust (includes mātauranga Māori) and transparent
- Integrated – aligns with wider sector and government objectives and activities
- Equitable – recognises early adopters and has 'equitable' impacts across the agricultural sector.

In addition to these criteria, all government actions taken to address climate change must uphold the principles of Te Tiriti o Waitangi, to avoid further inequity resulting from addressing climate change.

Partnership Options

He Waka Eke Noa partners will ask farmers and growers about policy options before giving advice to the Government. A range of options were considered by the partners, and the options that the partners will seek feedback on are:

1. Farm-level Levy
2. Processor-level Hybrid Levy.

This document also covers the 'Backstop' – Agriculture in the NZ ETS – to support understanding on how the Partnership options differ from the current legislated alternative.

These options perform differently against the criteria, and the Partnership has to consider the trade-offs between the options. The key advantages that the Partnership options offer, compared to simply pricing emissions through the NZ ETS, are the split-gas approach, the ability for the agricultural sector to have input into the process for setting the price and recycling revenue, and recognition of some sequestration that is not recognised through the NZ ETS.

Emissions Reductions

The Partnership has recognised that reducing on-farm emissions requires a broader approach than just putting a price on emissions.

The aim of the pricing system is to motivate and reward actions that will reduce emissions and the warming impact of the sector. Farmer change is influenced by a number of factors including awareness of the issue, knowledge, motivation, confidence, and support. The pricing system is one part of a broader framework to support this process. The pricing system seeks to raise funds to run the system, pay farmers for sequestration, support farmers to reduce emissions and recognise and reward the reductions.

Emissions reduction targets:

- CH_4 emissions to reduce by 10% below 2017 levels by 2030
- N_2O and CO_2 to reduce to net zero by 2050

The targets are out of scope for He Waka Eke Noa, industry partners will be engaging with the Government on targets outside of He Waka Eke Noa.

He Waka Eke Noa modelling shows that by 2030, agricultural emissions of methane (CH_4) will reduce by 4.4% and nitrous oxide (N_2O) by 2.9% under existing government policies (e.g. National Policy Statement for Freshwater, and Forestry in the NZ ETS) and market and economic drivers. Modelling also indicated that if He Waka Eke Noa or NZ ETS were to apply a simple price to agricultural emissions and nothing more, little further reductions would be achieved (less than 1%). However, if the revenue generated by the pricing were to be recycled to support on-farm behaviour change, more reductions could be attained.

For the Farm-level Levy, at the prices modelled, emissions pricing combined with revenue recycling is estimated to deliver additional CH_4 reductions of up to 4.3% and N_2O reductions of 1.8% between now and 2030 (over and above the baseline achieved by other environmental policies).

For the Processor-level Hybrid Levy, at the prices modelled, emissions pricing combined with revenue recycling could deliver additional CH_4 reductions of up to 3.9% and N_2O reductions of 1.7% between now and 2030.

These emissions reductions come from a combination of land-use change, practice change and technology uptake.

It is anticipated that the waste sector could achieve a reduction in total biogenic methane of at least 1.7% by 2030[1].

[1] Climate Change Commission, 2021, https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/Evidence-21/Evidence-CH-12-Long-term-scenarios-to-meet-the-2050-target.pdf

	Farm-level Levy and revenue recycling	Existing policies	Waste sector	Total
CH_4	4.3%	4.4%	1.7%	10.4%
N_2O	1.8%	2.9%		4.7%

	Processor-level Hybrid Levy and revenue recycling	Existing policies	Waste sector	Total
CH_4	3.9%	4.4%	1.7%	10%
N_2O	1.7%	2.9%		4.6%

In conjunction with existing policies and allowing for additional biogenic methane reductions from the waste sector, the options presented by He Waka Eke Noa lead to an estimated reduction in emissions broadly aligned with current legislated targets for 2030, if accompanied with the commercial availability of emissions mitigation tools, such as methane inhibitors and low emissions livestock genetics. This could also be true of the NZ ETS backstop, if the Government decided to adopt elements of revenue recycling.

The 'Backstop' – Agriculture in the NZ ETS

The Government has legislated that agricultural emissions will enter the NZ ETS if an effective and workable alternative is not put forward by the Partnership.

The key features of the 'backstop' are:

- Emissions are calculated at the meat, milk, and fertiliser processor level, based on the quantity of product received from farms or, in the case of fertiliser, sold to farms
- Processors could decide whether to pass on the cost to farms based on the quantity of product processed or fertiliser bought
- Initially 5% of emissions from agriculture would be priced (95% of emissions would be freely allocated to processors). Free allocation is expected to reduce by one percentage point a year
- All gases would be treated the same, i.e. short- (CH_4) and long-lived (N_2O and CO_2) gases would be priced at the same rate per tonne of carbon dioxide equivalent (CO_2e)
- Currently only sequestration (carbon removals from vegetation) eligible for entry into the NZ ETS is recognised
- Government intends that any revenue raised through the backstop would be invested back into the agricultural sector to support further emissions reductions. This could include elements of revenue recycling designed through He Waka Eke Noa and paying for sequestration not eligible for the NZ ETS (e.g. riparian plantings).

Advantages:

- Low administration costs, estimated at $10 million per annum. This would be made up of $8 million in costs to processors, (which includes additional time spent reporting and auditing, passing on the cost to farmers, the purchase of New Zealand Units (NZU) and hedging costs) and $2 million for operational costs. Establishment costs are estimated to be $3 million. If the Government were to introduce revenue recycling or recognise additional sequestration this would increase the administration costs, including costs for farmers
- Any revenue raised through the NZ ETS would be invested back into the agricultural sector to generate further emissions reductions.

Disadvantages:

- A processor-level price signal is blunt, applies only to fertiliser sales and farms that sell directly to processors and does not recognise individual farms for the actions they take to reduce emissions
- Does not treat short- (CH_4) and long-lived (N_2O and CO_2) gases differently. The same rate would apply to short- and long-lived gases.

Farm-level Levy

The key features of the Farm-level Levy are:

- Emissions are calculated at farm level using farm-specific data. The farm then pays a levy for its net emissions
- A split-gas approach to levying would be applied, which means that different levy rates would apply to short- (CH_4) and long-lived (N_2O and CO_2) gases. This approach reflects that CH_4 is not required to reduce to net zero
- Rewards eligible on-farm sequestration, which can offset some of the cost of the emissions levy
- Any revenue raised through the levy would be invested back into the agricultural sector to support emissions reductions through research and development, support adoption of mitigations, or pay for/provide credit for additional emissions reductions.

Advantages:

- Enables a split-gas approach (treats short- (CH_4) and long-lived (N_2O and CO_2) gases differently)
- Calculates emissions at farm level which recognises a greater number of efficiencies and mitigations that could be taken up by farms
- Farms that have taken early action to reduce emissions will face a lower emissions cost because emission reductions from on-farm efficiencies and mitigations are recognised in the tool to calculate on-farm emissions
- Farms that have taken early action to maintain and increase sequestration will be rewarded because annual sequestration from existing vegetation will be recognised (if it meets He Waka Eke Noa requirements)
- Any revenue raised through the levy would be invested back into the agricultural sector to generate further emissions reductions and support lower emissions food production.

Disadvantages:

- Significant administration costs, currently estimated at \$80 million – \$96 million per annum. This would be made up of \$32 million – \$43 million cost to farmers in time spent reporting i.e. up to \$1,200 – \$1,600 in time per farm, and \$48 million – \$53 million for operational costs. Establishment costs are estimated to be \$124 million – \$149 million. Further work is underway to refine these costs.

Processor-level Hybrid Levy

The key features of the Processor-level Hybrid Levy are:

- Emissions are calculated at the meat, milk, and fertiliser processor level, based on the quantity of product received from farms or, in the case of fertiliser, sold to farms
- Processors would likely pass on the cost to farms based on the quantity of product processed, or fertiliser bought
- A split-gas approach to levying would be applied, which means that different levy rates would apply to short- (CH_4) and long-lived (N_2O and CO_2) gases. This approach reflects that CH_4 is not required to reduce to net zero
- Any revenue raised through the levy would be invested back into the agricultural sector to support emissions reductions through research and development, support adoption of mitigations, or pay for/provide credit for additional emissions reductions through Emission Management Contracts (EMC) and/or on-farm sequestration through Sequestration Management Contracts (SMC)
- Farms and collectives could choose to enter into an EMC to get a payment for reducing emissions and/or an SMC to get payment for sequestration on-farm.

Advantages:

- Enables a split-gas approach (treats short- (CH_4) and long-lived (N_2O and CO_2) gases differently)
- Administration costs are lower than Farm-level Levy, but higher than NZ ETS, currently estimated at \$39 – \$66 million per annum. This would be made up of \$4 million cost to processors, \$8 million – \$19 million cost to farmers i.e. up to \$600 – \$1,600 in time per farm and \$27 million – \$43 million for operational costs. Establishment costs are estimated to be \$79 million – \$129 million. Further work is underway to refine these costs
- Could provide a transitional step towards a farm-level pricing system

- EMCs would reward individual farm action and make a processor-level levy more effective at reducing emissions
- Farms who have taken early action to maintain and increase sequestration can be rewarded via an SMC because this includes recognising future sequestration associated with existing vegetation (if it meets He Waka Eke Noa requirements).

Disadvantages:

- A processor-level price signal is blunt, applies only to fertiliser sales and farms that sell directly to processors and does not recognise individual farms for the actions they take to reduce emissions
- To be effective at incentivising emission reductions, some EMCs may require a benchmark that could disadvantage those who have taken early action to reduce or already have low emissions.

On-farm Sequestration

Both the Farm-level Levy and Processor-level Hybrid Levy would recognise on-farm sequestration. Recognition for on-farm sequestration will be funded through the revenue from pricing emissions. The value of sequestration would be set at a price that balances the incentives to recognise sequestration and reduce emissions while ensuring the affordability of the system. These options would:

- Recognise some vegetation types not currently eligible for the NZ ETS. It would not recognise NZ ETS eligible exotic forestry
- Recognise vegetation categories that are either permanent (indigenous/native vegetation that will not be harvested) or cyclical (vegetation that is felled and re-established, generally exotic species)
- Recognise indigenous regenerating/planted forests, riparian planting, shelter belts, perennial cropland, non-NZ ETS eligible woodlots/tree lots, and scattered exotics
- Use different methods to calculate sequestration rates depending on the vegetation type, state, and stage of development
- Place liabilities on vegetation if it is cleared (permanent categories) or cleared and not replanted (cyclical categories). This relates only to vegetation that is entered into the He Waka Eke Noa system. There are also provisions for when vegetation is removed as a result of adverse events and customary harvest
- Provide a pathway for other forms of sequestration (e.g. soil carbon, tussock grasslands) to be on-boarded when there is sufficient evidence and measurement techniques.

How to provide feedback

We want to know what is important to you in an emissions pricing system, what you like and dislike about these options, and your preference.

There will be an opportunity to provide feedback through an online form by 1 March 2022 or through attending an industry event in February 2022.

What's next?

The He Waka Eke Noa partners are planning broad nationwide engagement with their farmers and growers in February 2022. Feedback from engagement will form part of the final policy recommendations to the Minister of Climate Change and the Minister of Agriculture in April 2022.

The Government will consider He Waka Eke Noa recommendations and make final decisions on an agricultural emissions pricing system. This will involve consideration of a range of factors such as implications of meeting New Zealand's climate change targets, and engagement with wider stakeholders outside the agricultural sector.

Introduction

He Waka Eke Noa – the Primary Sector Climate Action Partnership is a collective commitment between the Government, industry, and Māori. It was formed in response to proposed government policy to bring agriculture into the NZ ETS and to the challenges posed by climate change. The partnership aims to contribute to the global efforts under the Paris Agreement, to limit the global average temperature increase to 1.5 Celsius above pre-industrial levels while maintaining food production.

He Waka Eke Noa covers all agricultural greenhouse gas emissions including:

- Biogenic methane (CH_4) – generated by ruminants as a by-product of digestion (less than 5% comes from dung and effluent systems)
- Nitrous oxide (N_2O) – released into the atmosphere from dung and urine patches, and nitrogen (N) fertilisers
- Carbon dioxide (CO_2) – urea N-fertilisers contribute to farm CO_2 emissions.

Why are we doing this?

He Waka Eke Noa partners are working to enable sustainable food and fibre production for future generations while remaining profitable and competitive in international markets. The aim of He Waka Eke Noa is to build a system for farms to measure and report their greenhouse gas emissions by 2024, have a plan to manage greenhouse gas emissions and adapt to a changing climate by 2025, and be incentivised to act on emissions through an appropriate pricing system in 2025.

He Waka Eke Noa is designing an alternative pricing system to the NZ ETS for agricultural emissions so that the system can:

- Recognise and reward on-farm changes that reduce emissions
- Apply a split-gas approach to recognise the difference in climate impact between different gases
- Recognise on-farm sequestration that the NZ ETS does not
- Ensure that revenue generated helps reduce emissions in the agricultural sector.

Government has legislated emissions reduction targets for 2030 and 2050. The targets are out of scope for He Waka Eke Noa, industry partners will be engaging with the Government on targets outside of He Waka Eke Noa. Other policies and land use change driven by wider market and economic dynamics will go some way towards helping achieve the Government's target. In conjunction with existing policies and allowing for additional biogenic methane reductions from the waste sector, the options presented by He Waka Eke Noa lead to an estimated reduction in emissions broadly aligned with current legislated targets for 2030, if accompanied with the commercial availability of emissions mitigation tools, such as methane inhibitors and low emissions livestock genetics.

Emissions reduction targets: the legislated targets are to reduce CH_4 emissions by 10% below 2017 levels by 2030 and reduce N_2O and CO_2 emissions to net zero by 2050.

Effect of other environmental policies on emissions reductions: initial modelling shows that by 2030 under other current environmental policies (National Policy Statement for Freshwater, and Forestry in the NZ ETS), there would be a reduction below 2017 levels of 4.4% in agricultural sector CH_4 emissions, and 2.9% in the sector's N_2O emissions.

Waste sector contribution to methane targets: Climate Change Commission advice shows emissions reductions from waste across four scenarios. The most conservative scenario is a 19% reduction in biogenic methane emissions from waste by 2030 (i.e. 1.7% reduction in total biogenic methane).[2]

[2] Climate Change Commission, 2021, https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/Evidence-21/Evidence-CH-12-Long-term-scenarios-to-meet-the-2050-target.pdf

An appropriate pricing system is part of a broader framework that can recognise or reward decisions that are made on farm to reduce emissions. Farms with lower emissions will face a lower cost. Farms may also receive signals and support to reduce emissions from other sources such as consumers, banks, processors, extension, and other policies. It is important we continue to support the hard work our farmers and growers have been doing to reduce the environmental impact of their business.

What is the purpose of this document?

As part of the He Waka Eke Noa process, the Partnership needs to provide recommendations to the Government by April 2022 on an alternative to the NZ ETS for the pricing of agricultural emissions and recognition of sequestration. The Government will consider this, along with separate advice from the Climate Change Commission on the Partnership's progress.

He Waka Eke Noa partners are seeking feedback from farmers and growers on potential options before making recommendations to the Government. To help farmers make comparisons, this document outlines the 'backstop' of agriculture in the NZ ETS at the processor level, as well as two options developed by He Waka Eke Noa: **Farm-level Levy** and **Processor-level Hybrid Levy.**

The consultation document is designed to allow discussion of the best option. When providing feedback the focus should be on the option, not the cost to a particular sector or farm type. All numbers and modelling in this document are indicative only.

Achieving an equitable outcome for Māori

Giving effect to Te Tiriti o Waitangi, which includes Te Tiriti principles of partnership and active protection, will need to be considered in the system design and pricing system, and include such matters as:

- Providing opportunities for Māori to partner in governance arrangements, and have oversight of the implementation programme, including decisions on revenue distribution and monitoring
- Ensuring that resourcing provides for equity in outcomes, and the overall design and pricing system does not disproportionately disadvantage Māori farmers, growers, and landowners
- Initiatives to assist and support farmers and growers to implement He Waka Eke Noa, provided by Māori for Māori
- Targeted information and support to better enable Māori to avoid any adverse impacts
- Support for roles for Māori as advisors and auditors in the implementation programme.

In *Inaia tonu nei: a low emissions future for Aotearoa*, the Climate Change Commission places emphasis on ensuring that the transition to a low-emissions economy does not compound historic grievances and further disadvantage Māori. He Waka Eke Noa design elements will consider the impact on Māori landowners and the adjustments required to address any equity issues and give effect to Te Tiriti o Waitangi.

Through the bicultural relationship established by Te Tiriti o Waitangi, we have an opportunity to develop a shared set of values and responses to reducing greenhouse gas emissions and to ensure that the impact of the transition to a low-emissions society in Aotearoa does not compound the historical injustices that Māori in the food and fibre sector continue to experience.

The options presented in this document must consider the unique circumstances of Māori landowners and the rights and interests of Māori collectives within the sector. The Partnership must recognise the unique land tenure and ownership structures that Māori land authorities operate within, and the historical impediments and legislation that constrain the development and use of Māori land.

The system must also embrace the Māori world view of Te Taiao (the entire interdependent system of the environment that sustains life), and the responsibilities of those who are kaitiaki of their whenua (the appointed guardians of their lands). In line with Te Ao Māori, the He Waka Eke Noa system aims to recognise the interlinkages between multiple environmental policy frameworks (water, land, and biodiversity).

Māori land

The modelling done by He Waka Eke Noa to date has not specifically addressed these structural differences. The case studies factor this in to a certain extent, but the output presented is financial only. Further analysis on the impacts of emissions pricing on Māori land is underway.

The framework must consider the implications for Māori agribusiness. While many of the impacts faced by the primary sector will be similar across different sectors (i.e. impacts per kg of product will be the same), the land tenure structures faced by Māori landowners are different, meaning Māori landowners may be impacted differently. Under Te Ture Whenua Māori Act 1993, owners of Māori freehold land are significantly restricted; (1) to using the land administration structures contained within the Act, and (2) in transferring ownership of the land.

Many Māori farming entities are intergenerational, made up of multiple blocks of land ranging in size, and often with multiple land uses within one entity (e.g. sheep and beef, dairy, and horticulture). A significant proportion of Māori-owned land is leased out with a multitude of leasing arrangements, some of which are mandated, and most of which are very long term.

Māori farming entities are diverse in structure, ranging from small-scale blocks through to multi-farm entities with vertical integration in the supply chain. Many of these entities have multiple landowners with a varying degree of input into how the businesses are run. Outcomes from the land are broad and a financial return is generally a secondary consideration to wider outcomes for whānau, hapū and iwi, such as the health and wellbeing of the land and water.

Modelling and case studies approach

The Partnership modelling approach includes industry-specific models for sheep and beef, dairy, and horticulture. These models are summarised and aggregated in a peer-reviewed, pan-sector modelling report. The modelling report summarises the impacts of emissions pricing options on sheep and beef, dairy, and horticulture industries. This analysis includes the impact on emissions, production, and profit. The sheep and beef model does not include any estimates of farm optimisation or increased efficiency in response to price, whereas the dairy model uses optimisation.

The Partnership case studies approach includes 20 farm systems that show the financial impacts of the emissions pricing options, as well as on-farm efficiency gains that could reduce emissions. These are representative farm models constructed in Farmax, based on the Beef + Lamb NZ Economic Service data for the sheep and beef farms, and DairyNZ statistics for the dairy farms. The Māori farm case studies are based on actual farms, which include six trusts and two incorporations.

The estimates of impacts, including those on emissions, costs, and farm profits, are based on modelling using assumptions based on best available information and insight but may be subject to change. The process of testing assumptions will continue where necessary in parallel with and after the consultation to ensure the final recommendations to Government are based on robust and agreed results. The pan-sector modelling and case studies reports are draft and will be finalised before recommendations are made.

For more detail, the reports on pan-sector modelling and case studies can be found on the He Waka Eke Noa website.

Future technologies to reduce emissions (mitigations)

Alongside pricing, the sector and government are actively developing and evaluating mitigation technologies, both from New Zealand and offshore, and striving to deliver these options to farmers as quickly as possible. In addition work is underway on removing hurdles to implementation, such as regulation. There are currently limited technological mitigation options available to farmers and growers, however further research and development will support the delivery of new mitigation technologies. The Biological Emissions Research Science Accelerator (BERSA) has compiled an overview of selected mitigation approaches and their progress status in a New Zealand context (see Appendix 2).

Backstop: Agriculture in the NZ ETS

New Zealand has a legal and policy framework in place to address climate change, including the Climate Change Response Act 2002, and the New Zealand Emissions Trading Scheme (NZ ETS).

Currently greenhouse gas emissions from all other sectors (electricity and gas, transport, industry, waste, and forestry) are priced via the NZ ETS.

The NZ ETS is the legislated 'backstop' for pricing agricultural emissions if an effective and workable alternative is not delivered through He Waka Eke Noa.

Who is responsible for reporting and paying for emissions?

Processors (dairy and meat) and synthetic fertiliser manufacturers and importers would be responsible for reporting and paying for short- (CH_4) and long-lived (N_2O and CO_2) emissions. It is expected that this would be passed on to farms through reduced pay-outs and increased fertiliser costs.

How are emissions calculated?

Emissions would be calculated using national average emissions factors for relevant products, e.g. milk, meat, and synthetic fertiliser. These use emissions per kg of agricultural product produced, or per tonne of synthetic fertiliser sold.

The way emissions are calculated for a processor-level price does not reflect any differences in on-farm practices that change an individual farm's emissions. The only way individual farms can reduce the passed-on cost they pay for emissions is by producing less meat or milk or by using less synthetic fertiliser.

How are emissions priced?

Initially 5% of emissions from agriculture would be priced (95% of emissions would be freely allocated to processors). Short- and long-lived gases are treated the same with a carbon equivalence metric (GWP100). Processors would be required to purchase New Zealand Units (NZUs) from the NZ ETS market or government auctions, and then surrender (give to the administrating entity) NZUs to cover their total emissions. Therefore, the cost they face would be the carbon price at the time. See below for how rebates would affect this cost.

How can emissions be offset with sequestration?

Emissions are not directly offset with sequestration. However, farms can separately enter eligible forests into the NZ ETS to earn NZUs for sequestration, which they can trade on the open market.

How will the revenue from the system be used?

Government intends that any revenue raised would be invested back into the agricultural sector to support further emissions reductions, and this could include paying for sequestration not currently eligible for the NZ ETS (e.g. riparian plantings).

Government also intends to consider including elements of the revenue recycling policy that has been designed through He Waka Eke Noa in the backstop option. This includes providing incentives for on-farm actions that help reduce emissions and to uptake technology and supporting research and development on future emissions reduction technology and practice.

Will rebates be offered in this system?

If agricultural emissions were included in the NZ ETS, processors would initially receive a free allocation of NZUs equal to 95% of their emissions. This means the agricultural sector would initially be exposed to 5% of the costs of their emissions. It is expected that this free allocation would be phased down by one percentage point a year.

Impacts and Insights

The Partnership has modelled a range of emission and sequestration prices to better understand the impacts on farm costs and Economic Farm Surplus (EFS)[3] of emissions pricing in the NZ ETS.

Modelling on the impacts of pricing agricultural emissions in the NZ ETS assumes a carbon price of $85/tonne CO_2e in 2025, rising to $138/tonne in 2030, and starting with a 95% discount (free allocation) that phases down one percentage point a year.

Product costs by sector

- **Dairy sector cost in 2025** is equivalent to $0.05/kg MS (milk solids). The cost in 2030 is equivalent to $0.16/kg MS
- **Sheep, beef, and deer sector cost in 2025** is equivalent to $0.10/kg sheep meat, $0.07/kg beef, and $0.15/kg venison. The cost in 2030 is equivalent to $0.30/kg sheep meat, $0.22/kg beef, and $0.46/kg venison
- **Fertiliser costs in 2025** is equivalent to $0.02/kg N, and the cost in 2030 is equivalent to $0.07/kg N
- These costs are likely to be passed to farms through lower produce prices, or higher product prices for fertiliser.

Impact on Economic Farm Surplus (EFS)

- **The 2025 price** results in <5% impact on EFS for most farms. The impact on EFS is higher for red-meat farms than dairy, because dairy systems can produce more product per unit of emissions emitted
- **The 2030 price** has a much greater impact on EFS. This could potentially impact the viability of some red-meat farming systems
- Red-meat farms that are mainly breeding or trading operations face the lowest cost under the processor-level NZ ETS system, as some of their stock is sold to finishing properties that send the animal to the processor. However, finishing farms may pass the cost on to breeding farmers when purchasing stock
- The costs associated with the complex management-governance arrangements for Māori land/farms have not yet been included in the analysis and would result in additional operating costs.

Case study farms

Case study analysis on 20 different farm types shows the direct impact of price under the different pricing system options, and the impact on EFS. See Appendix 3 for more detail on the 20 different farm types and the methodology used.

[3] Economic Farm Surplus (EFS) is Earnings before Interest Tax and Rent – it includes wages, management wage and also depreciation.

Farm Type	Key farm information (kgMS, total stock units, kgN/ha)	2025 ($85/tonne CO_2e, 95% discount) *		2030 ($138/tonne CO_2e, 90% discount)	
		Cost	% change in EFS	Cost	% change in EFS
North Island Hill Country	4,841 (su)	$6,348	-3.2%	$20,613	-10.2%
North Island Intensive	2,745 (su)	$6,515	-4.5%	$21,156	-14.7%
South Island Hill Country	9,751 (su)	$4,772	-2.5%	$15,496	-8.3%
South Island Deer	7,037 (su)	$5,903	-2.6%	$19,168	-8.4%
South Island Mixed Cropping	2,850 (su), 215 (kgN/ha)	$7,502	-2.4%	$24,358	-7.8%
Māori Agribusiness sheep and beef range**	3,733 – 7,843 (su)	$10,138 to $18,515	-3.2% to -1.9%	$32,918 to $60,119	-6.2% to -10.4%
Canterbury Dairy	349,135 (kgMS)	$16,850	-1.7%	$54,712	-5.5%
Taranaki Dairy	118,296 (kgMS)	$5,683	-1.7%	$18,452	-5.5%
Waikato/Bay of Plenty Dairy	134,925 (kgMS)	$6,607	-1.7%	$21,452	-5.6%
Māori Agribusiness dairy range	132,403 – 223,264 (kgMS)	$6,419 to $10,756	-1.4% to -6.2%	$20,843 to $34,925	-4.6% to -20.1%
Pipfruit***	43 (kgN/ha)	$30	0%	$100	0%
Kiwifruit***	115 (kgN/ha)	$100	0%	$329	-0.01%
Vegetables (Pukekohe and Canterbury)***	125 - 183 (kgN/ha)	$300 to $440	-0.03 to -0.05%	$974 to $1,426	-0.1 to -0.16%

* Prices derived from Climate Change Commission's 'Our Path to 2035' scenario: https://www.climatecommission.govt.nz/get-involved/sharing-our-thinking/data-and-modelling.

** Māori Agribusiness sheep and beef case study farms carry more stock units than the other sheep and beef case study farms. See Appendix 3 for more details.

*** Horticulture economic impact is expressed as % of cash operating surplus.

Emissions reductions

- Initial modelling suggests that these prices could lead to reductions in total agricultural emissions of less than 1% reduction in both CH_4 and N_2O below 2017 levels, additional to reductions as a result of other environmental policies
- Under the NZ ETS backstop, Government intends that any revenue raised would be invested back into the agricultural sector to support further emissions reductions. Government has not made any decisions as to how this revenue would be recycled; if recycled in the ways described for the Processor-level Hybrid Levy this could lead to equivalent emissions reductions by 2030.

Recycling Revenue

- At the above prices, the estimated revenue from emissions levies is $130 million – $430 million per annum
- Government intends that any revenue raised would be invested back into the agricultural sector to support further emissions reductions, which could include paying for sequestration not currently eligible for the NZ ETS (e.g. riparian plantings). Further emissions reductions could be achieved through recycling revenue.

Administration costs

Administration costs would be lowest for the NZ ETS backstop.

		Establishment cost	Operating cost
NZ ETS backstop	Administrator		$2m
	Processor		$8m
	Total	**$3m**	**$10m**

Annual operating costs are estimated for the period 2025 – 2030; they include interest and capital payments for the IT system. Establishment costs include the total development cost of the system. The two costs provide different indicators of the administration costs – they should not be added together.

The total estimated operating cost is $10 million per annum ($8 million cost to processors and $2 million for operational costs) and the estimated establishment cost is $3 million.

Set-up costs are relatively low as the NZ ETS already exists and would need minimal upgrade and ongoing resourcing to add livestock and fertiliser emissions.

Processors already report emissions. The cost to processors includes additional time spent reporting and auditing, passing on the cost to farmers, the purchase of NZUs and hedging costs.

If the Government were to introduce revenue recycling or recognise additional sequestration this would increase the administration costs, including costs for farmers.

For more detail, the reports on pan-sector modelling, case studies and administration costs can be found on the He Waka Eke Noa website.

He Waka Eke Noa – Split-gas Levy Approach

For both the Farm-level Levy and Processor-level Hybrid Levy options, a split-gas approach to calculating emissions and setting levy rates has been proposed. This means that different levy rates would be set for short- (CH_4) and long-lived (N_2O and CO_2) gases. This approach reflects that CH_4 is not required to reduce to net zero.

Setting the initial levy rates

A core principle of the split-gas approach is recognising the different characteristics of the different gases. The two options for setting the initial levy rates are:

1. Broadly aligned to the NZ ETS carbon price (e.g. NZ ETS carbon price at a set point or period of time)
2. A unique levy rate based on a consideration of relevant factors.

Implementation agency

The He Waka Eke Noa system will have an 'implementation agency'. This agency will be responsible for registrations, payment management, compliance, auditing, and other administration tasks.

Requirements to seek advice

The levy rates would be advised on by an advisory body. Representation on this body would reflect the principles of Te Tiriti o Waitangi and include the agriculture sector. The advisory body could have responsibility for:

- Providing advice on the setting of the initial levy rates
- Engaging with the sector and wider public on the levy-rate setting process
- Considering a range of factors in setting the levy rates
- Reviewing or updating the levy rates.

Factors to consider in setting or updating levy rates

Setting the levy rates would involve balancing a range of factors that could be set out in the legislation that establishes the levy, to ensure the price level is appropriate to meet the levy's objectives. These include:

- Trajectory of emissions towards emissions targets
- Availability and cost of (current and future) on-farm mitigations
- Social, cultural, and economic impact on farmers, regional communities, and Māori agribusiness (from both the imposed levy and climate change)
- Currently available scientific, mātauranga Māori and economic information
- Emissions and production moving offshore, and food security.

The Partnership is also exploring a price ceiling. An example would be that the overall cost would be no more than if agriculture entered the NZ ETS.

There are a range of potential scenarios under which levy rates may need to change. The table below captures some examples of these scenarios using the first two factors listed above. The expected price responses outlined in the table are simplistic and in practice these would need to be weighed against all other factors and supported by in-depth analysis, modelling, and consultation.

Factor	Scenario	Price of emissions
Trajectory of emissions	Agricultural emissions are increasing.	Likely to increase.
	Agricultural emissions are declining at a rate that exceeds budgets and targets.	Likely to decrease.
	Agricultural emissions are stable or declining at a rate that will not achieve budgets and targets.	Likely to increase.
	Agricultural emissions are on track to meeting budgets and targets.	Likely to be stable.
	Emissions targets have been met (in 2030 and/or 2050).	Likely to be stable. Note: A maintained price signal is likely to be necessary to discourage increases in emissions. However, it is difficult to predict how the pricing system may change out to 2050 and beyond.
Availability of mitigations	Cheap or expensive mitigation options become available.	Expected price could fall or increase respectively to incentivise the uptake of mitigations.

Governance and principles for investing levy revenue

Investment of revenue raised through the levy could be co-managed between the agricultural sector, Māori/iwi and government and reflect the principles of Te Tiriti o Waitangi. Principles for investing levy revenue could include the following:

Principle	Explanation
Justifiable and effective	Funding is directed toward system objectives i.e. reducing emissions and supporting/encouraging low-emissions farming while retaining the agriculture sector's viability and competitiveness.
Transparency and accountability	There is a transparency over the allocation of any revenue and that there is a clear and robust rationale for the funding.
Equity	Revenue is used for initiatives that benefit or, have the potential to benefit, as many participants who have paid into the system as possible i.e. initiatives will need to cover all sectors who have paid into the system.
Integrated and adding value to existing funding	Funding is targeted at areas/constraints where there is either a gap in, or limited, existing funding i.e. we want to avoid duplication or crowding out of existing funding.
Enabling and user-friendly	Funding is flexible and adaptable. Application system and process is low cost and user-friendly.
Credible	The funding must be based on robust science and mātauranga Māori.

Collectives

Groups would be able to register in either of the two He Waka Eke Noa options as a collective. A collective is a group that chooses to work together to report their emissions and potentially to reduce or offset them. A collective could be made up of participants all supplying the same processor, a catchment community, or some other grouping. This is a key consideration for Māori land that is often owned by whānau, hapū, iwi groupings, trusts and incorporations that may choose to respond in this way as collectives.

A collective could work alongside a pricing system in several ways. It would allow farm enterprises to link their farms and submit a single return, or for Industry Assurance Programmes to use their current systems to report on behalf of their members. This could involve internal trading within the collective. Reporting would be at the collective level rather than the individual farm.

Potential transition between Processor-level Hybrid Levy and Farm-level Levy

A farm-level system is best able to recognise the range of efficiencies and mitigations that could be taken up on farm now and in the future. However, a farm-level system may require additional time and development to be a cost-effective option. This could be addressed by starting with a Processor-level Hybrid Levy system in 2025 and transitioning to a Farm-level Levy system over time.

To support long-term planning and investment, partners recognise the importance of providing as much certainty as possible on the timing and pathway of any transition.

A key aspect to that certainty is giving a timeframe for that transition, as well as ensuring the way the Processor-level Hybrid Levy system is set up could easily transition to the Farm-level Levy system, and a work programme set up in parallel on the building blocks required for an effective farm-level system. Further work would be required to identify a specific year to transition. However the partners would expect this to be by the early 2030s at the latest.

So that eligible farmers can participate practically and effectively in a farm-level split-gas levy there needs to be:

- Development of a central calculator to calculate on-farm emissions
- Ability for all eligible farmers and growers to capture and record data (including geospatial data for sequestration) to input into a central calculator
- Cost-effective mitigation options
- Knowledge of mitigation options and ability to adopt/implement mitigations including farmer advisory services to support that adoption
- User-friendly and cost-effective system administration processes.

There are some key indicators that would suggest that progress was being made on the building blocks. These are:

- Effectiveness of system in meeting objectives e.g. reducing emissions and retaining a viable agriculture sector
- Increasing technology and capability (both on farm and across skilled professionals) to measure, manage and reduce agricultural emissions
- Uptake of plans to measure and manage emissions
- Uptake of Emission Management Contracts (EMCs) by farms
- Uptake of Sequestration Management Contracts (SMC's)
- Increased availability of mitigation technology
- Lower administration costs, including time spent on – data capture, estimating, recording, and reporting emissions; and implementing and managing the reporting and audit system.

A work programme could be developed around these indicators, and they could be monitored to ensure timely progress to support the transition.

If there is a transition between systems, work would be undertaken to ensure that key elements of the Processor-level Hybrid Levy system are set up to easily transition into a Farm-level Levy system, and that the systems are designed with a transition in mind to avoid duplication of administration costs.

He Waka Eke Noa – Option 1: Farm-level Levy

This section outlines how the Farm-level Levy pricing system could work. This system uses the split-gas approach to price emissions at the farm level. The key features of this option would be:

1. Farms calculating their short- and long-lived gas emissions through a single calculator
2. Actual on-farm emissions determining payment rather than using national averages
3. On-farm efficiencies and mitigations being recognised as they become available
4. A split-gas approach to pricing, meaning different levy rates would apply to short- and long-lived gases
5. Recognition of sequestration on-farm, which could offset some of the cost of the emissions levy.

The following diagram shows how the net cost to the farm would be calculated under the Farm-level Levy.

	A		B		C		$
	The cost that each farm faces for their short-lived gas emissions (CH_4)	+	The cost that each farm faces for their long-lived gas emissions (N2O and CO_2)	-	The value that each farm is rewarded for their on-farm sequestration	=	The costs/values total to a 'net' emissions return, where A, B, and C are netted as dollar values, not as gases through a carbon equivalency metric
determined by	The weight of CH_4 calculated (Kg) The price for CH_4 (\$/kg)		The weight of long-lived gases calculated (kg CO_2e) The price for long-lived gases (\$/kg CO_2e)		Area of eligible vegetation The relevant sequestration rate/s in weight of long-lived gases (kg CO_2e) The price for sequestration (\$/kg CO_2e)		

Who is included in the system?

All farms would have to register in the farm-level pricing system if they were GST registered and annually averaged over:

- 550 stock units (sheep, cattle, deer, and goats); or
- 50 dairy cattle; or
- 700 swine (farrow to finish); or
- 50,000 poultry; or
- 40 tonnes of nitrogen through synthetic nitrogen fertiliser application.

This definition captures all farms that emit over 200 tonnes CO_2e per year, which is 96% of all agricultural greenhouse gas emissions (around 23,000 farms). The remaining 4% of emissions are from small lifestyle blocks, orchards, vineyards, and equine.

Who is responsible for reporting and paying for emissions?

The options have been narrowed down to:

1. **Landowner** (with business owner delegation): The person(s) who owns the land would be responsible for reporting and paying for emissions from that land and could choose which areas of sequestration are accounted for. They could formally delegate this responsibility to a business owner who must agree to accept it, OR
2. **Business owner**: The person(s) responsible for the overall operation of the business would be responsible for reporting and paying for the emissions from it. Sequestration could be accounted for with landowner permission.

There is a range of business and land ownership arrangements (including leasing) across different farm systems. There will be transitional challenges with either option for farms under legal agreements, until they are completed or renegotiated. The Partnership is continuing to explore options to manage this transition.

How are emissions calculated?

The pricing system would use a single centralised calculator to enable a transparent, credible, and consistent approach to calculating emissions. It would use two methods:

- The **simple method** means farms are recognised for a range of improvements in farm management that result in emissions reductions. It applies industry averages to stock classes and combines these with actual farm production data. This option would be easy to complete but less accurate and may slightly overestimate emissions.
- The **detailed method** captures the emissions reductions options recognised through the simple method plus on-farm efficiencies, and CH_4 and N_2O mitigations from improved animal genetics, forage types, and optimised farm management. This option would take more time to complete but be more accurate and reflect a greater number of on-farm efficiencies and mitigation practices.

The mitigations that are recognised in the simple and detailed methods are included in Appendix 4.

Farm inputs for calculation methods	Simple	Detailed
Farm area	√	√
Stock reconciliation	√	√
Milk, meat, wool and velvet production per animal type and class	√	√
Area of farm in different slope classes	√	√
Annual synthetic N fertiliser by type	Annual	Monthly
Synthetic N fertiliser application method (arable/vegetables production only)	√	√
Monthly or quarterly animal numbers by livestock class and age		√
Key farm operations animal number by body weight		√
Time and animal numbers on off-paddock facilities		√
Date of start and end of grazing of different feed types		√
Imported feed		√
Planned start of mating		√
Weaning/post-weaning percentages		√
Effluent/manure application method		√

He Waka Eke Noa is working through the feasibility of a centralised tool that allows current tools to input their data[4] automatically.

This will be audited primarily through an annual desktop-based audit. Any reporting outside the typical range will be followed up with an on-farm audit.

[4] This is how the IRD system operates with different accounting software.

How are emissions priced?

The Farm-level Levy system uses the split-gas approach and sets a separate price for biogenic methane (CH_4) and long-lived gases (N_2O and CO_2).

The Partnership recommends a unique price for CH_4. A unique price reflects the different characteristics of CH_4 as a short-lived gas and recognises that CH_4 reductions do not need to get to zero. The price can be tailored to specific CH_4 reductions required.

The price of long-lived gases (N_2O and CO_2) would be a discounted rate of the NZ ETS carbon price.

Aligning long-lived gases to the NZ ETS treats long-lived gases consistently with the carbon price in the broader economy, and better enables offsetting to achieve a net zero target for long-lived gases. However it is important the long-lived gas price is discounted and phased in over time to manage economic and social impacts of the emissions price on farmers and rural communities and avoid emissions and production moving offshore.

The Partnership is also exploring a price ceiling. An example would be that the overall cost would be no more than if agriculture entered the NZ ETS.

How can emissions be offset with sequestration?

On-farm sequestration, including a number of vegetation types not eligible in the NZ ETS, would be rewarded and farms that choose to would receive a financial offset to their emissions cost. See *Recognising Carbon Sequestration On-farm* section for more detail.

Recognition for on-farm sequestration will be funded through the revenue from pricing emissions. The value of sequestration would be set at a price that balances the incentives to recognise sequestration and reduce emissions while ensuring the affordability of the system. This could be broadly aligned with the NZ ETS carbon price, though further work is being completed on the relationship between the long-lived gas price and sequestration, and the cost implications of that relationship.

How will the revenue from the system be used?

The revenue raised through the levy would be invested back into the agricultural sector to generate further emissions reductions and support lower emissions food production. This would be done through:

- Research and development
- Additional payment/credit for adoption of approved practices or use of technologies.

The adoption of approved practices or technologies would be recognised through the central calculation engine and would result in additional payment/credit for those practices or technologies. It is likely to include the same actions as the action-based Emissions Management Contract (EMC) under the Processor-level Hybrid Levy option. Further work is underway to consider how low emissions land use could be recognised under this system.

Will rebates be offered in this system?

A rebate option could maintain the incentive to reduce emissions while protecting farms from the full cost of emissions. It does this by providing a direct payment/rebate to farms to cover some of the costs faced under a split-gas levy.

Two main rebate options were considered for the farm-level system: Land-based efficiency (emissions per hectare measured against similar land classes), and output-based efficiency (emissions efficiency per unit for product). There was not a consensus amongst the partnership to progress these further. Concerns related to implementation complexities and the risk of shifting the cost burden to a subset of farms depending on the approach adopted.

A minority of partners support the output-based rebate as a potential option as it could be an effective means of delivering an incentive for uptake of a full range of emissions mitigations while minimising impacts on profitability and production. A minority of partners support the land-based rebate as it recognises more extensive farming systems that are operating within the carrying capacity of the land and therefore have fewer options to further reduce their emissions. A summary of the land-based and output-based rebates is provided below. Further detail is available on the He Waka Eke Noa website.

Land-Based Option

Under a land-based rebate option, a farm would receive a rebate/assistance based on its land area, adjusted for the average emissions associated with the 'carrying capacity' of the land (with some adjustment made for land improvements).

This option would advantage farmers who have been farming within their carrying capacity, or who have not developed their land.

More intensive farms operating above a defined carrying capacity would have a greater proportion of their emissions exposed to a price. This option is challenging to implement primarily because defining carrying capacity requires an understanding of how multiple variables interact and affect carrying capacity on different land/soil types, in different climates, in different sectors, and across different years.

The type of land-based rebate explored would need a map created to determine carrying capacity. There is a significant risk that mapping cannot be undertaken with sufficient accuracy to be suitable for a pricing system to be implemented by 1 January 2025.

The land-based rebate would favour more extensive farms relative to intensive farms. More intensive farms operating above a defined carrying capacity would have a greater proportion of their emissions exposed to a price. For more detail see He Waka Eke Noa Factsheet 1: Farm-level Split-gas Levy with land-based rebate on the He Waka Eke Noa website.

Output-Based Option

An output-based rebate could be applied only to livestock emissions. Emissions from synthetic fertiliser would be priced through another system. Under an output-based rebate option, a farm would receive a rebate/assistance based on national average efficiency per unit of product.

This option rewards livestock systems that are most emissions efficient per unit of product. This is often (but not always) associated with higher-intensity farms, i.e. farms with higher stocking rate and rate of production. Farms that are less emissions efficient per unit of product would face a greater net cost.

There are a number of different ways that an output-based rebate could be applied. Not all farms have a final output (such as those that breed or sell to other farms), and so they would not receive a rebate. For this to work, the rebate would have to pass through the supply chain. While there may be ways to do this, it would add complexity and costs to the system. For more detail see He Waka Eke Noa Factsheet 2: Farm-level Split-gas Levy with output-based rebate on the He Waka Eke Noa website.

Impacts and Insights

The Partnership has modelled a range of price combinations for biogenic methane (CH_4), long-lived gases (N_2O and CO_2), and sequestration to understand the impacts of Farm-level Levy emissions pricing on farm costs and emission reductions.

For ease of comparison between pricing options, the table below reflects prices equivalent to prices under the NZ ETS backstop option. They are indicative only. The levy rate for biogenic methane (CH_4), and any initial discount on the price of long-lived gases (N_2O and CO_2) and the price of sequestration have not been decided and would be determined and updated following the process and factors outlined in the sections: *Requirements to seek advice and Factors to consider in setting or updating levy rates.*

The split-gas approach means biogenic methane (CH_4) and long-lived gases (N_2O and CO_2) would not be priced at the same rate per tonne of CO_2e. The 2030 prices in the table below include a scenario where the price of sequestration (C) is equivalent to the NZ ETS carbon price. This is used for illustrative purposes only. There is an important trade-off between the price of the levy, the price of sequestration, and the ability to achieve emission reductions while minimising impacts on farm profitability. A lower price of sequestration could mean a lower levy price could be applied. Further work is being completed on the relationship between the long-lived gas price and sequestration, and the cost and emission reduction implications of that relationship.

It is the combination of emissions pricing and the use of revenue raised that generates emission reductions while limiting impacts on profit and production.

Emissions reductions

The following table shows emission price combinations modelled and impacts on emission reductions and average profit by sector in 2030.

The cost and availability of future mitigation technologies to reduce emissions has a significant impact on emission reductions and resulting impacts on profit and production. The current progress of mitigation technologies is illustrated in Appendix 2. Two mitigation technology scenarios have been modelled: a medium-tech scenario and a high-tech scenario. The high technology scenario assumes greater availability of technology options, including higher uptake rates and lower costs. This scenario is applicable only in 2030.

Modelling does not include emission reductions associated with efficiency gains on sheep and beef farms. This could result in slightly higher emission reductions than shown.

Initial modelling suggests that NZ ETS equivalent prices in 2030 would drive a range of 1.3% – 4.3% additional reductions in CH_4, in addition to the reductions as a result of the other environmental policies. This would see total decreases of 5.7% – 8.7% in CH_4 from 2017 levels. The initial modelling suggests that NZ ETS equivalent prices in 2030 would drive a range of 1.6% – 1.8% additional reductions in N_2O above the baseline reductions from existing environmental policy. This would lead to a total reduction of N_2O emissions by 2030 of 4.5% – 4.7% from 2017 levels.

This is as a result of the incentives provided by farmers facing a lower payment for reducing their emissions, which drives greater behaviour change.

	Price of methane (A)	Price of long-lived gases (B)	Price of sequestra-tion (C)	Modelled emission reductions including baseline reductions from 2017 %		Impacts on average farm profit %		
				CH_4	N_2O	Dairy	Sheep + Beef	Hort/Arable
2030	\$0.35c/kg *	\$13.80/tonne CO_2e*	\$138/tonne CO_2e	- 5.7 to - 8.7	-4.5 to -4.7	-5.5 to -5.7	-6 to -6.1	0 to -0.5

* indicative costs if the levy rates for CH_4 and the discount for long-lived gases are the equivalent of the NZ ETS backstop. Prices derived from Climate Change Commission's 'Our Path to 2035' scenario: https://www.climatecommission.govt.nz/get-involved/sharing-our-thinking/data-and-modelling

For more detail (including impacts on emissions per unit of product), the report on pan-sector modelling can be found on the He Waka Eke Noa website.

The product costs and case study costs below do not include the reductions in cost that farms could achieve through on-farm practice improvements or future mitigations.

Product costs by sector

- **Dairy sector cost in 2025** is between \$0.04 and \$0.05 kg MS (milk solids), and \$0.12 and \$0.15 in 2030
- **Sheep, beef, and deer sector cost in 2025** is between \$0.11 and \$0.23 kg sheep meat, \$0.08 and \$0.17 kg beef, and \$0.26 kg venison. Finishing farms typically have a lower cost, and breeding farms a higher cost. For 2030 the cost is between \$0.23 and \$0.76 for sheep meat, \$0.16 and \$0.55 beef, and \$0.86 venison.
- **Fertiliser costs in 2025** is equivalent to \$0.02/kg N, and the cost in 2030 is equivalent to \$0.07/kg N

Impact on Economic Farm Surplus (EFS)

- For some case study farms, the cost is slightly lower than the NZ ETS backstop and therefore there is a lower impact on EFS. This is because this option accounts for the actual length of time livestock are present on-farm and uses emissions factors that relate to individual stock classes. In comparison, the NZ ETS backstop currently uses average emissions factors for individual stock types (species) and average lifespans.
- Other case study farms, e.g. breeding farms such as South Island hill country and North Island hill country and some Māori farms, face a higher cost than the NZ ETS backstop and therefore a greater impact on EFS. In these instances, the cost includes all livestock on-farm, rather than only those sold to processors as under the NZ ETS backstop.

Sequestration

Indicative rewards from additional sequestration recognised under He Waka Eke Noa, based on indicative sequestration rates for each vegetation types and assuming the full NZ ETS carbon price for this, include:

- Indigenous vegetation established before 1 January 2008, being actively managed: \$156 per hectare in 2025
- Indigenous vegetation established on or after 1 January 2008: \$552 per hectare in 2025
- Riparian vegetation: \$238 per hectare in 2025
- More detail on these and other categories is in the section *Recognising Carbon Sequestration On-farm*.

Further analysis is needed on which farm systems would benefit most from sequestration opportunities, but it has been identified that some South Island hill country farms would likely have fewer sequestration opportunities than other sheep and beef systems due to drier climates and land-use restrictions. The following sequestration rates are indicative and used only for modelling.

Vegetation type	Sequestration rate (t CO_2e/ha pa)
Indigenous vegetation established before 1 January 2008	1.83
Indigenous vegetation established on or after 1 January 2008	6.5
Riparian vegetation established on or after 1 January 2008	3.5
Perennial crops	1.3

Case study farms

The tables below show emissions prices, potential sequestration offsets and resulting impact on EFS for the 20 case study farm types, assuming the price combinations described above.

There is a wide range of vegetation that could be eligible for He Waka Eke Noa on farms, but there is limited data on actual vegetation. These case studies provide a broad estimate of sequestration that could be rewarded. In reality farmers may enter this vegetation over time, particularly if fencing is required. See Appendix 3 for more detail on the 20 different farm types and the methodology used.

Farm Type	Key farm information (kgMS, total stock units, kgN/ha)	2025 - CH_4 \$0.11/kg and N_2O \$4.25/T CO_2e (95% discount on Carbon price of \$85/T) and C \$85/T CO_2e		
		Farm-level Levy A+B	Sequestration C	% change in EFS
North Island hill country	4,841 (su)	$7,254	$3,927	-1.7%
North Island intensive	2,745 (su)	$5,066	$2,587	-1.7%
South Island hill country	9,751 (su)	$11,320	$5,227	-3.3%
South Island deer	7,037 (su)	$11,048	$5,227	-2.5%
South Island mixed cropping	2,850 (su), 215 (kgN/ha)	$4,301	$1,006	-1.0%
Māori agribusiness sheep and beef range*	3,733 – 7,843 (su)	$12,917 to $22,693	$8,400 to $62,391	-1.5% to +5.4%
Canterbury dairy	349,135 (kgMS)	$13,147	$1,154	-1.2%
Taranaki dairy	118,296 (kgMS)	$4,948	$928	-1.2%
Waikato/Bay of Plenty dairy	134,925 (kgMS)	$6,280	$602	-1.5%
Māori agribusiness dairy range	132,403 – 223,264 (kgMS)	$6,426 to $9,346	$0 to $38,549	-6.2% to +5.9%
Pipfruit**	43 (kgN/ha)	$30	0	0%
Kiwifruit**	115 (kgN/ha)	$100	0	0%
Vegetables (Pukekohe and Canterbury)**	125 - 183 (kgN/ha)	$300 to $440	0	-0.03 to -0.05%

Farm Type	Key farm information (kgMS, total stock units, kgN/ha)	2030 - CH_4 $0.35/kg and N_2O $13.80/T CO_2e (90% discount on Carbon price of $138/T) and C $138/T CO_2e		
		Farm-level Levy A+B	Sequestration C	% change in EFS
North Island hill country	4,841 (su)	$23,600	$6,376	-8.6%
North Island intensive	2,745 (su)	$16,481	$4,200	-8.5%
South Island hill country	9,751 (su)	$36,829	$8,486	-15.1%
South Island deer	7,037 (su)	$35,941	$8,486	-12.0%
South Island mixed cropping	2,850 (su), 215 (kgN/ha)	$13,994	$1,633	-3.9%
Māori agribusiness sheep and beef range*	3,733 – 7,843 (su)	$52,628 to $73,829	$13,637 to $101,293	-7.4% to 3.8%
Canterbury dairy	349,135 (kgMS)	$42,765	$1,874	-4.1%
Taranaki dairy	118,296 (kgMS)	$16,095	$1,506	-4.4%
Waikato/Bay of Plenty dairy	134,925 (kgMS)	$20,428	$977	-5.1%
Māori Agribusiness Dairy range	132,403 – 223,264 (kgMS)	$20,903 to $30,404	$0 to $62,586	-20.2% to 6.5%
Pipfruit**	43 (kgN/ha)	$100	0	0%
Kiwifruit**	115 (kgN/ha)	$329	0	-0.01%
Vegetables (Pukekohe and Canterbury)**	125 - 183 (kgN/ha)	$974 to $1,426	0	-0.1 to -0.16%

*Māori Agribusiness sheep and beef case study farms carry more stock units than the other sheep and beef case study farms. See Appendix 3 for more details.

**Horticulture economic impact is expressed as % of cash operating surplus. While orchard trees and vine sequester carbon, there has been minimal expansion in hectares in pipfruit and kiwifruit since 2008.

Recycling revenue

A farm-level split-gas levy would raise revenue. Emissions costs are directly financially offset by on-farm sequestration recognised in the system: Emissions levy less sequestration = net revenue raised. At the above prices, the estimated gross revenue from emissions levies is $137 million per annum in 2025 to $573 million in 2030. The actual amount raised would be less as the financial offset from sequestration would be netted off at the farm-level first, which would reduce the amount paid in. The sequestration is estimated to range from $66 million in 2025 to $234 million in 2030 so actual estimated revenue raised would be $71 million in 2025 to $339 million in 2030.

The following table illustrates the activities revenue could be recycled into and potential associated costs.

Areas for recycle revenue	Amount
Research and development	$10m per annum. This is an indicative value, there is work underway on a research and development strategy that could inform this, including consideration of current investment by government and sector.
Support for lower emissions food production, or payment/credit for adoption of approved practices or use of technologies	$0 - $21m per annum This value would be informed by availability of mitigations and level of emissions reductions sought.
Administration costs	$24m - $27m for operational costs per annum, including operational costs associated with new technology uptake. This is 50% of the administrator operating cost for levy and additional payments (see *Administration costs* section below for details). This is an indicative value and would be informed by principles of cost share between government and participants.

Administration costs

Administration costs would be highest for establishing and implementing a farm-level pricing system.

The costs outlined below include the establishment of the system; on-going administration of the system; and the operating costs to various parties (like processors, farmers). Current estimates suggest the following administration costs, however further work is being done to refine these.

		Establishment cost	Operating cost
Farm-level Levy	Administrator		$41m to $45m
	Farmer		$28m to $39m (i.e. up to $1,200 to $1,600 in time per farm)
	Total	**$117m to $141m**	**$69m to $84m**
Additional payments for new technology uptake	Administrator		$7m to $8m
	Farmer		$4m
	Total	**$7m to $8m**	**$11m to $12m**

Annual operating costs are estimated for the period 2025 – 2030, including interest and capital payments for the IT system. Establishment costs include the total development cost of the system alongside the first two years of operations. The two costs provide different indicators of the administration costs and they should not be added together.

The total estimated operating costs are $69 million – $84 million per annum ($28 million – $39 million cost to farmers in time spent reporting i.e. up to $1,200 – 1,600 in time per farm and $41 million – $45 million for operational costs) and the estimated establishment cost is $117 million – $141 million.

The estimated cost for additional payments for new technology uptake are $11 million – $12 million per annum ($4 million cost to farmers in time spent reporting, and $7 million – $8 million for operational costs), and an additional estimated establishment cost of $7 million – $8 million.

The implementation agency would incur capital costs for the scope and build of the pricing system. Post-2025, the focus would move to operation including registration, reporting, levy payment, audit, and compliance.

The administration costs to farmers would start from 2024 and are a result of the time and effort required to measure and report emissions and sequestration, alongside audit costs.

- For the simple method, recording data is estimated to take five hours for a dairy, sheep, beef, or deer farm
- For the detailed method, recording data is estimated to take 10 hours for a dairy farm and 25 - 75 hours for a sheep, beef, or deer farm
- For cropping farms with no livestock, fertiliser only, it is estimated to take around five hours for both methods.

The Partnership has considered the time already spent recording data, including information collected for He Waka Eke Noa milestones to know your number, and have a plan, existing processor assurance programmes, NAIT and Freshwater Farm Planning.

For more detail, the reports on pan-sector modelling, case studies and administration costs can be found on the He Waka Eke Noa website.

He Waka Eke Noa – Option 2: Processor-level Hybrid Levy

This section outlines how the Processor-level Hybrid Levy pricing system could work. The key features of this options are:

1. Processors would pay for emissions based on the emissions charge applied to products supplied, or bought (fertiliser), by farmers or growers. Processors would likely pass on the cost to farms based on the quantity of product processed, or fertiliser bought
2. There would be separate emissions charges for short- and long-lived gases
3. Farms individually or in collectives could receive a payment for emissions reductions if they chose to enter into an Emissions Management Contract (EMC). This would be a voluntary process, but once established the contracts would be binding
4. Farms could also receive a payment for sequestration via a Sequestration Management Contract (SMC). This would be a voluntary process, but once established the contracts would be binding.

An EMC and SMC would provide an incentive for farms or collectives to reduce emissions, and maintain and increase sequestration, through receiving a payment that would go some way toward offsetting the costs they would receive via the processor.

If there was a transition between systems, work would be undertaken to ensure that key elements of the Processor-level Hybrid Levy system were set up to easily transition into a Farm-level Levy system, and that the systems were designed with a transition in mind.

The following diagram shows how the net cost to the farm would be calculated under the Processor-level Hybrid Levy.

	A		B		$		EMC		SMC
	The cost that each processor faces for their short-lived gas emissions (CH_4).	+	The cost that each processor faces for their long-lived gas emissions (N_2O and CO_2)	=	These costs total to an emissions net cost, where A and B are added together as dollar values.	-	Voluntary contract to receive payment for on-farm emissions reduced.	+	Voluntary contract to receive payment for recognised sequestration on-farm.
determined by	National average CH_4 emissions per unit of production x amount of product.		National average long-lived gases emissions per unit of production x amount of product.						

Who is responsible for reporting and paying for emissions?

Processors (meat and dairy) and fertiliser manufacturers and importers would be responsible for reporting and paying for emissions, based on the emissions charge applied to products supplied or bought by farmers or growers.

Farm-level reporting might be required for farms or collectives that chose to enter an Emissions Management Contract and receive a payment for emissions reductions or a Sequestration Management Contract and receive a payment for sequestration.

How are emissions calculated?

Emissions would be calculated using national average emissions factors for relevant products, e.g. milk, meat, and synthetic fertiliser. They would be applied per kg of product produced and per tonne of synthetic fertiliser sold. The Partnership is recommending a review and update of national average emissions factors[5] prior to the implementation of a processor-level system.

Individual farms emissions would need to be calculated if they chose to apply for an EMC. See *Emissions Management Contracts (EMC)* below for further detail.

How are emissions priced?

The Processor-level Hybrid Levy system uses the split-gas approach and sets a separate price for biogenic methane (CH_4) and long-lived gases (N_2O and CO_2). The Partnership recommends a unique price for CH_4. The price of long-lived gases would be a discounted rate of the NZ ETS carbon price.

The Partnership is exploring a price ceiling. An example would be that the overall cost would be no more than if agriculture entered the NZ ETS.

How can emissions be offset with sequestration?

Individual farms or collectives could only seek recognition for sequestration by entering into a Sequestration Management Contract (SMC). The same categories and considerations would apply as under a farm-level system. See *Sequestration Management Contract* and *Recognising Carbon Sequestration On-farm* sections for more detail.

Recognition for on-farm sequestration will be funded through the revenue from pricing emissions. The value of sequestration would be set at a price that balances the incentives to recognise sequestration and reduce emissions while ensuring the affordability of the system. This could be broadly aligned to the NZ ETS price, though further work is being completed on the relationship between long-lived gas price and sequestration, and the cost implications of that relationship.

How will the revenue from the system be used?

The revenue raised through the levy would be invested back into the agricultural sector to generate further emissions reductions. This will be done through:

- Research and development
- Payment/credit for adoption of approved practices, use of technologies (e.g. vaccine, inhibitors etc.) or additional emissions reductions through Emission Management Contracts (EMC)
- Payment/credit for on-farm sequestration through Sequestration Management Contracts (SMC).

Will rebates be offered in this system?

The Processor-level Hybrid Levy doesn't include a direct rebate, but payments could be offered through an EMC and SMC.

[5] This could include an update of emissions factors for deer, beef cattle and dairy, milking goats and sheep, synthetic nitrogen fertiliser, and an update of all emissions factors to separate methane and nitrous oxide emissions.

Emissions Management Contracts (EMC)

An Emissions Management Contract (EMC) is a key component of the Processor-level Hybrid Levy. Individual farms or collectives could enter an EMC to be rewarded for formally managing and reducing their emissions and adopting new mitigation technologies as they become available.

An EMC would give farms and collectives the opportunity to receive revenue to offset some of the costs of the emissions charges that would be passed on by processors. Emission reductions could be incentivised through a payment that is a multiplier of the levy charge e.g. 2.5 times. There are two potential approaches to an EMC:

1. An **actions-based approach** would reward farms or collectives for the adoption of approved practices or technologies. Rewarding the uptake of low-methane sheep genetics is an example of an actions-based reward. The reward received could be based on a national-average reduction calculation; or made farm-specific through a simple farm-level calculation. Some farm system efficiencies, e.g. low-N forages, could also be recognised if a simple farm-level calculation approach was adopted.
2. A **benchmark-based approach** would reward farms or collectives for emissions reductions beyond an initial benchmark, based on emissions at a historic point in time or date range. The reductions would be calculated through a central calculator based on the farm-level detailed method (see *Option 1: Farm-level Levy – How are emissions calculated* section for more detail) and could reward both farm system efficiencies alongside new practices and technologies.

The mitigations that are recognised in the benchmark-based and actions-based approach are included in Appendix 5.

There are trade-offs between these approaches; the action-based approach is simple with low administration costs and could recognise early action. However, it cannot recognise some farm system efficiencies and as a result, it may not support the required emissions reductions. The benchmark-based approach would capture more accurate emissions reductions and support greater emissions reductions but has higher administration costs and could disadvantage those who have taken early action to reduce or who already have low emissions.

All farms, collectives, and agriculture service providers are eligible to enter into an EMC.

The minimum contract period would be three years. If the contract was not met, payment would not occur. When the contract period ends, there would be no obligation for a farm or collective to enter into a new contract or continue to undertake the emissions reductions actions or activities previously contracted. The EMC would require annual reporting (with evidence that the agreed actions or emissions reductions have occurred) and receive annual payment. The EMC would provide the ability for farmers to go over and above without requiring contract renegotiation.

An EMC must meet the following criteria: maximises impact; scientifically credible and verifiable; supports additional reductions or enables actions that would otherwise not be economically viable; must be implementable in the timeframe; and avoids negative consequences on other environmental outcomes.

The primary audit approach would be an annual desktop-based audit for at least 10% of the contracts, with on-farm audits as required.

Sequestration Management Contract (SMC)

A separate but similar process to the EMC would be used to recognise and reward sequestration. Farms or collectives could enter a Sequestration Management Contract (SMC) to be recognised and rewarded for on-farm sequestration. A SMC would give farms and collectives the opportunity to receive revenue to offset some of the costs of the emissions charges passed on by processors.

All farms and collectives are eligible to enter into an SMC, however the contract would only be with a landowner due to the long-term implications for land-use flexibility. This would be registered against the certificate of title to keep track of sequestration opportunities and liabilities against the land.

The contract period would be indefinite and would require annual reporting and receive annual payment.

The same categories and considerations would apply as under a farm-level system. See *Recognising Carbon Sequestration On-farm* section for more detail.

Impacts and Insights

The Partnership has modelled a range of price combinations for methane (CH_4), long-lived gases (N_2O and CO_2), and sequestration to understand the impacts of the Processor-level Hybrid Levy on farm costs and emission reductions.

For ease of comparison between the pricing options, the table below reflects prices equivalent to prices under the NZ ETS backstop option. They are indicative only. The levy rate for biogenic methane (CH_4), and any initial discount on the price of long-lived gases (N_2O and CO_2) and the price of sequestration have not been decided and would be determined and updated following the process and factors outlined in the sections: *Requirements to seek advice* and *Factors to consider in setting or updating levy rates*.

The split-gas approach means biogenic methane (CH_4) and long-lived gases (N_2O and CO_2) would not be priced at the same rate per tonne of CO_2e. The 2030 prices in the table below include a scenario where the price of sequestration (C) is equivalent to the NZ ETS carbon price. This is used for illustrative purposes only. There is an important trade-off between the price of the levy, the price of sequestration, and the ability to achieve emission reductions while minimising impacts on farm profitability. A lower price of sequestration could mean a lower levy price could be applied. Further work is being completed on the relationship between the long-lived gas price and sequestration, and the cost and emission reduction implications of that relationship.

Emissions reductions

The following table shows emission price combinations modelled and impacts on emission reductions and average profit by sector in 2030.

It is the combination of emissions pricing and the use of revenue raised (including into EMCs and SMCs) that generates emission reductions while limiting impacts on profit and production.

As with the Farm-level Levy option, the cost and availability of future mitigation technologies to reduce emissions has a significant impact on emission reductions and resulting impacts on profit and production. Two mitigation technology scenarios have been modelled: a medium-tech scenario and a high-tech scenario.

Initial modelling suggests that NZ ETS equivalent prices in 2030 would drive a range of 3.2% – 3.9% additional reductions in CH_4, in addition to the reductions as a result of the other environmental policies. This would see total decreases of 7.6% – 8.3% in CH_4 from 2017 levels.

The initial modelling suggests that NZ ETS equivalent prices in 2030 would drive a range of 1.6% – 1.7 % additional reductions in N_2O above the baseline reductions from existing environmental policy. This would lead to a total reduction of N_2O emissions by 2030 of 4.5% – 4.6% from 2017 levels.

	Price of methane (A)	Price of long-lived gases (B)	Price of se-questration (C)	Modelled emission reductions including baseline reductions from 2017 %		Impacts on average farm profit %		
				CH_4	N_2O	Dairy	Sheep + Beef	Hort/Arable
2030	$0.35c/kg *	$13.80/tonne CO_2e*	$138/tonne CO_2e	-7.6 to -8.3	-4.5 to -4.6	-4.4 to -4.6	-5.1 to -5.4	0 to -0.5

* indicative costs if the levy rates for CH_4 and the discount for long-lived gases are the equivalent of the NZ ETS backstop. Prices derived from Climate Change Commission's 'Our Path to 2035' scenario: https://www.climatecommission.govt.nz/get-involved/sharing-our-thinking/data-and-modelling

For more detail (including impacts on emissions per unit of product), the report on pan-sector modelling can be found on the He Waka Eke Noa website.

Product costs by sector

- **Dairy sector cost in 2025** is equivalent to $0.05/kg MS (milk solids). The cost in 2030 is equivalent to $0.16/kg MS
- **Sheep, beef, and deer sector cost in 2025** is equivalent to $0.10/kg sheep meat, $0.07/kg beef, and $0.15/kg venison. The cost in 2030 is equivalent to $0.30/kg sheep meat, $0.22/kg beef, and $0.46/kg venison
- **Fertiliser costs in 2025** is equivalent to $0.02/kg N and the cost in 2030 is equivalent to $0.07/kg N
- These costs are likely to be passed on to farms through lower produce prices, or higher product prices for fertiliser.

Sequestration

Indicative rewards from additional sequestration recognised via SMC's, based on indicative sequestration rates for each vegetation types and assuming the full NZ ETS carbon price for this, include:

- Indigenous vegetation established before 1 January 2008, being actively managed: $156 per hectare in 2025
- Indigenous vegetation established on or after 1 January 2008: $552 per hectare in 2025
- Riparian vegetation: $238 per hectare in 2025
- More detail on these and other categories is in the *Recognising Carbon Sequestration On-farm* section.

Case study farms

The tables below show emissions prices (assuming costs are passed through by processors), potential credits via EMCs and SMCs and resulting impact on EFS for the 20 case study farm types, assuming the price combinations described above. The value of the SMC credit has been calculated on the basis of all He Waka Eke Noa eligible sequestration assumed for the farm (or actual sequestration in case of Māori agribusiness case studies). The value of the EMCs has been calculated based on improved production efficiencies, which sees the same output of production or profitability from the farm system but with reduced emissions.

There is a wide range of vegetation that could be eligible for He Waka Eke Noa on farms, but there is limited data on actual vegetation. These case studies provide a broad estimate of sequestration that could be rewarded. In reality farmers may enter this vegetation over time particularly if fencing is required. See Appendix 3 for more detail on the 20 different farm types and the methodology used.

Farm Type	Key farm information (kgMS, total stock units, kgN/ha)	2025 - CH_4 $0.11/kg, N_2O $4.25/T CO_2e and C $85/T CO_2e			
		Processor levy A+B	EMC credit	SMC credit	% change in EFS
North Island hill country	4,841 (su)	$6,543	$1,608	$3,927	-0.5%
North Island intensive	2,745 (su)	$6,715	$852	$2,587	-2.3%
South Island hill country	9,751 (su)	$4,918	$358	$5,227	0.4%
South Island deer	7,037 (su)	$6,083	$1,625	$5,227	0.3%
South Island mixed cropping	2,850 (su), 215 (kgN/ha)	$7,502	$0	$1,006	-2.1%
Māori agribusiness sheep + beef*	3,733 – 7,843 (su)	$10,450 to $19,089	$1,273 to $11,493	$8,400 to $62,391	0.2% to 7.5%
Canterbury dairy	349,135 (kgMS)	$17,337	$1,482	$1,154	-1.5%
Taranaki dairy	118,296 (kgMS)	$5,845	$794	$928	-1.2%
Waikato/Bay of Plenty dairy	134,925 (kgMS)	$6,798	$278	$602	-1.5%
Māori Agribusiness dairy range	132,403 – 223,264 (kgMS)	$6,603 to $11,075	$649 to $1,393	$0 to $38,505	-5.8% to 5.8%
Pipfruit**	43 (kgN/ha)	$30	0	0	0%
Kiwifruit**	115 (kgN/ha)	$100	0	0	0%
Vegetables (Pukekohe and Canterbury)**	125 - 183 (kgN/ha)	$300 to $440	0	0	-0.03 to -0.05%

Farm Type	Key farm information (kgMS, total stock units, kgN/ha)	2030 - CH_4 $0.35/kg; N_2O $13.80/T CO_2e; C $138/T CO_2e			
		Processor levy A+B	EMC credit	SMC credit	% change in EFS
North Island hill country	4,841 (su)	$20,852	$5,230	$6,376	-4.6%
North Island intensive	2,745 (su)	$21,401	$2,772	$4,200	-10.0%
South Island hill country	9,751 (su)	$15,674	$1,163	$8,486	-3.2%
South Island deer	7,037 (su)	$19,389	$5,285	$8,486	-2.5%
South Island mixed cropping	2,850 (su), 215 (kgN/ha)	$24,358	$0	$1,633	-7.2%
Māori agribusiness sheep + beef*	3,733 – 7,843 (su)	$33,304 to $60,832	$4,140 to $37,392	$13,637 to $101,293	-2.5% to 10.6%
Canterbury dairy	349,135 (kgMS)	$55,290	$4,823	$1,874	-4.9%
Taranaki dairy	118,296 (kgMS)	$18,664	$2,584	$1,506	-4.4%
Waikato/Bay of Plenty dairy	134,925 (kgMS)	$21,679	$904	$977	-5.2%
Māori agribusiness dairy range	132,403 – 223,264 (kgMS)	$21,061 to $33,847	$2,111 to $4,533	$0 to $62,586	-18.3% to -6.4%
Pipfruit**	43 (kgN/ha)	$100	0	0	0%
Kiwifruit**	115 (kgN/ha)	$329	0	0	-0.01%
Vegetables (Pukekohe and Canterbury)**	125 - 183 (kgN/ha)	$974 to $1,426	0	0	-0.1 to -0.16%

* Māori agribusiness sheep and beef case study farms carry more stock units than the other sheep and beef case study farms. See Appendix 3 for more details.

** Horticulture economic impact is expressed as % of cash operating surplus. While orchard trees and vine sequester carbon, there has been minimal expansion in hectares in pipfruit and kiwifruit since 2008, so SMCs are unlikely to be claimed. The cost of applying for an EMC will be a barrier for low emitters. No EMC rebates are assumed to be claimed by horticultural or arable growers.

Recycling revenue

At the assumed prices described above, a processor-level split-gas levy would raise revenue of around $137 million per annum in 2025 and up to $590 million per annum.

The following table illustrates the activities revenue could be recycled into, and potential associated costs.

Areas for recycle revenue	Amount
Research and development	$10m per annum. This is an indicative value, there is work underway on a Research and Development Strategy to inform this, including consideration of current investment by government and sector.
Payment/credit for on-farm sequestration through an SMC.	$66m – $233m per annum. This is an indicative value, based on current on-farm data and modelling assumptions.
Payment/credit for adoption of approved practices, use of technologies or additional emissions reductions through an EMC.	$21m – $256m per annum. This is an indicative value, based on modelling assumptions.
Administration costs	$14m – $22m per annum share of operational costs, this includes operational costs associated with EMC. This is 50% of the administrator operating cost for levy and EMC/SMC (see section *Administration costs* below for details). These are indicative values and would be informed by principles of cost share between government and participants.

Administration costs

The total estimated operating costs are $6 million per annum ($4 million cost to processors and $2 million for operational costs) and the estimated establishment cost is $4 million.

The costs outlined below include the establishment of the system; on-going administration of the system; and the operating costs to various parties (like processors, farmers). Current estimates suggest the following administration costs, however further work is being done to refine these.

		Establishment cost	Operating cost
Processor-level Hybrid Levy	Administrator		$2m
	Processor		$4m
	Total	**$4m**	**$6m**
Emissions/Sequestration Management Contract (EMC and SMC)	Administrator		$25m to $41m
	Farmer		$8m to $19m (i.e. up to $600 to $1,600 in time per farm)
	Total	**$75m to $125m**	**$33m to $60m**

Annual operating costs are estimated for the period 2025-2030; they include interest and capital payments for the IT system. Establishment costs include the total development cost of the system. The two costs provide different indicators of the administration costs and they should not be added together.

The processor costs are approximately half those of the Processor-level NZ ETS as the Processor-level Hybrid Levy has no transaction costs associated with purchasing NZUs and hedging costs.

The administration costs for the EMC and SMC result in an additional estimated operating cost of $33 million – $60 million per annum ($8 million – $19 million cost to farmers i.e. up to $600 (actions-based) – $1,600 (benchmark-based) in time per farm and $25 million – $41 million operational costs). The additional estimated establishment cost is $75 million – $125 million. The cost per farm is lower than for the Farm-level Levy because it is assumed that farmers with ready access to required data are more likely to apply for an EMC or SMC.

Similarly to the Farm-level Levy, the implementation agency would incur capital costs for the scope and build of the pricing system. Post-2025, the focus would move to operation including EMC and SMC application processing, audit, and compliance.

The administration cost to farmers would start from 2025 and is a result of the time and effort required to apply for an EMC and/or SMC, alongside audit costs.

For more detail, the reports on pan-sector modelling, case studies and administration costs can be found on the He Waka Eke Noa website.

Recognising Carbon Sequestration On-farm

The Farm-level Levy and Processor-level Hybrid Levy pricing systems would offer farms the ability to recognise sequestration from some on-farm vegetation. This would give farms a way to offset some of the financial liability from their emissions.

Some basic principles are useful to understand the Partnership recommendations for recognising sequestration:

- The faster trees grow, the faster carbon is accumulated. Typically, exotic trees grow faster than indigenous trees. However, unharvested forests (i.e. native forests) store more carbon than clear-fell plantations over the long term.
- For a given type of vegetation at a particular location, two broad factors impact sequestration: the stage of growth, and the way it is managed
- The international accounting approach of 'additionality' recognises only 'new' or above 'business-as-usual' sequestration. This approach ensures environmental integrity when using carbon removals or offsets to meet climate targets.
- The amount of carbon that different vegetation types sequester is finite
- When vegetation is removed, it can become a source of emissions. All vegetation types that are recognised would need to be maintained in vegetation or face a liability if they are cleared (permanent categories) or cleared and not replanted (cyclical categories).

What categories of vegetation can farmers and growers be rewarded for?

Through the pricing system, farms could choose to enter many types of vegetation not currently eligible for the NZ ETS. These vegetation types fall into two broad categories: permanent and cyclical.

Permanent vegetation includes planted or regenerated indigenous/native vegetation that would not be harvested and is generally self-sustaining through self-seeding. Land must remain in permanent vegetation and not be cleared. Categories include:

a) Indigenous vegetation established before 1 January 2008: At least 0.25ha of land wholly or predominantly in indigenous woody vegetation[6] either planted, regenerated, or a combination. Stock must be excluded from the area. For regenerating, a seed source needs to exist within 100m radius from centre of vegetation area.

b) Indigenous vegetation established on or after 1 January 2008 and also not forested at or prior to 1 January 1990: At least 0.25ha of land wholly or predominantly in indigenous woody vegetation either planted, regenerated, or a combination, that was in pasture prior to 1 January 2008. For regenerating, a seed source needs to exist within 100m radius from centre of vegetation area. A declaration will be required stating that the land was not in vegetation prior to 1 January 1990.

c) Riparian vegetation established on or after 1 January 2008: Plantings suited to margins and banks of waterways including wetlands, minimum of 1m wide from the edge of the bank of the waterway/wetland. Predominantly woody vegetation including indigenous and/or a mix of non-indigenous plants used for environmental benefit. Non-woody vegetation such as flaxes and toetoe are included but must not be the predominant species.

NZ ETS-eligible indigenous forest would be eligible to be entered into the He Waka Eke Noa system.

[6] indigenous woody vegetation: includes gorse/broom (as a nursery crop for indigenous species if seed is present), manuka and/or kanuka, matagouri, mixed broadleaf/scrub such as swamp maire, five finger, coprosma, wineberry, lemonwood, cabbage trees, totara/kahikatea, old growth cut-over, and beech.

Cyclical vegetation is defined as vegetation that is planted and may be felled and re-established. This kind of forest is not self-sustaining and needs to be replanted to ensure its continuation. To be eligible for the system, all cyclical categories must have been planted on or after 1 January 2008.

Categories include:

a) Perennial cropland: An orchard and/or vineyard greater than 0.25ha in size that is established on or after 1 January 2008.
b) Scattered forest: Minimum of 0.25ha for any area counted with minimum stocking rate of 15 stems per hectare. Scattered forest is not eligible if it is >1ha, and >30% canopy cover at maturity, and >30m wide (i.e. once it meets the NZ ETS criteria).
c) Shelterbelts: A linear vegetation feature consisting of one or more rows of trees and/or shrubs planted on or after 1 January 2008 with a minimum linear canopy cover of 90%. The shelterbelt is not eligible if it is >1ha, and >30% canopy cover at maturity, and >30m wide (i.e. once it meets the NZ ETS criteria).
d) Woodlots/tree-lots: Up to 1ha and at least 0.25ha of tree species that have greater than 30% canopy cover.

NZ ETS-eligible exotic forest would not be eligible for the He Waka Eke Noa system, as it can already be recognised through the NZ ETS. The Partnership aims to avoid creating further incentive for planting exotic forests.

How will farmers and growers be rewarded for their on-farm sequestration?

The Farm-level Levy and Processor-level Hybrid Levy systems would recognise sequestration on-farm by following the international accounting approach of '**additionality**'. This means only 'new' or above 'business-as-usual' sequestration is rewarded. This approach ensures environmental integrity when using carbon removals or offsets to meet climate targets. Additionality is usually determined by setting a year as a baseline.

The system would reward sequestration by following the additionality approach in two ways:

1. Setting a baseline year so any sequestration in new vegetation established on or after 1 January 2008 is considered additional
2. Setting a baseline of 'business-as-usual management' so that any sequestration associated with ecological/vegetation management is considered additional. The use of this baseline allows recognition of vegetation established prior to 1990.

The Partnership considered the trade-offs between different baselines. An earlier baseline could allow for additional vegetation to be recognised at a higher rate but subsequently requires additional proof and verification. The 2008 baseline is easier to prove and verify, and still allows farms to be recognised for on-farm sequestration.

Ecological/vegetation management refers to targeted management of pre-2008 indigenous vegetation that recognises specific ecological needs of a planted or regenerating area of indigenous vegetation. The minimum standard to meet this is stock exclusion. The ability to recognise additional actions such as targeted, active pest and weed control, and enrichment planting may be included. Where this is recognised, this would receive a slightly higher value for sequestration.

How will sequestration from permanent categories be calculated?

Indigenous vegetation established before 1 January 2008 would be rewarded with an annual rate based on additional sequestration from management action. Farmers would need to provide proof of active management (stock exclusion).

Indigenous vegetation established after 1 January 2008 would be rewarded with an annual sequestration rate based on yearly accumulation of carbon. There would be no area limit for how much permanent vegetation could be recognised, as long as it met the definition.

How will sequestration from cyclical categories be calculated?

Cyclical vegetation would be rewarded by recognising the long-term average carbon stock. This is the average carbon after considering losses from harvesting and gains from replanting. There would be different sequestration rates and long-term averages for different vegetation types.

Any cyclical vegetation eligible for the NZ ETS would not be eligible for this system.

What is the audit and verification process for sequestration?

For audit and verification, sequestration would need to be captured in an online mapping system. To minimise system duplication and administration costs, this would take into consideration existing systems and programmes such as NZ ETS and Freshwater Farm Planning.

What if my sequestration is greater than my emissions?

For most farms or collectives, the areas of eligible sequestration are unlikely to be greater than emissions. For the small number of farms where sequestration may be greater than emissions, He Waka Eke Noa is considering providing a credit to be used against future liabilities or a financial payment.

How are Te Ao Māori interests and values recognised?

The Partnership recognises that Māori have a unique relationship with the natural world and place significant cultural value on indigenous vegetation. Many species are considered taonga, are sources of food, traditional medicine, and indicators of a healthy environment. Respect and caring for indigenous vegetation is central to the interconnected relationship Māori have with these taonga.

Considering policy design through a Te Ao Māori perspective aims to help identify what this could look like in practice. There is ongoing work to ensure cultural values and practices are integrated within the new system.

What if I remove vegetation/deforest?

When vegetation is removed, it can become a source of emissions. Vegetation recognised for sequestration in the system would face liabilities and compliance penalties if this vegetation was cleared. Cyclical vegetation would only face liabilities and compliance penalties if the vegetation was not replanted.

What if there is an adverse event like a flood, drought, or earthquake, that damages my vegetation?

If an area of vegetation were significantly damaged or destroyed by an adverse event, the farm would not face any penalty, but would no longer receive recognition for the sequestration in that area until it reached the same state it was in prior to the adverse event.

Will additional sources of sequestration be recognised in the future?

Better measurement and recognition of sequestration occurring on farms is a priority for the Partners. These include more accurate assessment of the sequestration rates or trees on farm and also additional sources of sequestration (e.g. soil carbon, wetlands, and tussock) may be recognised in the system in the future. For example, soil scientists have concluded that it should be possible to include changes in soil carbon in a pricing system in the future if adequate investment is made into research and development, but current scientific knowledge is not sufficient. For more detail, the report on soil carbon can be found on the He Waka Eke Noa website.

What choices will a farmer or grower need to make?

Farms could choose whether to enter NZ ETS eligible indigenous vegetation into the system or NZ ETS. They could not enter the same area of vegetation into both systems.

Farms would also need to decide what on-farm vegetation they want to be recognised. There would be liabilities associated with removing any recognised vegetation.

Comparison of sequestration currently in NZ ETS and proposed in the new pricing system.

Type of Vegetation	NZ ETS	He Waka Eke Noa
Exotic forest: more than 1ha exotic, 30 metre canopies	Eligible	Not eligible
Perennial cropland: at least 0.25ha orchards & vineyards, associated with perennial cropland planted on or after 1 January 2008	Not eligible	Eligible
Small woodlots: up to 1ha and at least 0.25ha of tree species with greater than 30% canopy cover, planted on or after 1 January 2008.	Not eligible	Eligible
Scattered trees: minimum of 0.25ha for any area counted with min stocking rate of 15 stems/ha planted on or after 1 January 2008. May include shelterbelts.	Not eligible	Eligible
Indigenous vegetation post-1989	Eligible: post-1989 native forest can be registered in NZ ETS, proof needed the land not in forest prior to 1 January 1990.	Eligible: indigenous vegetation planted on or after 1 January 2008 rewarded with annual sequestration rate based on yearly accumulation of carbon. Indigenous vegetation planted before 1 January 2008 would be rewarded with an annual rate based on additional sequestration from management action.
Indigenous vegetation pre-1990	Not eligible	Eligible with reward for active management of vegetation.
Riparian	Not eligible	Eligible

The Government will consider recommendations and make final decisions for recognising on-farm sequestration taking into account the work of He Waka Eke Noa and consultation with stakeholders, including other sectors.

Summary of Options

	Backstop: Agriculture in the NZ ETS	Option 1: Farm-level Levy	Option 2: Processor-level Hybrid Levy
Who is responsible for reporting and paying for emissions?	Meat and dairy processors, synthetic N-fertiliser manufacturers/importers.	Farms that meet the farm definition either individually or as part of a collective.	Meat and dairy processors, synthetic N-fertiliser manufacturers/importers. Farms and collectives can apply for payments via an Emission Management Contract (EMC).
How are emissions calculated?	Tonnes product (meat, milk solids, synthetic N-fertiliser) multiplied by a national emissions factor to determine emissions per unit of product (output).	Central calculator that includes a simple and detailed method to determine actual emissions at farm-level.	Tonnes product (meat, milk solids, synthetic N-fertiliser) multiplied by a national emissions factor to determine emissions per unit of product (output).
How are emissions priced?	Participants pay the carbon price of the day in NZ ETS by purchasing and surrendering NZUs, but also receive 95% free allocation reducing by 1 percentage point each year	Unique levy rate for CH_4 and long-lived gases (N_2O and CO_2) would be a discounted rate of the NZ ETS carbon price. Minister/s responsible for setting the levy seek and consider the advice of an external advisory group.	Unique levy rate for CH_4 and long-lived gases (N_2O and CO_2) would be a discounted rate of the NZ ETS carbon price. Minister/s responsible for setting the levy seek and consider the advice of an external advisory group.
How can emissions be offset with sequestration?	NZ ETS eligible forests can be entered into the existing NZ ETS.	Emissions are directly offset by sequestration from some vegetation types not included in NZ ETS. This includes: • Indigenous/native vegetation planted or regenerating vegetation • Perennial cropland (orchards and vineyards) • Scattered trees and small woodlots established on or after 1 January 2008 that are not NZ ETS eligible exotic forest.	Rewards the same categories and sequestration rates as described in Option 1: Farm-level Levy through a Sequestration Management Contract (SMC).
How will the revenue from the system be used?	Government intends that any revenue raised through the backstop would be invested back into the agricultural sector to support further emissions reductions. This could include paying for sequestration not eligible for the NZ ETS (e.g. riparian plantings).	The revenue raised through the levy would be invested back into the agricultural sector to support lower emissions food production and generate further emissions reductions through research and development or actions on-farm that help reduce emissions, including uptake of new technology.	The revenue raised through the levy would be invested back into the agricultural sector to generate further emissions reductions through research and development or to reward actions on-farm that help reduce emissions via an EMC.

	Backstop: Agriculture in the NZ ETS	Option 1: Farm-level Levy	Option 2: Processor-level Hybrid Levy
Key advantages	Low-cost system to administer/ collect revenue.	Farmers pay for their actual on-farm emissions rather than estimated emissions based on national averages. Treats CH_4 and long-lived gases (N_2O and CO_2) differently. Farmers who have taken early action to reduce emissions will face a lower emissions cost because emission reductions from on-farm efficiencies and mitigations are recognised in the tool to calculate on-farm emissions. Farmers who have taken early action to maintain and increase sequestration will be rewarded because this includes recognising sequestration associated with existing vegetation (if it meets He Waka Eke Noa requirements).	Low-cost system to collect revenue. Treats CH_4 and long-lived gases (N_2O and CO_2) differently. EMCs could make a processor-level levy more effective at reducing emissions, and recognise efficiencies and mitigations taken up by farms. Provides a transitional step towards a farm-level pricing system. Farmers who have taken early action to maintain and increase sequestration can be rewarded via an SMC because this includes recognising sequestration associated with existing vegetation (if it meets He Waka Eke Noa requirements).
Key disadvantages	Does not treat CH_4 and long-lived gases (N_2O and CO_2) differently so misaligns with emissions targets. No control over price. Does not recognise individual farms for actions they take to reduce emissions. A processor-level price is blunt and is unlikely to be effective at reducing emissions, but the revenue raised would be redirected into initiatives to help reduce sector emissions.	Potential to use rebates to maintain an incentive to reduce emissions with a lower net price but to date no practical and equitable rebates have been identified. High cost to administer both to farms (mostly in time) and implementing agency.	A processor-level price signal is blunt and does not recognise individual farmers for the actions they take to reduce emissions. To be effective at incentivising emission reductions some Emissions Management Contracts will require a benchmark from which to measure change. This could disadvantage those who have taken early action to reduce or already have low emissions.

Trade-offs

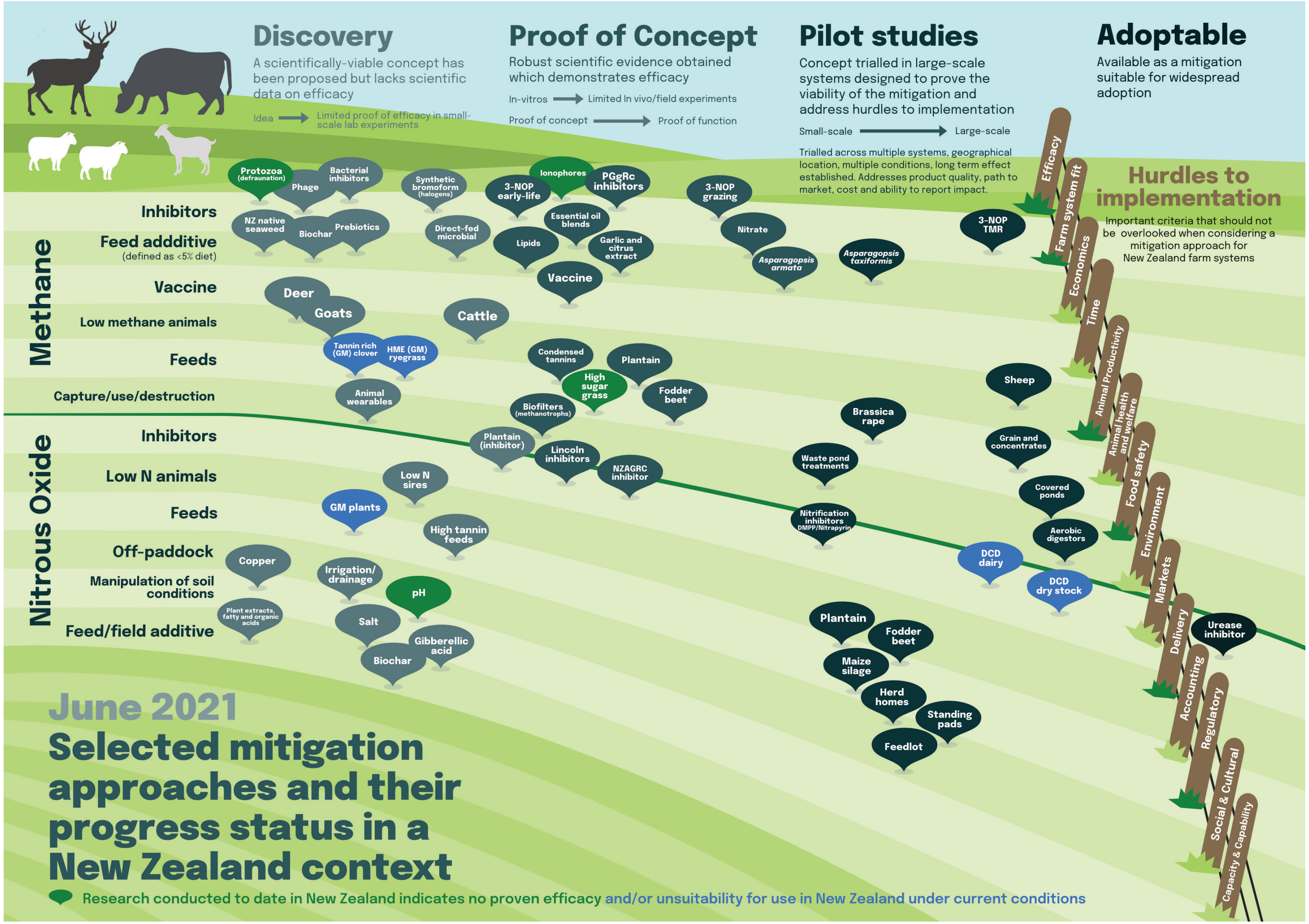
These options perform differently against the criteria, and the Partnership has to consider the trade-offs between the options. The key trade-offs are:

- The more complexity in the system (e.g. farm-level reporting, vegetation types, accuracy of emissions calculation) will increase the cost of administration for the system but will recognise additional on-farm actions, mitigations, and sequestration
- The cost of administration for the system will impact on the amount of revenue available to recognise sequestration and support additional agricultural emissions reductions
- The cost of sequestration in the system will impact on the revenue available to administer the system and support additional agricultural emissions reductions
- The cost and availability of future mitigation technologies to reduce emissions has a significant impact on emission reductions and resulting impacts on profit and production.

Appendix 1: Other options considered for farm-level pricing

Option considered	Description	Key considerations/reasons for not progressing
Baseline and credit levy	Participants would face a penalty or incentive, based on a performance baseline. Farms that don't meet the baseline would incur a penalty while farms that exceed it would receive a credit. The baselines would be regularly revised to recognise changes in emissions performance levels.	The main disadvantage is how to determine the performance baseline. If the performance baseline is determined by outputs (milk/meat) efficiency, then farms such as breeding operations and store farms would be excluded.
Single-market cap and trade scheme	Farms would participate in a separate agricultural trading scheme to the NZ ETS. A single cap for emissions would be set with all gases converted to CO_2e using GWP_{100}. Farms would surrender units for the agricultural greenhouse gases they emit within a given period. It would be up to the emitter to decide whether to reduce their emissions or purchase units. The price the emitter pays for units would be set by supply and demand within the market.	The main disadvantage was cost and complexity for farms. Farms would be required to engage with and learn an unfamiliar system. A requirement to trade units adds cost, complexity, and risk for farms.
Split-market cap and trade scheme	Farms would participate in a separate agricultural trading scheme to the NZ ETS. Two caps would be set: one for long-lived gases, and one for short-lived gases. Farms would surrender separate units for CH_4 and N_2O emitted within a given period. It would be up to the emitter to decide whether to reduce their emissions or purchase units. The price the emitter pays would be set by supply and demand within the market.	While this option allowed for a split-gas approach it still posed cost and complexity challenges. In addition to the challenges associated with a single-market cap and trade, farms would trade two different types of units, with two prices driven by the two different caps. This creates additional administrative cost and complexity. This option could create inequity across sectors as it could result in sectors outbidding each other.
Good Management Practice (GMP) based levy	Farms could opt to adopt good management practices or technologies or incur a cost relative to the emissions reduction which would have occurred if this action had been adopted. If a mitigation exists that has the potential to reduce on-farm emissions by a large amount, the farm would face a correspondingly large levy cost. However, if no mitigations were available to the farm, no cost exposure results.	A core disadvantage of this approach is in defining 'good management practice' and implementing this in practice. The principle of recognising GMP could be achieved when farms adopt mitigations/apply GMPs to reduce emissions and it is reflected in the emissions calculation for A and B (i.e. lower emissions), and good practice through increasing sequestration is recognised through defining 'C'. GMP is also supported through inclusion of greenhouse gases in farm planning.

Appendix 2: Biological Emissions Research Science Accelerator (BERSA) – Future mitigations



Appendix 3: Case study farm description and methodology

Twenty farm systems show the financial impacts of a range of pricing systems and price settings, as well as on-farm efficiency gains that could reduce emissions. These are representative farm models constructed in Farmax, based on the B+LNZ Economic Service data for the sheep and beef farms, and DairyNZ statistics for the dairy farms. The Māori farm case studies are based on actual farms which include six trusts, and two incorporations. Two of the trusts are administered by Te Tumu Paeroa. At this stage, where multiple land uses exist within the larger-scale entities, only one has been reflected in the case study. The range of impacts across these entities for each sector are presented in this document.

All farms were modelled using Farmax except for the South Island mixed cropping farm (based on an actual farm), noting Farmax doesn't suitably model crop production. Model outputs include:

- Agricultural GHG levy price
- Price impact on milk solids, beef, sheep meat, venison, and N-fertiliser
- Farm EFS less the levy price, and levy price and mean debt
- Percentage farm EFS change after levy price.

Sheep, Beef and Deer Farms		North Island Hill Country	North Island Intensive	South Island Hill Country	South Island Deer	South Island Mixed Cropping	Māori Agribusiness Sheep and Beef 1	Māori Agribusiness Sheep and Beef 2	Māori Agribusiness Sheep and Beef 3
Description		Breeding and finishing operation.	Sheep and cattle breeding and finishing operation with all lambs finished. Steers, bull-beef, and yearling dairy grazers (May to May contract).		The farm is the same as South Island hill country but with the sheep and beef operation scaled back to 53% of the operation and 47% deer. The model used 5-year average for schedule and velvet prices.	On the plains and irrigated by pivot and lateral spray irrigation. Soils are versatile, of optimum fertility, free draining and suitable for intensive cropping (LUC 1 & 2).	Central North Island sheep and beef farm with breeding ewes, finishing cattle and dairy grazers.	Breeding operation including breeding ewes and cattle.	Breeding operation including breeding ewes and cattle.
Area		Total area of 525ha with 507ha effective, including 53ha flats, 238ha rolling hills and 234ha steep.	Total area of 290ha with 278ha effective, mostly flats.	Total area of 1,562ha with 1,532ha effective, including 200ha flats, 409ha rolling, 326ha steep and 627ha tussock.	Total area of 1,562ha with 1,532ha effective, including 200ha flats, 409ha rolling, 326ha steep and 627ha tussock.	Total area of 261ha with 245ha effective	Total area of 966ha with 908ha effective.	Total area of 1,079ha with 750ha effective.	Total area of 1,459ha with 1,153ha effective
Livestock - Sheep	Ewe hogget	420	420	969	485		820	495	1,600
	MA ewes	1,680	660	3,591	1,796	250	2,200	1,274	5,345
	Lambs (weaned)	2,127	939	4,434	2,216	2,600			
	Rams	25	10	36	18		30	12	85
	Mixed hogget						40	1,017	
	Mixed sheep						20		
	Total sheep	**4,252**	**2,029**	**9,030**	**4,515**	**2,850**	**3,110**	**2,798**	**7,030**

Sheep, Beef and Deer Farms		North Island Hill Country	North Island Intensive	South Island Hill Country	South Island Deer	South Island Mixed Cropping	Māori Agribusiness Sheep and Beef 1	Māori Agribusiness Sheep and Beef 2	Māori Agribusiness Sheep and Beef 3
Livestock - Beef	MA cows	157		279	140				270
	Dairy grazers		90						
	Heifer calves	79		150	75				
	1-year heifers	78		69	35		689		144
	2-year heifers	37		67	34				144
	Steer calves	79	90	150	75				
	1-year steers	77	89					14	97
	2-year steers	78	90					69	95
	Bulls								13
	Breeding bulls	4		6	3				
	Bull calves		120						
	1-year bulls		119				182	216	50
	2-year bulls		118				148	636	
	Total beef	**589**	**716**	**721**	**362**		**1,019**	**935**	**813**
Livestock – Deer	Hinds				900				
	2-year hinds				185				
	1-year hinds				190				
	Hind fawns (weaned)				280				
	Stag fawns (weaned)				280				
	1-year stags (sold)				230				
	Breeding stags				29				
	Total deer				**1,865**				
Livestock – Velveting stags	1-year stags				50				
	2-year stags				45				
	MA stags				200				
	Total stags				**295**				
Crops grown	Wheat					10.5 t/ha			
	Barley					8 t/ha			
	Ryegrass seed					2,480 kg/ha			
	Peas - garden					5 t/ha			
	Clover					1,000 kg/ha			

N-Fertiliser (kgN/ha)		7	21	3	3	215	6	10	0
Notes		All lambs are finished, except replacements. Lambing percentage is 130%. All steers are kept and sold as two-year-olds and all heifers are sold at 20 months, except for 25% replacements.	Lambing percentage is 145%. All lambs are sold prime. Steers bought at seven months and fattened to 2.5 years; bull calves bought at four months and fattened to the same age.	MA cows grazed on tussock and brought down for calving (Sept to Jan). MA ewes grazed on tussock from mid-January until the beginning of April. Lambing percentage is 128%. 27% of lambs sold prime the rest store. All calves except replacements sold as weaners.	Lambing percentage is 128%. The surplus weaner hinds are sold at weaning while the weaner stags are kept and sold the following spring.	Lambing percentage is 180%. 60% of total annual farm revenue is earned from crop sales 40% from lamb finishing and trading. Breeding ewes used to manage crop residue and strategic grazing of crops	Lambing percentage is 134%.	Lambing percentage is 130%	Lambing percentage is 130%
Feed		Supplements made include 10ha (30 tonnes) of swedes/kale, 10ha (8 tonnes) of leafy turnips (8t/ha), and 240 bales of baleage.	Supplements made include 12ha (108 tonnes) of plantain and 610 bales of baleage.	Supplements made include 20ha (90 tonnes) of swedes and 600 bales of baleage.	All other aspects of the farm system are the same apart from an additional 10t of oat grain bought in.	No supplement imported.	Supplements made include 17ha (162 tonnes) Chou and 42ha (126 tonnes) pasture silage.	No supplements are made or bought.	A total of 57ha of forage crops are grown and fed on farm. No supplements are made or bought.
Economic Farm Surplus		$201,176 or $397/ha	$144,063 or $518/ha	$187,327 or $122/ha	$228,268 or $149/ha	$314,253 or $1,283/ha	$529,585 or $583/ha	$494,397 or $659/ha	$731,113 or $634/ha
Vegetation	Riparian	8.0	3.0	2.0	2.0	1.0			159.0
	Pre-2008 native		4.5	15.1	15.1	1.0	54.0	140.0	97.0
	Post-2008 native	2.0				1.0			
	Space planting	2.6							
	Macrocarpa		0.9	0.9	0.9				
	Shelterbelts			1.0	1.0				
	Scattered trees			2.0	2.0				
	Total area	12.6	8.4	21.0	21.0	3.0	54.0	140.0	246.0
	Sequestration (CO_2e/ha)	46.2	30.4	61.5	61.5	11.8	98.8	256.2	734.0

Dairy Farms		Canterbury	Taranaki	Waikato/Bay of Plenty	Māori Agribusiness Dairy 1	Māori Agribusiness Dairy 2	Māori Agribusiness Dairy 3	Māori Agribusiness Dairy 4	Māori Agribusiness Dairy 5
Area		Total area of 240ha with 233ha effective, and effluent block of 86ha.	Total area of 112ha with 107ha effective.	Total area of 136ha with 131ha effective.	Total area of 213ha with 204ha effective.	Total area of 160ha with 153ha effective.	Total area of 190ha with 170ha effective.	Total area of 480ha with 234ha effective.	Total area of 267ha with 219ha effective.
Livestock - Dairy	MA cows	809	298	373	610	450	515	600	599
	1-year heifers	182	64						
	Heifer calves (born)	186	65	81					
	Bobby calves (sold)	623	227	289					
KgMS		349,135	118,296	134,925	223,264	132,403	183,483	165,318	192,362
N-Fertiliser (kgN/ha)		163	139	120	56	87	150	34	134
Notes		Heifers are grazed on farm.	Heifers are grazed on farm.	Heifers are grazed off farm.	Heifers grazed off farm.	Heifers are grazed off farm.	Heifers are wintered on farm.	Heifers grazed off farm.	Heifers are grazed off farm.
Feed		215 tonnes of silage, 145 tonnes of barley grain and 5.7 tonnes of calf meal are bought. Supplements made include 200 tonnes of fodder beet and 13 tonnes of pasture silage.	Supplements made include 72 tonnes of turnips and 62.5 tonnes of pasture silage. 113 tonnes of maize silage, 42 tonnes of hay, 49.8 tonnes of palm kernel expeller, 19.3 tonnes of distillers grain and 2.2 tonnes of calf meal is bought.	Supplements made include 106 tonnes of maize silage and 25 tonnes of pasture silage. 85 tonnes of maize silage, 190 tonnes of palm kernel expeller and 2.7 tonnes of calf meal is bought in.	Supplements made include 9ha (108 tonnes) kale, 8ha (56 tonnes) bulb turnips and 20 tonnes pasture silage. 215 tonnes of palm kernel expeller, 230 tonnes of pasture silage, 75 hay bales and 5.1 tonnes of calf meal is bought.	Supplements made include 13 ha (130 tonnes) bulb turnips and 6ha (160 tonnes) maize silage. 33 tonnes of palm kernel expeller and 3 tonnes of calf meal is bought.	Supplements made include 164 tonnes of maize silage, 14ha (119 tonnes) bulb turnips, 1ha (18 tonnes) fodder beet and 50 tonnes of pasture silage. 220 tonnes of palm kernel expeller is bought.	Supplements made include 60 tonnes of pasture silage and 150 bales of baleage. 140 tonnes of palm kernel expeller and 25 bales of baleage are bought.	Supplements made include 88 tonnes of pasture silage. 321 tonnes of palm kernel expeller is bought.

Dairy Farms		Canterbury	Taranaki	Waikato/Bay of Plenty	Māori Agribusiness Dairy 1	Māori Agribusiness Dairy 2	Māori Agribusiness Dairy 3	Māori Agribusiness Dairy 4	Māori Agribusiness Dairy 5
Economic Farm Surplus		$991,267 or $4,254/ha	$334,024 or $3,122/ha	$383,640 or $2,929/ha	$758,268 or $3,717/ha	$103,477 or $676/ha	$546,367 or $3,214/ha	$498,932 or $2,132/ha	$338,135 or $1,544/ha
Vegetation	Riparian	1.5	1.0	1.5				2.0	38.0
	Pre-2008 native	1.0	0.5	1.0			13.0	244.0	
	Post-2008 native	1.0	1.0						
	Space planting								
	Macrocarpa								
	Shelterbelts								
	Scattered trees								
	Total area	3.5	2.5	2.5	0.0	0.0	13.0	246.0	38.0
	Sequestration (CO_2e/ha)	13.6	10.9	7.1	0.0	0.0	23.8	453.5	133.0

Horticulture and Arable Farms	Pipfruit	Kiwifruit	Vegetable production (Pukekohe)	Vegetable production (Canterbury)
Data Source	Hawkes Bay Horticultural Nutrient and Financial Benchmarking Results.	Pers Comm J Benge for Zespri.	Nutrient Performance and Financial Analysis of Upper Waikato Horticulture Growers.	Overseer nutrient modelling of commercial vegetable production.
Area ha	33	31	100	100
N kg/ha	43	115	183	125
Total Emissions (T Co_2e)	0.22	0.77	1.03	0.71
Cash Operating Surplus $/ha	$61,486.00	$98,506.00	$8,831.00	$9,619.00

Appendix 4: Mitigations recognised in Farm-level Levy emissions calculation

	Simple Method	Detailed Method
On-farm Efficiency Gains	Arable/horticulture: Reduced synthetic fertiliser use	Arable/horticulture: Reduced synthetic fertiliser use
	Livestock: Reduce synthetic fertiliser inputs, together with reduced stocking rates and increase production per animal	Livestock: Reduce bought-in supplements and synthetic fertiliser inputs, together with reduced stocking rates and while increasing production per animal
	Livestock: Adjust stocking policy (numbers, species, and ratios)	Livestock: Adjust stocking policy (numbers, species ratios, breeding vs finishing animals, and time on property)
		Livestock: Reducing losses and reproductive issues, and improving health to optimize replacement rates and cull least productive stock earlier
		Livestock: Optimise pasture quality and production per animal
Reduce Total Livestock through Land Use Change	Convert more productive pastoral land to high value arable/ horticultural crops	Convert more productive pastoral land to high value arable/ horticultural crops
	Convert less productive land to planted/ regenerating indigenous or exotic trees	Convert less productive land to planted/ regenerating indigenous or exotic trees
Mitigations: Current		Low CH_4 forages (adjusted CH_4 Emission Factor (EF) per kg Dry Matter Intake (DMI)
		Low N_2O forages (adjusted N excretion per animal type, age, and sex; adjusted N leaching factor)
	Urease inhibitor; Fertiliser incorporation (adjusted ammonia loss factor)	Urease inhibitor; Synthetic fertiliser and manure incorporation (adjusted ammonia loss factor)
Mitigations: In Progress	Low CH_4 sheep Breeding Value (BV) (adjusted CH_4 emissions per head*)	Low CH_4 sheep (BV) (adjusted CH_4 EF per kg DMI[7])
Mitigations: Future	Low CH_4 sheep (vaccines/inhibitors), low CH_4 cattle (vaccines/inhibitors/BV) (adjusted CH_4 emissions per head*)	Low CH_4 sheep (vaccines/inhibitors), low CH_4 cattle (vaccines/inhibitors/BV) (adjusted CH_4 EF per kg DMI)
		Low N_2O cattle (adjusted N excretion)
	Nitrification inhibitors (adjusted N_2O EF and N leaching factor for urine and dung, manure application and synthetic N fertiliser)	Nitrification inhibitors (adjusted N_2O EF and N leaching factor for urine and dung per forage type; for manure application and synthetic N fertiliser)
	Effluent ponds - CH_4 flaring to CO_2; CH_4 biogas harnessing for energy source (adjusted amount of CH_4 emitted).	Effluent ponds - CH_4 flaring to CO_2; CH_4 biogas harnessing for energy source (adjusted amount of CH_4 emitted).
	Covered manure stores (adjusted ammonia loss factor)	Covered manure stores (adjusted ammonia loss factor)

[7] BV for low CH_4 is recorded as percentage reduction in CH_4 emitted per head; research BV on this basis currently available for sheep but has yet to be fully integrated into the genetic evaluation in Beef + Lamb Genetics: estimated completion 2022. The low CH_4 BV integrate the effect of low CH_4 per kg DMI and increased feed efficiency (less DMI per unit of production). For detailed methods, the proposed approach for capturing low CH_4 sheep in GHG calculations is to convert BV to an adjusted CH_4 emitted per kg DMI. In future, BV may be separated into an adjusted CH_4 and increased feed efficiency.

Appendix 5: Mitigations recognised in Emissions Management Contracts (EMC)

	Actions rewarded	Benchmark rewarded
Improve the Efficiency of Pasture and Crop Production		
Minimise N-Surplus through reduced N-fertiliser use	In part	Y
Reduce N-Surplus through reduced supplementary feed	In part	Y
Inhibitor coated urea	Y	Y
Reduce Total Feed Eaten		
Convert less productive land to indigenous or exotic trees	In part	Y
Cull less productive stock early	In part	Y
Adjust stocking policy, e.g. breeding vs finishing ratios, breeding cow longevity, dairy-beef, hogget mating, lambing %, finish faster	N	Y
Reduce stock losses and optimise replacement rates	In part	Y
Increase animal performance through genetic selection	In part	Y
Match Feed Demand with Pasture Growth and Utilisation		
Convert more productive land to high-value crops	N	Y
Reduce bought-in supplementary feed	N	Y
Use of lower protein forages	In part	Y
Optimise pasture quality and production to meet feed demand	N	Y
Improve Effluent Management		
Better effluent management, e.g. effluent as a fertiliser, methane capture	In part	Y
Future Technologies		
Low emissions genetic selection	Y	Y
Feed additives - 3NOP	Y	Y
Vaccines	Y	Y
Nitrification inhibitor	In part	Y

Our Partners

Apiculture New Zealand
Beef+Lamb New Zealand
DairyNZ
DCANZ
Deer Industry New Zealand
Ministry for the Environment
FOMA
FAR
Federated Farmers of New Zealand
Horticulture New Zealand
Irrigation New Zealand
MIA Innovation Limited
Ministry for Primary Industries