Analysis of Pricing Options

Update 9th December 2021

Contents

Released under the Official Information Act 1982

1 Introduction, Pricing Options and Assumptions

1.1 Updates Included in this Note

This note updates previous analyses of the impacts of He Waka Eke Noa pricing options. It includes:

- A narrower range of prices.
- The inclusion of a high technology scenario that assumes greater availability of technology options, including higher uptake rates and lower costs.
- An additional pricing option that combines a farm level levy with some elements of the processor hybrid.

1.2 Pricing Options

The note summarises the analysis of four emissions pricing options:

1. Processor-level inclusion of agriculture in the NZ emissions trading scheme (P-ETS);
2. Farm-level levy (FLL) on emissions;
3. Processor hybrid (PH), including a processor-level revenue-raising charge on emissions with some of the money used to pay for on-farm emission reductions via an Emission Management Contract (EMC); and
4. Farm level levy with limited-scope EMC (FLL+). This is a variant of 2 and 3 that involves some of the FLL revenue being used to pay for on-farm emission reductions via subsidised costs for emission reduction technologies only.

In broad terms:

- The P-ETS has effects on emissions only via a reduction in the value of output (and incentives for emission reductions from lower production) and an increase in the costs of fertiliser input (providing incentives for increased efficiency of use).
- The FLL is designed primarily to provide incentives for emission reduction via the direct price on emissions at the farm level, but also affects farm profits and thus can result in some reduced production.
- The PH is designed with a levy that is primarily to raise revenue, with the revenue then used to purchase emission reductions, with emission reduction payments (ERPs) under EMCs.
- The FLL+ has elements of the FLL and of a reduced form of PH.

However, despite these broad design differences, in practice all options that raise revenue can make similar use of the revenue raised: paying for emission reductions, payment for

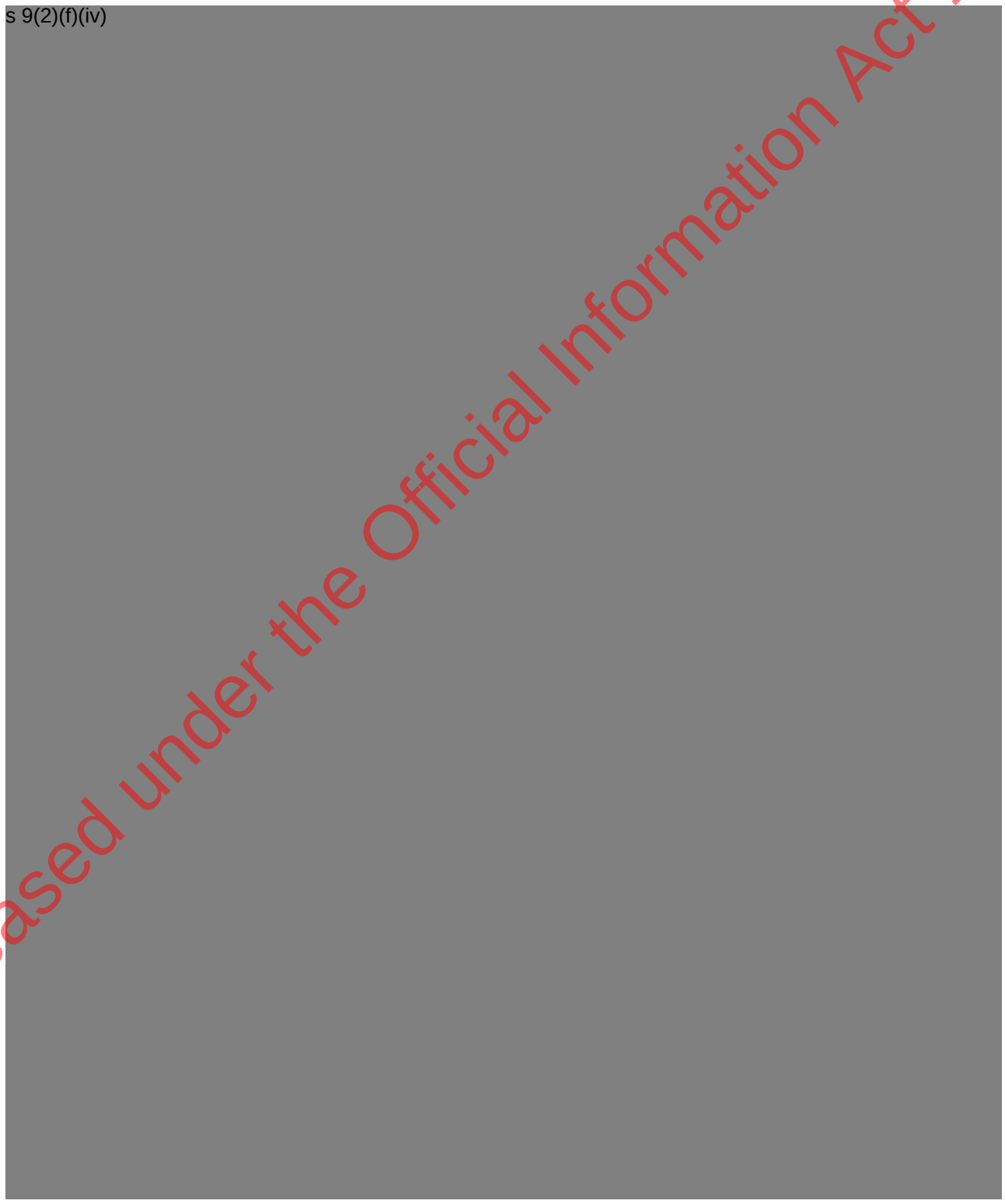
Released under the Official Information Act 1982

sequestration, system administration costs and funding research and development (R&D), particularly into technical emission reduction options.

The options are compared against a baseline which includes current policy settings: the implementation of freshwater regulations and forestry included in the ETS. The pricing options are assumed to start in 2025 with results reported for 2025 and 2030.

1.3 Prices

s 9(2)(f)(iv)



Released under the Official Information Act 1982

1.4 Scaling Up

The results are produced from separate models for dairy and for sheep & beef. These are combined to produce an overall assessment of the impacts on total agricultural emissions. The data included in the individual models are slightly different from the totals in the national inventory, so adjustments are made to aggregate the effects at the sectoral level (Box 1).

Box 1 Calculation of Scaling Factors from Sectoral to Agriculture total

Table 3 shows the emissions included in the models for sheep & beef and for dairy, alongside the numbers calculated in the national inventory for the 2017 base year (as reported in greater detail by agricultural sector by the Climate Change Commission) and the modelled numbers as a percentage of the inventory numbers. It summarises emissions as tonnes of methane (CH_4) and tonnes of CO_2 equivalents (CO_2-e) for CH_4, nitrous oxide (N_2O) and CO_2 based on global warming potentials (GWP_{100}) of 25 and 298 for CH_4 and N_2O respectively.[2] The numbers in the models are different because of slightly different assumptions and exclusion of some farms, eg the sheep & beef model includes commercial farms only. Other agriculture is included here using data from the inventory only.

Table 3 Agriculture Sector emissions 2017

GHG	Sheep & Beef Model*	Sheep & Beef Inventory	Dairy Model*	Dairy Inventory	Other Agri-culture	Total Model*	Total Inventory
CH_4 (t CH_4)	511,536 (93%)	552,872	616,132 (104%)	592,444	28,418	1,156,085 (98%)	1,174,508
CH_4 (t CO_2-e)	12,788,395 (93%)	13,821,793	15,403,289 (104%)	14,811,105	710,453	28,902,136 (98%)	29,362,699
N_2O (t CO_2-e)	1,824,125 (81%)	2,243,349	3,158,703 (72%)	4,379,939	467,103	5,449,931 (77%)	7,094,394
CO_2 (t CO_2-e)	272,458 (88%)	308,848	688,527 (104%)	661,949	77,063	1,038,048 (99%)	1,047,861
Total (t CO_2-e)	14,884,977 (91%)	16,373,990	19,250,519 (97%)	19,852,993	1,254,619	35,390,115 (94%)	37,504,954

* Percentages in brackets are modelled numbers as a % of inventory numbers

Source: Inventory data from Climate Change Commission (2021)[3]

In scaling up to an impact on total sectoral emissions, we apply to a percentage of emissions only using the following assumptions:

- Where the percentage in Table 3 is less than 100%, we assume the reduction applies to that percentage of emissions, eg a modelled 1% reduction in sheep & beef CH_4 emissions is assumed to be an actual 0.93% reduction of total sheep & beef emissions and a 0.44% reduction in total agricultural sector CH_4 emissions.
- Where the percentage in Table 3 is greater than 100%, we assume the reduction is the same as modelled, eg a 1% reduction in modelled dairy CH_4 emissions is assumed to represent an actual 1% reduction in dairy CH_4 emissions.

Taking account of emissions not accounted for in the models and the contribution of the individual land uses to total agriculture emissions, the multipliers in Table 4 are used to convert a 1% reduction in land use specific emissions to sectoral emissions. For example, an estimated 1% reduction in sheep & beef CH_4 emissions is estimated to be a 0.44% reduction in agriculture CH_4 emissions.

[2] This uses AR4 GWPs, which is the same as used in the national inventory and for the existing ETS.

[3] Climate Change Commission (2021) Scenarios dataset for the Commission's 2021 Draft Advice for Consultation (output from ENZ model). Accessed at: https://www.climatecommission.govt.nz/get-involved/sharing-our-thinking/data-and-modelling/

Released under the Official Information Act 1982

Table 4 Multipliers to convert land use specific 1% emission reductions to agriculture sector emission reductions

Sector	CH_4	N_2O
Dairy	0.50%	0.45%
Sheep & Beef	0.44%	0.26%

Released under the Official Information Act 1982

2 Aggregate Results

In this Section we summarise the impacts for the agriculture sector in aggregate. The analyses for the individual sectors are given in later sections.

2.1 Baseline

The baseline assumptions are those assumed to occur in the absence of further policy. We estimate the impacts relative to a 2017 baseline, which is that used for the legislated biogenic methane target.[4] The aggregate results are shown in Table 5. The estimated baseline reduction in methane emissions in 2030 is calculated to be 4.4% of 2017 levels, along with a reduction in N_2O emissions of close to 3%.

s 9(2)(f)(iv)

There are significant estimated reductions in sheep & beef farm area and in animal numbers. This is a result of the estimated increased land use change from farming to forestry, incentivised by the NZU price. Modelling the land use change does not differentiate between: (1) part-farm afforestation, in which the additional revenues from forestry would be assumed to stay in the sheep & beef sector and to add to average profits, and (2) full-farm conversion, in which profits would exit the industry. Using the first assumption would increase baseline average profit levels and reduce the estimated impacts of the pricing options. Because of the uncertainty over effects at the farm level, we have used the following assumptions:

- Baseline changes in land use and animal numbers in dairy and sheep & beef farms are included as the starting position for the analysis of emissions pricing options. This means there are fewer animals than in 2017.

- Profit impacts for sheep and beef farms are calculated by estimating the additional costs of the emissions pricing system (costs of charges, emission reductions and other, eg administration costs passed on) but estimating the percentage change in

[4] National emission objectives set in the Climate Change Response (Zero Carbon) Amendment Act 2019 require reductions in agricultural emissions. These are:

- Net zero emissions of all greenhouse gases (GHGs) other than biogenic methane (CH_4), but including nitrous oxide (N_2O), by 2050; and
- 24 to 47 per cent reduction of biogenic methane emissions below 2017 levels by 2050, including a 10 per cent reduction below 2017 by 2030.

Released under the Official Information Act 1982

profit relative to original (2017) profit levels without the additional value of the ETS to average profit.

2.2 Revenue Use Assumptions

All the pricing options have revenue requirements, some of which are assumed to be taken from the revenue raised by the pricing mechanism. The components are shown in Table 6.

Table 6 Revenue requirements for individual pricing options

	Administration costs	Sequestration payments	Emission Reduction Payments	R&D
Processor ETS	ü	?	?	ü
Farm Level Levy	ü	ü	?	ü
Processor Hybrid	ü	ü	ü	ü
Farm Level Levy +	ü	ü	ü	ü

All options have administration costs and are assumed to use some revenue for R&D. The He Waka Eke Noa pricing options include the introduction of new options for sequestration to be rewarded, but this could be included as a use of revenue in the processor ETS also.[5] Emission reduction payments (ERPs) are a design feature of the PH but could also be used in the other options. We have included a pricing option that combines the farm level levy with emission reduction payments for a limited set of reduction options using technology only.

2.2.1 Administration Costs

Administration costs differ between the options and with respect to how they are paid. The assumptions used are shown in Table 7. In addition, some option-specific revenue requirements will be paid for by direct charges to farmers under the PH option (as discussed below).

s 9(2)(f)(iv)

[redacted]

[5] This makes the assumption that inclusion of agriculture in the ETS would include some free allocation of NZUs and the sale (by auction) of additional NZUs. The additional auction revenue could be hypothecated for use in the agriculture industry.

Released under the Official Information Act 1982

2.2.2 Funding Additional Sequestration

Under the He Waka Eke Noa pricing options it is proposed that additional sequestration options are available, beyond those currently included in the ETS. This includes:

- Existing pre-2008 native forest that is managed to obtain additional sequestration, eg via fencing to exclude stock;
- Existing, post-2007 native forest that is managed to obtain additional sequestration; and
- Planting of riparian areas, eg areas required to be excluded under existing freshwater regulations.

s 9(2)(f)(iv)

These data have been compiled from a variety of sources and split into those available rapidly and that available later (the additional areas identified in the Beef + Lamb New Zealand survey). It is assumed that:

- 50% of the rapidly available opportunities are taken up in 2025 and 100% by 2030;

Released under the Official Information Act 1982

- of the 'available later' areas, 50% is assumed to be taken up by 2030 and 100% by 2035.

Using these assumptions, if the price paid for sequestration is assumed to be the same as the NZU price, the total revenue requirement might be $66 million in 2025 and $234 million in 2030.

2.2.3 Research & Development

R&D costs are assumed to be $10 million per annum (in current prices) in all options.

2.3 Processor ETS

The processor ETS is modelled using a single set of price assumptions; these are based on the assumed NZU prices in 2025 ($85/t CO_2-e) and 2030 ($138/t CO_2-e), with 95% and 90% allocations in 2025 and 2030 respectively. The aggregate results are shown in Table 9 as the change relative to the baseline in 2025 and 2030. The prices are the effective net prices after the allocation has been provided.

s 9(2)(f)(iv)

The emission reductions are additive to those in the baseline, ie in relation to the biogenic methane target, the estimated 0.8% reduction in CH_4 emissions in 2030 is additional to the baseline 4.4% reduction (Table 5). The results include the impacts on emissions (adjusted for aggregate emissions as discussed above), production of milk and meat and on sectoral profit.

The revenue raised from the charge is reported also. This is assumed to be used to fund R&D and might be used to fund sequestration and ERPs (in which case it becomes a very similar instrument to the PH, apart from the processor ETS using GHG combined emission factors for the charge element).

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

[redacted]

2.4.4 High Technology Assumptions

An alternative set of model runs is presented below using high technology assumptions. This assumes lower prices and higher adoption rates. It makes no appreciable difference in 2025 because of the low availability of any technologies. The 2030 results are shown in Table 14.

There are significantly increased reductions in CH_4, eg 2.3% reduction under the highest price setting compared to a 0.9% reduction in Table 12. The impacts are largely from the greater assumed uptake in the sheep & beef sector.

s 9(2)(f)(iv)

[redacted]

2.5 Processor Hybrid

Under the processor hybrid, revenue is raised from a charge on processors and this is spent on a combination of:

- Administration costs;
- R&D;
- Payments to farmers for verified emission reductions;
- Payments to farmers for verified sequestration.

s 9(2)(f)(iv)

[redacted]

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

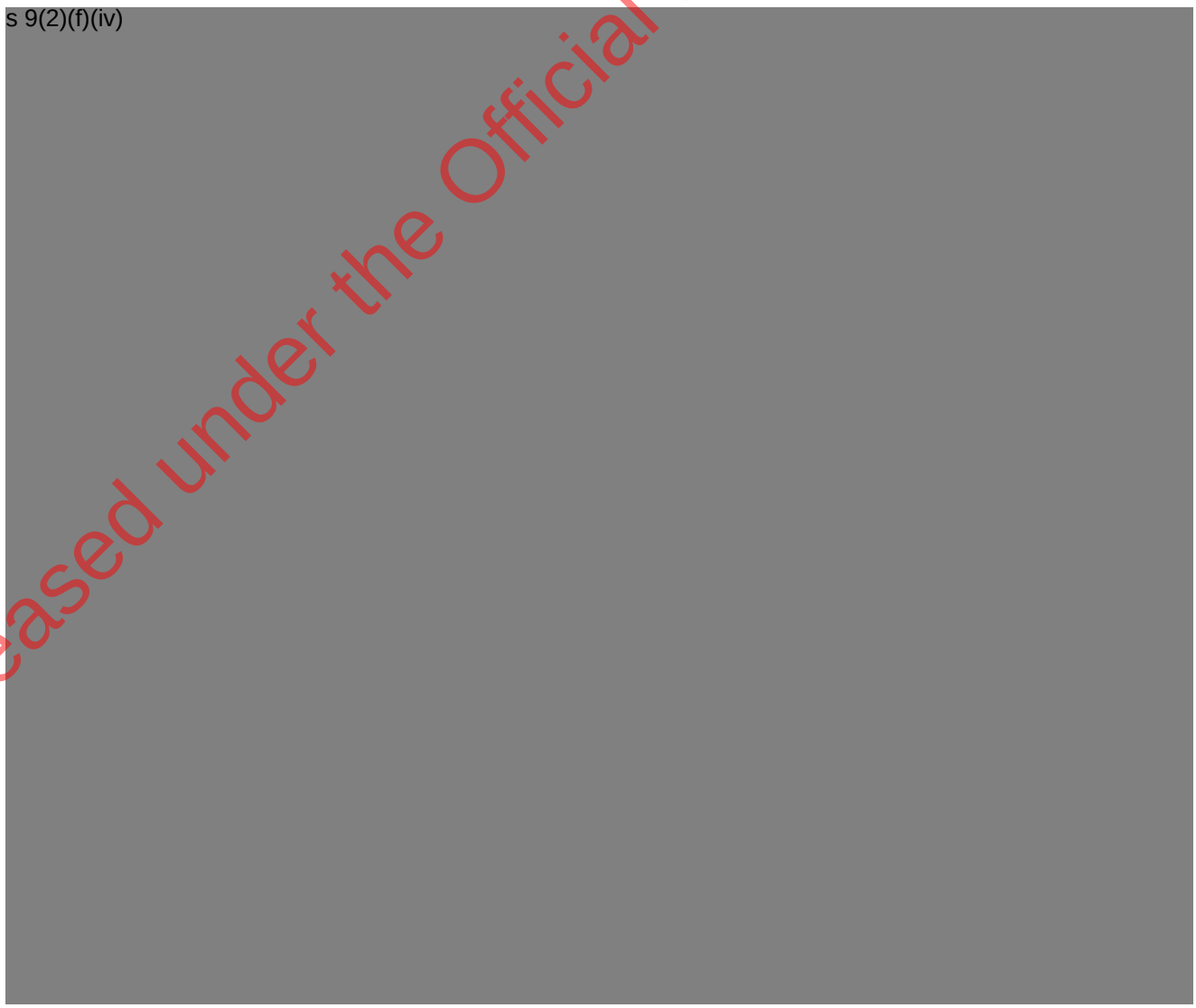
Released under the Official Information Act 1982

s 9(2)(f)(iv)

2.6 Farm Level Levy and EMCs

This option has been recently proposed. It assumes the revenue from the FLL is used to fund the development and application of emission reduction technologies (genetics, vaccines inhibitors). It is modelled as a farm level levy with the assumptions used in the processor hybrid then added, ie payments for emission reductions, although this is limited to technologies rather than including other efficiencies or output reductions.

s 9(2)(f)(iv)



Released under the Official Information Act 1982

2.7 Conclusions

- At the same price, all options raise similar amounts of revenue
    - Differences reflect average emission factor assumptions
    - Differences in levels of emission reductions (and thus the residual emissions or output on which revenue is raised)

- The processor hybrid achieves higher emission reductions than the farm level levy, although this plays out differently for the individual sector models.

  For sheep & beef, there is a slightly lower impact because the emission reductions that occur are a result of the marginal price on emissions and these are effectively the same (using a FLL or marginal payment for emission reductions under the PH). The FLL has greater effects because
    - The levy is unavoidable whereas EMCs are voluntary
    - There is a farm-specific barrier (modelled as a cost of participation which might represent payment for admin costs or farmer 'hassle' costs)

  In contrast, for dairy, the main effect on emissions is via the total costs of the pricing option and the impact on farm level profits. This is effectively the same between the pricing options (using the same prices). EMCs then provide an additional incentive to reduce emissions above this impact on profit.

- There are a limited number of options that combine low emission prices (and low impacts on farm profits), with incentives for emission reductions greater than 3% (in 2030) and that are not estimated to have a net revenue loss (revenue spend greater than revenue raised). Further options might be identified by reducing the amount paid for some of the current calls on revenue, eg by reducing the amount paid for sequestration eligible only under He Waka Eke Noa.

Released under the Official Information Act 1982

3 Sheep & Beef

s 9(2)(f)(iv)

3.3 Farm Level Levy

Emission reductions in the sheep and beef sector are estimated to occur from land use change and the use of emission reduction technologies: genetics, vaccines and inhibitors.

Released under the Official Information Act 1982

3.3.1 Standard Technology Assumptions

The impacts in 2025 are shown in Table 27. Because of its significance, we show the profit impacts with and without the ETS. Because the opportunities for afforestation vary significantly across farms and some of the land use change to forestry may be whole farm conversion, the positive benefits of the ETS revenue will not be distributed evenly. To take account of this we show the effects of the pricing if there was no additional revenue from the ETS, ie with the same prices but without the shift in land use in the baseline or policy scenario. This means the pricing effects, including the costs of the charge, are on top of a lower starting level of profit, ie the same as the 2017 level in Table 25 rather than the larger levels including the ETS revenue.

s 9(2)(f)(iv)

Released under the Official Information Act 1982

3.4 Processor Hybrid

3.4.1 Standard Technology Assumptions

The results for the PH options are shown below for 2025 and 2030. This includes reductions in emissions, the amounts raised in revenue from the charge, the amount paid in ERPs, for sequestration and the net amount. The net amount is revenue minus the cost of ERPs and sequestration but not the costs of administration or R&D, as these would be shared between dairy and sheep & beef sectors.

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

4.3 Farm Level Levy

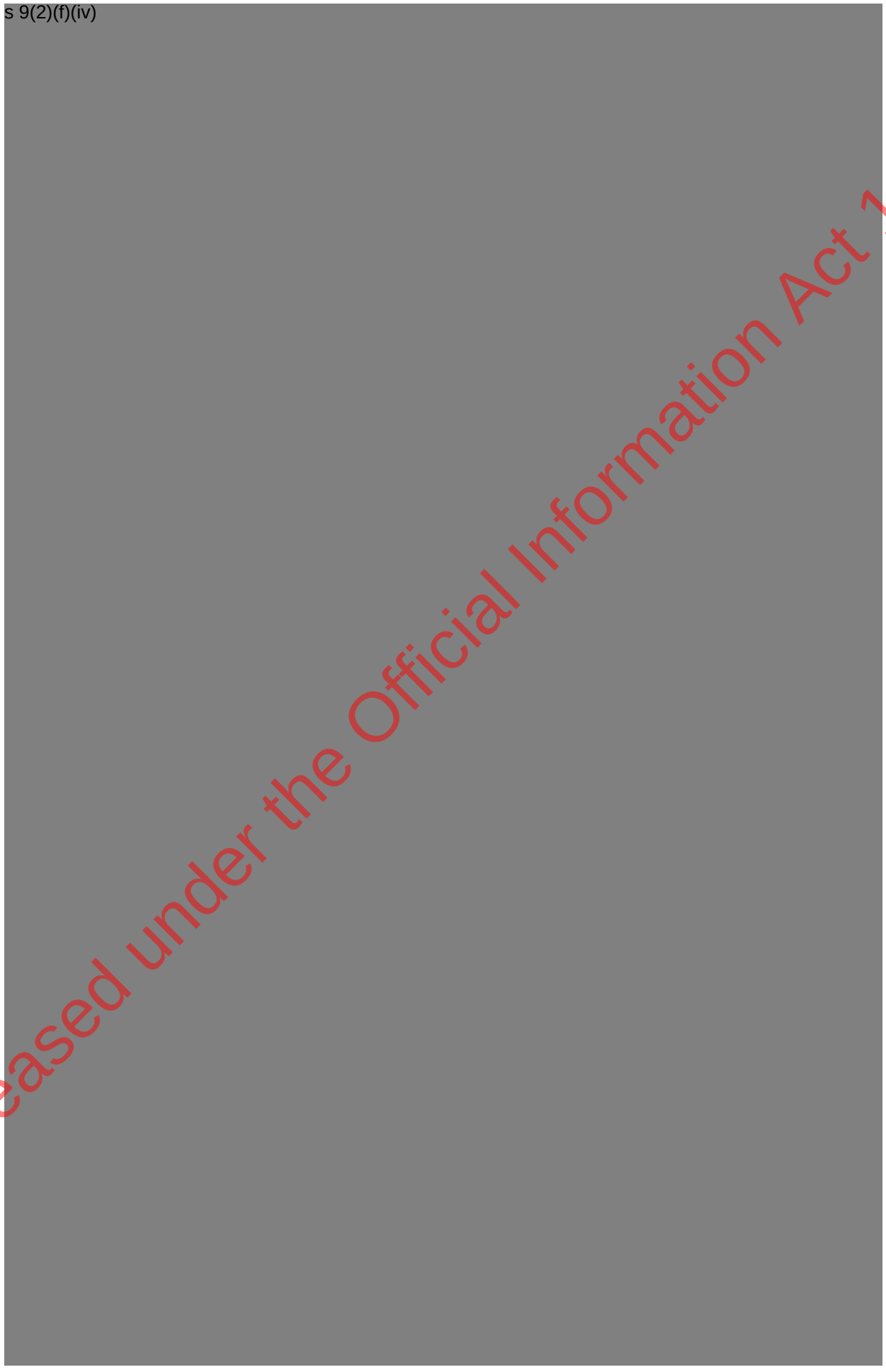
4.3.1 Standard Technology Assumptions

The farm level levy analysis includes the potential use of on-farm mitigations. One option is included in the analysis: 3-Nitrooxypropanol (3NOP), which is an organic compound that reduces the methane emissions from ruminants (see Box 2).

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)



Released under the Official Information Act 1982

4.4 Processor Hybrid

The processor hybrid results for dairy are shown below. As with the sheep & beef analysis, the analysis assumes all farms take-up the EMC opportunity if the benefits to them exceed the cost. Unlike the sheep & beef analysis the assumption is that payments are made against a benchmark level of emissions set historically. This means payments are made for any emission reductions; for example, these may come from reduced cow numbers, reduced fertiliser use, and/or for the use of mitigation technologies (a methane inhibitor is included: 3NOP), to name a few. This assumption is justified by incentivising any reductions in environmental emissions and because farmers retain the right to choose between the many different ways these reductions are made.

4.4.1 Standard Technology Assumptions

The emission reduction payments (ERPs) under EMCs use a multiplier of these prices. Multipliers of 1, 2.5, and 5 are explored in the model. The tables include a net amount that takes account of the costs of the ERP but does not include other costs which might be funded from revenue raised on sheep & beef. The magnitude of changes to farm management and emissions, relative to the baseline, increase as higher methane and long-lived gas prices are realised. The results suggest that there is generally insufficient revenue collected from a charge on dairy processors unless a multiplier of 1 or 2.5 is used or a low charge rate is used in conjunction with a medium (5X) multiplier.

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

HE WAKA EKE NOA STEERING GROUP PAPER

16 December 2021

Prices and impacts

Paper No: 4 UNCLASSIFIED

1. PURPOSE

1.1. This paper provides the Steering Group with:

- Analysis on the relationship between the methane, nitrous oxide, and sequestration price in both the farm-level and processor-level hybrid options.
- A recommendation on which prices should be included in the engagement paper to show potential prices and impacts of the pricing policy.
- A summary of the impacts of those prices (on emissions reductions, profit and production) based on the modelling and case study analysis attached in Appendix 1 and 2.

2. DECISIONS REQUIRED

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

3. KEY POINTS

3.1. He Waka Eke Noa will not recommend levy prices. The Partnership will recommend the system and factors to consider in setting the price(s) and point to modelled impacts generated from our work to determine preferred options and settings.

3.2. Farmers and growers nevertheless want a clear sense of what the pricing system will cost them. This will be important for engagement.

3.3. How we set the relationships between the prices has an impact on the incentive of the pricing system to reduce methane and nitrous oxide and on the impacts on the different farms/farm types. The scope of C (sequestration included in the system) can also adjust incentives and impacts.

3.4. We have used some initial assumptions and in-principle decisions (for a farm level system) about the relationships between prices (A is unique; B & C are connected and linked to the NZU price initially), and links to the ETS option as a starting point for our modelling work. We have then undertaken a 'price discovery process' by iterating and increasingly de-linking prices to assess the relative contribution and impact on emissions reduction, profit and production, and revenue (in a farm level system), and revenue needs in a processor hybrid system (e.g. in a processor hybrid system we need to know how much rewarding sequestration and on-farm emissions reductions might cost in order to build a budget which then dictates the levy rate/s).

3.5. This work finds that:

- ultimately unique rates for A, B and C will be needed to meet system objectives and ensure the system is financially sustainable
- that deriving the unique rates (for both a farm level or a processor-hybrid system) should start from clear principles about the relationship between prices (if any) both within the He Waka Eke Noa system and with the rest of the economy (i.e. the NZU price)

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

[redacted]

3.6. It is recommended that the following price combinations are used to illustrate potential prices and impacts of those prices in the engagement document. These price combinations illustrate impacts when the He Waka Eke Noa options have an equivalent price to the NZU price in the NZ ETS backstop, and where they are more or less than the NZ ETS backstop. The price combinations chosen that are not the equivalent to NZU prices are the combinations that pan-sector modelling has shown to deliver credible emission reductions (3+ percent reduction in methane in addition to an estimate 4 percent reduction in the base case) while limiting (but not fully negating) impacts on profit and production on different farm systems.

3.7. For most of these price combinations there is some resulting 'net' revenue' This means actual prices should be further refined/reduced.

s 9(2)(f)(iv)

[redacted]

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

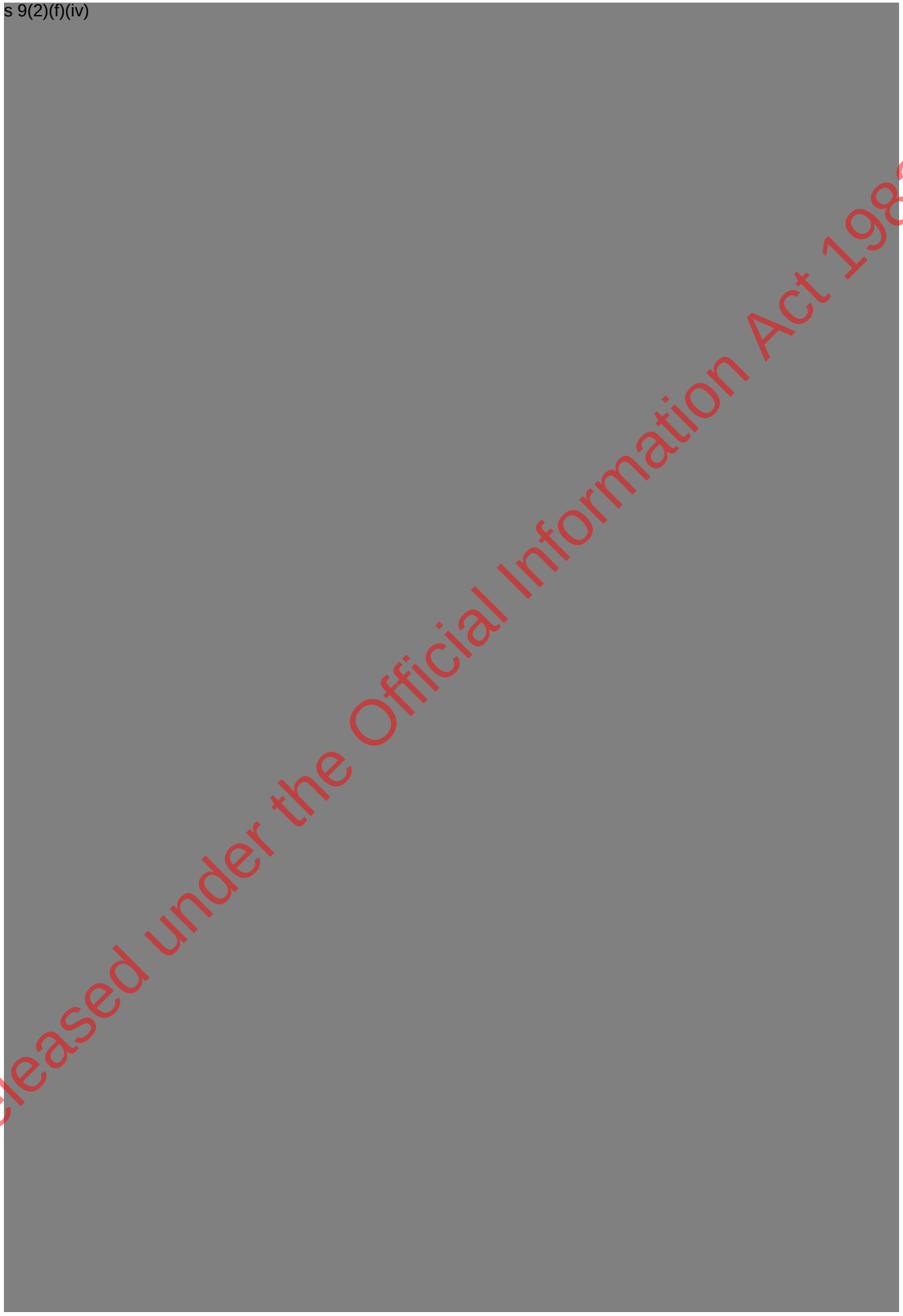
s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)



Released under the Official Information Act 1982

5. SUMMARY OF IMPACTS

5.1. The combination of emissions pricing and the use of recycled revenue can generate emissions reductions and limit impact on production and profit.

5.2. Under current policy settings (namely Essential Freshwater and NZ ETS forestry) the estimated baseline reduction in methane emissions in 2030 is calculated to be 4.4% below 2017 levels, along with a reduction in N_2O emissions of close to 3% below 2017 levels.

5.3. Reductions in the waste sector's contribution to methane will also result in some methane reductions below 2017.

5.4. The cost and availability of mitigations has a significant impact on the effectiveness of the policies to reduce emissions. Two 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. The higher tech scenario is only applicable in 2030.

5.5. Table/s below show the results of the sector modelling at the above price combinations at medium tech and high-tech scenarios (for full results see Appendix 1 - Analysis of Pricing Options (Updated 9 December 2021)).

5.6. The modelling includes:

- Estimated funds/investment required from recycled revenue as detailed in Paper 7 – Recycled Revenue and summarised as follows:

s 9(2)(f)(iv)

- *For Farm Level* – additional payments for uptake of new mitigation technology where the amount paid for emissions reductions associated with that tech uptake is 2.5 times multiplier of the rate at which the charge is levied. This is similar to an action-based EMC under the Processor Hybrid.
- *For Processor Hybrid* - use of a combination of benchmark (Dairy) and action based (Sheep and Beef) Emissions Management Contracts (EMCs) where the amount paid for emissions reductions is 2.5 times multiplier of the rate at which the charge is levied.

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

5.9. Most of the price combinations result in 'net' revenue. s 9(2)(f)(iv) [redacted]

5.10. The results of the case studies at the above price scenarios are attached in Appendix 1.

5.11. These include sequestration and for the Processor Hybrid an EMC 'credit' based on the modelled farm practice changes to reduce emissions specific to each farm (where the amount paid for emissions reductions is 2.5 times multiplier of the rate at which the charge is levied). Unlike the modelling, the case studies do not include any future tech.

s 9(2)(f)(iv) [redacted]

7. CHANGES TO ENGAGEMENT DOCUMENT

7.1. The impacts and insights section for the He Waka Eke Noa options have been updated to reflect the price combinations described above. Including the four different price combinations means there is now a substantial amount of information in the impacts and insights chapters. We propose working directly with a subgroup of the Steering Group to refine that chapter directly after the Steering Group meeting on 16 December.

7.2. The impacts and insights section for the ETS option has not changed.

Gus Charteris
Consultant

Kelly Forster
Programme Director

Released under the Official Information Act 1982

Appendix 1 – Analysis of Pricing Options (Update 9th December 2021)

See separate attachment.

Please refer document 13

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

HE WAKA EKE NOA STEERING GROUP PAPER

16 December 2021

Revenue Recycling

Paper No: 7 UNCLASSIFIED

1. PURPOSE

1.1. The purpose of this paper is to seek a Steering Group decision on initial priority areas for use of system revenue to reflect in the engagement document.

1.2. The paper also:

- Notes, enduring principles to help direct He Waka Eke Noa revenue.
- Notes, principles for how different administration costs related to the emissions pricing system/s might be funded.
- Outlines the estimated funding/investment required to support administration costs, and the initial priority areas for use of system revenue.

2. DECISIONS REQUIRED

2.1. **Agree** that the following be reflected in the engagement document as initial priority areas for use of He Waka Eke Noa revenue:

- On-farm sequestration.
- Paying for/providing credit for additional emissions reductions for those farmers that can do this e.g., via an EMC system.
- Research and development into, and support for adoption of, mitigations e.g., vaccine, inhibitors etc.

s 9(2)(f)(iv)

Released under the Official Information Act 1982

3. ROLE OF REVENUE RECYCLING

3.1. The intention is that revenue generated from the He Waka Eke Noa system will play an important role in supporting the objectives of the system e.g., reducing emissions while retaining the agriculture sector's viability and competitiveness.

3.2. The central questions relating to revenue recycling and the status of the work are captured in Table 1 below.

3.3. An in-principle decision has been made by the Steering Group that either some or all of the He Waka Eke Noa revenue is hypothecated. Work is now focussed on the following questions:

- How much revenue is likely to be raised? (in the context of a farm-level system), and how much revenue will be required to fund priority activities? (in the context of a processor-level hybrid system).
- Who should bear the different administration costs of the system?
- What should hypothecated revenue be used for?
- Who should manage hypothecated revenue?
- How should hypothecated revenue be disbursed?

3.4. This paper seeks a decision on initial priority areas for use of system revenue to reflect in the engagement document and provides some principles to help guide the use of recycled revenue over time, and principles for how different administration costs related to the emissions pricing system/s might be funded.

Table 1: Key questions, considerations, and status of work underway

Key questions	Considerations and next steps
1. Should revenue be recycled?	• An in-principle decision has been made that either some or all of the He Waka Eke Noa revenue is hypothecated.
2. How much revenue will be raised OR how much revenue will be required to fund priority activities?	• Analysis and modelling has provided estimates of: o Revenue raised at different prices o The quantity and price of sequestration o Cost of EMCs (which will be dependent on uptake, price for emissions and any incentive multiplier) o Likely need for investment in R&D
3. How will admin costs of system be paid for?	• This is important question as it helps determines how much revenue will be available for investment into areas/activities that support system objectives. • Section 6 below provides some principles for funding different types of administration costs.
4. What should the funds be spent on?	• There are some areas that have broad support. These are: o On-farm sequestration o Paying for/providing credit for additional emissions reductions for those farmers that can do this e.g., via an EMC system o R&D into, and support for adoption of, mitigations e.g., vaccine, inhibitors etc. • There have been mixed views on the following areas: o Targeted extension/adoption programmes. There is a view this is BAU activity and while additional investment will be

Released under the Official Information Act 1982

	important some industry Partners have said this should be covered by existing industry commitments. o Rewarding/incentivising nature-based solutions i.e. activities that have a multitude of co benefits e.g. removing barriers to planting natives. o Support for land diversification where there are barriers that are preventing the uptake of opportunities.
5. Who should administer the funds?	• This is being considered in the context of the different bodies and advice that will need to come together to form the overall agriculture GHG pricing system. • The recommendation is that two new bodies be created to provide advice to Ministers. • **An advisory group** comprised of representatives from the sector – likely representatives from industry organisations whose constituents face a price for agricultural emissions. This group would put advice to the Minister of Climate Change and Minister of Agriculture and/or the implementation agency as to how revenue should be recycled back into the sector. It is proposed that the sector advisory group would advise the Ministers on appropriate people from the agricultural sector that could provide required expertise on the independent advisory panel. • **An independent advisory panel** comprised of membership based on a range of expertise/knowledge identified in the factors to consider when setting and reviewing levy rates. This is important to sector representatives to ensure that the panel contains a balanced view, while remaining independent. • The new implementation agency is also likely to have a role in supporting the advisory group with its role in relation to revenue recycling.
6. How should the funds be disbursed?	• This will depend on the area: o Sequestration will be a payment/credit (either netted off from A+B or via an EMC) o EMCs. Credit/payment will be provided in line with contractual commitments. o R&D. Still to be worked through but would involve payment to successful applicants.

4. PRINCIPLES TO HELP GUIDE DECISIONS ON THE USE OF RECYCLED REVENUE

4.1. The Pricing Working Group has identified a set of enduring funding and design principles that could help guide decisions on the use of recycled revenue.

4.2. Feedback from Partners to date has noted a desire to ensure the decision-making process for the use of recycled revenue remains flexible and adaptable so that funds are directed to where it is going to make the biggest difference for the sector.

4.3. At the same time Partners have been keen to be quite specific about the use of recycled revenue so that we can estimate the amount of the money that could be required, the impact this will have on setting the levies (under a processor-level hybrid system), and the impact the use of this revenue will have on reducing emissions. Feedback also suggests that farmers and growers would like to have clarity about how any revenue from the system will be used and this will form an important part of the engagement in February.

4.4. Key funding and design principles identified are:

Released under the Official Information Act 1982

Principle	Explanation
1. **Justifiable and effective**	• Funding is directed toward system objectives i.e., reducing emissions while retaining the agriculture sector's viability and competitiveness.
2. **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.
3. **Equity**	• To avoid equity concerns within and amongst participants, revenue should ideally be used for initiatives which benefit or, have the potential to, benefit as many participants as possible.
4. **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.
5. **Enabling and user-friendly**	• Funding is flexible and adaptable. • Application system and process is low cost and user-friendly.
6. **Credible**	• The funding must be based on robust science and Mātauranga Māori.

5. INITIAL PRIORITY AREAS FOR USE OF RECYCLED REVENUE

5.1. At this point there are some areas that have broad support across the Partnership:

- On-farm sequestration.
- Paying for/providing credit for additional emissions reductions for those farmers that can do this e.g., via an EMC system.
- R&D into, and support for adoption of, mitigations e.g., vaccine, inhibitors etc. [This may include extension activities that are beyond BAU].

5.2. The working assumption is that sequestration has been 'baked in' as an assumed payment to farmers to offset their levy costs and appropriately reward sequestration and that EMCs would be available (under a processor-level hybrid system) to recognise the emissions reductions of all farmers willing to enter into these contracts. Some Partners are strongly of the view that one of the best uses of recycled revenue will be to invest in R&D and assistance with the adoption of mitigation technology as this will be a critical pathway to reducing emissions while retaining a viable and competitive sector. Other Partners are seeking reassurance that any funding for R&D adds value to, and does not crowd out, existing funding and is not a justification for levy rates that may damage farm viability.

5.3. There are mixed views on the following areas:

- Targeted extension/adoption programmes. There is a view this is BAU activity and while additional investment will be important industry Partners have said this should be covered by existing industry commitments.
- Rewarding/incentivising nature-based solutions i.e., activities that have a multitude of co benefits e.g. removing barriers to planting natives.
- Support for land diversification where there are barriers that are preventing the uptake of opportunities.

6. PRINCIPLES FOR FUNDING ADMINISTRATION COSTS

Background

Released under the Official Information Act 1982

6.1. If the pricing system programme administration costs were to be funded from the revenue generated, they would impact upon the total funds available for rewarding programme eligible sequestration, incentivising emissions reductions, and investment in future greenhouse gas mitigation research and development.

6.2. Noting there are multiple beneficiaries to the agricultural greenhouse gas pricing system, and farmers and growers will pay a charge plus incur additional farm data collection and reporting costs; it is important that the programme administration costs are distributed in a fair and transparent manner. The following principles and subsequent analysis have been provided to support a more detailed analysis in the future once the costs are known.

Principles

6.3. The following principles have been developed to help guide the distribution of administration costs:

- *Accountable and transparent*

  Cost distribution decisions must be justifiable and the mechanism through which decisions made transparent

- *Reasonable*

  The cost is appropriate and suitable for the service being provided

- *Equitable*

  Any cost should be fair and equitable and reflect the ability of a sector or individual to pay. This is a key consideration for any cost recovery charges.

- *All beneficiaries should contribute*

  A unique emissions pricing system for agriculture could benefit the agricultural sector to a greater extent than being subject to the NZ ETS.

  The New Zealand government has committed to international and domestic greenhouse gas reduction targets and reporting its progress towards these; the agricultural greenhouse gas pricing system will contribute towards these.

- *Partnership approach*

  He Waka Eke Noa is a partnership where sectors are working together with iwi/Māori and Government to develop a system for measuring, managing, and reducing agricultural greenhouse gas emissions.

Programme Administration Costs

6.4. The programme administration costs broadly fit under the following five areas:

- *Levy Collection*

  Costs associated with collecting the farm or processor levy, including the development and operation of the registration, reporting and payment system.

- *Emissions Management Contracts*

Released under the Official Information Act 1982

Costs associated with the voluntary reward programme to encourage emissions reductions and enable sequestration to be recognised under the Processor-level Hybrid Levy system.

- *Compliance*

  Costs associated with auditing of returns and enforcement action.

- *Method Research & Development*

  Costs associated with updating the science that underpins the emissions calculation.

- *Operational Policy*

  Costs associated with the on-going implementation of government policy.

Funding Sources

6.5. There are five funding sources for the distribution of the programme administrator costs. Different components of the cost could be funded by one or many of these:

- Government funding (general taxation fund)
- Revenue recycled from the levy
- Cost recovery charges to individual participants
- Funding from primary sector bodies
- Funding from commercial interests (processors, fertiliser manufacturers/ importers or commercial service providers).

6.6. An additional consideration is whether the programme administrator should be directly providing the function or service, or should it be transferred directly to participants.

Cost Distribution Analysis

6.7. The table on the following page provides an overview of the programme administrator costs; considerations for each area of these; and the potential funding sources to be considered in the distribution of costs.

Recommendation

6.8. Note that the programme administrator costs (once known) will require detailed analysis to understand where the costs and benefits fall, and the administration costs then distributed accordingly.

Released under the Official Information Act 1982

	Considerations	Government funding	Revenue recycling	Cost recovery charges	Sector Bodies	Commercial Interests
Levy Collection	Emissions and sequestration must be considered separately; reporting emissions results in a charge; sequestration provides a reward Advanced IT features (beyond core reporting functions) that provide reduced farm administration costs and/ or commercial advantage must also be considered	Emissions system development and operation Sequestration system development and operation Advanced IT system features	Emissions system development Sequestration system development	Emissions system operation Sequestration system operation		Advanced IT system features
Emissions Management Contracts (EMC)	EMC provide a reward for emissions reductions and SMC for sequestration EMC may also provide a transition pathway to a farm-level system under the Processor-level Levy system	EMC system development and operation SMC system development and operation	EMC system development SMC system development	EMC system operation SMC system operation		
Compliance	Government requires sufficient confidence emissions reporting is robust and accurate and any non-compliance is addressed Audit should be independent	Audit Enforcement action		Audit Enforcement action		
Calculation Method	Calculation method must meet government obligations and policy Credible sector and commercial research and development is incorporated into the calculation method	Calculation method maintenance General and sector specific research			Sector research	Commercial research
Operational Policy	The on-going implementation of government policy to reflect its obligations and policies	Policy implementation				

Released under the Official Information Act 1982

7. ESTIMATED FUNDING/INVESTMENT REQUIRED

7.1. Under a farm-level system, prices will be set (based on the consideration of a range of factors), this will generate revenue, eligible sequestration will be netted off from A+B and relevant administration will be paid for, leaving the revenue that will be available for funding on-farm emissions reductions and any R&D.

7.2. Under a processor-hybrid system, a 'budget' could be set which would include e.g., estimated costs of sequestration, payment for on-farm emissions reductions, and R&D. This budget could then be used to set the levy rates.

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

s 9(2)(f)(iv)

Released under the Official Information Act 1982

8. NEXT STEPS

Out of Scope

Released under the Official Information Act 1982

HE WAKA EKE NOA STEERING GROUP PAPER

16 December 2021

Output-based rebate: Testing implementation assumptions

Paper No: 9 UNCLASSIFIED

1. PURPOSE

1.1. This paper provides the Steering Group with a summary of due-diligence analysis relating to the assumptions made about implementing a farm-level levy with an output-based rebate. It also seeks guidance on whether to include an output-based rebate as an option that could be feasible to implement with further design in the engagement material. The engagement material would be clear about the impact for different farm types and systems and any associated equity considerations.

1.2. The due-diligence work finds that there are feasible options to implement an emissions levy with an output-based rebate, in a way that provides a strong marginal incentive to reduce emissions while protecting farmer income.

1.3. The focus of the analysis was the practical challenges and costs relating to implementation, rather than solving any underlying equity issues with regard to the types of farming operations that may benefit to a greater or lesser extent with this type of approach. These equity issues remain relevant.

2. DECISIONS REQUIRED

2.1. **Agree** to include an output-based rebate as an option (that could be feasible to implement with further design) in the engagement material. The engagement material would be clear about any underlying equity considerations with this approach;

OR

2.2. **Agree** to continue to park the output-based rebate as an option that has a range of equity and implementation challenges. The engagement material would note that implementation challenges could be overcome with further design work but that there remained a range of important equity concerns.

2.3. **Note** the output-based rebate is modelled to have very different effects in dairy (where we see limited impacts), versus the sheep and beef sectors (where the emissions levy achieves high levels of emission reductions, accompanied by a rebate that lower impacts on profit). This is because of model differences.

2.4. **Note** the potential approaches outlined in this paper could address some equity challenges (particularly the concern about whether the rebate would be passed on to breeders and trading farms), but they do not resolve the fact some farms (even within like farming systems) are inherently less emissions efficient than others (for reasons beyond farming practice and capability e.g. land type, regional differences etc), and will be impacted by a

Released under the Official Information Act 1982

greater extent with an output-based rebate approach, as they will be with any emissions price.

2.5. **Note** there is a risk inherent in output-based rebate options that very efficient farmers (i.e., significantly more than 5% more efficient than the average), who also have the capital to make the necessary investments and changes, could increase production and receive a rebate for doing so that is greater than the emissions levy payment. This could result in an increase in absolute emissions from these farms. Our view, however, is that there are a range of relatively simply fixes and existing barriers that would largely mitigate this risk (see Section 4.6). In addition, farms less efficient than average will have an offsetting incentive to reduce output as they will always face a net cost.

2.6. **Note** our working assumption has been that an output-based rebate approach would either be just for methane or for methane and nitrous oxide from livestock. A rebate/discount on nitrous oxide from fertiliser (and/or livestock) would need to be dealt with separately.

3. CONTEXT FOR DUE DILIGENCE WORK

3.1. The Programme Office commissioned a subgroup of its consultants, supported by Government Partners[1], to undertake appropriate due-diligence relating to the assumptions that have been made about implementing an output-based rebate.

3.2. The due diligence work finds that there are feasible options to implement an output-based rebate in a way that provides a strong marginal incentive to reduce emissions while protecting farmer profits.

3.3. The focus of the analysis was the practical challenges and costs relating to implementation rather than solving any underlying equity issues with regard to the types of farming operations that may benefit to a greater or lesser extent with this type of approach. These equity issues remain relevant.

4. CALCULATING AN OUTPUT-BASED REBATE

4.1. An output-based rebate allows a significant portion of a farm's initial emissions levy bill to be returned, reducing their overall net obligation, while maintaining most of the strength of the marginal incentive to reduce emissions. This allows a much higher emissions price to be used, at no additional financial burden to the farmer.

4.2. It does this by paying the farmer 95% of what their bill would be if they were a perfectly average producer. Therefore, if the farmer is actually perfectly average, they will receive 95% of their bill back, but if they shift to becoming (or are already) 5% more efficient than the average, they will receive 100% of their bill back. However, unlike a flat-rate discount, every unit of emissions that the farmer reduces saves them the full cost of that emission, as this reduction does not have an impact on their rebate if their level of production is maintained. Therefore, at the higher price that the rebate facilitates, the farmer's bill drops measurably with every unit of reduction.

[1] Gus Charteris, Lee Matheson, Tim Denne, Andrew Curtis, Jay Forlong & Chelsea Judy (MfE), Darran Austin & Jamie Ash (MPI).

Released under the Official Information Act 1982

4.3. The equation itself is as follows:

Final bill = initial bill – rebate **Rebate = output × national average emissions factor for that output × emissions price × 95%**

4.4. For this to actually work in practice, three things are needed:

- The data used to calculate the farmer's initial bill (i.e. using their absolute emissions) needs to be on a different basis to the output-based calculation. This means that calculating a farmer's absolute emissions just using their output and national average emissions factors will not be sufficient, as this just compares the average to the average when providing a rebate, and an effectively proportional discount is created. Instead, additional datapoints and/or unique on-farm emissions factors are necessary. The more non-averaged data that can be gathered, the less the incentive is muddied and weakened.
- Either:
  - Confidence that the market would function effectively to pass-through the value of rebates to farms not producing final output; or
  - If the effects of the rebate are not expected to feed through to breeders and traders in market prices, the data used to calculate the rebate on an output basis may need to be available even when the farmer does not have a final output of meat or milk to a processor. The options provided in this paper primarily focus on solving this issue, as it is the largest technical challenge. They do so by either changing the definition of who receives the rebate, or providing a pathway for gathering sufficient data (or proxy data) to achieve this calculation on all farms.
- Finally, in the situation where there was widespread response to the emissions price the national average emissions factors would need to be fixed for periods of time (e.g., this could be five-year periods in line with price reviews), so that the incentive to improve efficiency and reduce emissions over time is maintained. This also allows some incentive to be kept even if less-than-sufficient data is gathered from some participants. This is in line with how the review of the NZ ETS industrial allocation advised using emissions factors.

4.5. There is an inherent risk in output-based rebates that very efficient farmers (i.e., significantly more than 5% more efficient than the average), who also have the capital to make the necessary investments and changes, could increase production and receive a greater rebate for doing so. This could result in an increase in absolute emissions from these farms. Set against this, all other farms (those with emissions efficiencies less than 5% above average) will face a net cost per unit of output, such that there is no aggregate incentive for increased total agricultural output.

4.6. However, we expect that there are a range of relatively simply fixes and existing barriers to largely mitigate this risk:

- Farmers already have significant barriers and limitations to intensification, both financially, and from existing regulation such as for freshwater;

Released under the Official Information Act 1982

- There is already an economic incentive to increase efficient production to increase revenue, and more investigation would be needed, but we expect this one additional factor is not sufficient to overcome the inertia and challenges that are already limiting this happening on all farms;

- The system is likely to be designed with phase-out of rebate levels, which means that any gain would be short-term, and farmers would need to continue to stay ahead of the shrinking rate (i.e. more than 6% more efficient, then more than 7%, and so on, which will eventually hit a natural and technological limit). A simple on-farm cap or restriction could also be put on the rebate, such as, your rebate cannot make up more than 100% of your initial bill if your production increases, but maintaining or reducing production can allow for more than 100% so that you are rewarded for actual emissions reductions.

5. MODELLING TO DATE

5.1. The output-based rebate is modelled to have very different effects in dairy versus the sheep and beef sectors. An output-based rebate is noticeable for achieving high modelled levels of emission reductions, accompanied by lower impacts on profits because of the rebates paid in the sheep and beef sector. For example, at $1.75/kg and $70/t, at full exposure there is a 3.7% reduction in CH4, a 0.5% reduction in N2O and an 60% reduction in profit. Under the output option there is a similar impact on emissions but only 2% and 3% reductions in profits respectively. The lower profit reductions are matched by the much lower level of (net) revenue earned. Much of the revenue from the charge is used to fund the rebates to compensate for profit losses that would otherwise occur.

5.2. We do not see this in the dairy model because of the approach taken to the way emissions reductions are achieved. For dairy farms, the main impact on methane emissions is via reductions in livestock numbers and output when farms become unprofitable. The rebates under this option limit the impacts on profit so that farms do not reduce livestock or emissions. In contrast, the sheep and beef model estimates that the impact of a full marginal price under this option will incentivise the use of mitigation technologies when available. The dairy modelling suggests the output-based option will lead to very small impacts on emissions, profits, and production, although more recent modelling has included greater availability of emission reduction technologies which will increase the modelled effectiveness of this option.

5.3. Modelling results from the He Waka Eke Noa pan-sector analysis are captured in Tables ES5 and ES6 below. Inclusion of emission reduction technologies in the dairy model would be expected to change the results to some extent, especially if technologies are brought forward in time or are reduced in cost.

Released under the Official Information Act 1982

s 9(2)(f)(iv)

[redacted]

Released under the Official Information Act 1982

6. PREVIOUS PARTNERSHIP ANALYSIS

6.1. The original Pricing Workstream included the output-based rebate as an option in their assistance longlist, and provided the following summary of qualitative analysis in handover to the Pricing Working Group[2]:

> **Description:** All participants face the cost for their estimated weight of emissions, discounted by a variable percentage based on their emissions efficiency. No variants are being considered.
>
> **Intended outcome:** The cost faced by participants reduces the more efficient they are and increases the less efficient they are.
>
> **How this would work in practice:** An output metric is determined based on the chosen efficiency indicator, decoupled from the participant's actual emissions, which is calculated into a rebate. The participant's total cost is the cost on their actual emissions minus the value of the rebate.
>
> **Key drawbacks:** Additional reporting and data required. Metric methodology required is much more complicated. Could incentivise increase in absolute emissions on the most efficient farms. Penalises specific systems that are inherently emissions intensive but low absolute emissions.
>
> **Benefits / unintended consequences avoided:**
>
> Limits emissions leakage. Directly recognises efficiency and efficiency gains.

[2] Paper: *Price Exposure Scoping Document*

6.2. The Pricing Workstream also identified a range of possible formulae calculating this rebate, including fixing elements of the calculation over time to maintain the marginal incentive. This process identified that at least the national average emissions factors, if not the entire rebate, likely need to be fixed for set periods of time in order to ensure the marginal incentive is maintained. This assumption is maintained under the options presented by this paper.

6.3. Quantitative assessment by Charlotte Glass and the Pricing Working Group[3] concluded:

- **Difficult to calculate for some farms and factors do not exist for others** so could not be used in the comparison. This option was only able to be calculated for two of the farm businesses in the testing sample (extensive sheep and beef and the dairy unit), and livestock are likely to be the only source of emissions for which Output-based price exposure is feasible.
- **Will reward more efficient producers per unit of output**; however, these farmers tend to be higher total emitters, so it results in a weakened price signal to higher emitters. Further modelling would provide greater detail about the impact of those signals through behaviour change incentives for less efficient farmers.
- **Some aspects of production are less efficient, and others are more efficient. The national factors used did not relate to the specialisation within the production system that occurs on farms**. If the efficiency factors do not relate to each farm business, they may not direct farmers to appropriate future changes.
- **Where this option can be calculated (dairy milk production and some sheep and beef operations), it may incentivise the most efficient producers to increase production**, as they will receive a greater rebate for every unit of production that they add.

6.4. Further design work was able to tease out and resolve a number of issues identified in earlier analysis of this option (for example to clarify output only applies to methane or for methane and nitrous oxide from livestock). The Steering Group however decided to park the output-based rebate given the significant implementation challenges focussed on:

- The reliance on the market to send price signals along the supply chain from farms producing output to farms who are not; and
- The exclusion from pricing/rebate of farms with livestock but who are not selling direct to processors, meaning livestock emissions are only counted at the end of life for those livestock and that farmers are unable to benefit from the rebate for efficiency gains they are making. This was considered to be a significant barrier for certain farm types.

6.5. Some Partners also continued to have concerns about the equity consequences of the output rebate option approach (see Section 7 below). Government Partners continued to show general interest in rebates, noting that a farm-level system was unlikely to function effectively (or without considerable economic damage) without some form of rebate or assistance. Some Partners, in particular including dairy processors, continued to back the output-based rebate, and considered other industry initiatives and examples of market pricing supported the principle that an efficiency-based rebate on output would be driven to other areas of the supply chain. Both the ETS backstop and the processor-hybrid also do not directly capture the emissions of farms not selling directly to processors (noting, the purpose of the processor-hybrid levy is to raise revenue not incentivise behaviour change). Work over the last month has focused on appropriate due diligence on the two key implementation challenges and potential barriers. This is picked up in Section 8 below.

[3] Paper: *Pricing Working Group and Consultant Paper – Price Exposure*

Released under the Official Information Act 1982

7. EQUITY ISSUES

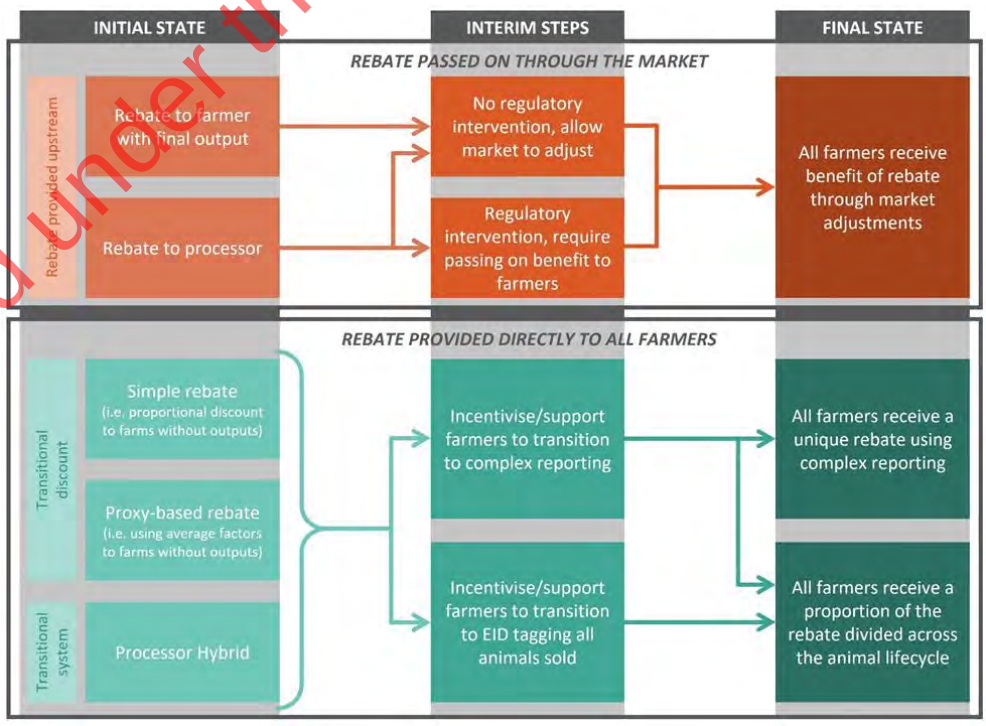
7.1. Like most pricing options an output-based rebate has different impacts for different farm types and systems. The key equity concern (beyond some farm systems not necessarily producing output for processing), that some partners have had with this option is that, as designed, the rebate rewards emissions efficient farmers, while penalising less efficient production.

7.2. While an output-based rebate only compares the emissions efficiency of output between 'like' farming systems (the efficiency of dairy farmers will only be compared to the efficiency of other dairy farmers, and not to other farming systems such as sheep and beef farmers), this does not account for the considerable diversity of farming systems within a sector (e.g., sheep and beef or arable). Also, some farms are inherently less emissions efficient than others, not because of farming practice and capability, but because of regional (and sub-regional) variations in climate and land type. It is the lack of ability to change these resource constraints that concerns some Partners. This equity issue remains a valid consideration even if the implementation challenges can be solved.

8. IMPLEMENTING AN OUTPUT-BASED REBATE

8.1. The approach taken by the subgroup was to work through the key implementation barriers, to tease out possible solutions and consider further the cost and complexity of the option. Specifically, these implementation challenges were around facilitating the rebate to flow through the supply chain and how all farmers could directly receive a rebate to ensure all emissions mitigation activities (including those implemented on farms not producing output) were captured.

8.2. The following diagram illustrates the two macro-options for implementing an output-based rebate identified by the subgroup (described in more detail below). The diagram highlights the work that would be required following the initial rollout of pricing in 2025, in order to transition to an effective and (more) equitable final system.



Released under the Official Information Act 1982

Option 1 – Rebate passed on through the market (orange)

8.3. Only upstream participants in the system receive a rebate directly, being either farmers who sell to processors, or the processors themselves. No theoretical output needs to be determined for farms without outputs.

8.4. The initial rebate could be provided at one of two points:

A. Only farms with final outputs	• If a farm sells meat or milk to a processor, this is used as the basis of calculating a rebate that covers all emissions associated with the animal, including at points earlier in the supply chain. This means that the rebate is likely to be greater than 100% of the final farm's emissions charge (i.e. approximately 95% of the cumulative emissions charge of the farms that participate in a supply chain). • No rebate is provided to farmers who do not sell to a processor. Instead, the value of the rebate that the farmer with output receives is expected to be passed onto the farmers in their supply chain, through an increase in the cost they pay for animals/products/services/etc.
B. Processors	• Meat and milk processors receive the rebate based on the farm outputs they buy. The rebate will cover approximately 95% of the cumulative emissions charge of the farms that participate in the supply chain for each product. • No rebate is provided at the farm level, to farms with or without final outputs. Instead, the value of the rebate that the processor receives is expected to be passed onto the farmers in their supply chain, through an increase in the price they pay for milk/meat, and then those farmers pay for animals/etc, in the same way as would an increase in the price of milk or meat. It is expected this will create a 'clearer' price signal that can be carried through the supply chain than the potential signal created through allocating the rebate to only those farms with outputs. This will need to be tested with modelling.

8.5. We have considered two approaches to ensuring the value of the rebate gets distributed through market adjustments:

A. No regulatory intervention	• The market is largely expected to adjust to distribute the value of the rebate. No regulatory intervention occurs. • However, supporting work could be done to educate farmers and processors on the shifts that this system would entail to maintain profitability across the sector. For example, providing estimates of how much of the rebate value is on average attributable to different points in the supply chain; communicating a clear narrative about how passing on the value of the rebate supports the profitability of farms without output to continue selling a consistent number of animals to finishing farms in following years, rather than pocketing the rebate for short-term gain. • This approach could apply to the rebate being paid to either the farmer with final outputs or to the processor.
B. Regulatory intervention	• The market is regulated to require participants to pass the value of the rebate through their supply chain. • Supporting work is still possible to make this simpler and more accessible. • This approach could mean that the regulation applies to all transactions in the supply chain, or solely to the rebate that the processor receives (if this is the point of obligation chosen for the rebate), to ensure the process of passing the rebate to farmers with outputs occurs in the first instance and establishes precedent for the value to continue being passed on.

8.6. Our assessment is that the cost and complexity of regulating price exchanges between farmers is likely to be high, and that regulation can only viably be applied if the rebate is

Released under the Official Information Act 1982

applied to processors. Regulation on all transactions would likely also shift the focus of participants in the system away from minimising their bill through emissions reductions and efficiency gains toward arranging their transactions and farm systems to receive as much passed-on rebate as possible, and toward complying with the greater administrative and regulatory requirements.

8.7. Without regulation on all transactions (i.e. no regulation, or only to processors), there are a range of views across the subgroup about the ability for farmers downstream to actually increase costs and benefit from the value of the rebate being passed on without regulation.

Option 2 – Rebate provided directly to all participants (green)

8.8. All emitting farms are participants in the system and are levied and receive some form of rebate directly, regardless of whether they supply a final product to processors. One of a various number of proxies could be used to determine a theoretical output or emissions contribution to the final output from all farms in the supply chain.

8.9. We expect that the system, to maintain a strong marginal incentive across all farms and treat all farms equitably, would need a transitional period to give farmers time to meet the data requirements. In the interim, we have identified three possible 'initial states' for ensuring all farmers receive assistance to support facing the cost on their emissions:

A. Simple discount	• Farms without final outputs would receive a proportional discount on their emissions charge. This would likely be at a lower rate than the output-based rebate (e.g. 90% instead of 95%), and could face a more rapid phase-out, to further incentivise the shift to new data requirements. Farmers without outputs but who want to provide complex reporting straight away could have a unique on-farm proxy calculated from the first year.
B. Average proxy rebate	• Farms without final outputs would receive an output-based rebate on their emissions charge calculated using an average proxy (e.g. stock numbers), resulting in what is effectively a proportional discount, but using the same rebate formula across the system. Farmers without outputs but who want to provide complex reporting straight away could have a unique on-farm proxy calculated from the first year.
C. Processor hybrid	• The processor-level hybrid levy that the Partnership is currently designing could be used as the transitional system while all farmers ensure they meet the data requirements. • Note that it may be more difficult to transition from an outcomes-based emissions management contract (EMC) option to output-based rebates at the farm level, as behaviours would be rewarded on a different basis under each system, and the use of a baseline for the EMC creates something of a property right that could pose difficulties and resistance to later revoke. However, an actions-based EMC could be viable, as there is still an intention to recognise good on-farm actions and behaviours under all variants of the system and possible rebates.

8.10. While this transitional period is in place, we have identified two possible data-based solutions to calculating a sufficient proxy for output across all farms:

A. Complex reporting	• All farms would be required to, by a certain year, meet the complex reporting requirements proposed by the Partnership, or a minimum subset thereof. The key piece of data would be liveweight gain, with varying options for frequency (e.g. quarterly, annually, or only when sold) and granularity of the measurement (e.g. whether breeds or just stock classes).
B. EID tagging	• All farms would be required to EID tag animals (or mobs) that are sold.

Released under the Official Information Act 1982

	• All dairy, beef, and deer farms should already meet this requirement, and have the data on file through NAIT to report into the farm-level pricing system. • Sheep farmers who sell store would be required to begin tagging all (or a set portion) of their animals; however, any lambs bred and sent to processors without leaving the one farm would not need to be tagged, as this farm already has a final output for these animals.

8.11. Once these data requirements are met by all farms, the rebate could be calculated and distributed across the supply chain in one of two ways (being the 'final state' of the system):

A. Unique rebate	• All farms have an actual or theoretical output calculated, based on the emissions that occur while the animal is on their farms, which they receive regardless of who they buy and/or sell animals to/from. This approach would likely only work as a result of all farms using complex reporting.
B. Rebate divided across lifecycle	• A single value of rebate is calculated based on the final output, which is then divided between the farmers who contributed to this product at various points in the animal's lifecycle throughout the supply chain, based on how long the animal spent on their farm or another similar estimate of contribution to total emissions associated with the animal. This approach would likely work under both complex reporting and EID tagging.

8.12. We have provided the following assessments of the components of this option.

8.13. For the two farm-level 'initial states' under this option (**simple discount or average proxy rebate**):

- This option does not provide a sufficient marginal incentive for farms without output to reduce emissions and relies solely on there being sufficient incentive to shift to the more robust data requirements, which then create the incentive to reduce emissions. For efficient farms without final output, this incentive should be sufficient, as would receive a greater effective discount under an output-based rebate. However, for very inefficient farms (e.g. under 90% of the national average emissions factor for their product), there will be no incentive to make this transition, as their effective discount will be the same or lower under an output-based rebate.

- The phase-out of assistance (both rebates and discounts) over time should somewhat mitigate this risk, especially if a stronger phase-out rate is applied to the simple discount/average proxy rebate to further incentivise transition over the first few years.

- Separate factors or factor adjustment may need to take place to account for any difference between farms without outputs that are intensive or extensive depending on the function they serve in the supply chain (e.g., intensive finishing), and would on average always fall above or below the national average emissions factors for the products their system contributes to down the chain.

8.14. For the **complex reporting approach**:

- The collection of extra data by the system could have risks and implications for the administrator. However, Partners have expressed interest in incentivising uptake of complex reporting regardless, and one additional datapoint (liveweight gain), which the system will already be set up to receive, should not increase the cost of the reporting and administration system significantly in comparison to 1) the base costs

Released under the Official Information Act 1982

of farm-level pricing of any form, and 2) the benefit of delivering an effective assistance regime.

- The rules around choosing which data to report may need to be very tight, to avoid cherry picking which data is reported to manipulate the emissions total. This could mean farmers can only report simple, simple + liveweight, or full complex; or only report simple or full complex.

8.15. For the **EID tagging approach**:

- This approach is more data and compliance heavy for participants in the first instance, if they do not already EID tag their animals. There are costs associated with the tags and tagging itself, as well as adjusting to a new concept, but these costs should continue to drop.

- However, in the longer term, this approach could significantly simplify the reporting process for most farmers, streamline the calculation for the administrator, and have market assurance and transparency co-benefits and alignment with other policies and consumer demand.

- It is important to note that this may also be a direction of policy over time. For example, a recommendation from the recent independent review of MBovis was to: *"Expand requirements for mandatory, electronic movement recording to include all movements of groups of foot and mouth disease- susceptible species farmed within New Zealand, including sheep, goats and pigs".*

8.16. For the two 'final states' under this option (**unique rebate or rebate divided across lifecycle**):

- To some extent, the full rebate pass-through can never be ensured for farmers without final outputs, because average data of some kind will be necessary to convert a proxy into a theoretical output. However, if complex reporting is used, the range of more granular datapoints allows on-farm actions to be better recognised, and efficiency gains are still rewarded. Or, if EID tagging is used, there is the opportunity to develop a system that distributes the rebate across the supply chain relative to the expected emissions intensity at each stage, rewarding efficiency gains and emissions reductions relative to 1) each farmer's ability to ensure their point in the chain is emissions efficient, and b) each farmer's emissions efficiency relative to other farms who perform the same service.

Cross-cutting considerations

8.17. Across the options, there are a series of overarching comments and considerations:

1. Can an output-based rebate perversely incentivise increases in gross emissions?	• This question is still live, though we anticipate that exogenous factors (e.g. freshwater regulations), existing barriers (why are all farmers not doing this anyway to become more profitable?), and simple structural elements (e.g. phase-out of assistance, updating factors periodically, and potentially caps on over-allocation) are likely sufficient to mitigate this. • In addition, this is only every applicable to some farms, whereas the majority of farms will always face a net cost per unit of output.

Released under the Official Information Act 1982

	• Assessment of the proportion of farms to which this possibility theoretically applies would be useful to determining the level of risk.
2. Maintaining the incentive through fixing parts of the equation	• Even if we can solve the issue of applying an appropriate proxy or other solution to farms without final outputs, many farms will face a weakened marginal incentive to reduce absolute emissions if their even complex reporting derives datapoints from output values, which some farm management tools do. This means their unique on-farm system and practices will not be sufficiently differentiated from the national average. On top of this, there are feedback loops regardless of how the data is gathered, and some of the marginal incentive to reduce absolute emissions is always eroded under output-based options. • The marginal incentive to improve emissions efficiency remains strong under suitable complex reporting, but whether this is sufficient to translate to reductions in absolute emissions is uncertain. • Fixing the national average emissions factors over a period of time (e.g., every five years, which could align with price setting updates) will mitigate some of this issue. • Fixing the entire rebate for this period would further strengthen the incentive, though this then introduces identical equity concerns to other historical rebates, simply delivered through a different calculation.
3. Reporting costs and complexity	• This process has attempted to work through some of the structural implementation issues but has not addressed the broader concern with the high costs and complexity of any farm-level system, especially the compliance burden this will place on the participant. However, the general position across the subgroup is that introducing a rebate on top of farm-level pricing does not add significant additional cost (though may add varying complexity) to the reporting and other elements necessary to generate the initial emissions charge at the farm level. • Most of the options above have a small amount of additional cost and complexity to certain participants, with reduced cost and complexity for other participants. For example, EID tagging will cost sheep farmers, though this could then result in lower complexity over time (and may well be a future requirement to meet other policy objectives); whereas any system that expects the market to pass on the value of the rebate does not require any additional reporting and compliance costs from farms without outputs, but may introduce a new element of complexity, as farmers will need to understanding when and how they should expect to benefit from market adjustment.
4. Effectiveness through reporting granularity	• As with all options considered by the Partnership, better data will create better incentives. For an output-based rebate, the more granularity available on the following datapoints, the more effective the system is likely to be: o Stock breeds over stock classes will recognise the efficiencies of different animals, rather than push farmers toward whichever animal scores best against the national average emissions factors despite other considerations; o Datapoints derived from inputs rather than back calculated from outputs will more clearly decouple the rebate from the emissions charge; o Liveweight measurements of more animals and/or carried out more frequently will provide a better picture of how the rebate should be provided across the supply chain relative to each farm's emissions.

Released under the Official Information Act 1982

9. NEXT STEPS

9.1. The policy design and analysis in this paper has been reflected in the following sections of the engagement document:

- Will rebates be offered in this system? Under Farm-Level Levy (p. 16 and 17) - *references the equity issues for output-based and land-based rebate.*

9.2. This has NOT pre-empted the Steering Group decision on whether the output-based rebate should be an option in the engagement document, so will be updated as required following the Steering Group meeting.

Gus Charteris

Consultant

Principal Author

Released under the Official Information Act 1982

APPENDIX ONE: SUBGROUP ASSESSMENT OF OUTPUT-BASED REBATE OPTIONS

High-level description	Examples	Data requirements	Initial commentary	Risks to assess
1(A) – Cost passed through supply chain				
All farmers face the price, but only farmers with final outputs receive a rebate. The market is assumed to adjust and costs/prices for products and services find new equilibria to reflect this. Some parallel systems to 'grease the wheels' possible.	► Farmer Billy runs a dairy operation, and sells milk directly to a processor. Under this option, he will pay for the full cost of his emissions, and receives a 95% rebate based on the national average emissions factors for dairy products. Billy therefore has a full marginal incentive to reduce emissions, while the assistance allows him to face and appropriately respond to the emissions price. ► Farmer Thackery runs a dairy heifer grazing operation, and therefore has no meat output. Under this option, he would not receive a rebate and would face the full price on his emissions. Without assistance, Thackery would face a full marginal incentive to reduce emissions, and economic theory would suggest that this introduced cost (the emissions charge) would pass through to the prices he charges to those farmers who graze their animals on his farm.	All farms with outputs will be recording sufficient data, which could be provided through either complex or simple reporting to enable this rebate. All farms without outputs will not need to opt into any additional reporting beyond what is needed to report their on-farm emissions.	By only providing rebates to those farms with outputs, this system perhaps offers the strongest marginal incentive for those farms without outputs because they will face the full cost of their emissions. For those farms that do have outputs and therefore receive a rebate, a simple reporting methodology will produce some form of marginal incentive to reduce emissions. If a farmer with an output were to switch to a complex reporting methodology, the marginal incentive to reduce their emissions would likely strengthen, as the further a farmer can differentiate their operation from the mean, the more their efficiencies can be recognised relative to the fixed rebate. There is uncertainty over how efficiently the cost of full exposure to emissions faced by farmers without outputs will be passed on to the rest of the market players. Theory would suggest that prices will reach a new equilibrium to compensate for the introduced costs to some sector actors that provide market inputs upon which others depend. Because non-output farmers would need to increase the prices for their services (e.g. winter grazing) or demand a higher price for store livestock, those with high emissions could lose market share to those farmers with lower emissions (who can therefore pass less cost on through contractual arrangements). Under this scenario, phase-out would only apply to those farmers with outputs (those receiving rebates). While phase-out would help maintain a marginal incentive as farmers get more efficient, it also means farmers that are receiving an output would face two additional costs instead of one: 1) the price increase generated from non-output farmers and 2) capital costs of increasing on-farm efficiency or losing assistance over time.	► Some sectors and farm types will be significantly more affected than others by a lack of rebate, and this may be seen as generally inequitable and otherwise 'differential pricing' by sector Partners. ► The farmer who finishes animals is likely to be considerably over-allocated to reflect the full emissions of the animal, only some of which occurred on their farm. While this is intended to be passed on, if this does not occur the incentive for this farmer to reduce is drastically undercut. ► Many farmers do not realistically have the ability to pass on costs, as those who sell to store are typically price takers (in the sense that they will accept whatever price is offered). Therefore, the inertia in the system may mean significant delay before these farmers see benefit from the rebate, as they cannot influence this themselves.
1(B) – Rebate to processor				
All farmers face the price, but the rebate is received by the processor. The market is assumed to adjust and costs/prices for products and services find new equilibria to reflect this. Some parallel systems to 'grease the wheels' possible.	► Farmer Winifred runs a dairy operation, and sells milk directly to a processor. Under this option, she will pay for the full cost of her emissions, but her processor would receive a rebate. Without assistance, Winifred would face a full marginal incentive to reduce emissions, and economic theory would suggest that this introduced cost (the emissions charge) would pass through to the prices she receives from the processor for her product.	Simple reporting would be sufficient across all farms, though there is still benefit to farmers adopting complex reporting to capture their on-farm actions.	The comments above for option 1(A) largely apply here also, only all farms face the impacts and incentives of the 'non-output' farms from above. In one sense, 1(B) is simpler than 1(A), and potentially more equitable as there is not an imbalance between farmers who do and do not receive a rebate. However, 1(B) also adds another layer through which the benefit of the rebate must pass before the farmers at the beginning of the supply chain receive any value for it.	► What additional complexity is created by requiring both farmers and processors to participate in the system? ► Same risk as above where farmers often do not have the ability to pass on costs, especially if the processor decides to pocket some of the benefit of the rebate.
2 – Simple transitional rebate				
All farmers face the price, farmers with final outputs receive an output-based rebate, and farmers without outputs receive a simple discount. The simple discount rate is assumed to be lower to incentivise farmers to report sufficient data as a proxy for output. In the examples below, the base rate is assumed to be 95%, and the simple rate 90%.	► Farmer Abernathy runs a dairy operation, and sells milk directly to the processor. He pays for the full cost of his emissions, and receives a rebate based on 95% of the national average emissions factor for dairy. Abernathy therefore has a full marginal incentive to reduce his emissions, while the assistance allows him to face and appropriately respond to the cost on his emissions. ► Farmer Bertrand runs a sheep and beef operation, but only sells store livestock, and has no meat product. However, he records the liveweight gain of all livestock sold, and has opted into complex reporting. He pays for the full cost of his emissions, his reported liveweight gains are used as a proxy for output, and he receives a rebate based on 95% of the national average emissions factors for sheep meat and beef meat. Bertrand therefore has a close-to-full marginal incentive to reduce his emissions, while the assistance allows him to face and appropriately respond to the cost on his emissions. ► Farmer Cordelia runs a sheep and beef operation, but only sells store livestock, and has no meat product. She pays for the full cost	All farms with outputs will be recording sufficient data, which could be provided through either complex or simple reporting to enable this rebate. All farms without outputs who opt into complex reporting will have sufficient data. All farms without outputs who do not currently record sufficient data can identify this in their return, and will default to a simple discount until any point at which they choose to provide additional data.	This option does not provide a sufficient marginal incentive for farms without output to reduce emissions, and relies solely on there being sufficient incentive to shift to providing an additional datapoint (i.e. liveweight gain), which then creates an incentive to reduce emissions. For efficient farms without final output, this incentive should be sufficient, as they will then receive a greater effective discount under an output-based rebate. However, for considerably inefficient farms (i.e. under 90% of the national average emissions factor for their product), there will be no incentive to make this transition, as their effective discount will be the same or lower under an output-based rebate. The phase-out of assistance (both rebates and discounts) over time should somewhat mitigate this risk, especially if a stronger phase-out rate could be applied to the simple discount to further incentivise transition over the first few years. Separate factors or factor adjustment may need to take place to account for any difference between farms without outputs that are intensive or extensive, and would on average always fall above or below the national	► Without sufficient phase-out or updating of factors, inefficient farms might have a disincentive to provide complex reporting to maintain the flat-rate discount. If these farms had outputs, there might be a perverse incentive to shift farm system toward no longer finishing animals to avoid the lower relative output-based rebate compared to their actual emissions inefficiency. ► The collection of extra data by the system could have risks and implications for the administrator. However, Partners have expressed interest in incentivising uptake of complex reporting regardless, and one additional datapoint is less onerous on the system than full complex reporting. ► Further to this, the rules around choosing which data to report may need to be very tight, to avoid cherry picking to manipulate the emissions total.

Released under the Official Information Act 1982

	of her emissions, and receives a flat-rate discount of 90% of her emissions return. Cordelia therefore only has a 10% marginal incentive to reduce her emissions, but the assistance allows her to face and appropriately respond to the cost on her emissions. However, the lower rebate level that she receives (compared to a farmer with an output or who records liveweight gain) creates an incentive to transition over time to recording and reporting liveweight gain of all livestock sold, to be used as a proxy for output. She does not have to opt into full complex reporting to begin receiving an output-based rebate, but may if she chooses.		average emissions factors for the products their system contributes to down the chain. One additional data point, which the system will already be set up to receive, should not increase the cost of the reporting and administration system significantly in comparison to the benefit of delivering an effective assistance regime.	
3 – Animal sales output proxy				
All farmers face the price, farmers with final outputs receive an output-based rebate, and farmers without outputs receive a rebate using animal sale numbers. It is assumed that all beef and deer farmers will already have this data through NAIT, and that sheep farmers could be required to report simple, comparable data if and when they sell live animals. Stock numbers reported in this way could either be used as a proxy for output with its own factors, or to divide a single rebate per animal across farms.	► Farmer Adelaide runs a dairy operation, and sells milk directly to the processor. She pays for the full cost of her emissions, and receives a rebate based on 95% of the national average emissions factor for dairy. Adelaide therefore has a full marginal incentive to reduce her emissions, while the assistance allows her to face and appropriately respond to the cost on his emissions. ► Farmer Bartholomew runs a primarily beef operation, but only sells store livestock, and has no meat product. However, he has NAIT records for all livestock sold. He pays for the full cost of his emissions, his NAIT data is used as a proxy for output, and he receives a rebate based on 95% of the national average emissions factors for beef meat. Bartholomew therefore has a close-to-full marginal incentive to reduce his emissions, while the assistance allows him to face and appropriately respond to the cost on his emissions. He does not have to opt into full complex reporting to begin receiving an output-based rebate, but may if he chooses. ► Farmer Constance runs a primarily sheep operation, but only sells store livestock, and has no meat product. She is required through the system to tag all sheep that she sells. She pays for the full cost of her emissions, her animal sales data is used as a proxy for output, and she receives a rebate based on 95% of the national average emissions factors for sheep meat. Constance therefore has a close-to-full marginal incentive to reduce her emissions, while the assistance allows her to face and appropriately respond to the cost on her emissions. She does not have to opt into full complex reporting to begin receiving an output-based rebate, but may if she chooses.	All farms with outputs will be recording sufficient data, which could be provided through either complex or simple reporting to enable this rebate. All farms without outputs who opt into complex reporting will have sufficient data. All farms without outputs who use the NAIT system will have sufficient data. All farms without outputs who do not use the NAIT system would be required to tag animals they sell.	This approach is more data-heavy for all participants in the first instance, though potentially less data-heavy in the long run than option 2. Integration with the NAIT system is necessary, or farmers will at least need to report the data that they also report for NAIT, which will require some work. However, as this data already exists, this barrier is less significant, especially as beef and deer are part of NAIT even when they do not have a direct meat output. Sheep farmers who sell to processors, and therefore have an output, do not need to tag their animals; those who sell to other farmers, and therefore do not have an output, will need to tag their animals. Some farmers may do both, but there should not be any instance in which one animal requires both approaches. The tagging of sheep would not necessarily need to meet NAIT requirements in all regards, and simply be a means of recording numbers of animals sold. To some extent, the full marginal incentive will be lost, because national average emissions factors will be necessary to convert animal sale numbers into an approximate output. However, because this then gives information on where and when animals spend different portions of their lifecycle, there is the opportunity to develop a system that distributes the rebate across the supply chain relative to the expected emissions intensity at each stage, reclaiming some of the ability to receive benefit for efficiency gains and emissions reductions.	► Likely significant risk to buy in from some Partners, especially due to the up-front cost to sheep farmers for this system to function. However, potentially mitigated by a) the likelihood of this process occurring anyway, and b) the reduced cost and complexity to farmers over the longer term. ► The collection of extra data by the system could have risks and implications for the administrator. However, alignment with other systems and/or further simplification of reporting overall may reduce the burden of this.

Cross-cutting risks to assess:

- Does an output-based rebate perversely incentivise increasing production by highly efficient producers, especially without a cap to balance this at a macro-level? Assessment needed of whether exogenous factors (e.g. freshwater regulations), existing barriers (e.g. what is stopping farmers from making more money by doing this anyway?), and simple structural fixes (e.g. caps on over-allocation, phase-out, updating factors) are enough to mitigate this risk.
- Even if we can solve the issue of applying an appropriate proxy or other solution to farms without final outputs, many farms will face a weakened marginal incentive if they are using complex reporting that derives some of their datapoints from output values, as their unique on-farm system and practices will not be sufficiently differentiated from the national average. Analysis will be needed to determine what proportion of farmers this likely applies to, the extent of any remaining marginal incentive, and to what degree fixing the factors for a period of time can strengthen this.

Released under the Official Information Act 1982