The Cost of Cows: How to Price Agricultural Emissions According to Responsive Regulatory Theory

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The agricultural sector is a major contributor to New Zealand's greenhouse gas emissions profile. The sector is also economically and socio-culturally important to New Zealand. This tension makes the regulation of agricultural emissions a difficult prospect. In 2018, the Government established the Interim Climate Change Committee to assess how surrender obligations could best be arranged if agricultural methane and nitrous oxide emissions were to enter the New Zealand Emissions Trading Scheme. The Climate Change Response (Emissions Trading Reform) Amendment Act 2020 came into force on 22 June 2020. The Amendment states that livestock emissions will be priced at farm-level and fertiliser emissions will be priced at processor-level from 2025. This article will examine how the pricing of agricultural emissions should be designed according to responsive regulatory theory to better address climate change issues.

1. INTRODUCTION

Regulating agricultural emissions is a challenging task for New Zealand. On one hand, reducing agricultural emissions is crucial if New Zealand is to meet its international obligations on climate change. On the other hand, the agricultural sector is economically and socio-culturally important for New Zealand. In the past, the New Zealand Government has favoured economic

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and socio-cultural interests, choosing not to regulate agricultural emissions. However, the mounting pressure to take action on climate change has recently seen the Government take steps towards regulating agricultural emissions.

In 2018, the Government established the Interim Climate Change Committee (ICCC) to assess how surrender obligations could be arranged if agricultural methane and nitrous oxide emissions entered into the New Zealand Emissions Trading Scheme (NZ ETS).[1] After engaging farmers, growers, primary sector organisations, Māori land owners, foresters, NGOs and bankers, the ICCC recommended that livestock emissions be priced at farm-level and fertiliser emissions be priced at processor-level.[2] The Government then undertook public consultation through the *Action on agricultural emissions* discussion document.[3] Subsequently, the Climate Change Response (Emissions Trading Reform) Amendment Act 2020 came into force on 22 June 2020. This Amendment states that livestock emissions will be priced at farm-level and fertiliser emissions will be priced at processor-level from 2025.[4]

2. BACKGROUND

This part will examine the characteristics of agricultural emissions and the steps that have been taken towards implementing regulation.

2.1 What are Agricultural Emissions?

Agricultural emissions mainly come in the form of methane and nitrous oxide.[5] Methane and nitrous oxide cause warming in the atmosphere and therefore contribute to climate change.[6]

Methane is produced during the digestive process of ruminant animals such as sheep and cows.[7] It is a powerful, but short-lived greenhouse gas (GHG).[8] A methane emission will only remain in the atmosphere for about 12 years, but

1 Cabinet Paper "The Interim Climate Change Committee terms of reference" (March 2019) at [9].
2 Interim Climate Change Committee [ICCC] *Action on agricultural emissions: evidence, analysis and recommendations* (30 April 2019) at 7.
3 Ministry for the Environment *Action on agricultural emissions: A discussion document on proposals to address greenhouse gas emissions from agriculture* (July 2019) [MfE *Action on agricultural emissions*].
4 Climate Change Response Act 2002, s 2A.
5 ICCC, above n 2, at 20.
6 At 24.
7 At 20.
8 At 24.

it has an intense warming effect.[9] One tonne of methane emitted today causes more warming than a tonne of carbon dioxide over a 200-year period (despite carbon dioxide having a much longer life).[10] The less methane emitted, the less it will contribute to global warming. However, because methane has a short life, it does not accumulate in the atmosphere.[11] Therefore, methane emissions do not have to be reduced to zero to prevent methane from contributing to global warming.[12]

Nitrous oxide comes from animal urine and the use of synthetic fertilisers.[13] It has a life of over 100 years, but only small amounts are emitted.[14] Like carbon dioxide, nitrous oxide accumulates in the atmosphere.[15] Therefore, net emissions must be reduced to zero to stop it from contributing to global warming.[16]

In reports and legislation, agricultural emissions are often divided into "livestock emissions" and "fertiliser emissions". That terminology will be used in this article.

2.2 Agricultural Emissions in New Zealand

Agriculture contributes significantly to New Zealand's GHG emissions profile. In 2017, agricultural emissions made up 48.1 per cent of New Zealand's carbon dioxide equivalent emissions.[17] Methane emissions from enteric fermentation were 34.2 per cent of New Zealand's gross emissions, and nitrous oxide emissions from agricultural soils were 10.6 per cent of New Zealand's gross emissions.[18]

2.2.1 Agricultural emissions and the New Zealand Emissions Trading Scheme

Despite agriculture's significant contribution to New Zealand's GHG profile, the sector does not have surrender obligations under the NZ ETS.[19] The NZ ETS

9 At 24.
10 At 24.
11 At 24.
12 At 24.
13 At 20.
14 At 24.
15 At 24.
16 At 24.
17 Ministry for the Environment *New Zealand's Greenhouse Gas Inventory 1990–2017* (April 2019) [MfE *New Zealand's Greenhouse Gas Inventory 1990–2017*] at 148.
18 At 148.
19 Catherine Leining and Suzi Kerr *A Guide to the New Zealand Emissions Trading Scheme* (Motu Economic and Public Policy Research, August 2018) at 4.

is the principal element of New Zealand's response to climate change.[20] The NZ ETS is a market where obligated parties must surrender a tradable emission unit to the Government for each tonne of emissions that they are liable.[21] The cost to obligated parties of surrendering emission units raises the relative cost of high-emission goods and services, creating an incentive for businesses and consumers to reduce or avoid emissions.

Livestock and fertiliser processors are required to report their emissions under the NZ ETS but are not subject to surrender obligations.[22] As such, processors must measure and report emissions from livestock and fertiliser, but they do not have to buy or surrender units on the NZ ETS market. When the NZ ETS was enacted in 2008, it was intended that agricultural emissions would become subject to surrender obligations in the future.[23] However, surrender obligations for the agricultural sector were deferred indefinitely in 2012 because the Government was concerned about lack of cost-effective mitigation options and the effect on the competitiveness of New Zealand's agricultural products.[24] As such, there is no financial incentive for farmers to reduce agricultural emissions. The lack of financial incentive has seen agricultural emissions in New Zealand increase by 13.5 per cent between 1990 and 2017.[25]

2.3 The Paris Agreement

In October 2016, New Zealand confirmed its commitment to take action on climate change by ratifying the Paris Agreement.[26] The aim of the Agreement is to keep the global average temperature well below 2°C above pre-industrial levels, while pursuing efforts to limit the temperature increase to 1.5°C.[27]

New Zealand's commitment to the Paris Agreement was brought into law by the Climate Change Response (Zero Carbon) Amendment Act 2019. The Climate Change Response Act 2002 (the Act) was amended so that the purpose of the Act is to provide a framework by which New Zealand can develop and implement clear and stable climate change policies that contribute to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5°C above pre-industrial levels.[28]

20 At 1.
21 At 2.
22 At 4.
23 At 3.
24 At 4.
25 MfE *New Zealand's Greenhouse Gas Inventory 1990–2017*, above note 17, at 10.
26 United Nations Framework Convention on Climate Change "Paris Agreement — Status of Ratification" <www.unfccc.int>.
27 Paris Agreement (opened for signature 22 April 2016, entered into force 4 November 2016), art 2.1.
28 Climate Change Response Act, s 3(1)(aa)(i).

2.4 Climate Change Response (Zero Carbon) Amendment Act 2019

As well as confirming New Zealand's commitment to the Paris Agreement, the Climate Change Response (Zero Carbon) Amendment Act 2019 sets more specific goals for reducing emissions.

The Amendment inserted s 5Q into the Act. Section 5Q sets out the emissions reduction targets for the year 2050. It states that net accounting emissions of greenhouse gases, other than biogenic methane, should be zero by 2050.[29] It also states that biogenic methane should be reduced by: 10 per cent below 2017 levels by 2030; and 24 per cent to 47 per cent below 2017 levels by 2050.[30]

2.5 Interim Climate Change Committee

In order to fulfil New Zealand's commitments under the Paris Agreement, the Government established the ICCC to develop evidence and analysis on the priority matters of agriculture and renewable electricity generation.[31]

The terms of reference for the ICCC required it, amongst other things, to create a report containing evidence, analysis, and recommendations on "[h]ow surrender obligations could best be arranged if agricultural methane and nitrous oxide emissions enter into the New Zealand Emissions Trading Scheme (NZ ETS)".[32]

The ICCC released the report *Action on agricultural emissions: evidence, analysis and recommendations* (ICCC report) on 30 April 2019.[33] The report considers issues such as the significance of agricultural emissions, the economic importance of agriculture in New Zealand, where the point of obligation should sit, how emissions should be calculated, how the free allocation should be distributed, how to encourage development of emission-reducing technology, and how to facilitate the transition to low emission farming.[34]

The ICCC found that:[35]

> … a policy package is needed that motivates all farmers to play a part in reducing agricultural emissions while supporting them to change farming practices or move toward lower emissions land uses. A policy that rewards

29 Section 5Q(1)(a).
30 Section 5Q(1)(b).
31 Cabinet Paper "Interim Climate Change Committee Terms of Reference and Appointment" (17 April 2018) at [4].
32 Cabinet Paper, above note 1, at [9].
33 ICCC, above note 2.
34 At 6–7.
35 At 6.

actions at farm-level is critical in the long term to realise the full potential for emissions reductions.

The ICCC report is useful as it explores the various options for pricing agricultural emissions. Part 4 of this article will examine the options set out by the ICCC through a responsive regulatory lens.

2.6 Action on Agricultural Emissions

After receiving the ICCC report, and engaging in conversation with leaders in the agriculture sector, the Government released the discussion document *Action on agricultural emissions* (the discussion document).[36] The discussion document proposed that livestock emissions be priced at farm-level, and fertiliser emissions be priced at processor-level, from 2025.[37] The discussion document also put forward two interim options for working towards the pricing of emissions by 2025. The options were to include livestock and fertiliser emissions in the NZ ETS during the interim period, or to have a formal sector–government agreement to progress towards a farm-level pricing mechanism.[38] The discussion document also asked for feedback on opportunities and barriers for on-farm GHG mitigation.[39]

Submissions on the discussion document closed on 13 August 2019. After reviewing the available evidence and public submissions, the Government considered that livestock emissions would be priced at farm-level, and fertiliser emissions at processor-level, from 2025.[40] Also, the Government decided not to include agricultural emissions in the NZ ETS during the interim period. Instead, a Joint Action Plan would be developed with the agricultural sector and iwi/Māori to build the necessary systems for a farm-level pricing mechanism.[41]

2.7 Joint Action Plan on Primary Sector Emissions

The *Joint Action Plan on Primary Sector Emissions* (the *Joint Action Plan*) is an agreement between the Government, primary sector groups and iwi/Māori to work towards the development of an appropriate farm-level emissions pricing mechanism by 2025. The agreement is based on the primary sector proposal

36 MfE *Action on agricultural emissions*, above note 3.
37 At 6.
38 At 6.
39 At 6.
40 Cabinet Minute of Decision "Action on Agricultural Emissions: Final Policy Proposals" (16 September 2019) CAB-19-MIN-0480 at [8].
41 At [24].

He Waka Eke Noa.[42] The proposal outlines the primary sector's commitment to respond to the global issue of climate change and invites the Government to work with the sector in order to develop an appropriate pricing mechanism for agricultural emissions.[43]

The *Joint Action Plan* contains key milestones to ensure that a farm-level pricing mechanism is developed in a timely manner. These milestones were introduced into legislation by the Climate Change Response (Emissions Trading Reform) Amendment Act 2020.

2.8 Climate Change Response (Emissions Trading Reform) Amendment Act 2020

The Climate Change Response (Emissions Trading Reform) Amendment Act 2020 came into force on 22 June 2020. This Amendment gives effect to the Government's decisions regarding agricultural emissions.

Section 2A of the Act now provides that livestock emissions will be priced at farm-level, with measuring and reporting of emissions beginning in 2024 and surrender obligations beginning in 2025.[44] Section 2A also states that surrender obligations for fertiliser emissions will commence in 2025 at processor-level.[45]

Section 219 provides for a date to be set by Order in Council for surrender obligations for livestock and fertiliser emissions at processor-level.[46] The date must not be before 1 July 2022.[47] The Minister may only recommend a date after consulting the Minister of Agriculture and considering a report provided by the Climate Change Commission (the Commission).[48]

The Commission must report to the Minister by 30 June 2022 on: the progress made towards meeting the primary sector climate change commitments; the progress made towards getting farmers ready to comply with reporting and surrender obligations; and any barriers or further steps required to get farmers ready to comply with such obligations.[49]

Schedule 5 of the Act sets out the primary sector climate change commitments that the Commission must report on.[50] By 31 December 2021, 25 per cent of farms must have a documented annual total of on-farm GHG emissions, by

42 Primary Sector Climate Change Commitment "He Waka Eke Noa — Our Future in Our Hands" (July 2019) Ministry for the Environment <www.mfe.govt.nz>.
43 At [1]–[2].
44 Climate Change Response Act, s 2A(5D).
45 Section 2A(5A).
46 Section 219(3).
47 Section 219(5).
48 Section 219(4).
49 Section 220.
50 Schedule 5.

methods and definitions accepted by the He Waka Eke Noa steering group.[51] All farms must hold such information by 31 December 2022.[52] A system for farm-level accounting and reporting must be in use by 1 January 2025.[53] There are also requirements for the implementation of farm plans that help farmers measure and manage GHG emissions.[54]

Section 219 of the Act is effectively a backstop. If, after consulting the Minister of Agriculture and receiving the Commission's report, the Minister is not satisfied with the progress towards implementing a mechanism to price livestock emissions at farm-level, the Minister may recommend that livestock emissions be priced at processor-level instead.[55]

3. RESPONSIVE REGULATION

Before applying responsive regulatory theory to the pricing of agricultural emissions, it is necessary to explain what responsive regulation is. This part will explore responsive regulation from its conception to its current use in various regulatory spheres.

3.1 What is Responsive Regulation?

The idea of responsive regulation was first coined by Ayers and Braithwaite in 1992 in their book *Responsive Regulation*.[56] According to them, responsive regulation is about "the need to transcend the intellectual stalemate between those who favour strong regulation of businesses and those who advocate deregulation".[57] It is about finding a middle ground between strong state regulation and free markets. It is regulation that responds to the industry structure, as well as the motivations and objectives of the regulated parties.[58] According to responsive regulatory theory, it is preferable to work with regulated parties to influence their behaviour, rather than trying to control them.

Ayres and Braithwaite state that "[r]esponsive regulation is not a clearly defined program or a set of prescriptions concerning the best way to regulate. On the contrary, the best strategy is shown to depend on context, regulatory

51 Schedule 5 cl 1.
52 Schedule 5 cl 2.
53 Schedule 5 cl 3.
54 Schedule 5 cls 5–7.
55 Section 219(4)(c).
56 Ian Ayres and John Braithwaite *Responsive Regulation: Transcending the Deregulation Debate* (Oxford University Press, New York, 1992).
57 At 3.
58 At 4.

culture, and history."[59] Responsive regulation is a broad idea that can be applied to many different situations, rather than a set of rules that prescribe how to regulate. Ayres and Braithwaite recognise that different industries (and different firms within an industry) will respond differently to regulation.

3.2 Tit-for-tat Enforcement

Central to Ayres and Braithwaite's responsive regulation is the idea that "escalating forms of government intervention will reinforce and help constitute less intrusive and delegated forms of market regulation".[60] Escalating intervention requires a regulator to have a range of regulatory tools available to them. These regulatory tools escalate in the sense that some are used to persuade regulated parties to comply and some are used to punish for non-compliance. If the regulated party does not comply with the persuasive, less intrusive regulation, the regulator may use a more punitive regulatory tool. Ayres and Braithwaite call this tit-for-tat enforcement.

3.2.1 Promoting cooperation

Ayres and Braithwaite argue that tit-for-tat enforcement promotes cooperation between the regulator and the regulated party. Generally, a regulated party wishes to minimise regulatory costs and the regulator aims to maximise compliance.[61] Therefore, achieving compliance through persuasive regulation is preferable for both parties as it tends to be easier and cheaper.[62] Persuasive regulation is cheaper for the regulator because they spend less on litigation, and cheaper for the regulated party as they avoid costly fines or other sanctions associated with punitive regulation. If a regulated party does not comply, tit-for-tat enforcement allows the regulator to escalate their response to a more punitive regulatory strategy. This escalation is likely to encourage the regulated party to cooperate so that the regulator reverts to persuasive strategies.

3.2.2 Recognising different motivations

Another reason that Ayres and Braithwaite promote tit-for-tat enforcement is because of the differing motivations among regulated parties. In his book *To Punish or Persuade*, Braithwaite rejected a regulatory strategy based totally

59 At 5.
60 At 4.
61 At 21.
62 At 19.

on persuasion.[63] He argued that a regulated party will exploit a strategy of persuasion when they are motivated by economic rationality.[64] For example, a regulated party may choose to breach regulation if the benefits from non-compliance outweigh the sanctions. However, Braithwaite also rejected a regulatory strategy based totally on punishment.[65] He argued that punishing regulated parties will insult and demotivate those that carry a sense of responsibility and are trying to do the right thing.[66] Such punishment can lead to parties resisting regulation and finding loopholes to avoid it.[67]

Ayres and Braithwaite use Braithwaite's study of nursing homes to show how different regulated parties can have different motivations.[68] The study shows that different nursing homes were motivated to different extents by maximising profits and by providing a decent standard of care.[69]

Ayres and Braithwaite argue that tit-for-tat enforcement is the best strategy to deal with motivational diversity.[70] If the nursing home is motivated to provide the best care for their residents, persuasion is the best strategy to maintain a decent standard of care.[71] If the nursing home is motivated by maximising profits, the regulator may need to escalate the regulatory strategy to one that is more punitive. The sanctions for non-compliance should make it economically rational for a regulated party to comply with regulations. The best strategy will cause a regulation breaker to reform and cooperate, allowing the regulator to revert to a more persuasive regulatory strategy.

3.3 Tripartism

Ayres and Braithwaite recognise that cooperation between regulators and regulated parties may lead to capture and corruption.[72] Corruption is when the regulated firm bribes the regulator and the regulator allows the firm to breach regulations.[73] Capture is when the regulator is dominated by the regulated industry and acts in the best interests of the industry.[74]

63 John Braithwaite *To Punish or Persuade: Enforcement of Coal Mine Safety* (State University of New York Press, Albany, 1985) cited in Ian Ayres and John Braithwaite *Responsive Regulation* (Oxford University Press, New York, 1992) at 24.
64 At 24.
65 At 24.
66 At 24.
67 Ayres and Braithwaite, above note 56, at 25.
68 At 27.
69 At 28–29.
70 At 29.
71 At 29.
72 At 54.
73 At 56.
74 Will Kenton "Regulatory Capture" (23 October 2019) Investopedia <www.investopedia.com>.

Ayres and Braithwaite advance the idea of tripartism as a method for preventing capture and corruption while encouraging cooperation.[75] Tripartism is when a third party, such as a public interest group, is involved in the regulatory domain.[76] The public interest group can either: have the power to directly punish a firm; or have the power to punish regulators who fail to punish firms for non-compliance.[77]

3.4 The Pyramid of Regulatory Strategies

Ayres and Braithwaite illustrate the idea of escalating government intervention through the pyramid of regulatory strategies.[78] The pyramid shape aims to show how the escalating strategies channel most of the regulation towards the base of the pyramid.[79]

Ayres and Braithwaite intend for the pyramid of regulatory strategies to apply to an entire industry rather than individual firms.[80] That is, the entire industry will be regulated by one of the strategies on the pyramid, and the entire industry may move up or down the pyramid depending on how they cooperate with regulation.

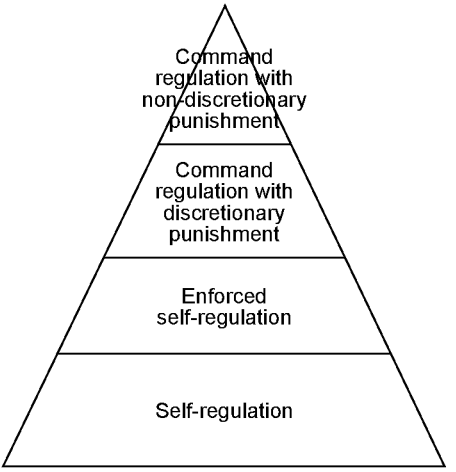

Figure 1: Pyramid of regulatory strategies.
Source: Ayres and Braithwaite *Responsive Regulation*.[81]

75 Ayres and Braithwaite, above note 56, at 54.
76 At 54.
77 At 56.
78 At 39.
79 At 39.
80 At 38.
81 At 39.

Ayres and Braithwaite give the above example of such a pyramid (see Figure 1). However, they note that this is just one example of a regulatory strategies pyramid.[82]

3.4.1 The enforcement pyramid

It is important to differentiate between the enforcement pyramid and the pyramid of regulatory strategies. The enforcement pyramid focuses on the actual sanctions for breaching regulation. For example, the enforcement pyramid may escalate from persuasion, to warning letter, to civil penalty, to criminal penalty, to licence suspension or revocation.[83] This article is not concerned with the *enforcement* of agricultural emissions regulation, but rather on the design of the regulatory strategy that puts a price on agricultural emissions.

3.4.2 Command regulation

Command regulation (also called command and control regulation) is at the top of Ayres and Braithwaite's pyramid. This sort of regulation usually consists of state-made rules that prohibit or restrict certain activities.[84] Command regulation is generally very costly for both the regulator and regulated party. The costs may come in the form of fines for breaking the rules and litigation if those fines are disputed. With regard to environmental regulation, Neil Gunningham states that in "the 1980s direct/'command and control' regulation was widely criticised, both within the USA and elsewhere, for being inflexible and excessively costly for business".[85] Similarly, Cameron Holley states, "the centralised and uniform nature of command-and-control regulation was increasingly criticised as costly, cumbersome, inefficient and insensitive to local contextualities".[86]

3.4.3 Self-regulation

Self-regulation is at the bottom of the pyramid. Self-regulation is when the state negotiates a regulatory goal with the industry and leaves it up to the industry to achieve that goal.[87] Ayres and Braithwaite consider self-regulation to be the

82 At 38.
83 At 35.
84 Neil Gunningham "Environment Law, Regulation and Governance: Shifting Architectures" (2009) 21 JEL 179 at 182.
85 At 183.
86 Cameron Holley "Environmental regulation and governance" in Peter Drahos (ed) *Regulatory Theory: Foundations and Applications* (ANU Press, Acton, 2017) 741 at 744.
87 Ayres and Braithwaite, above note 56, at 38.

least burdensome approach for both the regulator and the regulated industry because it allows the industry to achieve its goals with optimal efficiency.[88] However, the industry may be tempted to exploit the self-regulation strategy if it is economically rational for them to do so.[89] Gunningham provides several reasons why self-regulation may be unsuccessful, including "the central role of industry in the target-setting process, the scope for free riding, the uncertainty over regulatory threats, non-enforceable commitments, poor monitoring and lack of transparency".[90] Ayres and Braithwaite argue that, in order to reduce the temptation for regulated parties to exploit self-regulation, the regulator needs to show a willingness to escalate the regulatory strategy up the pyramid.[91]

3.4.4 Middle bands

Ayres and Braithwaite consider that command and control regulation and self-regulation were relatively well-tested and applied by 1992.[92] However, Gunningham notes that such strategies had limited success in the environmental context through the 1980s.[93] Ayres and Braithwaite also recognised the problem with such strategies and expressed the need for innovative regulatory strategies in the middle bands of the pyramid.[94]

One idea that Ayres and Braithwaite put forward is the enforced self-regulation model. The enforced self-regulation model requires negotiation between government and individual firms to establish regulations for each firm.[95] The firm is required to regulate itself, but the rules may be publicly enforced.[96] Some of the benefits of enforced self-regulation are that the rules are tailored to match the individual firm, regulatory innovation is encouraged, and the firms are more committed to rules they write themselves.[97]

"New environmental governance" (NEG) is another regulatory strategy that might be positioned in the middle bands of the regulatory strategies pyramid. Cameron Holley looks at the emergence of NEG in the late 1990s.[98] He finds that command and control regulation and self-regulation were often unsuitable for complex environmental problems and resulted in further

88 At 38.
89 At 38.
90 Gunningham, above note 84, at 187.
91 Ayres and Braithwaite, above note 56, at 38.
92 At 101.
93 Gunningham, above note 84, at 183, 184 and 187.
94 Ayres and Braithwaite, above note 56, at 101.
95 At 101.
96 At 101.
97 At 110–113.
98 Holley, above note 86, at 742.

ecological degradation.[99] As a result, there was a movement towards NEG. NEG emphasises "collaboration, integration, participation, deliberative styles of decision-making, adaptation and learning".[100] It is a form of "polycentric governance" where government, non-governmental organisations (NGOs), the private sector and civilians all play a role in decision-making. For example, collaborative approaches to water management in New Zealand involve a variety of non-state actors assuming administrative, regulatory, managerial and mediating functions previously undertaken by the state.[101]

NEG's principles of collaboration and polycentric governance echo the principles of cooperation and tripartism in responsive regulation. Moreover, both NEG and responsive regulation were developed because other regulatory strategies failed to deal with complex problems.

Another regulatory strategy that might sit in the middle bands of the pyramid is management-based regulation. Gunningham describes management-based regulation as programmes that "offer regulatory rewards and incentives in return for a commitment to adopt and implement an environmental management system".[102] The National Environmental Performance Track in the USA and Environmental Improvement Plans in Australia are two examples of management-based regulation.[103]

Gunningham considers that Environmental Improvement Plans have been a success in Victoria, Australia.[104] The plans pressured companies to improve their environmental performance and also improved dialogues and relationships between companies, communities, and regulators.[105] This success shows that it is possible to have a successful, innovative regulatory strategy in the middle bands of the pyramid.

However, it is important to note that flexible regulatory initiatives have also been subject to criticism. For example, the USA Environmental Protection Agency's "Project XL" (a Clinton–Gore initiative) offered companies the opportunity to seek waivers from existing regulatory requirements in exchange for a commitment to environmental improvements through innovative changes

99 At 742.
100 At 742.
101 At 748.
102 Gunningham, above note 84, at 190.
103 At 190.
104 At 191–192.
105 At 192.

in manufacturing practices.[106] However, the project attracted fewer applications and resulted in fewer innovations than expected.[107] The project also had high transaction costs, lacked a statutory base, and parties could not overcome mutual mistrust.[108] This criticism highlights that innovative regulatory strategies must be fit for purpose. "[T]he best strategy is shown to depend on context, regulatory culture, and history."[109] If the regulation does not appropriately combine dialogue, incentives and sanctions, regulated parties may not comply, either because they feel that the regulator is imposing excessive control over them, or because non-compliance is economically rational.

3.5 Application of Responsive Regulation

The responsive regulatory model is used by a multitude of regulatory bodies working in a range of different fields such as food safety, child protection, and taxation.[110] The Department of Internal Affairs is one New Zealand agency that uses the responsive regulatory model (see Figure 2).[111] The pyramid shows that the behaviour of the regulated party determines which strategy the regulator will use. The regulator can escalate the strategy if the regulated party is unwilling to comply. The threat of escalation creates pressure down the pyramid, pushing regulated parties towards the less costly regulatory strategies.

106 Rena Steinzor "Regulating Reinvention: Does the Emperor Have any Clothes?" (1996) 26 ELR 10527 at 10529.

107 Gunningham, above note 84, at 191.

108 At 191.

109 Ayres and Braithwaite, above note 56, at 5.

110 Mary Ivec and Valerie Braithwaite *Applications of Responsive Regulatory Theory in Australia and Overseas: Update* (Regulatory Institutions Network, Occasional Paper 23, March 2015) at 22, 60 and 90.

111 Department of Internal Affairs *Minimising Harm — Maximising Benefit: The Department of Internal Affairs' Approach to Compliance & Enforcement* (August 2012) at 7.

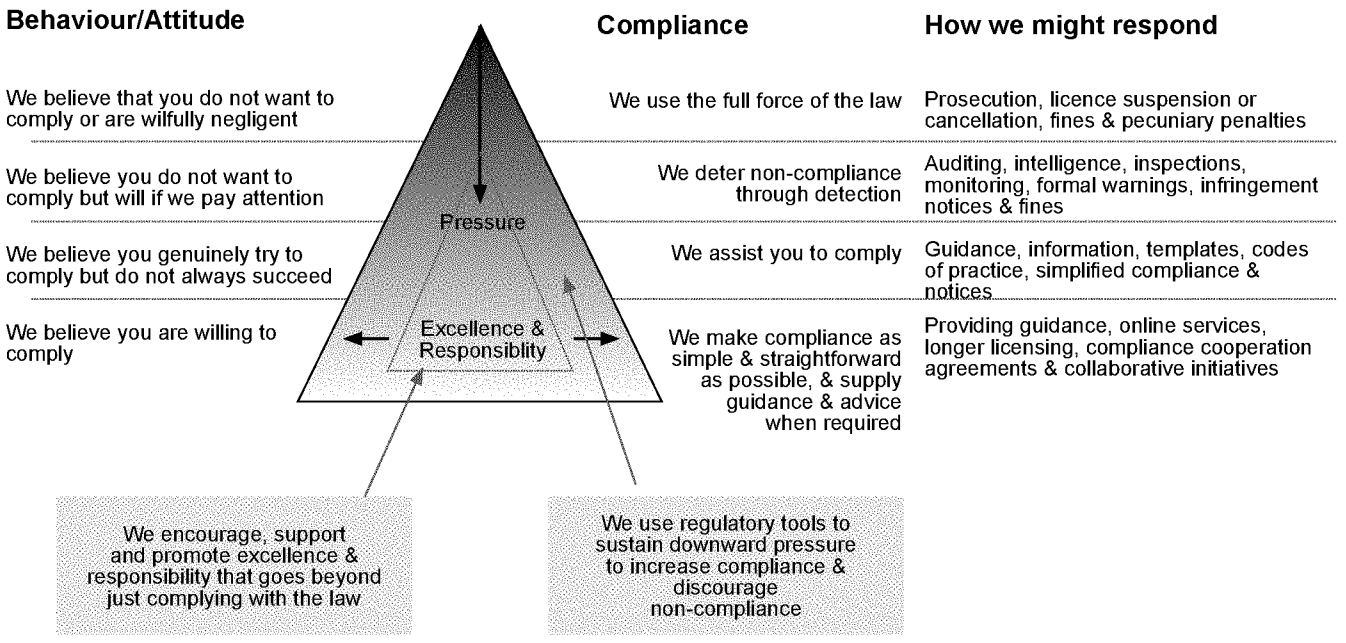

Figure 2: Department of Internal Affairs' compliance model.[112]

112 At 7.

The use of the responsive regulatory model in New Zealand, and around the world, shows that responsive regulation is still good principle. When asked whether responsive regulation works, Mary Ivec and Valerie Braithwaite explain that the principles of responsive regulation are supported by evidence from the social sciences and economics.[113] However, they are careful to note that it "is not an 'off-the-shelf' program that can be transferred from one context to another without preparation and consultation".[114] They emphasise that "[r]esponsive regulatory principles have to be implemented in a way to suit context".

Responsive regulatory theory can be useful in implementing effective regulation. However, it is not as simple as applying the Department of Internal Affairs' compliance model to agricultural emissions. Careful attention must be paid to the agricultural industry in order to understand the implications of regulating and the motivations of the regulated parties.

4. A COMPLEX PROBLEM AND TRADITIONAL METHODS OF REGULATION

It is useful to examine the regulation of agricultural emissions through a responsive regulatory lens because agricultural emissions are a complex problem. This part will illustrate the complexity of agricultural emissions by addressing: the environmental, economic and socio-cultural interests; the different motivation levels of farmers to reduce emissions; and the limited tools currently available for reducing agricultural emissions. Due to the complex nature of agricultural emissions, it is likely that simple forms of regulation will be ineffective. Responsive regulatory theory suggests that an innovative regulatory strategy must be developed to suit the specific context of agricultural emissions.

4.1 The Complexity of Environmental Problems Generally

The issue of complexity is not unique to agricultural emissions. Many environmental problems are complex. Elizabeth Fisher puts this complexity down to the polycentric, interdisciplinary, normative and scientifically uncertain nature of environmental problems.[115]

Environmental problems are interdisciplinary because the law often relies on scientific measurements. For example, the Resource Management (National

113 Ivec and Braithwaite, above note 110, at 5.
114 At 5.
115 Elizabeth Fisher "Environmental Law as 'Hot' Law" (2013) 25 JEL 347 at 351.

Environmental Standards for Air Quality) Regulations 2004 set out the ambient air quality standards for contaminants.[116] The threshold concentration for the contaminant PM_{10} is 50 micrograms per cubic metre expressed as a 24-hour mean.[117] Adding to the complexity is the fact that the science of environmental effects is sometimes uncertain. Fisher argues that some actions are undertaken on a normative basis because the consequences of those actions are not easily predictable.[118]

Creating law to deal with complex and uncertain problems is challenging. Gunningham notes, "the more complex the environmental problem, the more obvious become the limitations (and the inefficiencies) of direct regulation in addressing it".[119] Moreover, Fisher states that:[120]

> ... environmental law stands in stark contrast to those areas of law where actors, interests, preferences, and thus rights and responsibilities, can be easily identified and thus workable frames of legal action can operate. Environmental law is thus a subject in which "reassured certainties give way to tormented complexities".

4.2 The Complexity of Agricultural Emissions

In *Bulga Milbrodale*, the Chief Judge of the New South Wales Land and Environment Court notes that environmental problems involve interconnections between multiple parts of the eco-system, the socio-cultural and economic realms.[121] This section will explore those interconnections in the context of agricultural emissions to illustrate the complexity of regulating in this area.

4.2.1 Environmental concerns

Agricultural emissions are an environmental concern because they contribute to climate change.[122] Climate change is a global issue with wide-reaching consequences. The Government has committed to acting on climate change by

116 Resource Management (National Environmental Standards for Air Quality) Regulations 2004, sch 1.
117 Schedule 1.
118 Fisher, above note 115, at 351.
119 Gunningham, above note 84, at 184.
120 Fisher, above note 115, at 348.
121 *Bulga Milbrodale Progress Association Inc v Minister for Planning and Infrastructure and Warkworth Mining Limited* [2013] NSWLEC 48 at [31]–[42].
122 ICCC, above note 2, at 19.

reducing agricultural emissions by between 24 per cent and 47 per cent below 2017 levels by 2050.[123]

4.2.2 Economic concerns

There is concern that the regulation of agricultural emissions will have significant economic implications because the agricultural sector is an important part of New Zealand's economy. The sector generates 35 per cent of annual export revenue.[124] In 2018, there were 108,138 people employed in the sector.[125]

The main concern is that regulation will impose costs on farmers (in particular, livestock farmers).[126] Increased costs for farming livestock may cause certain types of farming to become financially unviable and, in turn, cause widespread land use change.[127] Land use change is where land is converted to a different type of farming or converted into forestry. Land use change may lead to job losses, an inability of farmers to service debt incurred before the regulation was introduced, a decrease in the value of farm land and infrastructure, and stranded assets such as meat and milk processing plants.[128] Such effects were experienced by rural communities in the 1980s when agricultural subsidies were removed and rapid land use change occurred.[129] During that time rural communities experienced loss of employment and reduced populations that in turn affected institutions such as schools, libraries and sports clubs.[130] Therefore, it is important that the possible negative impacts on rural communities are taken into consideration when designing regulation for agricultural emissions.

Another economic concern is that regulating agricultural emissions will cause emissions leakage.[131] Emissions leakage occurs when a country introduces emissions regulation that makes the cost of production higher.[132] Higher production costs may cause manufacturers to move production to another

123 Climate Change Response Act, s 5Q(1)(b)(ii).
124 ICCC, above note 2, at 19.
125 Statistics New Zealand "Industry (subdivision) and work status by age group and sex, for the employed census usually resident population count aged 15 years and over, 2006, 2013, and 2018 Censuses" (2018) NZ.Stat <www.nzdotstat.stats.govt.nz>.
126 ICCC, above note 2, at 80.
127 At 80.
128 At 80.
129 At 81.
130 At 81.
131 At 82.
132 Suzie Greenhalgh, Jim Sinner and Suzi Kerr *Emissions trading in New Zealand: Options for Addressing Trade Exposure and Emissions Leakage* (paper prepared for New Zealand Climate Change Policy Dialogue, September 2007) at 1.

country without emissions regulation.[133] The country that loses producers will suffer economic consequences and it is possible that any decrease in emissions in one country is offset by an increase in another.

In New Zealand, there is concern that the regulation of agricultural emissions will increase the cost of producing meat and milk. Increased costs will likely make New Zealand products relatively more expensive. Countries that New Zealand typically exports to may choose to import cheaper products from countries that do not have agricultural emissions regulation. A decrease in demand for New Zealand products will likely have economic implications for the agricultural sector and New Zealand as a whole. Moreover, increased production of agricultural products in other countries may cause higher agricultural emissions that will negate any reduction of agricultural emissions in New Zealand.

However, the ICCC considers that regulation of agricultural emissions is unlikely to cause a decrease in the production of dairy products in New Zealand in the short term because dairy is highly profitable and involves high capital investments.[134] However, the dairy market is highly volatile.[135] This volatility could make dairy less profitable in the short term. Also, it is likely that regulation of agricultural emissions will impose some cost on dairy farms that will further erode profitability.

The ICCC also considers that if New Zealand dairy exports decrease due to the regulation of emissions, the countries that are most likely to increase production are in Western Europe and North America.[136] Countries in those areas tend to have economy-wide emission caps, so if their agricultural emissions do increase, other sectors of their economy will have to reduce emissions.[137] Therefore, the risk of emissions leakage is lower.

Drystock production is the production of meat, wool, velvet and other similar products. The ICCC states that drystock production is more likely to result in emissions leakage because some countries that could potentially increase drystock production do not have emission reduction targets.[138] However, the ICCC considers that any land use change, from drystock production to forestry, will be a result of forestry becoming more profitable, not because agricultural emissions are regulated.[139]

133 At 1.
134 ICCC, above note 2, at 82.
135 Adrian Fernandez-Perez and others "Properties and the predictive power of implied volatility in the New Zealand dairy market" (2019) 39 Journal of Futures Markets 612 at 612.
136 ICCC, above note 2, at 82.
137 At 82.
138 At 82.
139 At 82.

Overall, responsive regulatory theory demands that the pricing of agricultural emissions be designed so that the impact on rural communities and the risk of emissions leakage is minimised.

4.2.3 Socio-cultural concerns

There are also concerns about how regulating agricultural emissions could impact Māori-owned land. One concern is that many iwi/Māori land owners are unable to respond to policy in a timely way, to minimise risk and maximise strategic opportunities.[140] This inability is because many iwi/Māori land owners place emphasis on the intergenerational impacts and the cultural value of the land.[141] Another concern is that the current models of agricultural education and training are not suitable for Māori because they fail to take into account the specific governance and decision-making structures for Māori land.[142] Moreover, some Māori-owned land is subject to the Te Ture Whenua Maori Act 1993, which places restrictions on selling, leasing and mortgaging land.[143] These restrictions make it difficult to raise capital to develop the land.[144] Also, nearly 80 percent of Māori-owned land falls within land use capability classes 6 to 8.[145] Classes 6 to 8 include land that is unsuitable for arable cropping and of low suitability, or unsuitable, for pastoral use or forestry.[146] Therefore, if the costs imposed by the regulation of agricultural emissions cause a type of farming to become unviable, it will be difficult for Māori-owned land to transition from one land use to another.

The ICCC concludes that "[a]ny policy must fulfil the Tiriti o Waitangi principle of partnership and good faith with iwi/hapū and recognise the unique characteristics of Māori land".[147] Overall, it is important that the factors specific to Māori-owned land are taken into account so that the regulation of agricultural emissions does not create further barriers to the development of Māori-owned land.[148]

140 At 12.
141 At 12.
142 At 49.
143 At 12.
144 At 12.
145 At 12.
146 Ian Lynn and others *Land Use Capability Survey Handbook — a New Zealand handbook for the classification of land* (3rd ed, Landcare Research New Zealand, Lincoln, 2009) at 9.
147 ICCC, above note 2, at 6.
148 At 12.

4.2.4 Motivation to reduce emissions

Another factor that makes regulating agricultural emissions a complex task is the different motivation levels of farmers to reduce emissions. Braithwaite's study found that nursing home managers were motivated to different extents by two things: profits and standard of care.[149] In the context of agricultural emissions, farmers are motivated to different extents by profits and emission reduction. It is expected that almost all farmers are interested in maintaining profits. However, some farmers are more motivated to reduce emissions than others.

The ICCC found that emissions per unit of product (emissions intensity) has decreased by about 20 per cent over the last 25 years.[150] Selective breeding, pasture and feed management, improved animal health and more effective fertiliser use have contributed to this improvement.[151] Farmers have also been planting on marginal land, which has many benefits for water quality and biodiversity, as well as reducing net emissions by absorbing carbon.[152]

Due to the varying motivations of farmers it is unlikely that persuasion or punishment alone will be effective. A farmer that is solely motivated by profits may choose to not reduce emissions if the cost of reducing emissions is more than the cost imposed on them by the regulation. As such, the regulation should make it economically rational for farmers to reduce emissions. On the other hand, the regulation should not punish farmers that are making progress towards reducing emissions. Instead, the regulation should encourage them to stay on that path.

4.2.5 Methods for reducing emissions

The final reason why regulating agricultural emissions is a complex problem is the lack of available methods for reducing emissions.

Methane emissions, which result from the digestive process of animals, are a function of the quantity of feed consumed by an animal, and nitrous oxide emissions are a function of the quantity of nitrogen added to the land through fertiliser, urine and dung.[153] Unless technology can change those relationships, the only way to reduce emissions is to reduce feed consumption and nitrogen applied to the land.[154] The ICCC set out various methods for reducing feed consumption and nitrogen application including: reducing stocking rates;

149 Ayres and Braithwaite, above note 56, at 28–29.
150 ICCC, above note 2, at 26.
151 At 26.
152 At 26.
153 At 32.
154 At 32.

reducing inputs; using fertiliser more efficiently; using low emission feeds; and improving manure management.[155] However, the Biological Emissions Reference Group (BERG) considers that widespread adoption of these methods would only reduce emissions from pasture-based livestock by up to 10 per cent.[156] Also, the BERG considers that achieving such reductions may have a significant negative impact on the profitability of some farms.[157]

The other method that is currently available for reducing agricultural emissions is changing land use.[158] Land use change may mean diversifying into lower emission farming such as horticulture, crops, pigs or poultry.[159] Alternatively, farmers may plant trees on land that was previously used for grazing animals.[160] Trees absorb carbon from the atmosphere, thereby reducing net emissions from the farm.[161] However, planting trees reduces the amount of land that can be used to graze stock, which will likely result in reduced production and profitability. If farmers can plant trees on marginal land, they may be able to reduce net emissions while maintaining production. However, the regulations will have to recognise tree planting as an emission reduction technique to incentivise farmers to plant trees.

The ICCC also identifies alternative methods for reducing agricultural emissions that may be available in the future.[162] Possible technologies include breeding low emission animals, nitrification inhibitors, methane inhibitors, methane vaccines, and genetically modified ryegrass.[163] The BERG considers that a methane vaccine could deliver a 30 per cent reduction in methane emissions from animals.[164] It has low confidence that a vaccine will be available by 2030 and medium-high confidence that it will be available by 2050.[165]

4.3 Traditional Regulatory Strategies and Agricultural Emissions

The next section of this part will explore why regulatory strategies such as self-regulation and command and control regulation are likely to be ineffective in the context of agricultural emissions. The ineffectiveness of such strategies means that responsive regulatory theory must be used to develop an innovative regulatory strategy that is suitable for agricultural emissions.

155 At 32–33.
156 *Report of the Biological Emissions Reference Group* (December 2018) at 5.
157 At 5.
158 ICCC, above note 2, at 34.
159 At 34.
160 At 34.
161 At 34.
162 At 37.
163 At 37–40.
164 *Report of the Biological Emissions Reference Group*, above note 156, at 6.
165 At 6.

4.3.1 Agricultural emissions in the free market

Agricultural emissions have never been included in the NZ ETS.[166] Therefore, any methane or nitrous oxide released during the production of agricultural goods is not factored into the price of the products. This omission is analogous to Hardin's "tragedy of the commons".[167] Hardin describes "common land" as land where anyone can graze their animals. An individual who grazes one extra animal on the common land receives all the benefits of owning one extra animal.[168] The negative component of overgrazing is shared by everyone who uses the common land.[169] Therefore, all rational individuals are motivated to add as many animals to their herd as possible. More animals result in overgrazing and the common land is ruined.[170] In the case of agricultural emissions, an individual receives all the benefits of adding an animal to their herd. The negative component is an increase in agricultural emissions that contribute to climate change. The effects of climate change are shared by everyone. Therefore, it is expected that every rational individual will farm as many animals as possible, resulting in the tragedy that is climate change.

The lack of an incentive to reduce emissions in the free market has seen agricultural emissions in New Zealand increase by 13.5 per cent between 1990 and 2017.[171] In order to reverse this trend, the regulation of agricultural emissions must create an incentive for farmers to reduce emissions.

4.3.2 Self-regulation of agricultural emissions

In the context of agricultural emissions, self-regulation might involve the Government and the agricultural industry negotiating the amount by which agricultural emissions must be reduced. The Government would then leave it up to the industry to achieve that reduction. Alternatively, self-regulation in the agricultural emissions context might be an agreement between the Government and the agricultural sector, in which the sector supports farmers to undertake emission reduction activities.[172]

Holley notes that voluntary and self-regulatory approaches used during the 1980s and 1990s "typically failed to deliver acceptable levels of industry-wide compliance, particularly where the gap between the private interests of business

166 Leining and Kerr, above note 19, at 4.
167 Garrett Hardin "The Tragedy of the Commons" (1968) 162 Science 1243.
168 At 1244.
169 At 1244.
170 At 1244.
171 MfE *New Zealand's Greenhouse Gas Inventory 1990–2017*, above note 17, at 10.
172 Beca *Assessment of the administration costs and barriers of scenarios to mitigate biological emissions from agriculture* (14 May 2018) at 6.

(not least, making a profit) and the public interest in environmental protection was substantial".[173] In the context of agricultural emissions, it is likely that industry-wide compliance would not be achieved with a self-regulatory strategy due to the different levels of motivation to reduce agricultural emissions. While some farmers may comply with a self-regulation strategy, others may try to avoid the regulation because it impacts their profit-making ability. Furthermore, the leaders of the agricultural industry will not want to put too much pressure on the farmers they represent. The industry will be reluctant to regulate in a way that increases costs of production, decreases competitiveness and causes land use change. If industry leaders did impose such regulation on farmers, farmers may vote in new leaders that promise to renegotiate with the Government and not impose costly regulation on farmers. Such reluctance from industry leaders echoes Ayres and Braithwaite's concerns about regulatory capture.[174] If a self-regulatory approach is adopted, making the industry the regulator, they may act in their own interests rather than require strict adherence to the regulation. Therefore, it is unlikely that self-regulation of agricultural emissions will achieve industry-wide compliance and meet emission reduction goals.

4.3.3 Command and control regulation of agricultural emissions

In the context of agricultural emissions, command and control regulation could take various forms. One conception might be a limit on allowable stock units per hectare of land. If stock numbers are reduced then production will also decrease. Reduced production may make some farms unviable and force them to change land use. As previously discussed, widespread land use change has implications for rural communities and the New Zealand economy.

Alternatively, the Government could create regulation that commands all farms to reduce agricultural emissions by a certain amount each year. However, with limited available methods for reducing emissions it is likely that this strategy would also require a reduction in animal numbers and fertiliser use. Furthermore, such regulation would be unfair on farmers that have already made progress towards reducing emissions. Those farmers may feel aggrieved if they are required to reduce emissions by the same amount as farmers who have not reduced emissions. Moreover, a blanket emission reduction requirement would act as a further barrier to the development of Māori-owned land.

Holley notes that adversarial enforcement of command and control regulation can "produce counterproductive resistance from regulated individuals and enterprises".[175] It is possible that farmers who have already reduced emissions

173 Holley, above note 86, at 745–746.
174 Ayres and Braithwaite, above note 56, at 54.
175 Holley, above note 86, at 744.

may resist command and control regulation. Those farmers may try to increase emissions before the regulation comes into force, so they are not disadvantaged. Such resistance is counterproductive to the goal of reducing agricultural emissions.

4.4 Summary

Traditional regulatory strategies have been ineffective at dealing with complex environmental problems in the past and it is likely that such strategies will also be unsuitable for the complex issue of agricultural emissions. As such, an innovative regulatory strategy is required. Such a strategy must reduce emissions, but also take into account the economic and socio-cultural implications of doing so. Furthermore, the strategy should account for the varying motivations to reduce emissions, reward the work that has already been done, and account for the fact that there are currently limited options for reducing emissions.

5. PRICING AGRICULTURAL EMISSIONS AND THE RESPONSIVE REGULATORY MODEL

This part will examine how the pricing of agricultural emissions should be designed to give effect to responsive regulatory theory.

5.1 The Point of Obligation

Emissions can either be priced at processor-level or farm-level. Pricing at processor-level involves less administrative costs but does not recognise all emission reduction options. The benefits of farm-level pricing are different for livestock emissions and fertiliser emissions.

5.1.1 Processor-level

Pricing emissions at processor-level means that the processor pays for the emissions.[176] Milk and meat processors pay for the emissions from livestock, and fertiliser processors and manufacturers pay for the emissions from fertiliser. The cost of livestock emissions is passed on to farmers through reduced pay-outs for milk and meat.[177] The cost of fertiliser emissions is passed on to farmers through a higher price for fertiliser. Under this approach, all farmers will

176 ICCC, above note 2, at 58.
177 At 58.

effectively pay the same price per unit of milk, meat or fertiliser.[178] Therefore, the only way for farmers to reduce the cost of emissions is to reduce production or fertiliser use.[179]

5.1.2 Farm-level

Pricing emissions at farm-level means that each farm pays for their own emissions. Farms can have different emissions intensity due to variations in breeding, pasture and feed management, animal health and fertiliser use.[180] Pricing emissions at farm-level allows these factors to be recognised.[181] Under this approach, farmers may reduce the cost of emissions by reducing production or adopting management practices that reduce emissions intensity. Moreover, farm-level pricing may incorporate other emission mitigation techniques, such as methane inhibitors and vaccines, when they become available.

5.1.3 The trade-off

The trade-off for recognising a wider range of emission reduction techniques is the administrative cost of pricing emissions at farm-level. The ICCC considers that farm-level pricing for livestock emissions will cost a minimum of $15 million, compared to $3 million for pricing at processor-level.[182] The higher cost is because farm-level pricing would have to be applied to between 20,000 and 30,000 farms (depending on the threshold for participation).[183]

According to responsive regulatory theory, the preferred strategy is usually the one that is least costly for the regulator and regulated parties.[184] Under this assumption, pricing at processor-level may be the preferred approach. However, the only way to reduce the cost of emissions under processor-level pricing is to reduce production or fertiliser use. This approach may be suitable for fertiliser emissions because using less fertiliser is currently the only recognised way to reduce fertiliser emissions.[185] As such, the ICCC concludes that it is preferable to price fertiliser emissions at processor-level to avoid the much larger administration costs of pricing at farm-level.[186] However, the ICCC notes that future developments may make it possible to recognise relationships

178 At 58–59.
179 At 58.
180 At 26.
181 At 58.
182 At 58.
183 At 58.
184 Ayres and Braithwaite, above note 56, at 19.
185 ICCC, above note 2, at 59.
186 At 60.

between fertiliser and specific land qualities.[187] If those developments do occur, then it may be beneficial to price fertiliser emissions at farm-level in the future.

For livestock emissions, pricing at processor-level does not recognise farm-specific emission mitigation techniques. Therefore, there is no incentive for farmers to implement management practices that allow them to reduce emissions while maintaining production. Moreover, there will be no incentive for farmers and scientists to develop emission reduction practices or technology. On the other hand, pricing at farm-level allows emission reduction techniques to be recognised and therefore encourages innovation in that area. As such, farm-level pricing of livestock emissions is a more responsive approach, despite the greater administration costs.

5.2 The Pyramid of Regulatory Strategies

The Government has not created a pyramid of regulatory strategies for agricultural emissions. However, it has used the idea of escalating regulatory strategies. If the Government is not satisfied with the progress towards pricing livestock emissions at farm-level, it may price livestock emissions at processor-level instead.[188] Generally, lower-cost regulatory strategies sit lower down on the pyramid, which would suggest that processor-level pricing should sit below farm-level pricing because of the much lower administration costs for processor-level pricing. However, in the context of livestock emissions, farm-level pricing is preferred by many in the agricultural sector because it recognises farms as having different emission intensities.[189] Moreover, processor-level pricing is closer to command and control regulation as it effectively places blanket regulation over all farmers. Therefore, farm-level pricing sits below processor-level pricing on the pyramid of regulatory strategies for livestock emissions.

Combining farm-level pricing, processor-level pricing, the free market, self-regulation and command and control regulation, it is possible to imagine a pyramid of regulatory strategies for livestock emissions (see Figure 3). The pyramid may be different for fertiliser emissions because it is preferable to price fertiliser emissions at processor-level rather than farm-level. However, this pyramid is useful for thinking about how the pricing of livestock emissions at farm-level should be designed in order to create pressure down the pyramid.

187 At 60.
188 Climate Change Response Act, s 219(4)(c).
189 ICCC, above note 2, at 58.

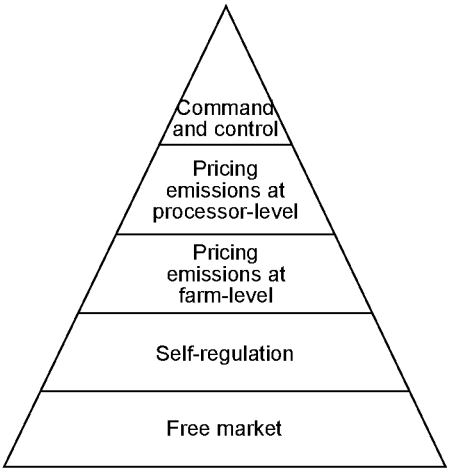

Figure 3: Pyramid of regulatory strategies for livestock emissions.
Source: Author.

In this pyramid, command and control regulation and processor-level pricing act as "sticks" that threaten the industry into compliance. Moreover, the industry will be more willing to comply with pricing at farm-level if they can move towards self-regulation or a free market in the future. These are the "carrots" that persuade the industry to comply.

The next section of this part will examine how farm-level pricing of livestock emissions should be designed to give effect to responsive regulatory theory.

5.3 Measuring Agricultural Emissions

It is not practicable to measure the actual methane and nitrous oxide emissions from each animal and paddock.[190] However, emissions can be measured based on an understanding of what drives them.[191] For example, the average New Zealand cow may produce "X" emissions per year. If a farm has 100 cows the farm's livestock emissions can be estimated. However, a cow may release more or less emissions depending on breed and diet. As such, there is a choice to be made as to whether the measurement of emissions takes into account breed, diet and other characteristics that affect emissions.

190 At 61.
191 At 61.

5.3.1 Fertiliser emissions

The relationship between fertiliser use and specific land qualities is not well understood.[192] It is assumed that the emissions from fertiliser are the same on all land. Based on this assumption, emissions from nitrogen fertiliser are calculated by multiplying a fixed emissions factor (the kilograms of nitrous oxide per tonne of fertiliser) by the number of tonnes of fertiliser applied.[193] Therefore, it is appropriate to estimate the quantity of fertiliser emissions based on the amount of fertiliser used.

5.3.2 Livestock emissions

Calculating livestock emissions can be more complicated because there are more recognised factors that influence the amount of emissions released. A basic calculation may be similar to the calculation for fertiliser. It may involve multiplying a fixed emissions factor (emissions per stock unit) by the number of stock units.[194] Under this method, the only way to reduce emissions is to reduce stock numbers. Therefore, a simple method of calculation is effectively the same as pricing emissions at processor-level. The only way for farmers to reduce the cost of emissions under both processor-level pricing and simple farm-level pricing is to reduce production. Reduced production may cause some farms to become financially unviable and lead to land use change. As discussed in part 4 above, land use change may have serious implications for rural communities and may disproportionately affect Māori-owned land. Furthermore, a simple method of calculation appears to share similarities with command and control regulation as it does not recognise the differences in emissions intensity between farms and places a blanket cost over all units of production. As discussed in part 3, this type of regulation is unlikely to be effective because it will demotivate farmers that have already done work to reduce emissions.

A more complex calculation may take into account stock numbers, animal size, animal performance and diet characteristics.[195] This method of calculation will recognise emission reduction options such as increasing animal performance or using low emission feed.[196] It may also be adapted to recognise the use of methane inhibitors and vaccines in the future. Under this method, farmers will be able to reduce the cost of emissions while maintaining production. Therefore, a complex method of calculation is a more responsive

192 At 59.
193 At 61.
194 At 61.
195 At 61.
196 At 61.

approach as it recognises the potential implications of reduced production and gives farmers the opportunity to remain financially viable while reducing emissions. A complex calculation also gives effect to Ayres and Braithwaite's tit-for-tat enforcement by addressing different motivation levels. Farmers that are solely motivated by making profit will face a cost that makes it economically rational for them to reduce emissions. Farmers that have already made efforts to reduce emissions will be rewarded with a lower cost imposed on them.

The downside of using a more complex method of calculation is the increased expense of gathering data on animals and feed.[197] Farms with relatively high emissions intensity would face the cost of gathering data and must pay more for their higher level of emissions. Those farmers may prefer a simple method of calculation. One solution is to include default values based on national averages.[198] Farmers can then choose to enter their own farm-specific values or use the default values. Under this approach, only farmers with low emissions intensity will have an incentive to enter farm-specific values.[199] Farmers with emissions intensity greater than the national average may be able to avoid the cost of gathering data and pay for less than their fair share of emissions. As such, the default values may need to be set slightly higher than the national average in order to compensate.[200] Overall, a more complex calculation method is preferable for livestock emissions, but the costs must be weighed against the benefits.

5.4 The Price

Should the price of agricultural emissions be based on the price of units in the NZ ETS or set by some other means? The answer is different for methane and nitrous oxide.

Carbon dioxide and nitrous oxide are long-life GHGs that accumulate in the atmosphere.[201] The legislation requires that net accounting emissions of carbon dioxide and nitrous oxide be zero by 2050.[202]

Conversely, methane has a much shorter life. The ICCC considers that "[i]f methane is emitted at a constant rate, methane concentrations are expected to stabilise in 50 years, as each new emission simply replaces a previous emission that is decaying naturally".[203] Therefore, methane emissions do not need to be

197 At 61.
198 Interim Climate Change Committee *Action on agricultural emissions: Technical appendix 2: Calculating agricultural emissions* (30 April 2019) at 21.
199 At 21.
200 At 21.
201 ICCC, above note 2, at 24.
202 Climate Change Response Act, s 5Q(1)(a).
203 ICCC, above note 2, at 25.

reduced to zero to stop them adding to global warming.[204] The relatively short life of methane is reflected in the legislative goal to reduce biogenic methane by 24 per cent to 47 per cent below 2017 levels by 2050.[205]

In the NZ ETS, one unit represents 1 tonne of carbon dioxide equivalent.[206] The price of units in the NZ ETS reflects the goal to reduce net emissions of carbon dioxide and nitrous oxide (as well as other GHGs) to zero. Therefore, it is sensible to use the NZ ETS unit price as the price for agricultural nitrous oxide emissions. However, since the goal for methane reductions is different, the price of units in the NZ ETS should not be the price for methane. If the NZ ETS unit price is used, the regulation may impose an unnecessarily high cost on farmers. A higher cost may cause more farms to become financially unviable. As such, the price of methane emissions should be set according to the required reduction of biogenic methane. The price can be adjusted over time to meet the legislative goals. A separate price for methane emissions is a more responsive approach as it recognises the difference between methane and other GHGs.

5.5 Free Allocation

The Government has committed to providing 95 per cent free allocation of emissions units if agriculture is included in the NZ ETS.[207] Free allocation is when the Government effectively writes off a proportion of units that a participant is liable to surrender. The purpose of free allocation is to minimise the economic and socio-cultural impacts of regulating agricultural emissions. The promise of 95 per cent free allocation means that the agricultural industry will only have to pay for 5 per cent of its emissions. However, the method used for distributing the free allocation will significantly alter how the cost of emissions is distributed across individual farms.[208]

5.5.1 Free allocation for fertiliser emissions

Free allocation for fertiliser emissions is relatively simple because of the processor-level pricing. Other sectors in the NZ ETS use an output-based allocation.[209] Under this approach, a fertiliser processor will receive 95 per cent allocation based on the fertiliser they sell. The processor will pay for 5 per cent of the emissions that result from the fertiliser they sell.

204 At 25.
205 Climate Change Response Act, s 5Q(1)(b).
206 Leining and Kerr, above note 19, at 6.
207 ICCC, above note 2, at 79.
208 At 79.
209 At 95.

5.5.2 Free allocation for livestock emissions

The ICCC explores various methods for distributing free allocation at farm-level.[210] One of the options is "grandparented allocation".[211] Under this method, a farm's allocation would be determined by its historical emissions, stock numbers or production.[212] Each farm would receive the same amount of free allocation each year, as long as the allocation rate remains constant.[213] The problem with this method is that those with historically high emissions receive more free allocation.[214] This method disadvantages those who have historically low emissions because their land is underdeveloped or they have already made efforts to reduce emissions.[215] Grandparented allocation is not a responsive approach as it is likely to demotivate farmers that have already made efforts to reduce emissions. Also, it exacerbates the socio-cultural impacts of the regulation, creating a barrier to the development of low emission farms, including Māori-owned land.

An alternative method for distributing free allocation is based on output and land area.[216] Under this approach, farms with higher output and more land area will receive more free allocation. This method promotes emissions efficiency (low emissions per unit of output) and low emissions relative to land area.[217] For example, a 100-hectare farm may produce 100 units of product per year.[218] On average, such a farm might be expected to release 100 emission units. Therefore, the farm will be allocated 95 emission units. However, if that farm is very efficient, a complex method of calculation might find that the farm only releases 95 emission units (because of selective breeding or using low emission feed). Since the farm receives 95 units for free, the farmer will not have to pay for any emissions. Conversely, if the farm releases 105 emission units (because the animals are inefficient compared to the national average) then the farmer will have to pay for 10 emission units. This approach is more responsive as it rewards farmers that have already taken steps to reduce emissions and promotes emissions efficiency. Promoting efficiency is beneficial because it is likely to encourage the development of management practices and technology that allow farms to maintain output while reducing emissions.

210 At 84.
211 At 85.
212 At 85.
213 At 85.
214 At 85.
215 At 85.
216 At 94.
217 At 92.
218 These are not actual numbers.

5.6 Carbon Sequestration

The agricultural industry believes that if all sources of GHG emissions (livestock and fertiliser) are to be recognised, then all carbon sinks should be recognised too.[219] Trees and other vegetation act as carbon sinks by absorbing carbon.[220] This process is known as sequestration. The more carbon that is sequestered, the less carbon there is in the atmosphere to contribute to warming. Farmers want to be rewarded for any trees or vegetation on their farms that sequester carbon.

At present, forest owners can only receive NZ ETS units if the forest: is at least 1 hectare in size; has at least 30 per cent tree crown cover in each hectare; and is at least 30 metres wide.[221] Many farms have small plantation areas, such as riparian strips and shelter belts, that do not meet these requirements and are therefore ineligible for NZ ETS units.

It may be beneficial for the regulation to recognise and credit smaller plantations and allow farmers to use that credit to offset the cost of emissions. Recognising more plantations will create an incentive to plant trees and other vegetation, especially on marginal land. Sequestration from these plantations will help to achieve GHG reduction goals. Furthermore, if farmers plant on marginal land, they will be able to maintain production and remain financially viable. This approach will reduce the risk of large-scale land use change.

The recognition of smaller plantations does mean the criteria for NZ ETS forests has to change. Sequestration from smaller plantations could be calculated at farm-level instead of going through the NZ ETS. The amount of carbon sequestered could be calculated by considering the species, age and number of trees and vegetation on the farm. The net emissions for a farm could then be calculated by subtracting the amount of carbon sequestered from the livestock emissions.

One barrier to recognising smaller plantations is the cost of monitoring those areas. It will not be cost effective for farmers to measure every single tree. There will still need to be a minimum size for a plantation to be recognised as a carbon sink. However, monitoring of plantations is likely to become easier with the development of new technologies such as aerial sensing.[222] As the technology develops, it will likely become more cost effective to measure sequestration in smaller plantations. Overall, recognising smaller plantations is a responsive approach as it will reward efforts to reduce emissions and minimise the risk of farms becoming financially unviable.

219 ICCC, above note 2, at 101.
220 At 101.
221 Climate Change Response Act, s 4(1).
222 ICCC, above note 2, at 104.

5.7 Reinvesting the Funds

Pricing agricultural emissions will result in a pool of money as farmers pay for their emissions. This begs the question: how should this money be used?

The responsive approach is to invest the funds back into the sector to help reduce agricultural emissions. The funds may be used to: educate farmers about emission reduction techniques; develop technology such as methane vaccines and inhibitors; and help open markets for low emission agricultural products. Such investments will help all farmers to reduce emissions while maintaining production and financial viability. In turn, investing back into the sector will mitigate the economic and socio-cultural implications of pricing emissions and encourage innovation in emission reduction techniques. New Zealand is already a leader of the Global Research Alliance on Agricultural Greenhouse Gases.[223] Further investments into initiatives and alliances will help New Zealand and the world transition towards low emission agriculture.

Another possible use of the funds is to pay a rebate to farmers that are highly emissions efficient. The ICCC considers that some farmers may have a negative net obligation under a complex method for calculating emissions and an output and land-based free allocation system.[224] For example, a farmer that is highly emissions efficient may be allocated 95 units but only release 90 units of emissions. The ICCC considers that a farmer in that position would receive a rebate for their five excess units.[225] A rebate will reward farmers that have already made progress towards reducing emissions. Furthermore, those farmers may use the funds to continue reducing their emissions.

While a rebate will reward those farmers who have made reductions, it is hard to imagine that those farms could effectively use the rebate to develop management strategies or technology that will help all farmers reduce emissions. Pooling the money together is much more likely to result in major developments that help to reduce emissions across all farms. As such, the funds generated from pricing agricultural emissions should be invested back into the sector. If there is excess money remaining after making such investments, rebates may be paid.

5.8 Tripartism

Ayres and Braithwaite express concern that cooperation may lead to capture and corruption. With agricultural emissions, there may be some concern that the He Waka Eke Noa steering group, who are involved in designing the regulation,

223 "New Zealand" Global Research Alliance on Agricultural Greenhouse Gases <www.globalresearchalliance.org>.
224 ICCC, above note 2, at 93.
225 At 93.

is dominated by primary sector leaders. This group may be tempted to act in the best interests of the agricultural industry, which may diminish the ability of the regulation to reduce agricultural emissions. However, the Government has adopted somewhat of a tripartism approach to alleviate this concern. The Climate Change Commission, an independent expert group, is required to submit a report to the Government on progress towards farm-level pricing by 30 June 2022.[226] This independent report will prevent the agricultural industry from acting solely in their own interests. The Commission will also act as a third party to advise the Government on phasing out free allocation.[227]

Once the regulation is in place, the Government may also adopt a tripartism approach to ensure compliance with the regulation. Tripartism may be achieved by allowing a third party to audit the measuring and reporting of emissions.

5.9 Moving Towards Self-regulation

Pricing agricultural emissions sits above self-regulation on the pyramid of regulatory strategies for agricultural emissions (see Figure 3) because pricing is a more costly strategy. Responsive regulation aims to create pressure down the pyramid towards the less costly regulatory strategies.[228] In the context of agricultural emissions, it is desirable that the industry moves towards self-regulation in the future because it will be less costly for the Government and farmers.

As discussed in part 4, self-regulation is unlikely to be an effective strategy for reducing emissions at present. However, it is possible that self-regulation could be an effective strategy in the future. Self-regulation will only be effective if farmers have an incentive to reduce emissions or keep emissions below a certain level. Some farmers may keep emissions low because they are motivated by a sense of environmental responsibility. However, others who are not so motivated will likely need a financial incentive to keep emissions low. This incentive may come in the form of a premium for low emission products.

As the idea of sustainability gains traction across the globe, consumer preferences are shifting towards goods that are produced in a safe, ethical and sustainable way.[229] As such, demand for low emission products is likely to grow. In turn, consumers will likely pay a premium for low emission agricultural products. A premium for low emission products will provide a financial incentive for farmers to reduce emissions.

Recognising this opportunity, the Government set up the Primary Sector Council in April 2018 to support the primary sector in maximising opportunities

226 Climate Change Response Act, s 220.
227 Section 85A(2A).
228 Ayres and Braithwaite, above note 56, at 19.
229 ICCC, above note 2, at 112.

from value-added products.[230] The Primary Sector Council considers that rewarding producers of ethical agricultural goods will require "verified products and associated marketing".[231] The marketing of low emission products may build on brands such as "100% Pure New Zealand".[232] The Government may also have a role to play in removing barriers to allow access to new markets.[233]

Taking advantage of these opportunities will provide a financial incentive to keep emissions low without the need for a pricing mechanism. However, there will still need to be some oversight by the industry or a third party to verify that the products are low emission products. If New Zealand can take advantage of these opportunities, it is possible that the agricultural industry may move towards self-regulation of agricultural emissions in the future.

5.10 Summary

It is possible and desirable for the pricing of agricultural emissions to be a responsive regulatory strategy. In order to achieve this outcome, the strategy must be designed in a certain way.

First and foremost, the regulation must create an incentive for farmers to reduce emissions. Pricing emissions will create a financial incentive to reduce emissions by reducing production or improving emissions efficiency. Part 4 argued that reduced production can have serious economic implications. As such, it is preferable that farmers reduce emissions while maintaining production. Therefore, a complex method of calculating livestock emissions is desirable because it will recognise improvements in emissions efficiency. Also, recognising smaller areas of vegetation as carbon sinks will allow farmers to reduce net emissions while maintaining production. Moreover, a separate price for methane should be used to reflect the different goals for different GHGs.

Part 4 also considered the socio-cultural concerns around regulating emissions. The main concern is that a price on agricultural emissions will create yet another barrier to the development of Māori-owned land. Free allocation is a key response to this concern. Distributing free allocation according to output and land size will minimise the costs imposed on Māori-owned land and minimise the economic implications of pricing emissions.

The regulation must also respond to the varying motivations of farmers. According to responsive regulatory theory, the regulation should create a financial incentive to reduce emissions for those that are motivated by profits, and reward those that have already taken steps to reduce emissions.

230 At 111.

231 Primary Sector Council *Fit for a Better World: Agriculture, Food and Fibres Sector — Vision and Strategic Direction Towards 2030* (June 2020) at 18.

232 ICCC, above note 2, at 112.

233 At 112.

This balance can be achieved by adopting a complex method for calculating livestock emissions and a land and output-based free allocation system. This method will impose a higher cost on those with relatively high emissions and a lesser cost, or even offer a rebate, on those with low emissions.

The regulation should also take into account the lack of available methods for reducing emissions. Free allocation will somewhat mitigate this issue. However, it is crucial that the funds raised from pricing emissions are used to educate farmers and develop emission reduction technology. Such investments will help farmers to reduce emissions now and in the future.

The funds raised from pricing emissions may also help the agricultural sector move towards self-regulation in the future. As well as investing in emission reduction technology, the funds should be invested in opening markets for low emission products. A premium for low emission goods will incentivise farmers to keep emissions low in the future.

It is important that the Government and industry cooperate during the design and implementation of this regulation. In order to prevent cooperation turning into capture, the Government may adopt a tripartism method for auditing and enforcing the regulation.

Overall, the pricing of agricultural emissions is more likely to achieve the legislated emission reduction goals if it is designed to suit the specific context of agricultural emissions.

6. CONCLUSION

The importance of agriculture to the New Zealand economy has become even more prevalent in the wake of Covid-19. While industries such as tourism have practically come to a standstill, the agricultural sector continues to produce and export goods.[234] The contribution of agriculture to New Zealand's economic recovery is gaining recognition as more New Zealand citizens have a positive view of farming.[235] However, climate change is still an issue and the agricultural industry is the largest contributor to New Zealand's GHG emissions profile.[236] Reducing emissions from agriculture is crucial for New Zealand to meet its international obligations.

It is important that the regulation of agricultural emissions balances environmental, economic, social, and cultural interests. Responsive regulatory

234 Michael Andrew "Tourism may have disappeared, but demand for NZ food is stronger than ever" (23 July 2020) The Spinoff <www.thespinoff.co.nz>.

235 Marc Elliott "Covid-19 appears to be having a positive impact on New Zealanders[']views of pastoral farmers" (May 2020) UMR <www.umr.co.nz>.

236 MfE *New Zealand's Greenhouse Gas Inventory 1990–2017*, above note 17, at 1.

theory helps to show how the pricing of agricultural emissions should be designed to achieve this balance. The regulation must: minimise the negative implications on the economy and Māori; recognise the varying motivations to reduce emissions; and recognise that there are currently limited options for reducing emissions. Moreover, it is desirable that the regulation guides the sector towards self-regulation in the future. If the regulation is designed according to the advice in part 5, it is more likely that the agricultural sector will cooperate and comply. In turn, it is more likely that the legislated goals for reducing emissions will be achieved.

Overall, it is possible for the pricing of agricultural emissions to be a responsive regulatory strategy. However, much work must be done to implement this regulation. As the pricing strategy is developed over the next few years, it is important that the Government, industry leaders, farmers, environmental groups and citizens remember: He Waka Eke Noa — we are all in this together.