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

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He Waka Eke Noa – We are all in this together

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. The sector provides jobs, produces exports and is the backbone of rural communities. In the past, the New Zealand Government has favoured economic 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 best be arranged if agricultural methane and nitrous oxide emissions enter 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]

This thesis will examine how the pricing of agricultural emissions should be designed according to responsive regulatory theory. Responsive regulatory theory is a useful framework for addressing agricultural emissions because it requires regulation to respond

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[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).
[4] Climate Change Response Act 2002, s 2A.

to the specific context of the regulated activity.[5] In the context of agricultural emissions, the regulation must respond to the tension between environmental, economic and socio-cultural interests. This thesis will examine how the regulation can be designed to reduce emissions, while minimising the economic and socio-cultural impacts.

The paper is structured as follows. Chapter I examines the characteristics of agricultural emissions and outlines the steps taken to arrive at the decision to price agricultural emissions. Chapter II will explain what responsive regulatory theory is and how it has been applied elsewhere. Chapter III argues that regulating agricultural emissions is a complex task. This complexity stems from the economic and socio-cultural interests involved, as well as the varying motivations to reduce emissions and the lack of available techniques for doing so. This thesis will argue that traditional regulatory strategies fail to account for these complicating factors and may have undesirable results. As such, New Zealand needs a regulatory strategy that responds to the complex nature of agricultural emissions and minimises the negative implications of regulation.

Finally, Chapter IV will examine how the pricing of agricultural emissions should be designed in order to give effect to responsive regulatory theory. Responsive regulatory theory demands that the regulation: has minimal negative implications; recognises that some farmers have already reduced emissions; and guides the industry towards self-regulation in the future. This thesis concludes that the regulation should use a complex method for measuring livestock emissions, a unique price for methane, an output and land-based free allocation system, recognise smaller plantations, invest the funds in technology and low emission product markets and have a tripartism enforcement system.

The author of this thesis is from a farming family. While this background gives the author some useful insights into this topic, it also means the author may have certain views and biases. This paper should be read with that in mind.

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[5] Ian Ayres and John Braithwaite *Responsive Regulation* (Oxford University Press, New York, 1992) at 5.

I Background

This Chapter will examine the characteristics of agricultural emissions and the steps that have already been taken towards implementing the regulation. Also, this Chapter will outline what actions the legislation requires and the backstop if those requirements are not fulfilled.

A What are Agricultural Emissions?

Agricultural emissions mainly come in the form of methane and nitrous oxide.[6] Methane and nitrous oxide cause warming in the atmosphere and therefore contribute to climate change.[7]

Methane is produced during the digestive process of ruminant animals such as sheep and cows.[8] It is a powerful, but short lived greenhouse gas (GHG).[9] A methane emission will only remain in the atmosphere for about 12 years, but it has an intense warming effect.[10] 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).[11] 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.[12] Therefore, methane emissions do not have to be reduced to zero to prevent methane from contributing to global warming.[13]

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[6] ICCC, above n 2, at 20.
[7] At 24.
[8] At 20.
[9] At 24.
[10] At 24.
[11] At 24.
[12] At 24.
[13] At 24.

Nitrous oxide comes from animal urine and from the use of synthetic fertilisers.[14] It has a life of over 100 years, but only small amounts are emitted.[15] Like carbon dioxide, nitrous oxide accumulates in the atmosphere.[16] Therefore, net emissions must be reduced to zero to stop it from contributing to global warming.[17]

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

B 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.[18] 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.[19]

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.[20] The NZ ETS is the principle element of New Zealand's response to climate change.[21] The NZ ETS creates a market where:[22]

> Obligated parties are required to surrender to the government a tradable emission unit for each tonne of emissions for which they are liable. The government limits the supply of emission units into a trading market which then sets the emission price based on

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[14] ICCC, above n 2, at 20.
[15] At 24.
[16] At 24.
[17] At 24.
[18] Ministry for the Environment *New Zealand's Greenhouse Gas Inventory 1990-2017* (April 2019) at 148.
[19] At 148.
[20] Catherine Leining and Suzi Kerr *A Guide to the New Zealand Emissions Trading Scheme* (Motu Economic and Public Policy Research, August 2018) at 4.
[21] At 1.
[22] At 2.

> unit supply and demand.[23] The cost to obligated parties of surrendering emission units gets passed on across the supply chain, raising the relative cost of higher-emission goods and services, making lower-emission behaviour more competitive, and 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.[24] 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.[25] 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.[26] As such, there is no financial incentive for farmers to reduce agricultural emissions. The lack of financial incentive has seen agricultural emissions increase by 13.5 per cent between 1990 and 2017.[27]

C The Paris Agreement

In October 2016, New Zealand confirmed its commitment to take action on climate change by ratifying the Paris Agreement.[28] The purpose 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; strengthen the ability of countries to deal with the

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[23] In the past there has been no limit on emission units in the NZ ETS. Section 50 of the Climate Change Response (Emissions Trading Reform) Amendment Act 2020 enables a limit to be introduced. The Climate Change Commission will advise on the limit in 2021. In the meantime, the Government has made a provisional emissions limit for 2021-2025. See: "Emissions reduction targets and emissions budgets in the New Zealand Emissions Trading Scheme" (25 September 2020) Ministry for the Environment <www.mfe.govt.nz>.
[24] Leining and Kerr, above n 20, at 4.
[25] At 3.
[26] At 4.
[27] Ministry for the Environment, above n 18, at 10.
[28] United Nations Framework Convention on Climate Change "Paris Agreement - Status of Ratification" <www.unfccc.int>.

impacts of climate change; and make sure that financial flows support the development of low-carbon and climate-resilient economies. [29]

Article 3 requires that each party to the Paris Agreement communicate and maintain a nationally determined contribution (NDC) to the global response to climate change.[30] New Zealand's NDC is to reduce GHG emissions by 30 per cent below 2005 levels by 2030.[31]

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° Celsius above pre-industrial levels.[32]

D 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 section 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.[33] 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.[34]

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[29] Paris Agreement (opened for signatures 22 April 2016, entered into force 4 November 2016), art 2.1.
[30] Article 4.2.
[31] United Nations Framework Convention on Climate Change "New Zealand's Nationally Determined Contribution" <www.unfccc.int>.
[32] Climate Change Response Act 2002, s 3(1)(aa)(i).
[33] Section 5Q(1)(a).
[34] Section 5Q(1)(b).

E 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.[35]

The terms of reference for the ICCC required them, 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)."[36]

The ICCC released the report, *Action on agricultural emissions: evidence, analysis and recommendations* (ICCC report) on 30 April 2019.[37] 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.[38]

The ICCC found that: [39]

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

The ICCC concluded that "the best way to reduce livestock emissions is to price them through a farm-level levy/rebate scheme."[40]

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[35] Cabinet Paper "Interim Climate Change Committee Terms of Reference and Appointment" (17 April 2018) at [4].
[36] Cabinet Paper, above n 1, at [9].
[37] ICCC, above n 2.
[38] At 6–7.
[39] At 6.
[40] At 7.

The ICCC report is useful for this paper as it explores the various options for pricing agricultural emissions. Chapter IV will examine the options set out by the ICCC through a responsive regulatory lens.

F 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).[41] The discussion document proposed that livestock emissions be priced at farm-level and fertiliser emissions be priced at processor-level from 2025.[42] 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.[43] The discussion document also asked for feedback on opportunities and barriers for on-farm GHG mitigation.[44]

Submissions on the discussion document closed on 13 August 2019. After reviewing the available evidence and public submissions, the Government decided to price livestock emissions at farm-level and fertiliser emissions at processor-level from 2025.[45] Also, the Government decided not to include agricultural emissions in the NZ ETS during the interim period. Instead, they decided to develop a Joint Action Plan with the agricultural sector and iwi/Māori to build the necessary systems for a farm-level pricing mechanism.[46]

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[41] Ministry for the Environment, above n 3.
[42] At 6.
[43] At 6.
[44] At 6.
[45] Cabinet Minute of Decision "Action on Agricultural Emissions: Final Policy Proposals" (16 September 2019) CAB-19-MIN-0480 at [8].
[46] At [24]. The Government also introduced supporting legislation that allows it to make regulations for freshwater farm plans and regulations requiring fertiliser companies to report on the sales of nitrogenous fertiliser. See: Resource Management Amendment Act 2020, s 64.

G 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 *He Waka Eke Noa*.[47] 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.[48]

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.

H 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 on 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.[49] Section 2A also states that surrender obligations for fertiliser emissions will commence in 2025 at processor-level.[50]

Section 219 of the Act states that the Governor General may, by Order in Council made on the recommendation of the Minister, appoint a date at which there would be surrender

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[47] Primary Sector Climate Change Commitment "He Waka Eke Noa – Our Future in Our Hands" (July 2019) Ministry for the Environment <www.mfe.govt.nz>.
[48] At [1]–[2].
[49] Climate Change Response Act 2002, s 2A(5D).
[50] Section 2A(5A).

obligations for livestock and fertiliser emissions at processor-level.[51] The date must not be before 1 July 2022.[52] The Minister may only make such a recommendation after consulting the Minister of Agriculture and considering a report provided by the Climate Change Commission (the Commission).[53]

Section 220 sets out the requirements for the Commission's report.[54] 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 reporting and surrender obligations.[55]

Schedule 5 of the Act sets out the primary sector climate change commitments that the Commission must report on.[56] By 31 December 2021, 25 per cent of farms must have a documented annual total of on-farm GHG emissions, by methods and definitions accepted by the He Waka Eke Noa steering group.[57] All farms must hold such information by 31 December 2022.[58] A system for farm-level accounting and reporting must be in use by 1 January 2025.[59] There are also requirements for the implementation of farm plans that help farmers measure and manage GHG emissions.[60]

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.[61]

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[51] Climate Change Response Act 2002, s 219(3).
[52] Section 219(5).
[53] Section 219(4).
[54] Section 220.
[55] Section 220.
[56] Schedule 5.
[57] Schedule 5 cl 1.
[58] Schedule 5 cl 2.
[59] Schedule 5 cl 3.
[60] Schedule 5 cls 5-7.
[61] Section 219(4)(c).

I Summary

In 2016 New Zealand confirmed its commitment to take action on climate change by ratifying the Paris Agreement.[62] The Government established the ICCC to investigate how agricultural emissions might be included in the NZ ETS.[63] After receiving the ICCC report and engaging in the public consultation process, the Government decided that livestock emissions should be priced at farm-level and fertiliser emissions at processor-level.[64] The Government also decided to develop the Joint Action Plan in order to work towards the implementation of a mechanism for pricing livestock emissions at farm-level.[65] The Government's decisions passed into law through the Climate Change Response (Emissions Trading Reform) Amendment Act 2020. This Amendment also sets out the milestones to be achieved under the Joint Action Plan and provides a backstop if the Minister is not satisfied with progress towards implementing a farm-level pricing mechanism for livestock emissions.[66]

Chapter I has examined: the characteristics of agricultural emissions, the relevant reports and legislation; and the steps that are yet to be taken to implement the regulation. Overall, this thesis aims to show how the pricing of agricultural emissions should be designed according to responsive regulatory theory. Chapter II will explain what responsive regulatory theory is and why it is useful in this context.

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[62] United Nations Framework Convention on Climate Change, above n 28.
[63] Cabinet Paper, above n 1, at [9].
[64] Cabinet Minute of Decision, above n 45, at [8].
[65] At [24].
[66] Climate Change Response Act 2002, sch 5 and s 219(4)(c).

II Responsive Regulation

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

A What is Responsive Regulation?

The idea of responsive regulation was first coined by Ayers and Braithwaite in 1992 in their book, *Responsive Regulation*.[67] According to Ayres and Braithwaite, responsive regulation is about "the need to transcend the intellectual stalemate between those who favour strong regulation of businesses and those who advocate deregulation."[68] 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.[69] According to responsive regulatory theory, it is preferable to work with regulated parties to influence their behaviour, rather than trying to control them. If the regulator imposes excessive control over regulated parties, those parties may feel held-down and resist regulation by sharing "knowledge about methods of legal resistance and counterattack."[70]

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 culture, and history."[71] 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.

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[67] Ayres and Braithwaite, above n 5.
[68] At 3.
[69] At 4.
[70] At 25.
[71] At 5.

An industry's response will depend on the market forces at play and the past and present state of regulation in that industry.

B 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."[72] 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. They argue that tit-for-tat enforcement is beneficial because it promotes cooperation and recognises that regulated parties have varying motivations.

1 Promoting cooperation

One reason that Ayres and Braithwaite argue for tit-for-tat enforcement is that it 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.[73] Therefore, achieving compliance through persuasive regulation is preferable for both parties as it tends to be easier and cheaper.[74] It 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 breaching punitive regulation. As such, the regulator and regulated party have an incentive to comply with persuasive regulation. If a regulated party does not comply, the regulator is able to escalate their response to a more punitive regulatory strategy. This escalation is likely to encourage the regulated party to cooperate in the hope that the regulator will revert to persuasive strategies once again.

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[72] Ayres and Braithwaite, above n 5, at 4.
[73] At 21.
[74] At 19.

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 on persuasion.[75] He argued that a regulated party will exploit a strategy of persuasion when they are motivated by economic rationality.[76] 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.[77] He argued that a strategy that punishes regulated parties will insult and demotivate those that are motivated by a sense of responsibility and are trying to do the right thing.[78] Such punishment can lead to parties resisting regulation and finding loopholes to avoid it.[79]

Ayres and Braithwaite use Braithwaite's study of nursing homes to show how different regulated parties can have different motivations.[80] Some of the nursing homes in the study were motivated by "a rational pursuit of profits without any concern for resident care except insofar as improving resident care will contribute to profit."[81] At the other end of the spectrum were nursing homes that were motivated by a "pursuit of what is best for the care of residents without any concern for maximizing profits".[82] Other nursing homes were motivated to different extents by a combination of maximising profits and providing a decent standard of care.[83] The motivational diversity in nursing homes is similar to the motivational diversity amongst farmers. Chapter III will explore how some farmers are more concerned with reducing emissions than others.

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[75] 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.
[76] At 24.
[77] At 24.
[78] At 24.
[79] Ayres and Braithwaite, above n 5, at 25.
[80] At 27.
[81] At 27.
[82] At 27.
[83] At 28–29.

Ayres and Braithwaite argue that tit-for-tat enforcement is the best strategy to deal with motivational diversity.[84] 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.[85] 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 with a punitive strategy should make it economically rational for the nursing home to comply with a certain standard of care. It is expected that the nursing home would then reform and cooperate, allowing the regulator to revert back to a more persuasive regulatory strategy. As such, Ayres and Braithwaite conclude that tit-for-tat enforcement is the best approach to regulation.[86] Chapter IV will examine how the regulation of agricultural emissions might deal with the motivational diversity of farmers.

C The Benign Big Gun

Ayres and Braithwaite also argue that "regulatory agencies are often best able to secure compliance when they are benign big guns."[87] They state that, "[b]y credibly asserting a willingness to regulate more intrusively, responsive regulation can channel marketplace transactions to less intrusive and less centralized forms of government intervention."[88] They consider that persuasive regulation is more likely to work when the regulator carries very harsh punitive powers. The more harsh the regulatory powers, the more inclined the regulated party will be to avoid the punishment. As a result, the regulated party is more likely to comply with persuasive regulation. Some of the most intrusive regulatory powers suggested by Ayres and Braithwaite include criminal penalties and licence revocation.[89]

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[84] Ayres and Braithwaite, above n 5, at 29.
[85] At 29.
[86] At 30.
[87] At 19.
[88] At 4.
[89] At 35.

D Tripartism

Although Ayres and Braithwaite argue that some cooperation is a good thing, they recognise that cooperation between regulators and regulated parties may lead to capture and corruption.[90] Corruption is when the regulated firm bribes the regulator and the regulator allows the firm to breach regulations.[91] Capture is when the regulator is dominated by the regulated industry and acts in the best interests of the industry.[92] Capture is a real possibility in the agricultural sector where companies such as Fonterra have great economic and political power.

Ayres and Braithwaite advance the idea of tripartism as a method for preventing capture and corruption while encouraging cooperation.[93] Tripartism is when a third party, such as a public interest group, is involved in the regulatory domain.[94] 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.[95] Chapter IV will examine how tripartism might work in the agricultural emissions context.

E The Pyramid of Regulatory Strategies

Ayres and Braithwaite illustrate the idea of escalating government intervention through the pyramid of regulatory strategies.[96] The pyramid shape aims to show how the escalating strategies channel most of the regulation towards the base of the pyramid.[97]

Ayres and Braithwaite intend for the pyramid of regulatory strategies to apply to an entire industry rather than individual firms.[98] That is, the entire industry will be regulated by one

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[90] Ayres and Braithwaite, above n 5, at 54.
[91] At 56.
[92] Will Kenton "Regulatory Capture" (23 October 2019) Investopedia <www.investopedia.com>.
[93] Ayres and Braithwaite, above n 5, at 54.
[94] At 54.
[95] At 56.
[96] At 39.
[97] At 39.
[98] At 38.

of the strategies on the pyramid and the entire industry may move up or down the pyramid depending on how they cooperate with regulation.

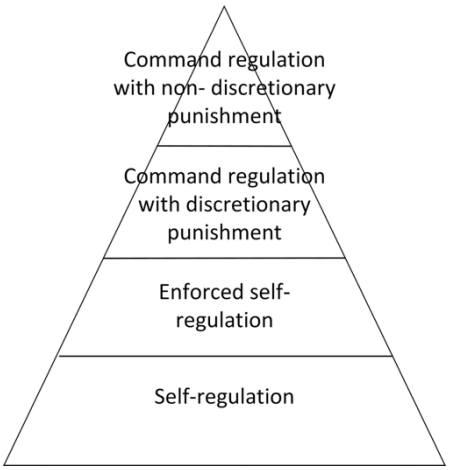

Figure 1: Pyramid of regulatory strategies

Source: *Responsive Regulation*[99]

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.[100]

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.[101] This paper is not concerned with the enforcement of agricultural emissions regulation. Instead, this paper is focused on the design of the regulatory strategy that puts a price on agricultural emissions. Therefore, the pyramid of regulatory strategies is more useful for this thesis.

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[99] Ayres and Braithwaite, above n 5, at 39.
[100] At 38.
[101] At 35.

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.[102] Ayres and Braithwaite use the military analogy of burning bridges to describe command regulation.[103] They state that, "[i]f the bridges that are an army's only route of retreat are burned, the enemy knows that it must fight a bloody battle if it advances beyond a certain point."[104] This analogy suggests that command regulation can be 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."[105] 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."[106]

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.[107] Ayres and Braithwaite consider that self-regulation is the least burdensome approach for both the taxpayer and the regulated industry because the industry has the opportunity to achieve the goal with optimal efficiency.[108] However, the industry may be tempted to exploit the self-regulation strategy if it is economically rational for them to do so.[109]

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[102] Neil Gunningham "Environment Law, Regulation and Governance: Shifting Architectures" (2009) 21 JEL 179 at 182.
[103] Ayres and Braithwaite, above n 5, at 38.
[104] At 38.
[105] Gunningham, above n 102, at 183.
[106] Cameron Holley "Environmental regulation and governance" in Peter Drahos (ed) *Regulatory Theory: Foundations and Applications* (ANU Press, Acton, 2017) at 744.
[107] Ayres and Braithwaite, above n 5, at 38.
[108] At 38.
[109] At 38.

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."[110] 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.[111]

4 Middle bands

Ayres and Braithwaite consider that command and control regulation and self-regulation were relatively well-tested and applied by 1992.[112] However, Gunningham notes that such strategies had limited success in the environmental context and were widely criticised through the 1980s.[113] 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.[114]

One idea that Ayres and Braithwaite put forward is the enforced self-regulation model. Enforced self-regulation is "an extension and individualization of "coregulation" theory".[115] Coregulation is when there is some form of industry self-regulation with some oversight by the government.[116] The enforced self-regulation model differs slightly as it requires negotiation between the government and individual firms to establish regulations for each firm.[117] The firm is required to regulate itself, but the rules can be publicly enforced.[118] 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 will be more committed to rules they write themselves.[119]

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[110] Gunningham, above n 102, at 187.
[111] Ayres and Braithwaite, above n 5, at 38.
[112] At 101.
[113] Gunningham, above n 102, at 183, 184 and 187.
[114] Ayres and Braithwaite, above n 5, at 101.
[115] At 102.
[116] At 102.
[117] At 101.
[118] At 101.
[119] At 110–113.

'New environmental governance' (NEG) is another regulatory strategy that might be positioned between command and control regulation and self-regulation. Cameron Holley looks at the emergence of NEG in the late 1990s.[120] He finds that command and control regulation and self-regulation were often unsuitable for complex environmental problems and resulted in further ecological degradation.[121] As a result, there was a movement towards NEG. NEG emphasises "collaboration, integration, participation, deliberative styles of decision-making, adaptation and learning."[122] 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.[123]

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. Management-based regulation was adopted by the Clinton-Gore administration as a middle ground between self-regulation and command and control regulation in the environmental context.[124] In 1995, President Clinton outlined a new environmental regulation programme that would be "collaborative" and "provide flexibility - but require accountability".[125] Gunningham notes that, "[e]arly efforts at regulatory flexibility focused on a shift away from specification or technology-based

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[120] Holley, above n 106, at 742.
[121] At 742.
[122] At 742.
[123] At 748.
[124] Gunningham, above n 102, at 188.
[125] Bill Clinton and Al Gore "Reinventing Environmental Regulation" (16 March 1995) govinfo <www.govinfo.library.unt.edu>.

environmental regulations (which tell duty holders precisely what measures to take) towards performance standards (which specify outcomes or the desired level of performance)."[126] However, performance standards only require firms to achieve a minimum standard and provide no incentive to go beyond the minimum.[127] As such, the Clinton-Gore administration moved towards management-based regulation.[128] According to Gunningham:[129]

> This approach involves firms developing their own process and management system standards, and developing internal planning and management practices designed to achieve regulatory goals. Such standards have the considerable attractions of providing flexibility to enterprises to devise their own least-cost solutions to social challenges, of facilitating their going beyond compliance with minimum legal standards, and (in contrast to direct regulation) of being applicable to a broad range of circumstances and to heterogeneous enterprises.

The National Environmental Performance Track in the USA and Environmental Improvement Plans in Australia are some examples of management-based regulation.[130] Gunningham states that "[i]n broad terms, these programmes offer regulatory rewards and incentives in return for a commitment to adopt and implement an environmental management system…"[131]

Meta-regulation takes management-based regulation one step further. Under this approach, the regulator does not check that the regulated party complies with the specific rules, but instead the regulator scrutinises the processes and management systems that the regulated party has in place to ensure that they comply with the rules.[132]

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[126] Gunningham, above n 102, at 189.
[127] At 189.
[128] At 189.
[129] At 189.
[130] At 190.
[131] At 190.
[132] At 190–191.

Gunningham considers that Environmental Improvement Plans have been a success in Victoria, Australia.[133] The plans have pressured companies to improve their environmental performance and also improved dialogues and relationships between the companies, communities, and regulators.[134] This success shows that it is possible to have a successful, innovative, regulatory strategy that fits in the middle bands of the pyramid.

However, it is important to note that flexible regulatory initiatives (such as management-based regulation and meta-regulation) have also been subject to criticism. For example, the USA Environmental Protection Agency's "Project XL" (a Clinton-Gore initiative) attracted fewer applications and resulted in fewer innovations than expected.[135] The programme also had high transaction costs, lacked a statutory base and parties could not overcome mutual mistrust.[136] 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."[137] If the regulation does not appropriately combine dialogue, incentives and sanctions, regulated parties may not comply, either because they feel that the state is imposing excessive control over them, or because it is economically rational to not comply. Chapter IV will examine how the pricing of agricultural emissions should be designed so that it is an effective regulatory strategy.

F 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.[138] In 2011 the Department of Internal Affairs released *A Guide for Compliance Agencies in New Zealand*.[139] The guide aims to outline the "core components of best-practice compliance

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[133] Gunningham, above n 102, at 191–192.
[134] At 192.
[135] At 191.
[136] At 191.
[137] Ayres and Braithwaite, above n 5, at 5.
[138] 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.
[139] Department of Internal Affairs *Achieving Compliance: A Guide for Compliance Agencies in New Zealand* (June 2011).

management."[140] It makes reference to Ayres and Braithwaite and provides a New Zealand example of a pyramid of regulatory strategies from Inland Revenue (see Figure 2).[141] The pyramid shows that the behaviour of the regulated party determines which strategy the regulator will use. The more willing the regulated party is to comply, the less costly the intervention. The regulator has the ability to escalate the strategy if the regulated party is not willing to comply. The threat of escalation creates pressure down the pyramid, pushing regulated parties towards less costly regulatory strategies.

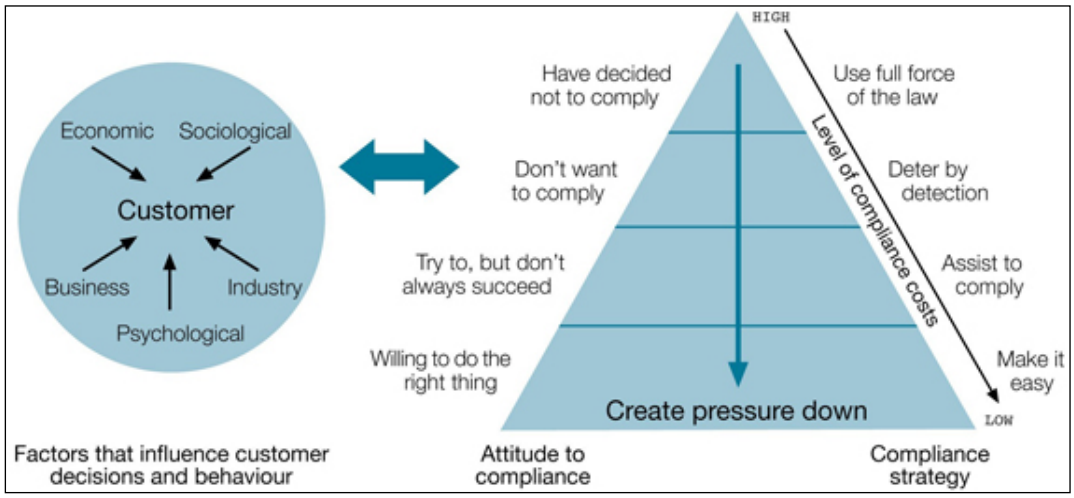

Figure 2: Inland Revenue's compliance model

Source: *Achieving Compliance: A Guide for Compliance Agencies in New Zealand*[142]

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.[143] 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."[144] They

[140] Department of Internal Affairs, above n 139, at 9.
[141] At 31.
[142] At 31.
[143] Ivec and Braithwaite, above n 138, at 5.
[144] At 5.

emphasise that "[r]esponsive regulatory principles have to be implemented in a way to suit context."

It is clear that responsive regulatory theory can be useful in implementing effective regulation. However, it is not as simple as applying Inland Revenue's compliance model to agricultural emissions. One must pay careful attention to the agricultural industry in order to understand the possible implications of regulation and the motivations of the regulated parties.

G Summary

Valerie Braithwaite's three principles of responsive regulation provide a nice summary of responsive regulation.[145] The first principle is to "take note of the context, and consider all the informal and formal regulatory strategies for changing the flow of events that currently operate and that might be introduced into that context."[146] This principle echoes Ayres and Braithwaite's argument that "the best strategy is shown to depend on context, regulatory culture, and history."[147] It is important to recognise that different industries and different firms will respond differently to regulation. Therefore, the regulator must understand the industry they are trying to regulate.

The second principle is to organise the regulatory strategies into a hierarchy, from the most minimally intrusive through to those that are maximally intrusive, with the regulatory preference being for the strategy that elicits compliance with least intrusiveness.[148] This principle reiterates Ayres and Braithwaite's pyramid of regulatory strategies. More controlling strategies are at the top of the pyramid and persuasive strategies are at the bottom (see Figure 1). Persuasive strategies, such as self-regulation, are preferable because they tend to be easier and cheaper for both the regulator and the regulated party.[149]

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[145] Valerie Braithwaite *Ten things you need to know about regulation and never wanted to ask* (Regulatory Institutions Network, Occasional Paper 10, December 2006) at 5.
[146] At 5.
[147] Ayres and Braithwaite, above n 5, at 5.
[148] Braithwaite, above n 145, at 5.
[149] Ayres and Braithwaite, above n 5, at 19.

However, if the persuasive strategy does not elicit compliance, the regulator must escalate to a more controlling strategy.

The third principle is to "create opportunities for dialogue about why regulation is necessary and elicit commitment to voluntary compliance in the future."[150] This principle relates to the idea of tit-for-tat enforcement. If the regulated party is willing to cooperate with the regulator, it is more likely that the firm or industry can move towards self-regulation. Valerie Braithwaite considers that dialogue between the regulator and the regulated party is crucial for cooperation. She also argues that rewards and benefits have a role to play in encouraging firms or industries to move towards self-regulation.[151] The concept of rewards relates to Ayres and Braithwaite's discussion of "sticks and carrots".[152] A "stick" is punishment for non-compliance, whereas a carrot is a reward for someone who achieves a certain standard. "Carrots" are important for encouraging firms to move towards self-regulation.

Overall, Chapter II has set out: what responsive regulation is; why regulators might use it; and how the pyramid of regulatory strategies works. The next Chapter aims to show why responsive regulatory theory should be used in the context of agricultural emissions.

[150] Braithwaite, above n 145, at 5.
[151] At 5.
[152] Ayres and Braithwaite, above n 5, at 43.

III 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 Chapter will demonstrate the complexity of agricultural emissions by addressing: the 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. Gunningham and Holley found that complex environmental problems have not responded well to command and control regulation or self-regulation in the past.[153] Responsive regulatory theory suggests that an innovative regulatory strategy must be developed to suit the specific context of agricultural emissions.

A 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.[154] The polycentric nature of environmental problems was also addressed in *Bulga Milbrodale* in the New South Wales Land and Environment Court.[155] The Chief Judge in that case notes that environmental problems involve interconnections between multiple parts of the eco-system, the socio-cultural and economic realms.[156]

Environmental problems are inter-disciplinary because lawyers and the law cannot work in isolation from the scientific reality. For example, the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 set out the ambient air quality standards for contaminants.[157] The threshold concentration for the contaminant PM_{10} is 50

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[153] Gunningham, above n 102, at 183, 184 and 187; Holley, above n 106, at 742.
[154] Elizabeth Fisher "Environmental Law as 'Hot' Law" (2013) 25 JEL 347 at 351.
[155] *Bulga Milbrodale Progress Association Inc v Minister for Planning and Infrastructure and Warkworth Mining Limited* [2013] NSWLEC 48.
[156] At [31]–[42].
[157] Resource Management (National Environmental Standards for Air Quality) Regulations 2004, sch 1.

micrograms per cubic metre expressed as a 24-hour mean.[158] The scientific measurement in this regulation illustrates the inter-disciplinary nature of environmental problems. Adding to the complexity of environmental problems 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.[159] This uncertainty has led to the development of the precautionary principle.[160]

Because environmental problems are complex and scientific uncertainty is prevalent, creating law to deal with such 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."[161] Moreover, Fisher states that:[162]

> … 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'.

B The Complexity of Agricultural Emissions

Like other environmental problems, agricultural emissions also raise environmental, economic and socio-cultural concerns. In addition, farmers have differing levels of motivation to reduce emissions and there are currently limited available methods for reducing emissions. As such, regulating agricultural emissions is a complex task that requires a responsive regulatory strategy.

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[158] Resource Management (National Environmental Standards for Air Quality) Regulations 2004, sch 1.
[159] Fisher, above n 154, at 351.
[160] Elizabeth Fisher "Is the Precautionary Principle Justiciable?" (2001) 13 JEL 315 at 316.
[161] Gunningham, above n 102, at 184.
[162] Fisher, above n 154, at 348.

1 Environmental concerns

Agricultural emissions are an environmental concern because they contribute to climate change.[163] Climate change is a global issue with wide reaching consequences. In response, the Government has committed to taking action on climate change by reducing agricultural emissions by between 24 per cent and 47 per cent below 2017 levels by 2050.[164]

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% of annual export revenue.[165] In 2018 there were 108,138 people employed in the sector.[166]

The main concern is that regulation will lead to increased costs imposed on farmers (in particular, livestock farmers).[167] Increased costs for farming livestock may cause certain types of farming to become financially unviable. Financial unviability may cause widespread land use change.[168] 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.[169] These effects were felt by rural communities in the 1980s when agricultural subsidies were removed and rapid land use change occurred.[170] During that time rural communities experienced loss of employment and reduced populations that in turn affected institutions such as schools, libraries and sports clubs.[171] Therefore, it is important that the

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[163] ICCC, above n 2, at 19.
[164] Climate Change Response Act 2002, s 5Q(1)(b)(ii).
[165] ICCC, above n 2, at 19.
[166] 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>.
[167] ICCC, above n 2, at 80.
[168] At 80. Land use change is where the land is used for a different type of farming or converted into forestry.
[169] At 80.
[170] At 81.
[171] At 81.

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.[172] Emissions leakage is when a country introduces emissions regulation that makes the cost of production higher.[173] Higher production costs may cause manufacturers to move production to another country without emissions regulation.[174] 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 consider 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.[175] Therefore, the ICCC consider that emissions leakage from dairy is unlikely. However, the dairy market is highly volatile.[176] 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.

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[172] ICCC, above n 2, at 82.
[173] Jim Sinner, Suzie Greenhalgh, Suzi Kerr *Emissions trading in New Zealand: Options for Addressing Trade Exposure and Emissions Leakage* (September 2007) at 1.
[174] At 1.
[175] ICCC, above n 2, at 82.
[176] 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.

The ICCC also consider that if New Zealand dairy exports decrease due to regulation of emissions, the countries that are most likely to increase production are in Western Europe and North America.[177] 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.[178] Therefore, the risk of emissions leakage is lower.

The ICCC state 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.[179] 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.[180]

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.

3 Socio-cultural concerns

There are also socio-cultural concerns associated with regulating agricultural emissions. In particular, there are concerns about how the regulation 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.[181] This inability is because many iwi/Māori land-owners place emphasis on the intergenerational impacts and the cultural value of the land.[182] 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

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[177] ICCC, above n 2, at 82.
[178] At 82.
[179] At 82. Drystock production is the production of meat, wool, velvet and other similar products.
[180] At 82.
[181] At 12.
[182] At 12.

specific governance and decision-making structures for Māori land.[183] Moreover, some Māori-owned land is subject to the Te Ture Whenua Māori Act 1993, which places restrictions on selling, leasing and mortgaging land.[184] These restrictions make it difficult to raise capital to develop the land.[185] Also, nearly 80 percent of Māori-owned land falls within land use capability classes 6-8.[186] Classes 6-8 mean that the land is unsuitable for arable cropping and of low suitability, or unsuitable for pastoral use or forestry.[187] 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 conclude 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."[188] 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.[189]

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. In Braithwaite's study of nursing homes he found that nursing home managers were motivated to different extents by two things: profits and standard of care.[190] In the context of agricultural emissions, farmers are motivated to different extents by profits and emission reduction. Like the nursing homes, one would expect that almost all farmers are interested in maintaining profits. However, some farmers are more concerned with reducing emissions than others. The motivation to

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[183] ICCC, above n 2, at 49.
[184] At 12.
[185] At 12.
[186] At 12.
[187] 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.
[188] ICCC, above n 2, at 6.
[189] At 12.
[190] Ayres and Braithwaite, above n 5, at 28–29.

reduce emissions is evidenced by the work already done by some farmers to reduce emissions. The ICCC found that emissions per unit of product (emissions intensity) has decreased by about 20 per cent over the last 25 years.[191] Selective breeding, pasture and feed management, improved animal health and more effective fertiliser use have contributed to this improvement.[192] 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.[193]

Due to the varying motivations of farmers it is unlikely that persuasion or punishment alone will be effective. Braithwaite argues that a party who is solely motivated by profits may not comply with persuasive regulation if it is economically rational to not comply.[194] In the context of agricultural emissions, a farmer that is solely motivated by profits may choose not to 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 famers to reduce emissions. However, Braithwaite also argued that a strategy that punishes regulated parties will insult and demotivate those that are motivated by a sense of responsibility. As such, the regulation of agricultural emissions should not punish farmers that have already made progress towards reducing emissions. Instead, the regulation should encourage them to stay on that path.

According to Ayres and Braithwaite, tit-for-tat enforcement is the best method for dealing with varying motivations.[195] Chapter IV will explore how tit-for-tat enforcement might transpire in the context of pricing agricultural emissions.

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[191] ICCC, above n 2, at 26.
[192] At 26.
[193] At 26.
[194] Braithwaite, above n 75, at 24.
[195] Ayres and Braithwaite, above n 5, at 29.

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. The lack of emission reduction methods is why the Government indefinitely excluded surrender obligations for agricultural emissions from the NZ ETS in 2012.[196]

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.[197] Unless technology can change those relationships, the only way to reduce emissions is to reduce feed consumption and nitrogen applied to the land.[198] The ICCC set out various methods for reducing feed consumption and nitrogen application including: reducing stocking rates; reducing inputs; using fertiliser more efficiently; using low emission feeds; and improving manure management.[199] 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.[200] This potential reduction is a lot less than the 24 to 47 per cent reduction set out in the Climate Change Response Act.[201] Also, BERG consider that achieving such reductions may have a significant negative impact on the profitability of some farms.[202]

The other method that is currently available for reducing agricultural emissions is changing land use.[203] Land use change may mean diversifying into lower emission farming such as horticulture, crops, pigs or poultry.[204] Alternatively, farmers may plant trees on land that was previously used for grazing animals.[205] Trees absorb carbon from the atmosphere,

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[196] Leining and Kerr, above n 20, at 4.
[197] ICCC, above n 2, at 32.
[198] At 32.
[199] At 32–33.
[200] *Report of the Biological Emissions Reference Group* (December 2018) at 5.
[201] Climate Change Response Act 2002, s 5Q(1)(b).
[202] *Report of the Biological Emissions Reference* Group, above n 200, at 5.
[203] ICCC, above n 2, at 34.
[204] At 34.
[205] At 34.

thereby reducing net emissions from the farm.[206] However, planting trees reduces the amount of land that can be used to graze stock, which may result in reduced production. If farmers are able to plant trees on marginal land, they may be able to reduce net emissions while maintaining production. However, the regulation of agricultural emissions will have to recognise tree planting as an emission reduction technique to incentivise farmers to plant trees. The possibility of recognising plantations as an emission reduction technique will be addressed in Chapter IV.

The ICCC identify alternative methods for reducing agricultural emissions that may be available in the future.[207] Possible technologies include breeding low emissions animals, nitrification inhibitors, methane inhibitors, methane vaccines and genetically modified ryegrass.[208] A methane vaccine aims to "trigger an animal's immune system to produce antibodies that suppress the activity of methanogens in the rumen."[209] BERG consider that a methane vaccine could deliver a 30% reduction in methane emissions from animals.[210] They have low confidence that a vaccine will be available by 2030 and medium-high confidence that it will be available by 2050.[211] A methane inhibitor also inhibits methanogens in the animal's rumen, but it is most effective when it is constantly consumed by the animal.[212] BERG have "[m]edium-high confidence that a methane inhibitor for grazing systems that can deliver a 10 to 30% reduction in biogenic methane will be available by 2030, and high confidence that one will deliver between a 30-50% reduction by 2050."[213]

6 Summary of the complexity of agricultural emissions

It is possible that developing technologies will allow significant reductions in agricultural emissions in the future. However, such technology is not available now and the current

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[206] ICCC, above n 2, at 34.
[207] At 37.
[208] At 37–40.
[209] At 40.
[210] *Report of the Biological Emissions Reference* Group, above n 200, at 6.
[211] At 6.
[212] ICCC, above n 2, at 39.
[213] *Report of the Biological Emissions Reference* Group, above n 200, at 6.

methods for reducing emissions can be very costly for farmers. If land use change is the only real option for making large emissions reductions, the regulation of agricultural emissions could have serious economic and socio-cultural impacts. Furthermore, some farmers have already made progress towards reducing emissions and this work should be recognised and rewarded. These factors combine to make the regulation of agricultural emissions a complex task. It is important that these factors are taken into account when designing the regulation. Chapter IV will examine how the regulation might be designed.

The next part of this Chapter 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.

C Traditional Regulatory Strategies and Agricultural Emissions

Due to the complex nature of environmental problems, simple regulatory strategies are often ineffective. Gunningham states that command and control regulation was criticised in the 1980s for being "inflexible and excessively costly for business" and that self-regulation results in "scope for free riding, the uncertainty over regulatory threats, non-enforceable commitments, poor monitoring and lack of transparency."[214] Similar results are likely to occur if agricultural emissions are subject to such regulatory strategies.

1 Agricultural emissions in the free market

Agricultural emissions have never been included in the NZ ETS.[215] 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'.[216] Hardin describes 'common land' as land where anyone can graze their

[214] Gunningham, above n 102, at 183 and 187.
[215] Leining and Kerr, above n 20, at 4.
[216] Garrett Hardin "The Tragedy of the Commons" (1968) 162 Science 1243.

animals. An individual who grazes one extra animal on the common land receives all the benefits of owning one extra animal.[217] The negative component of overgrazing is shared by everyone who uses the common land.[218] Therefore, all rational individuals are motivated to add as many animals to their herd as possible. Adding animals to everyone's herd results in overgrazing and the common land is ruined.[219] 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 cattle 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 increase by 13.5 per cent between 1990 and 2017.[220] In order to reverse this trend, the regulation of agricultural emissions must create an incentive for farmers to reduce emissions.

2 Self-regulation of agricultural emissions

Self-regulation is when the state negotiates a regulatory goal with the industry and leaves it to the industry to achieve the goal.[221] 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.[222]

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[217] Hardin, above n 216, at 1244.
[218] At 1244.
[219] At 1244.
[220] Ministry for the Environment, above n 18, at 10.
[221] Ayres and Braithwaite, above n 5, at 38.
[222] Beca *Assessment of the administration costs and barriers of scenarios to mitigate biological emissions from agriculture* (14 May 2018) at 6.

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 (not least, making a profit) and the public interest in environmental protection was substantial."[223] 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 on 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.[224] 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.

3 Command and control regulation of agricultural emissions

Command and control regulation usually consists of state made rules that prohibit or restrict certain activities.[225] 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. Such a limit would likely reduce the number of animals each farm can carry and therefore reduce emissions. However, if stock numbers are reduced then production will also decrease. Reduced production may make some farms unviable and

[223] Holley, above n 106, at 745–746.
[224] Ayres and Braithwaite, above n 5, at 54.
[225] Gunningham, above n 102, at 182.

force them to change land use. As previously discussed, widespread land use change has implications for rural communities and the New Zealand economy as a whole.

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. A reduction in animals and fertiliser would likely result in reduced production and widespread land use change. 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 already 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."[226] It is possible that such resistance may come from farmers if they consider command and control regulation to be unfair. Resistance is especially likely from farmers that have already reduced emissions. 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.

Overall, command and control regulation of agricultural emissions is likely to have harsh economic implications for farmers, rural communities and the economy as a whole. The inflexible nature of such regulation is likely to result in large scale land use change and could foster a counterproductive resistance. Therefore, command and control regulation is not the most suitable strategy for reducing agricultural emissions.

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[226] Holley, above n 106, at 744.

D 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. Without regulation, agricultural emissions are an externality in the free market. The free market has resulted in an increase in emissions over time. Self-regulation is unlikely to gain compliance from those that have less motivation to reduce emissions and command and control regulation may result in counterproductive resistance to reducing 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. The next Chapter will examine how to design the pricing of agricultural emissions so that it responds to these factors.

IV Pricing Agricultural Emissions and the Responsive Regulatory Model

The previous Chapter established that New Zealand needs an innovative regulatory strategy that is responsive to the complex nature of agricultural emissions. This Chapter will examine how the pricing of agricultural emissions fits within the pyramid of regulatory strategies and how it should be designed to give effect to responsive regulatory theory.

A 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.

1 Processor-level

Pricing emissions at processor-level means that the processor pays for the emissions.[227] 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.[228] The cost of fertiliser emissions is passed on to farmers through a higher price for fertiliser. Under this approach, all farmers will effectively pay the same price per unit of milk, meat or fertiliser.[229] Therefore, the only way for famers to reduce the cost of emissions is to reduce production or fertilise use.[230] As discussed in Chapter III, reducing production might mean that some farms become financially unviable.

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[227] ICCC, above n 2, at 58.
[228] At 58.
[229] At 58–59.
[230] At 58.

2 Farm-level

Pricing emissions at farm-level means that each farm pays for their own emissions. As discussed in Chapter III, farms can have different emissions intensity due to variations in breeding, pasture and feed management, animal health and fertiliser use.[231] Pricing emissions at farm-level allows these factors to be recognised.[232] 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 emissions mitigation techniques, such as methane inhibitors and vaccines, when they become available.

3 The trade-off

The trade-off for recognising a wider range of emissions reduction techniques is the administrative cost of pricing emissions at farm-level. The ICCC consider that farm-level pricing for livestock emissions will cost a minimum of $15 million compared to $3 million for pricing at processor-level.[233] The higher cost is due to the fact that farm-level pricing would have to be applied to between 20,000 and 30,000 farms (depending on the threshold for participation).[234]

According to responsive regulatory theory, the preferred strategy is usually the one that is least costly for the regulator and regulated parties.[235] 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.[236] There is some evidence that soil type and soil moisture may affect nitrous oxide emissions from fertiliser, but these

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[231] ICCC, above n 2, at 26.
[232] At 58.
[233] At 58.
[234] At 58.
[235] Ayres and Braithwaite, above n 5, at 19.
[236] ICCC, above n 2, at 59.

relationships are not well enough understood to be measured accurately.[237] 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.[238] However, the ICCC note that future developments may make it possible to recognise relationships between fertiliser and specific land qualities in the future.[239] If those developments do occur, then it may be beneficial to price fertiliser emissions at farm-level in the future.

With regard to livestock emissions, pricing at processor-level is not the most responsive approach because it does not recognise farm-specific emission mitigation techniques. The lack of recongition means that 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.

The ICCC conclude that livestock emissions should be priced at farm-level, as long as a balance is struck with the increased administration costs.[240] The Government followed the advice from the ICCC and legislated for livestock emissions to be priced at farm-level and fertiliser emissions to be priced at processor-level from 2025.[241] The next part of this Chapter will look at how these pricing strategies might fit within a pyramid of regulatory strategies for agricultural emissions.

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[237] ICCC, above n 2, at 59.
[238] At 60.
[239] At 60.
[240] At 63.
[241] Climate Change Response Act 2002, s 2A.

B The Pyramid of Regulatory Strategies

Think back to Ayres and Braithwaite's pyramid of regulatory strategies (see Figure 1).[242] The more controlling regulatory strategies sit at the top of the pyramid, whereas the more persuasive strategies are at the bottom. The escalating regulatory strategies aim to channel most of the regulation towards the base of the pyramid.[243]

Although the Government has not created a pyramid for agricultural emissions, they have used the idea of escalating regulatory strategies. If the Government are not satisfied with the progress towards pricing livestock emissions at farm-level, they may price livestock emissions at processor-level instead.[244] 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.[245] 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.

Chapter III argues that the free market has been ineffective at reducing agricultural emissions. Also, command and control regulation and self-regulation are unlikely to be effective in the context of agricultural emissions. However, it is useful to think about how those strategies might create pressure down the pyramid. Also, it is possible that self-regulation may become an effective strategy in the future.

Putting these strategies together, it is possible to imagine a pyramid of regulatory strategies for agricultural emissions (see Figure 3). This pyramid is more suited to livestock emissions

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[242] Ayres and Braithwaite, above n 5, at 39.
[243] At 39.
[244] Climate Change Response Act 2002, s 219(4)(c).
[245] ICCC, above n 2, at 58.

than fertiliser emissions. Pricing fertiliser emissions at processor-level is preferred because there is no real benefit in pricing fertiliser emissions at farm-level. Therefore, the pyramid may look different for fertiliser emissions. 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.

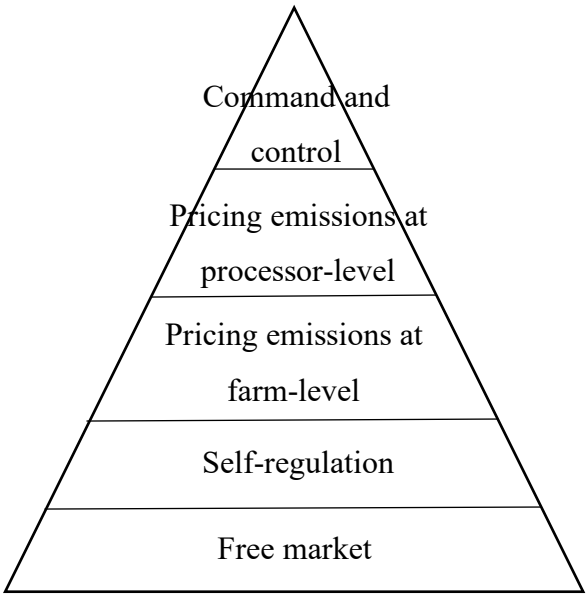

Figure 3: Pyramid of regulatory strategies for agricultural emissions
Source: Author

With the regulatory strategies structured in this way, it is clear that there is pressure on the agricultural industry to make farm-level pricing work in order to avoid processor-level pricing or command and control regulation. Those strategies 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 part of this Chapter will examine how farm-level pricing of livestock emissions should be designed to give effect to responsive regulatory theory. Responsive regulatory theory demands that the strategy: minimises the negative implications of the regulation;

takes into account the motivational diversity and the lack of available emission reduction methods; and guides the industry towards self-regulation in the future.

C Measuring Agricultural Emissions

It is not practicable to measure the actual methane and nitrous oxide emissions from each animal and paddock.[246] However, emissions can be measured based on an understanding of what drives them.[247] 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 the breed, diet and other characteristics that effect emissions.

1 Fertiliser emissions

The relationship between fertiliser use and specific land qualities is not well understood.[248] 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.[249] Under this method, the only way to reduce the cost of emissions is to use less fertiliser. As previously stated, the relationship between fertiliser emissions and different types of land may be better understood in the future. Therefore, the calculation of fertiliser emissions may need to account for soil type and soil moisture in the future.

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[246] ICCC, above n 2, at 61.
[247] At 61.
[248] At 59.
[249] At 61.

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.[250] 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 Chapter III, 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. It does not recognise the differences in emissions intensity between farms and places a blanket cost over all units of production. As discussed in Chapter III, 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.[251] This method of calculation will recognise more emission reduction options such as increasing animal performance or using low-emission feed.[252] 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 approach as it recognises the potential implications of reduced production. It 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

[250] ICCC, above n 2, at 61.
[251] At 61.
[252] At 61.

that have already made efforts to reduce emissions will be rewarded with a lower cost imposed on them. As previously discussed, rewarding farmers is important for moving towards self-regulation in the future.[253]

The downside of using a more complex method of calculation is the increased expense from gathering more data on animals and feed.[254] Farms with relatively high emissions intensity may face the cost of gathering data and also have to 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.[255] Farmers can then choose to enter their own farm specific values or use the default values. However, under this approach, only farmers with low emissions intensity will have an incentive to enter farm specific values.[256] 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 have to be set slightly higher than the national average to compensate.[257] Overall, a more complex calculation method is preferable, but the costs will have to be weighed against the benefits.

3 Tools for measuring emissions

The ICCC recognise two possible tools that could be used for complex calculations of livestock emissions.[258] The first tool is the agricultural inventory model (AIM). AIM estimates methane and nitrous oxide emissions using animal performance information such as size, milk yield and liveweight gain, as well as diet characteristics such as metabolisable energy, nitrogen content and digestibility.[259] AIM uses national average data in the

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[253] Braithwaite, above n 145, at 5.
[254] ICCC, above n 2, at 61.
[255] Interim Climate Change Committee (ICCC) *Action on agricultural emissions: Technical appendix 2: Calculating agricultural emissions* (30 April 2019) at 21. One example of regulation where entities may revert to default values is the default price-quality path (DPP) for electricity distributors. The DPP sets default values for starting prices, price changes and minimum quality of service. See: "Electricity lines default price-quality path" (2018) Commerce Commission New Zealand <www. comcom.govt.nz>.
[256] ICCC, above n 255, at 21.
[257] At 21.
[258] At 10.
[259] At 10.

calculations. The second tool is Overseer. Overseer takes the same approach as AIM, but uses farm specific data rather than national averages.[260]

While these tools may be a useful starting point for calculating agricultural emissions, they need to be developed into usable tools that can withstand "rigorous scrutiny".[261] The Parliamentary Commissioner for the Environment recommends that changes are made to Overseer's governance, transparency, peer review, funding, and ownership arrangements, in order to make it a more suitable tool in the regulatory context.[262] Also, the software for AIM and Overseer needs to be developed so that farmers can use it to make complex emission calculations.

D 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.

Chapter I examined the characteristics of carbon dioxide, nitrous oxide and methane. Carbon dioxide and nitrous oxide have longer lives and accumulate in the atmosphere.[263] The legislation requires that net accounting emissions of carbon dioxide and nitrous oxide be zero by 2050.[264]

Conversely, methane has a much shorter life. The ICCC consider 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."[265] Therefore, methane emissions do not need to be reduced to zero to stop them adding to

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[260] ICCC, above n 2, at 10.
[261] At 17.
[262] Parliamentary Commissioner for the Environment *Overseer and regulatory oversight: Models, uncertainty and cleaning up our waterways* (December 2018) at 119-124.
[263] ICCC, above n 2, at 24.
[264] Climate Change Response Act 2002, s 5Q(1)(a).
[265] ICCC, above n 2, at 25.

global warming.[266] As such, the legislative goal is to reduce biogenic methane by 24 per cent to 47 per cent below 2017 levels by 2050.[267]

In the NZ ETS, one unit represents one tonne of carbon dioxide equivalent.[268] 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. Overall, a separate price for methane emissions is a more responsive approach as it recognises the difference between methane and other GHGs.

E Free Allocation

The Government has committed to providing 95 per cent free allocation of emissions units if agriculture is included in the NZ ETS.[269] 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 as a whole will only have to pay for five per cent of their emissions. However, the method used for distributing the free allocation will significantly alter how the cost of emissions is distributed across individual farms.[270]

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[266] ICCC, above n 2, at 25.
[267] Climate Change Response Act 2002, s 5Q(1)(b).
[268] Leining and Kerr, above n 20, at 6.
[269] ICCC, above n 2, at 79.
[270] At 79.

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.[271] Under this approach, a fertiliser processor will receive 95 per cent allocation based on the fertiliser they sell. Therefore, the processor will pay for five per cent of the emissions that result from the fertiliser they sell.

2 Free allocation for livestock emissions

The ICCC explore various methods for distributing free allocation at farm-level.[272] One of the options is 'grandparented allocation'.[273] Under this method, a farm's allocation would be determined by its historical emissions, stock numbers or production.[274] Each farm would receive the same amount of free allocation each year, as long as the allocation rate remains constant.[275] The problem with this method is that those with historically high emissions receive more free allocation.[276] This method disadvantages those who have historically low emissions because their land is underdeveloped or they have already made efforts to reduce emissions.[277] 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.[278] 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.[279] For example, a 100 hectare farm may produce

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[271] ICCC, above n 2, at 95.
[272] At 84.
[273] At 85.
[274] At 85.
[275] At 85.
[276] At 85.
[277] At 85.
[278] At 94.
[279] At 92.

100 units of product per year.[280] 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 actually 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.

F 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.[281] Trees and other vegetation act as carbon sinks by absorbing carbon.[282] 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 meets the following criteria: the forest must be at least one hectare in size, have at least 30 per cent tree crown cover in each hectare and be at least 30 metres wide.[283] 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.

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[280] These are not actual numbers.
[281] ICCC, above n 2, at 101.
[282] At 101.
[283] Climate Change Response Act 2002, s 4(1).

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 be changed. 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.[284] As the technology develops it will hopefully become 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.

G 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?

[284] ICCC, above n 2, at 104.

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 a methane vaccine and methane inhibitors; and help open up 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.[285] 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 consider that some farmers may actually have a negative net obligation under a complex method for calculating emissions and an output and land-based free allocation system.[286] For example, a farmer that is highly emissions efficient may be allocated 95 units but only release 90 units of emissions. The ICCC consider that a farmer in that position would receive a rebate for their five excess units.[287] 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, rebates may be paid.

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[285] "New Zealand" Global Research Alliance on Agricultural Greenhouse Gases <www.globalresearchalliance.org>.
[286] ICCC, above n 2, at 93.
[287] At 93.

H Tripartism

Ayres and Braithwaite expressed concern that cooperation may lead to capture and corruption. With regard to agricultural emissions, there may be some concern that the He Waka Eke Noa steering group, who are involved in designing the regulation, is dominated by primary sector leaders. This group may be tempted to act in best interests of the agricultural industry, which may diminish the ability of the regulation to reduce agricultural emissions. However, the Government have adopted somewhat of a tripartism approach to alleviate this concern. The Climate Change Commission, an independent expert group, are required to submit a report to the Government on progress towards farm-level pricing by 30 June 2022.[288] 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.[289]

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.

I 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 controlling strategy. Responsive regulation aims to create pressure down the pyramid because the more persuasive strategies at the bottom of the pyramid tend to be less costly for the regulator and regulated parties.[290] In the context of agricultural emissions, it is desirable that the industry move towards self-regulation in the future because it will be less costly for the Government and farmers.

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[288] Climate Change Response Act 2002, s 220.
[289] Section 85A(2A).
[290] Ayres and Braithwaite, above n 5, at 19.

As discussed in Chapter III, 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, farmers who are not motivated by a sense of responsibility will likely need a financial incentive to keep emissions low. This incentive may come in the form of a higher price 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.[291] 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 emissions products will provide a financial incentive for farmers to reduce emissions.

Taking advantage of demand for low emissions products will require certain steps to be taken. Recognising this opportunity, the Government set up the Primary Sector Council in April 2018 to support the primary sector in maximising opportunities from value-added products.[292] The Primary Sector Council consider that rewarding producers of ethical agricultural goods will require "verified products and associated marketing."[293] The marketing of low emissions products may build on brands such as 100% Pure New Zealand and Taste Pure Nature.[294] The Government may also have a role to play in removing barriers to allow access to new markets.[295]

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

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[291] ICCC, above n 2, at 112.
[292] At 111.
[293] Primary Sector Council *Fit for a Better World: Agriculture, Food and Fibres Sector Vision and Strategic Direction Towards 2030* (June 2020) at 18.
[294] ICCC, above n 2, at 112.
[295] At 112.

be some oversight by the industry or a third party to verify that the products are low emission products. If New Zealand is able to take advantage of these opportunities, it is possible that the agricultural industry may move towards self-regulation of agricultural emissions in the future.

J 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. Chapter III argued that reduced production can have serious economic implications and may result in emissions leakage. 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.

Chapter III 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 also minimise the economic implications of pricing emissions.

The varying motivations of farmers is another factor that the regulation must respond to. 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. 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 a rebate, on those with low emissions.

The regulation should also take into account the lack of available methods for reducing emissions. If it does not, the economic implications will be magnified. 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 up 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. However, in order to prevent cooperation from 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 emission reduction goals if it is designed in accordance with the above advice. Farmers are more likely to adhere to the regulation if they consider the regulation to be suitable to the specific context of agricultural emissions.

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, farmers continue to produce and export goods.[296] The contribution of agriculture to New Zealand's economic recovery is gaining recognition as more New Zealand citizens have a positive view of farming.[297] However, as important as the economy is, climate change is still an issue and the agricultural industry is the largest contributor to New Zealand's GHG emissions profile.[298] 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 and socio-cultural interests. Responsive regulatory 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 industry towards self-regulation in the future. If the regulation is designed according to the advice in Chapter IV, 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 has to 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, economists and citizens remember: He Waka Eke Noa – we are all in this together.

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[296] Michael Andrew "Tourism may have disappeared, but demand for NZ food is stronger than ever" (23 July 2020) The Spinoff <www.thespinoff.co.nz>.
[297] 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>.
[298] Ministry for the Environment, above n 18, at 1.

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