

Tackling Agricultural Emissions Potential Leadership from a Small Country

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This paper looks at the challenges New Zealand has confronted and potential solutions that have emerged while investigating the inclusion of agricultural greenhouse gas (GHG) emissions in an emissions trading scheme. We argue that a small country such as New Zealand can have an important role in the global climate change mitigation efforts as a policy leader. Because agriculture is a core part of the New Zealand economy and because agricultural emissions comprise almost half of New Zealand's GHG emissions, New Zealand has focussed on creating a knowledge base around agricultural GHG mitigation that could be valuable for other countries. Though the Government has delayed the inclusion of agricultural emissions into the ETS until after 2015, much has been learned about how to effectively facilitate and create incentives for agricultural mitigation. Motu ran a dialogue process over 18 months to discuss how to best to address agricultural emissions through actions in New Zealand. The group, comprised of farmers along with business, non-governmental organisations, government and Māori representatives, both informed and was informed by a wide range of technical experts. Through dialogue, the group helped frame challenges within the sector, and created ideas on how to move forward. We present these results as suggestions of how to create socially and politically sustainable and effective environmental policy within an agricultural sector. We argue that we need to build concern and capabilities before we implement regulation; but also encourage short-term action by giving agency to those with existing concern and by giving clear signals that regulation is imminent. With a strong knowledge base and a clear vision, those involved in the agricultural sector can collaborate and innovate. If New Zealand can be successful and innovative in tackling agricultural emissions, as a small country we can help pave a way forward in this important area for green growth.

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I. Introduction

Small countries have an important role to play in climate change mitigation and achieving green growth: being policy innovators and policy leaders. New Zealand is a small country of just over 4 million people, and our comparative advantage in climate policy is in agriculture. This is an important role for New Zealand as excluding agricultural greenhouse gases (GHGs) from global mitigation efforts would substantially increase the cost of meeting a given mitigation target (Reisinger et al., 2012). Almost half of New Zealand's GHG emissions are from agriculture – by far the highest proportion among developed countries. Many countries may put a lower priority on agricultural mitigation in favour of easier mitigation options, but New Zealand does not have this luxury if we are to mitigate our fair share of global GHGs. If New Zealand mitigates our emissions in isolation, little will be achieved in mitigating global climate change. However, as a small country we can be more agile and innovative in the policies we develop, and we are disproportionately visible internationally relative to our population. This creates an opportunity to show leadership and help other countries tackle the difficult issue of agricultural GHG mitigation.

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To illustrate the importance of agricultural emissions, anthropogenic methane contributes about a third as much to planetary warming as CO₂, with agriculture responsible for about half of those emissions. In addition, nitrous oxide contributes about a third as much to global warming as methane, with around 60 percent of its emissions caused by agriculture. Ruminant livestock such as cattle and sheep are responsible for around two-thirds of agricultural methane emissions, along with a large proportion of nitrous oxide emissions (Forster et al., 2007; Eckard et al., 2010). This paper focuses on livestock emissions, which are the major source of agricultural emissions in New Zealand.

Reisinger et al. (2012) find that excluding agricultural non-CO₂ emissions from the global mitigation effort would increase the cost of reaching a 450ppm CO₂-equivalent global GHG target¹ by 2100 by 13 to 56 percent, depending on their assumptions. Given that global mitigation costs are likely to be high already, the large cost increase from excluding agricultural emissions means total global mitigation will likely be lower, worsening the effects of climate change. Thus, tackling agricultural emissions needs to be part of any plan for green growth and is required if the worst effects of climate change are to be avoided.

Eckard et al. (2010) argue that the primary focus of global climate change mitigation efforts has been on CO₂ because methane and nitrous oxide emissions are largely agricultural, and therefore are intimately tied up with food security. Global food security will become an increasing issue as the world's population grows from its present 7 billion to a predicted peak of around 9 or 10 billion by the middle of this century. Furthermore, climate change may make food production more difficult. Food security is a complex issue and needs to be considered as part of agricultural climate policy, but concerns about food security need not preclude agricultural mitigation. There may even be food security co-benefits to agricultural mitigation (FAO, 2006).

¹ This target refers to the warming caused by 450 parts per million atmospheric particles of CO₂, or the equivalent of that target in other GHGs.



In New Zealand, agricultural methane accounts for 30% of national emissions, while nitrous oxide is responsible for 18% (Clark et al., 2011). These emissions reflect the importance of agriculture to the New Zealand economy, rather than significant inefficiencies in the New Zealand agricultural sector. In fact, New Zealand's pastoral dairy and sheep and beef farms are amongst the most efficient in the world in terms of production per unit of GHG (Emissions Trading Scheme Review Panel, 2011). In 2008 the New Zealand government legislated to include agriculture in its Emissions Trading Scheme (ETS) from 2013. The entry of agricultural emissions into the ETS has since been pushed back, and now the entry date is set to be reviewed in 2015. This reflects the contentious and difficult nature of bringing agricultural emissions into the ETS, along with the power of farmer lobby groups.

Agricultural GHG mitigation actions are challenging to decide on, undertake and monitor, as they must be undertaken at the farm scale and each farm represents a complex biological system. This contrasts with fossil fuel emissions, where many mitigation actions can be embedded in technology adoption or large infrastructure decisions. Consequently, farmer capability and engagement is critical for policy effectiveness and addressing agricultural emissions cannot be viewed only as a technical exercise. Furthermore, because agricultural emissions come from a large number of small sources, and emissions can be accurately monitored only at the point of emission (in contrast to fossil fuels, which can be monitored at any point in the supply chain because of the direct relationship between fuel produced, fuel consumed and carbon dioxide), regulation of agricultural GHGs is administratively difficult.

Motu has undertaken significant research on agricultural emissions policy.² This paper is based on insights from an 18 month long dialogue process we recently completed to discuss how best to address agricultural emissions through actions in New Zealand. The dialogue group was comprised of New Zealand farmers, along with participants from iwi³, industry, non-governmental organisations (NGOs)

² See publications at www.motu.org.nz/research/group/agricultural_emissions.

³ Iwi are a major level of organisation of the indigenous Māori people. The word iwi is translated as tribe or tribes. They play an important role in Māori life, and own large amounts of rural land, much of which they farm.

and key local and central government departments. The group operated within the context of a polarised public debate over whether, when and how agricultural emissions should be dealt with under the ETS. Through an intensive dialogue process we aimed to deepen Motu's, and the group's, thinking. By creating a politically acceptable and sustainable policy that is effective at reducing GHG emissions, we hope that New Zealand's experience can help lead to better agricultural emissions policy globally.

From the understanding we gained through the dialogue group, the authors' three key messages are: 1) be explicit about wider objectives – not just local emission reductions; 2) engage a wide range of actors – this is not just an issue for government; and 3) build concern, capability and contracting (incentives) simultaneously, with more emphasis on concern and capability while New Zealand's response evolves.

This paper briefly reviews the international context and what New Zealand is doing about agricultural emissions (Section 2). Section 3 then describes AgDialogue. Section 4 looks at the key results and ideas from AgDialogue and finally Section 5 is a brief conclusion.

2. The International and New Zealand Context

The future shape of the global policy framework on climate change could have a significant effect on individual nations' mitigation efforts. For example, targets under the first commitment period of the Kyoto Protocol included agricultural emissions, meaning signatories such as New Zealand had agricultural emissions included in their national mitigation targets.⁴ However, the continuing United Nations Framework Convention on Climate Change (UNFCCC) negotiations, as well as unilateral action and other bi- and multi-lateral negotiations, mean there is considerable uncertainty about global climate policy. The new agreement currently being negotiated to come into force by 2020 could exclude agricultural emissions, or treat them separately from other emissions. These policy settings could have a significant effect on the costs and economic prospects of the various regions and countries of the world, especially for a country like New Zealand (Reisinger and Stroombergen, 2012; Reisinger et al., 2012). These policy realities could then flow on to individual farmers, depending on how the government chooses to respond to the international agreement. Dorner et al. (forthcoming) analyse how different scenarios would affect New Zealand farmers.⁵

New Zealand undertakes a large amount of pastoral farming. After the complete removal of agricultural subsidies by the central Government in the 1980s (Sandrey and Reynolds, 1990), there has been a gradual shift from extensive sheep and beef farming to forestry and to intensive dairy farming where land is suitable for dairying (Kerr and Olssen, 2012). New Zealand's livestock farmers are also efficient compared with other countries. Any improvements so far in GHG efficiency or higher levels of efficiency relative to other countries is not due to specific Government policy to reduce agricultural emissions, but through other mechanisms such as the commercial drive for efficiency and perhaps different local conditions or methods of production (Emissions Trading Scheme Review Panel, 2011).

⁴ The Kyoto Protocol was agreed under the UNFCCC, and its first commitment period (2008–2012), which New Zealand was a part of, committed developed countries who were signatories to binding mitigation targets.

⁵ For a useful summary of the climate policy options in agriculture globally and in New Zealand, and some more context for New Zealand, see Cooper et al. (2013).

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In terms of developing new mitigation technologies, the New Zealand Government was the initiator and a founding member of the Global Research Alliance on Agricultural Greenhouse Gases (GRAAGG) at the 2009 global climate change negotiations in Copenhagen. We are currently the location of its Secretariat and lead the group focussed on livestock emissions (Global Research Alliance on Agricultural Greenhouse Gases, 2012). As part of New Zealand's contribution to the global research effort, the Government established the New Zealand Agricultural Greenhouse Gas Research Centre.

The shape of climate policy for agriculture has been and continues to be a contentious issue in New Zealand. In 2003 the centre-left Labour-led Government decided to impose a levy on agricultural GHGs, in order to fund research into agricultural GHG mitigation. This levy met with strong opposition from farmers, who called it the "fart tax". It was dropped before it could be implemented, though research programmes have since received significant support from farming sector bodies.

The Labour-led Government then decided to develop an ETS as its flagship climate policy. The ETS passed into law in 2008. It was designed to be an all sectors, all gases scheme, which phased in the participation of different sectors over several years. It was linked with the Kyoto Protocol carbon market, but has a price cap of NZ\$25 per tonne of CO₂; these two design elements are still in the current scheme. Agricultural emissions were to be included from 2013, with a large allocation of free units to be gradually phased out.

The Labour Party lost the election in November 2008 to a centre-right coalition led by the National Party. This coalition is still in power, with the next election due in 2014. The National-led Government amended the ETS in 2009, significantly weakening the incentives in the scheme and pushing back the entry date for agriculture. The ETS has recently been amended again, after a review in 2011. Key arguments related to agriculture were that mitigation options are limited and that agricultural production could be pushed overseas by increased costs, thus negating any climate benefits (Federated Farmers of New Zealand, 2011). On the other hand, environmental groups and others argue that farmers are getting a free ride, essentially being subsidised by the rest of the economy for their GHGs (Greenpeace New Zealand, 2012). The recent amendments include pushing back the date of entry for agricultural emissions again. A review is scheduled for 2015 to consider when agricultural emissions should be included in the ETS. The AgDialogue was convened to cut through the polarised national debate on agricultural GHG policy.

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3. AgDialogue

Motu established a dialogue group on agricultural emissions, AgDialogue, to find and document effective, efficient and fair solutions to the challenge of mitigating agricultural GHGs. We also aimed to create a more informed policy environment. For these purposes just over 20 participants from a range of backgrounds based around New Zealand were selected to be part of an 18 month process.

Insights drawn from AgDialogue were from the collective thinking of the participants. We did not aim to reach a consensus view on any subject; the account presented in this paper of the results of the dialogue should be attributed only to the authors.

3.1. Selection of Participants

Participants were selected on the basis of the particular perspective they brought, as well as personal characteristics. While we did not aim to have a representative selection from the New Zealand population, the participants were purposely selected from a range of relevant groups. These groups included farmers, farm industry groups, Māori, NGOs, and local and central government. Relevant personal characteristics included being a good thinker, knowledgeable and interested in relevant topics, open-minded, and amenable to working as part of a group. The total number of participants was kept low – rarely more than 20 at a meeting – to allow in-depth discussion.

3.2. Dialogue Design

The aims of AgDialogue were achieved by covering a wide range of relevant topics, through discussion with experts and among participants. The dialogue process, developed in conjunction with Glen Lauder from Common Ground NZ, created conditions in which participants could learn from one another, come to a common understanding, and innovate together. The meetings were carefully planned and subtly directed, with a large amount of self-convening by the group. Each participant

⁶ Research that Motu has undertaken on the issue finds that such “leakage” is unlikely to be a major problem for New Zealand agriculture (Kerr and Zhang, 2009).

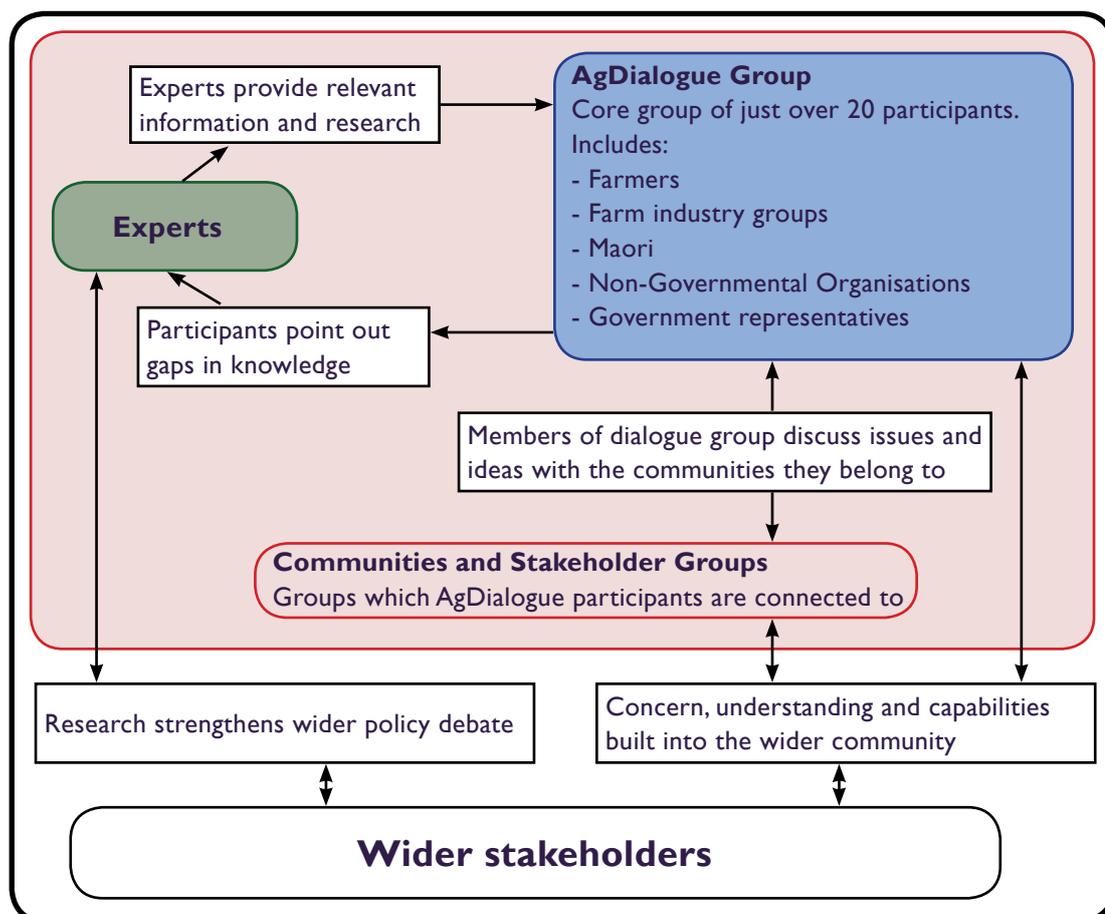


Figure 1. Agricultural Emissions Dialogue Group Structure

was interviewed by Glen Lauder before the process and between meetings. The idea of the group self-convening with minimal direction distinguishes a dialogue from processes led by a strong facilitator or meeting chair. This process of research and policy development has been used by Motu and Glen Lauder in the past on the initial design of the ETS in 2007, and on water quality issues in the Rotorua catchment on New Zealand's North Island. To help ensure a trusting environment, the group operated under the Chatham House rule.⁷ All proceedings were recorded via audio, and sometimes video for research purposes only.

The experts which helped inform the dialogue were from Motu and other reputable organisations including GNS, Infometrics, the Ministry of Foreign Affairs and Trade, NIWA and Lincoln University, provided key background material and discussed the latest research with participants; in turn the AgDialogue participants challenged the scope and interpretation of existing research and contributed new ideas. This interaction is represented in Figure 1.

The small number of participants and the consistent attendance of members over an extended period of time allowed a strong group rapport to build. This rapport, and the length of time given to the process, allowed the issues to be discussed honestly and in depth. Group discussion and thinking could progress and converge, rather than be subject to a polarised debate that solidified existing views and positions.

⁷ The Chatham House rule is that everything that is discussed can be talked about outside of the group meetings, but may not be attributed to any particular person.

The dialogue included seven half-day meetings at Motu offices in Wellington, and three two-day retreats at different locations in the North Island. The half-day meetings were mainly technical in nature, and the retreats focussed on deeper discussion by the participants. Material covered in the meetings included climate science, mitigation options for agriculture, monitoring, emissions trading and other policy options, wider economic considerations for the agricultural sector, farmer behaviour and behaviour change, cooperation, technology uptake, and fairness.

The second retreat focussed on getting the participants to come up with creative solutions to difficulties in implementing climate policy in agriculture identified in earlier meetings. The two subsequent half-day meetings and the final retreat focussed on developing and refining these ideas, and synthesising them into a package. We did not aim to produce a consensus view, but successfully produced a focussed and informed policy discussion within the group and beyond.

Published outputs acknowledge the members' participation if they choose but are the sole responsibility of and represent the opinions of Motu researchers alone.

3.3. Outcomes

The dialogue process created a more informed policy and research environment, both within and outside the AgDialogue group. The emergent ideas are presented in the Results section. These results have been communicated to government and others in the policy community and beyond. Further, we now have a network of well-informed and -connected people within the agricultural sector who are experts on the issues around agricultural GHGs.

As part of the communication process Motu produced a short film, with the help of professional filmmaker Jess Feast, synthesising some of the AgDialogue's understandings and ideas. We have created a presentation to be used in conjunction with the film as a teaching resource.⁸ The audience for this resource includes secondary and tertiary students, as well as farmers, industry groups, government. The AgDialogue group also started a blog about Agricultural Emissions, which is still active.⁹

4. Results

In this section, we present three broad messages from our experiences with the AgDialogue group:

- (i) Be explicit about wider objectives – not just local emission reductions;
- (ii) Engage a wide range of actors – tackling emissions is not just an issue for government;
- (iii) Build concern, capability and contracting (incentives) simultaneously, with more emphasis on concern and capability while New Zealand's response evolves.

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⁸ Both the film and teaching resources can be found at <http://agriculturalemissions.blogspot.co.nz/p/using-this-blog.html>

⁹ See agriculturalemissions.blogspot.co.nz

If New Zealand can get these things right, we can provide a template for dealing with emissions that other countries can emulate. This is our small country advantage.

This section presents the ideas around framing the problem of tackling agricultural emissions, including important background information about society's goals and mitigation options for agriculture. This is followed by the emergent solutions, which offer ideas for ways forward, or at least starting points for new solutions.

4.1. Framing the Problem

4.1.1. Policy and Societal Goals

We must first define the goals we are trying to achieve. It is important for New Zealand to contribute our fair share to the global climate change mitigation effort. New Zealand can contribute not only through direct reductions in our own emissions, but also given the difficulty of creating and sustaining global cooperation, through our ability to provide leadership in mitigating agricultural emissions. For New Zealand to be an exemplar for tackling agricultural emissions, and for our own policy goals, we need to ensure agricultural emissions are mitigated:

- (i) Efficiently. Achieving a mitigation target at least cost requires all lowest cost mitigation options to be utilised until the target is reached.
- (ii) Equitably. New Zealand must also demonstrate an approach to equity that is acceptable to our citizens. This includes avoiding large costs falling on any one particular community, such as the rural community.
- (iii) Visibly. If a driver of New Zealand's motivation is to facilitate and encourage action on agricultural emissions elsewhere, our efforts must be documented, evaluated and promoted abroad.

Achieving agricultural mitigation in these three ways will create politically and environmentally sustainable and effective policy in New Zealand and elsewhere.

Also important to New Zealand are the following two goals:

- (iv) Maintaining positive perception. The idea of New Zealand as clean and green is important for our international reputation and branding as well as for our own identity. For example, our tourism sector has used the slogan "100% Pure" with images of pristine New Zealand landscapes for a number of years. To maintain this reputation New Zealand needs to be seen to credibly perform well in all environmental areas.
- (v) Realising co-benefits. There are potential co-benefits of GHG mitigation in agriculture which need to be taken into account, such as improvements in water quality.

4.1.2. Mitigation Options

New Zealand has essentially two mitigation options in agriculture: becoming more efficient, and changing what we produce.

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Efficiency

In terms of efficiency of production, some techniques and technologies are already available, and others are undergoing research and development. New Zealand has a role to play in developing mitigation technologies, and is part of the global research effort mentioned in Section 2. Technologies currently under development are a long way off being able to be applied, given the time required to develop technologies which work in the lab, and then on farm. Global collaboration is important in this area, so that information, discoveries and ideas can be shared and improved.

New Zealand farmers are currently quite efficient compared with the rest of the world, which means there may already be scope for valuable information sharing among countries (Emissions Trading Scheme Review Panel, 2011). However, there is also scope for improvements using current knowledge in New Zealand.

New Zealand farms exhibit considerable heterogeneity in terms of production efficiency per unit of GHG, even when their geophysical characteristics are taken into account (Anastasiadis and Kerr, 2012). Given the tens of thousands of farms in New Zealand, many of which are family owned and run, it should not be surprising that a bell-shaped distribution of farm efficiency would occur. Various characteristics have been identified in international research which can make a farmer more likely to adopt new practices and technologies. Baumgart-Getz et al. (2012) identify the following factors as increasing the likelihood of adoption: larger farm size, younger farmer, better access to capital, better access to information and a higher level of environmental concern. The participants in AgDialogue built on this research from their experiences, emphasising that farms are a long term investment, and that New Zealand farms are heavily indebted so may be capital-constrained.

The New Zealand farming sector receives no subsidies for its produce, unlike most other agricultural sectors around the developed and developing world (OECD, 2009 and 2012). However, some incentives they face may not be optimally aligned for climate mitigation. This situation gives scope for policy adjustments that may lead to further efficiency improvements.

First, there is no capital gains tax in New Zealand. Though no research we are aware of has confirmed this, the AgDialogue group affirmed that it is widely believed that the lack of a capital gains tax leads to a perverse incentive for farmers to reinvest profits. This is so that they do not have to pay tax on those profits. This distortion can lead to over-capitalisation of farms, making them more intensive than is efficient, leading to over-production and therefore a higher level of GHG emissions than there would otherwise be.

Second, environmental externalities are not fully internalised in the costs of production. This includes GHGs, given New Zealand farmers do not yet face a GHG price under the ETS, but also includes other environmental limits. Another major externality is declining water quality. Farming and farming intensification has been a large contributor to this problem, which local and central government are currently looking to address. There is also pressure in some regions where water take exceeds the available supply (Land and Water Forum, 2010; Verburg et al., 2010; Ministry for the Environment, 2012).

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Land-Use Change

Changing what we produce in New Zealand is a more challenging prospect than increasing our efficiency. New Zealand’s food production will be optimised within the context of global food production. Although internalising the cost of GHGs in livestock products will make them less attractive, increasing global demand for food, and especially protein, will increase livestock prices, and internalisation of GHG implications in other countries (by consumers or governments) will allow New Zealand farmers to pass some of the GHG costs on to consumers. It is hard to know if we “should” be producing more or less livestock in the long term. We do not want to make massive, costly, and difficult to reverse land-use changes until we are more confident that these are globally valuable. By appropriately pricing environmental externalities into global food production, and continuing to improve the efficiency of this production, we will find our way forward in answering this question.

4.1.3. Thinking Up Solutions

Agricultural climate policy presents particular challenges. It is important to remember that global climate change is everyone’s problem to solve, and everyone has a part in the solution. We need to avoid falling into the trap of assuming that agricultural emissions are a problem only for government to regulate. We need to recognise this is a problem about multiple actors, and multiple types of action, coordinating to meet shared goals. The AgDialogue group discussed this context extensively; thus we present a framework, developed during AgDialogue, which could help frame the issue to find a way forward.

First, we identify the fact that everyone has some role in the agricultural sector – both in New Zealand and around the world. This is because everyone is at least a consumer of food. We divide up the roles of actors – both individuals and groups – into four

different levels. These levels are national, regional, community and individual.

At a national level, central government and industry groups, NGOs and banks with an interest in how the agricultural sector operates have interest and influence. At a regional level we find regional governments and organisations such as Federated Farmers and iwi. At a community level, community groups such as Rural Women New Zealand are active. Individually there are consumers, farmers and the people who work within organisations.¹⁰

For anyone at any of these levels to create change to reduce agricultural emissions, we argue they must address one or more of three areas. We divide possible actions into those that affect:

- (i) Concern – changing attitudes and encouraging action in this complex policy area
- (ii) Capability – knowledge and access to resources
- (iii) Contracting – legal agreements or regulation

These categories follow a logical progression; *concern* must be built – actors must be convinced of the need for change; they then need the *capabilities* to create change; finally there needs to be some sort of enforceable agreement (*contract*) to ensure change happens. These three steps need to be thought of both as a progression and as areas that need to be tackled simultaneously. Actors will progress through concern and capability at different speeds. It is not necessary to have all actors progressing before regulation begins, only a critical mass so the policy is acceptable and likely to lead to responses. The policy will reassure the actors who lead that they will not be unduly disadvantaged and will encourage or even force laggards to engage. Regulation can also begin gently, and slowly become more stringent as capability develops. Many actions will cover more than one of the areas at once (Keohane and Levy, 1996).

The three steps have parallels with Ostrom (1990), who identifies similar steps. We extend her work to identify three Ts, which orient the three Cs to achieving cooperation at a community level - trust, technical support and transparency. Trust, like concern, deals with attitudes; technical support is similar to capability; and contracting could be replaced by a less formal transparency to allow social enforcement of achieving agreed ends.

Another example from the literature is the recent research in New Zealand by Milfont (2012), who, through a round of mail surveys of New Zealanders, finds that there is a correlation between concern with climate change, and feelings of capability and support for wider action to mitigate climate change. This study reinforces the notion that the three Cs are all important, and can build on each other.

The AgDialogue also discussed the three Cs at an individual level, using three As. First, farmers and consumers need to have *agency* – a feeling that they can contribute and that they have some control over the issue; second, to have the *ability* to act; and then to be committed to take *action*. Again, these As fit under the three Cs, and follow a logical progression. Action will be strongest, especially in aggregate, with some sort of regulation (or in other words a social contract) in place. This means that

The three Cs – Concern, Capability and Contracting – are all important, and can build on each other.

¹⁰ Above these levels is the international level, though for our purposes we take the international context as given.

there are incentives in place to take that action, and a level playing field on which taking mitigation action is rewarded.

Combining these actors with the three Cs, we developed the matrix in Figure 2. The matrix allows users with a specific initiative – individuals or organisations, such as central government – to classify the purpose(s) of their initiative and be clear on their target audience, and hence to reflect on how it fits within a wider set of initiatives. This means the matrix is relevant to everyone, ideas can be conceived to hit certain targets, and gaps can be identified.

Public debate in New Zealand tends to focus narrowly around the actions of central government and the ETS is often identified as *the* climate change policy in New Zealand. However, looking at the matrix, we can quickly identify that the ETS occupies the top right-hand box only. The matrix demonstrates that the ETS should be seen as the final piece of a much wider picture rather than as a starting place and complete policy.

Central government can influence only a small number of the multitude of levers that can gradually transform individual behaviour, farm practice, consumption habits and the rural sector.

		<i>Types of Action</i>		
		Concern	Capabilities	Contracting (Regulation)
Level of Actors	National		Global Research Alliance on Agricultural Greenhouse Gases	Emissions Trading Scheme
	Regional			
	Community			
	Individual			

Figure 2. Matrix of Potential Actors and Actions

Any actor can look at the matrix and identify their role(s). People and organisations at all levels have a role. Central government can influence only a small number of the multitude of levers that can gradually transform individual behaviour, farm practice, consumption habits and the rural sector. Many other actors are already doing things that will help mitigate agricultural emissions, and these actions could be used to populate the matrix. However, actions would benefit from greater coordination, mutual reinforcement, shared vision and more resources. Many farmers and others are willing to contribute their share of the costs as long as they believe it is valuable.

Central government needs to consider what non-regulatory actions they should take before implementing regulation. Government has been engaging with farmers on climate change to some extent, and they are also undertaking research into technological solutions. The Government’s failure to get sufficient buy-in from farmers and sectoral groups into the ETS suggests either their non-regulatory actions

are flawed or insufficient, the ETS is significantly flawed, or both. Evidence of the need for action certainly is not the problem, nor is a lack of mitigation options, which are not currently being utilised to their full potential (see Section 4.1.2).

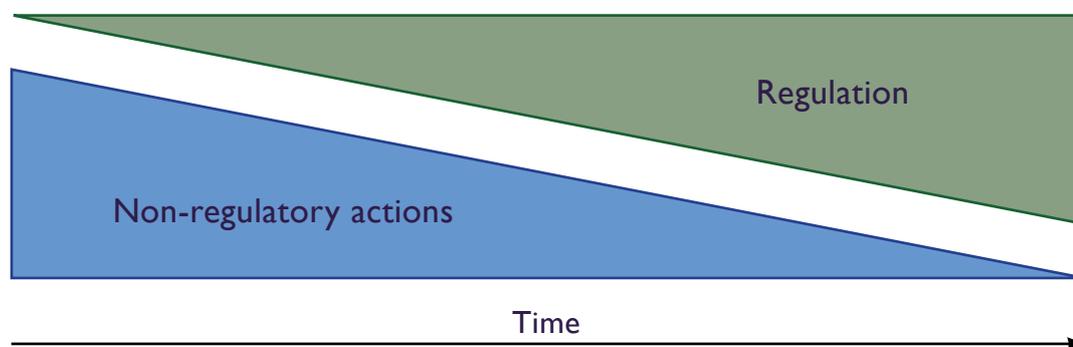


Figure 3. Mix for government of non-regulatory and regulatory actions over time

The graph above shows how the central government could frame its role. Non-regulatory actions are important to establish the groundwork for regulation. Once the groundwork has been laid and regulation is fully implemented, the regulation should drive climate policy long term. The central government may also have a role in helping with the coordination problem, acting as a catalyst for action by the other actors where appropriate. This could be a difficult but potentially important role.¹¹

The following section covers a package of ideas and thinking which came out of AgDialogue, given the policy goals and problem framing described in this previous section.

4.2. Emergent Action Package

The AgDialogue group collectively brainstormed nine prototype actions, which fit together as a package.¹² These could be introduced independently of agriculture entering the ETS, but would both facilitate its effective entry and complement the price signals that would be provided. In this section we describe our (the authors') vision and the package of prototypes. We then briefly discuss the ETS and some thoughts from the AgDialogue participants on the contentious issue of fairness.

4.2.1. Vision for New Zealand's Role in Addressing Agricultural Emissions

There is plenty of scope for increased efficacy in New Zealand's potential role as a leader in global agricultural emissions policy. In this section the authors, informed by AgDialogue, describe the vision we are working towards. If humanity is to combat the worst effects of climate change, we should start from the assumption that we will succeed, and act as though we will solve the challenges in the long term. Thus our vision is not a prediction of the future but rather an aspiration. By having a strong vision for New Zealand agriculture, we can work towards it in a way that will seem politically and economically attractive to others who might follow.

¹¹ The policy framework presented here is for reducing agricultural GHG emissions, and may or may not apply in other policy contexts.

¹² These do not necessarily represent a consensus.

We might address emissions through an intrinsic motivation to address climate change: *concern*. This would lead us to place emphasis on actions that can make New Zealand a credible leader in policy and science innovation in the agricultural emissions space. If we want people to follow us we must make the path attractive. This requires that we try to control and mitigate adverse consequences in terms of global food security and impacts on farmers and rural communities. We want to avoid sudden impacts on the agricultural sector and hence the New Zealand economy, high costs to taxpayers, and leakage of production. We need to be clear, however, when we are smoothing a transition to a new state of the world and when we are obstructing necessary change. We need to actively engage with, and learn from, countries on similar paths to our own, as well as those who face similar issues but are earlier along the path of addressing them.

If we want people to follow us we must make the path attractive. This requires that we try to control and mitigate adverse consequences in terms of global food security and impacts on farmers and rural communities.

In the long term, based on our assumption of global success, we envisage an international policy environment with a complete and stable international agreement. This agreement will be sufficiently stringent to effect change, even if it does not meet the current target of two degrees Celsius of warming. We envisage that New Zealand policies and mitigation practices are understood and used where appropriate. We have developed them with integrity and have demonstrated their effectiveness and application where appropriate. New Zealand and other countries have stable regulation, and in all nations the appropriate level of *concern* and *capabilities* is firmly established. If other countries do not price their emissions, they will have other forms of equally stringent regulation in place. Therefore, we will not protect production within New Zealand.

The long-term vision within New Zealand is that the full climate cost is imposed on marginal emissions, giving farmers efficient incentives. Fair compensation has been agreed for changes in land values – or, to the extent that this was not possible, historical grievances are accepted. Communities and workers have fully adjusted to the changed patterns of production and shifts in employment. Farmers are knowledgeable about existing mitigation options and apply them with confidence. There is ongoing research and dissemination of ideas. Other key environmental resources are well managed. For New Zealand, this probably involves a farm-scale ETS.

In the short term the problem is much more complex so the vision focuses more on process than specific outcomes. We don't know exactly where international agreements, technology or society are going or at what speed. There are costs and risks associated with acting early, but also benefits. With this in mind we suggest that we do not delay taking action but temper our pace to avoid irreversible change with long lasting negative consequences. We must keep the long term in mind, create and maintain options and focus on long-term efficiency.

As we move ahead we need to focus on devising fair decision-making processes that encourage participation and cooperation. There is a role for encouraging experimentation and learning, and rewarding those who take risks. We need to act with integrity, and always demand the highest quality information and science. We need to promote and coordinate a broad set of actions by players at all levels, while tackling concern, capabilities and regulation.

By thinking about the world we want to create we can develop ideas on how to get there.



4.2.2. Future-proofing New Zealand Farming

The package of prototype actions was developed over the course of the later AgDialogue meetings. They form a coherent package of actions which cover a number of boxes in the matrix and complement some actions which are already being taken. They are not an attempt to be a comprehensive package of actions nor a replacement for the ETS, and they may only end up having value in the discussion they create, as is often the case with prototypes. To be implemented, the prototypes would need a much longer and wider process of development. With these caveats in mind, we present AgDialogue's ideas to "future-proof" New Zealand farming.¹³

The first three prototypes work primarily to build concern.

- (i) Educational farming game. Inspired by computer games such as the popular Facebook game Farmville, and educational websites like Mathletics (see www.mathletics.co.nz), this prototype aims to create a fun and educational resource for primary and secondary students. A particular issue that came out of the AgDialogue was the perceived urban/rural divide in New Zealand. From the rural point of view, it is seen that urban people do not know much about the realities of farming. By having an innovative programme to get urban kids to learn more about farming and the challenges of mitigating environmental issues in agriculture, knowledge would be built within the important group of urban consumers.
- (ii) Sustainable cooking TV competition. In popular culture, cooking good food is becoming increasingly popular as a recreational activity, as evidenced by the large amount of cooking shows on TV. This prototype would tap into the desire of

¹³ The terminology of "future-proofing" New Zealand farming was the name AgDialogue gave the package

many to get back in touch with where food comes from, and its environmental impact. The prototype proposes the use of the competition format of cooking shows to educate consumers about the environmental aspect of their food consumption. This could include on farm segments and an environmental component to the judging of dishes.

- (iii) Kapa Haka competition. Kapa Haka is a type of traditional Māori performing art. The idea behind this prototype is to make climate change the theme of an annual Kapa Haka competition, to help inspire and deepen the knowledge of young Māori, and to encourage them to think creatively about the problem in a culturally relevant way.

The following prototypes are aimed at strengthening *capabilities* for action:

- (iv) Incorporating climate change into the farming (and other) curricula. Similar to the ideas in the educational farming game, there is plenty of scope to incorporate action on climate change into education. Within agricultural qualifications there are many ways to introduce units on climate change mitigation. It is also important to insert climate change mitigation into the general curriculum much earlier, at secondary or even primary level.
- (v) Proactive banking. Given that there are tens of billions of dollars worth of loans to farms in New Zealand, banks play an important role in how farms operate around New Zealand. This prototype was discussed at length. Although on the whole banks have brought at least some aspect of sustainability into their businesses, the group thought much more could be done. This is important for banks, given the increasing level of environmental regulation affecting farms and therefore affecting banks' investments. An example of this is ensuring basic environmental good practice on a farm before approving a loan. An even more proactive approach could see banks lending increasingly for on-farm capital investments which lessen a farm's environmental impact, and perhaps even discounted interested rates for that type of investment.¹⁴
- (vi) Improved interface for OVERSEER. An important tool for farm management in New Zealand is the computer programme OVERSEER, which has been developed by government-funded institutions to model nutrient flows and GHG emissions of farms (www.overseer.org.nz). Though nearly all dairy farms currently use OVERSEER, it is required only once every 2-3 years and is not used as a regular planning and decision tool. Currently there are few sheep and beef farms using it. In its current format, it is not user friendly. The input of data and running of OVERSEER is done by Fertiliser representatives. Many farmers only see the outputs in terms of allowable fertiliser and as a compliance exercise with their milk processor (it is a requirement of the main processor Fonterra) and their fertiliser supplier. Therefore, by improving the interface of OVERSEER farmers could be encouraged to use OVERSEER more frequently when making decisions about their farm. It can also be used to test different farm management plans when farmers are deciding what to do next. If the source code behind OVERSEER was made open source, than the interface could be developed by anyone with the appropriate skills.

¹⁴ ASB bank seems to have taken up the challenge, having recently announced a new type of low cost loan for sustainable on farm investments. See <http://agriculturalemissions.blogspot.co.nz/2013/03/proactive-banking.html>.

OVERSEER could be further improved by allowing farmers to easily download onto their computers all the information about their own farm kept about by other organisations, such as fertiliser companies, spreading companies and the national animal register (NAIT). This would prevent a farmer from having to enter this data themselves.

Furthermore, some of the outputs of OVERSEER (such as GHG emissions) could be uploaded to a central database if farmers wish, allowing each farmer to compare their GHG emissions to national and local averages, with the aim of encouraging farmers to make GHG efficiency improvements. The increased data would help farmers discuss amongst their peers, in formal or informal ways, practices that work for them to improve outcomes such as GHG intensity.

The following three prototypes fit most comfortably under the *contracting* or *regulation* heading:

(vii) Simplified gold standard. This prototype aims to create a set of graduated environmental standards for on-farm management practices. These standards would go from bronze to platinum, and would need to be qualitative rather than numerical – not an explicit farm level GHG footprinting or life-cycle analysis of products. They would be at the farm scale and would recognise actions that farmers could control. The standards would recognise a range of environmental outcomes. The graduated standards would be developed and improved over time, based on the best science. They would be set by a credible institution, with input from appropriate stakeholders. Farmers could then meet the standards voluntarily, and display their standard on their farm gate. This would encourage farmers within their communities to push themselves. Furthermore, farmers could use their certification to improve the value of their product if they wish. Traceability of which final product was produced on which farm is not currently possible, and may not be possible ever in certain situation (for example cheese on a frozen pizza), but the overall standards of meat and dairy processors could be used. Furthermore, small groups of farmers, who meet very high standards, could create niche products.

Taupō Beef provides a successful example of marketing a niche product on the basis of the environmental footprint of the farms. Taupō Beef is a small group of farmers in the Taupō area, who recently established their company to get a premium on their beef. They market their product on the fact that they farm under a nutrient cap to protect the water quality of the largest lake in New Zealand, Lake Taupō. This cap was set by the regional council, which is responsible for freshwater and land use management. Therefore Taupō Beef operates under stronger regulatory conditions than those that would be created by this prototype, but offers an interesting case study nonetheless.¹⁵

(viii) Clean green food branding. As New Zealand farmers improve their environmental practices (through means including the other prototypes listed here, the previous prototype especially being aimed at this area), AgDialogue participants saw it as important to have a national brand to promote the environmental performance of New Zealand food producers. As mentioned

This prototype aims to create a set of graduated environmental standards for on-farm management practices – not an explicit farm level GHG footprinting or life-cycle analysis of products.

¹⁵ The Taupō Beef story is told here: <http://agriculturalemissions.blogspot.co.nz/2011/12/taupo-beef-story.html>.

previously, the tourism industry in New Zealand has been using a “100% Pure” branding for some years. A similar brand for food could help promote all New Zealand produced food, and increase the value of New Zealand’s food exports. Funding for this branding could come from money raised from agriculture’s participation in the ETS, or elsewhere, as explained in the final prototype.

- (ix) Alternative financing mechanisms. AgDialogue members suggested that ETS revenue could fund initiatives such as prototype eight. However, as this is not in the current ETS policy design, and given some of the issues with the current ETS described in the section on Regulation below, members of the group suggested there could be alternative ways to fund programmes aimed at addressing agricultural emissions. One suggestion in this area was a capital gains tax on rural land, which New Zealand does not currently have. The benefits of a capital gains tax for mitigation of agricultural emissions are explained in Section 4.1.2. This tax would also be permanent, but if revenue is eventually raised from agriculture’s participation in the ETS, funds from the capital gains tax could be used elsewhere.

The preceding prototypes represent a mutually reinforcing package. For example, the first three, while building concern, also help build a market for prototypes eight and nine. Prototypes four, five and six aim to build the capabilities to help prototype seven work. Finally, prototypes seven and eight are clearly related through ensuring marketing efforts are credible, as well as ensuring mitigation efforts are rewarded, and prototype nine discusses funding possibilities.

It is useful at this point to reiterate that this package of prototypes is not intended to be a complete or even fully developed set of ideas. Rather, it is aimed at engaging a wider audience in a conversation which is not stuck and polarised. We hope that these suggestions can spark more ideas from people with different backgrounds and knowledge.

4.2.3. Regulation

Essentially there are two main approaches to regulation to mitigate agricultural emissions: the command and control approach, and some sort of pricing mechanism.

A command and control approach would set requirements for farms to undertake certain mitigation options. While the command and control approach may be used elsewhere, New Zealanders tend to be resistant to this type of approach. Livestock farms around New Zealand vary greatly in their characteristics; New Zealand has a very diverse range of landscapes and climates for a small country.

A pricing mechanism ideally should allow farmers to choose the optimal mitigation actions on their farm, given an efficient price signal. Given superior knowledge of their farm, farmers can undertake the optimal level of mitigation. The unsubsidised nature of the New Zealand agricultural sector could also mean it is more suited to this approach; perhaps this is partly why the Government chose to develop an ETS.

A mixture of both approaches could be taken. An example of this is minimum regulated standards of farm practices, plus a price incentive to encourage action above the minimum.

It is useful at this point to reiterate that this package of prototypes is not intended to be a complete or even fully developed set of ideas. Rather, it is aimed at engaging a wider audience in a conversation which is not stuck and polarised.



In order for a pricing mechanism to be effective, farmers must face the marginal cost of their own emissions, and must have sufficient capabilities to undertake mitigation actions. This is covered in our matrix, and is an important point to remember.

A major flaw in the current proposed ETS for agricultural emissions is that the price incentive is based on a national average emissions factor, which would determine a processor's emissions liability. This means that Fonterra, the major milk processor in New Zealand, would take into account this emissions cost when deciding the price farmers get for their milk. However, this does not take into account the large variation in farm efficiencies in New Zealand, nor would it take into account mitigation action taken on each individual farm. Further, the National GHG Inventory from which average emissions are calculated estimates national emissions by sampling farms around the country. This means it is likely that one farmer's mitigation actions will have no effect on the national average, as their farm will not be sampled. Given no effect of the mitigation action is observed by the regulator, there is no reduction in the producer-level charges, leaving no price incentives for mitigation by individual farmers.

The processor-level system could be modified to acknowledge the use of some mitigation techniques on-farm. Recognised mitigation techniques could earn that farmer a subsidy on their product, set at a level to offset the emission charges on the GHG emissions they reduce. There are limits to how accurate this approach is in terms of accounting for emissions mitigated on each farm, and the number of mitigation actions it can apply to.

Ideally the ETS would operate at a farm level, so that farmers do directly face the costs and benefits of their on-farm decisions and mitigation actions on the level of their GHG emissions.

Currently, agricultural emissions are set to enter the ETS at the processor level, because a small number of participants in the ETS makes administration costs lower and operation easier. It is a large undertaking to model the emissions of all farms in New Zealand, which would be required for a farm-level ETS. Whether the ETS ends up being at the farm level remains to be seen. However, the recent review of the ETS recommended farmers be the participants in the ETS, not their processors (Emissions Trading Scheme Review Panel, 2011), as did the Agricultural Technical Advisory Group in 2009 (Agriculture Technical Advisory Group, 2009).

Bringing farmers into the ETS does not mean they have to bear the full cost of their emissions. Public debates about the ETS often fail to separate the issues of fairness and efficiency. Farmers could be, on average, completely compensated for their costs while still facing the cost of their emissions at the margins. This would give farmers an efficient price signal for their emissions, but they would not bear the burden of their mitigation costs. What is fair is a more contentious issue than what is efficient, and a more difficult problem to resolve.

4.2.4. Fairness

The question of what is fair is not a technical one; here is the authors' take on some of the discussion on this topic in AgDialogue. We identify three principles for sharing costs.

The **first** is a "child's view", which is commonly identified in behavioural economic experiments (Henrich et al., 2004). Most people believe in the general principles that "everyone should have their turn" and "tasks and rewards should be equally shared". Application of these ideas, however, begs the question of what is shared and among whom.

If we were to equally share the costs to New Zealand of compliance with the first commitment period of the Kyoto Protocol, a back of the envelope calculation suggests that the cost could have been met by each person contributing 1% of their income. Another way of doing this is by splitting per person costs equally. This comes in at around NZ\$333 per year. In contrast, the average family-owned sheep/beef farm would lose on the order of \$40,000 per year, or 33% of profit, if they paid for all their emissions (Kerr and Zhang, 2009). Others interpret equal sharing to mean that every sector should face the "same" cost; but sectors do not bear costs, people do. "Equal treatment" has a pervasive appeal but can lead to outcomes where compensation is poorly targeted to cost. An example of this is the allocation in New Zealand of a fixed payment to each hectare of forestry land to compensate for the high cost of deforestation under the ETS – despite the fact that most forested land would never have been deforested (Karpas and Kerr, 2011).

A **second** commonly invoked principle is "polluter pays", although it was never intended to be an equity principle when it originally appeared in this report by the OECD (1972). This also has appeal but begs the question of who the "polluter" is. If interpreted as a principle of fairness, it implicitly assumes producers can pass costs of pollution on to consumers; this is not the case if New Zealand producers are the only ones facing these costs, but facing world prices for their production. Is the

Public debates about the ETS often fail to separate the issues of fairness and efficiency. Farmers could be, on average, completely compensated for their costs while still facing the cost of their emissions at the margins.

farmer or the consumer responsible for agricultural emissions? If the polluter must be “responsible” for her actions, she must understand that she is causing damage, and have the ability to do something about it. The principle of responsibility suggests that those who do bad things unintentionally should not be punished but also that those who do good things unintentionally should not earn rewards. Potentially, those who have benefited from high emissions, even if unintentionally, could expect to have some of the gains that came from this taken away from them. However, this is hard to achieve in practice. In the long term, those who continue to cause emissions should bear the costs; this is both equitable and efficient. This includes farmers who can mitigate cost-effectively but choose not to, and consumers who continue to purchase products associated with emissions.

The **third** principle is that those who are more able to bear costs should bear higher costs – those with high incomes or wealth relative to others. We live in a highly unequal world and need to take all opportunities to reduce those inequalities or at least avoid exacerbating them.

Equitable sharing of costs is also only one motivation behind exemption or free allocation of units to farmers in New Zealand. Other motivations are: addressing leakage of production outside New Zealand; smoothing the transition into a new economy with low emissions (to address stranded asset issues for individuals, farms and communities, and allow time for learning, experimentation and financial and psychological adjustment); and encouraging participation and compliance in a situation where change requires action by more than forty thousand farmers. These last three motivations are important in the short to medium term. In the long term, free allocation should be all about perceptions of equity as these adjustment challenges should be dealt with by then.

Conclusion

The climate challenge is perhaps most “wicked” in agriculture, and for wicked problems such as this there is a clear leadership role for small countries like New Zealand.¹⁶ There are the conflicting objectives of feeding a growing population and simultaneously recognising the important role agriculture must play in climate change mitigation. By recognising the need for coordination among multiple actors, and by addressing concern, capability and regulation, New Zealand could develop a package of effective national actions on agricultural emissions that could be adapted for use in many other countries. The agility of a small country allows more rapid and innovative policy development than could occur in a larger jurisdiction.

Agricultural emissions are not simply a problem for central government to solve through regulation. We need to involve all parties to coordinate effective action. This widespread involvement will help ensure that everyone is playing their role, that there is coordinated action working towards agreed goals, and that actions are informed by those who know what the consequences might be so that they are effective and not counterproductive. If we can get these things right, then the potential for mitigation in agriculture does not just hinge on a debate about regulation, such as whether or not there should be an ETS. Instead it will be a far richer and more innovative

¹⁶ See Rittel and Webber (1973) for an explanation of the use of the term “wicked” for public policy issues.

process, which should ultimately lead to better outcomes. By building social capital (the levels of connection and trust between people) to a level that such a collaborative approach requires, we can hope that conversations about our shared vision and what is fair will become easier too.

Tackling agricultural emissions needs to be collaborative at both a national level and an international level. The exciting opportunities that the New Zealand example demonstrates in this area can encourage other countries to act. If green growth is to be achieved, if the world's population is to be fed and if the worst effects of climate change are to be avoided, we need to take agricultural emissions seriously. That requires vision, innovation, collaboration, and a lot of hard work.

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