Inclusion of Agriculture in a Domestic Emissions Trading Scheme: New Zealand's Experience to Date

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History and Context

No country has previously attempted to include agriculture in an emissions trading system. This paper describes how the New Zealand Government plan to do it, what some of the critical issues have been and some of the outstanding challenges. If New Zealand can resolve these issues and so can create a strong system, this could create a precedent for many others.[1]

The History and Status of Greenhouse Gas Pricing Mechanisms in New Zealand

In 2003, the New Zealand Government agreed 'not to implement a legislated levy on the agricultural sector for the purposes of provision of research into agricultural non-carbon dioxide abatement as long as this Memorandum of Understanding is in effect'. This was in return for an agreement by the industry to fund mitigation research with the target of reducing total ruminant methane and nitrous oxide emissions by at least 20%.[2]

This agreement follows earlier attempts to put a levy on greenhouse gas emissions, which led to massive public resistance, as farmers at the time did not accept responsibility for emissions and saw the levy as the thin edge of a wedge. The farming sector's (especially dairy's) engagement with environmental issues has moved considerably since then, though there is still likely to be significant opposition.

The 'Projects to reduce emissions' initiative run by the Ministry for the Environment was a mechanism that allowed Joint Implementation type projects but these were primarily limited to energy and landfill gases.[3] Some of these affected agriculture, but did not include methane or nitrous oxide emissions from agriculture.

The previously proposed carbon taxes did not cover agriculture. The first was threatened in the late 1990s if voluntary emission controls were insufficient; it did not eventuate. The second was announced in 2002 to start in 2007; it was abandoned in 2005. Both collapsed at least in part due to strong industry opposition, and, in the later case, because of the extensive negotiated exemptions that gradually undermined the environmental efficacy of the tax.

Initial overall industry response to the emissions trading system (ETS) has appeared positive but as people delve further into the details and as ordinary firms and farmers become more familiar with the proposals and their likely implications, concern and opposition to at least some elements seem likely to grow.[4] Concerns with the ETS as a whole are focusing particularly around liquidity in and access to international carbon markets,

1 Policy development is actively progressing as this paper is written. This paper does not definitively cover the issues but records our thinking at a moment in time and provides a framework for more in-depth analysis.

2 This research is being implemented through the Pastoral Greenhouse Gas Research Consortium. The memorandum formally expired on 30 June 2007.

3 http://www.mfe.govt.nz/issues/climate/policies-initiatives/projects/index.html

4 Some detail about how the ETS will operate in agriculture is given in later section titled 'Overview of Treatment of Agriculture in NZ ETS'. More detail is available in government documents: http://www.climatechange.govt.nz/nz-solutions/reducing-our-footprint.shtml

leakage of production and emissions from trade-exposed emissions-intensive sectors, and the likely overall economic impact of the system.

The proposal for agriculture is still very open and discussions with industry groups have been active. Some agricultural industry representatives have expressed discomfort with the idea of processors or industry organisations being made points of obligation for farm-based mitigation activities. Others, such as some fertiliser companies, are willing to assist in the process of farm based monitoring but not take formal legal responsibility. Some individual farmers have expressed strong concern that the system could lead to downward pressure on food production (especially in the face of global food shortages).

Key Features of the New Zealand Emissions Trading System (ETS)

Firstly, New Zealand is part of the Kyoto system and thus the proposed ETS largely mirrors those of the Kyoto Protocol, distinguishing New Zealand from non-Kyoto countries' proposed systems (such as the United States). This also means that our 'cap' is not an absolute cap as New Zealand companies will be free to purchase and sell units internationally. New Zealand Units (NZUs) will be backed by Assigned Amount Units (AAUs) and be able to be converted and sold internationally.[5] Similarly the ETS will allow parties to purchase and surrender international credits from the Clean Development Mechanism and Joint Implementation (but not temporary Certified Emission Reductions from afforestation projects) as well as most AAUs.[6] This connection to international markets means that they will largely determine the New Zealand Unit price. This has raised some concerns about access to international markets and the uncertainty and likely volatility of these markets in the short term. It also means that sectors' entries do not need to be synchronised in an attempt to balance supply and demand and hence control market prices.

A second key and unusual feature is that the system is intended to be comprehensive: all sectors and all gases will be included. The proposal for free allocation for the agriculture sector (plus forestry and industrial sectors) uses a simple formula based on 2005 emissions that is consistently applied. It is proposed that all free allocation will be phased out consistently in a linear fashion between 2013 and 2025. This consistent treatment across sectors (at least on one visible basis) avoids most lobbying across sectors except in terms of the timing of entry. Lobbying over how free allocation will be allocation and over its phase-out is beginning to be intense.

Third, those who are points of obligation in the system will not necessarily be the same party that receives free allocations; the points of obligation are being chosen on the basis of primarily technical considerations.

These three key features have heavily shaped the nature of the debates on the critical issues of measurement and initial allocation of free units.

Why and when should agriculture be included in an ETS?

New Zealand is in a unique position as a developed country because of our unusual emissions profile. Agricultural non-carbon dioxide emissions make up around half of New Zealand's gross emissions. New Zealand policy needs to affect agriculture decisions to contribute effectively to global mitigation.

The government has decided in principle to formally bring all agricultural emissions into the ETS on 1 January 2013, and not to introduce any other price-based measures in the interim. However, the government intends to require participants to monitor their emissions prior to 2013 to ensure the relevant monitoring and reporting systems are functioning properly.

5 Assigned amount units are the basic currency of Kyoto. Each country that ratifies is given an amount of AAUs equal to their agreed target. For New Zealand this is the 1990 level of emissions.

6 The latter means that New Zealand is allowed to buy so called 'hot air' which are assigned amount units held by some Former Soviet Union countries (particularly Russia and Ukraine) in excess of their current emissions. These could be sold without any emission reduction within those countries. The European Union Emissions trading system does not allow purchase of these units.

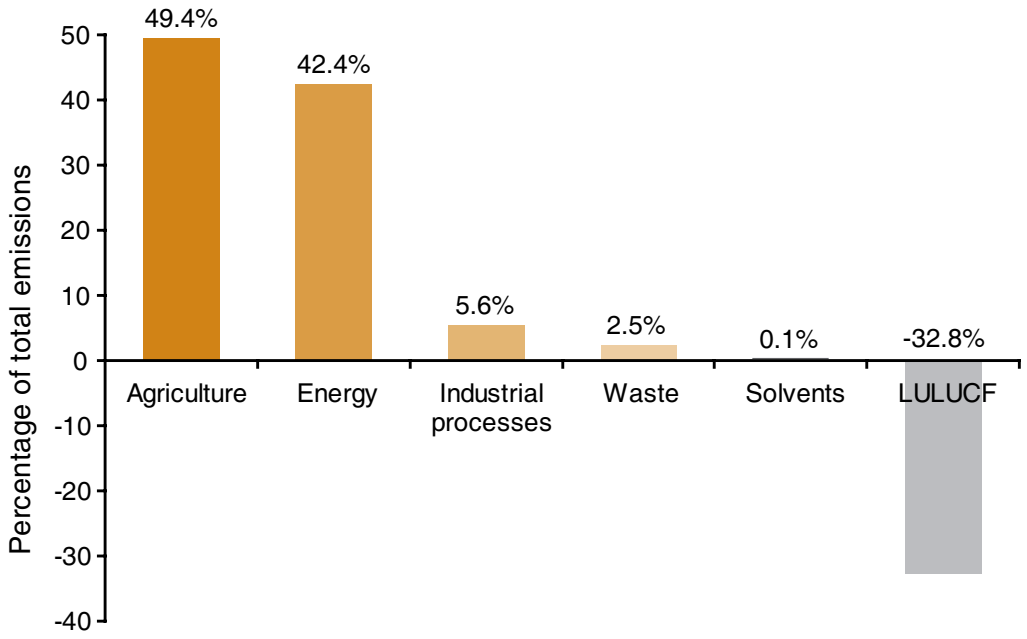

Figure 1: Contribution to total net New Zealand CO2-e emissions by sector, 2004 (Ministry for the Environment 2006).

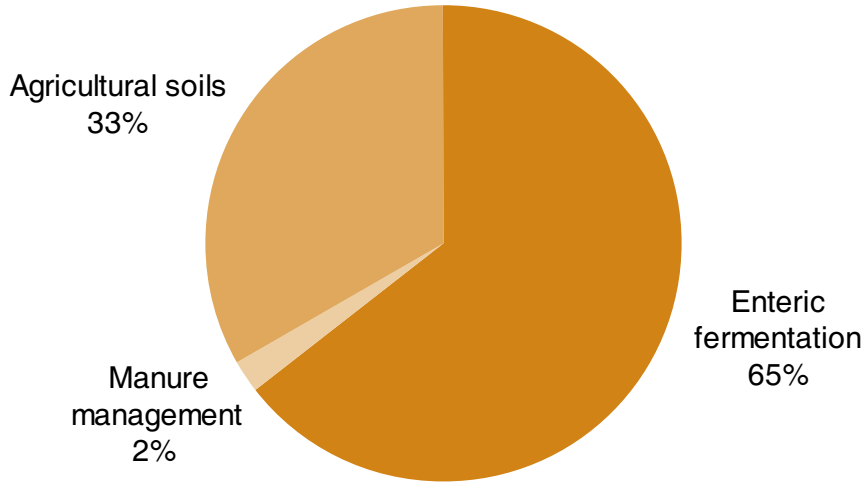

Figure 2: Contributions to agricultural GHG emissions (CO2-e) (Ministry for the Environment 2006).

How can agriculture contribute to climate mitigation?

New Zealand agriculture is primarily pastoral (dairy and sheep/beef) so this paper will address only emissions from these activities.

Methane emissions (primarily enteric fermentation) are fundamentally driven by dry matter intake. Processing efficiency is important but currently New Zealand has not developed methods to affect this systematically – this is a direction of intense current research. Dry matter intake depends on the number and size of animals. Larger, more productive animals use more energy. Productivity improvements mean that the same amount of final output can be produced with fewer animals. For example, by fattening lambs faster they can be slaughtered at 6 months rather than 1 year, which reduces the emissions per kilo of lamb produced, lowering methane emissions. Productivity in the dairy industry is currently growing at around 1% per year – it could possibly be accelerated. The other obvious way to reduce methane emissions is reduce the volume of product produced.

There are more options available for nitrous oxide emissions (primarily for those associated with agricultural soils). Nitrous oxide comes partly from fertiliser and partly from livestock depositions (urine and dung). Fertiliser use is growing extremely fast in New Zealand. Both the amount and timing of use can be altered. The amount of fertiliser and depositions relate directly to stock numbers and the level of production. Productivity improvements lower emissions per unit of output; lower output means lower emissions.

Manure and runoff management can also reduce the impact of a given level of depositions. For example, feeding pads concentrate urine and manure so it can be collected and disposed of with lower emissions. Nitrification inhibitors can, on some soils, reduce the percentage of urine and dung that is converted into nitrous oxide. They are already being applied to some farms, particularly in the South Island. The science behind measuring their impact is rapidly advancing.[7]

7 All these options also have benefits for water quality.

Why use trading as the policy instrument?

The cost and value of mitigation options varies considerably across farms. This makes it hard to regulate efficiently using traditional methods. Price-based measures provide farmers strong incentives and flexibility to choose their response. Including agriculture in the system also creates consistency with the pressure for other climate mitigation efforts within New Zealand and to a lesser extent abroad, which means both efficiency and equity benefits.

The value of New Zealand's effort

If New Zealand can learn how to effectively abate agricultural (especially livestock) emissions this will be internationally valuable, particularly for developing countries. New Zealand is already investing in research into mitigation options in these sectors, and the introduction of the ETS will lead to more publicly funded research. It will also induce private sector innovation and adoption of new technology and management practices.

New Zealand has already learned a lot about how to design a policy that includes agriculture. As the details of the ETS policy are refined, monitoring technology and models are being intensively investigated and will continue to be over the next year. New Zealand will continue to learn as it implements the policy and researchers plan to evaluate the system once it is operating. This will provide valuable knowledge to other countries that consider implementing similar programmes.

Overview of Treatment of Agriculture in NZ ETS

Agriculture

All energy-related emissions in agriculture are covered indirectly through the liquid fuels and stationary energy sectors. The system will also cover emissions from synthetic fertiliser use and enteric fermentation and manure management, which produce nitrous oxide and methane. Coverage of these gases is the focus of this paper.

The government proposes that coverage for sources of agricultural gases be limited to those

that are currently accounted for under New Zealand's nominated activities for the Kyoto Protocol. This is to ensure that the scheme coverage reflects New Zealand's current obligations under Kyoto, and is because of the limited technical feasibility of including additional sources. Broadly speaking, the ETS has been developed to cover the bulk of emissions from pastoral agriculture (sheep, beef, deer and related production such as wool and velvet), horticulture and arable production. This means that other minor sources may be included in the scheme where it is practical to do so, but a pragmatic approach will be taken and there is likely to be a range of minor emission sources to which the *de minimus* principle will apply.

The government's preferred point of obligation for emissions from fertiliser use is on the importers and producers of nitrogenous fertiliser. However, it has indicated a willingness to consider placing the obligation on farmers or sector bodies. For emissions from enteric fermentation and manure management the government's preferred point of obligation is on the processors of the relevant agricultural products (such as meat and diary processors), but again the option of placing the obligation on farmers or sector bodies has been retained.

The government plans to freely allocate units equal to 90% of 2005 emission levels when agriculture enters the ETS. This free allocation will decline linearly to zero in 2025. Free units could be allocated to farmers, processors or sector bodies and will not necessarily go to the party that is made the point of obligation. It is possible that agriculture could face a progressive obligation (ie be responsible for surrendering units to match only a share of emissions). All decisions on allocation, including the decision to delay entry of agriculture until 2013, are still subject to negotiation.

How agriculture fits into the more general ETS – interactions with other sectors

The inclusion of agriculture is directly relevant for forestry because they compete for marginal land. Once agriculture is included, the response in the forestry sector to its own signals will be stronger.

The interactions between agriculture and other sectors are primarily in terms of perceived equity. If agriculture is not included or is included very late, or if it is protected in some way, the burden of compliance falls more heavily on other sectors because the government will have fewer surplus Assigned Amount Units to sell (or more to buy). These concerns about special treatment of agriculture have been muted in part because of recognition of the sector's trade exposure and of the complexities of including it.

Key Challenges and ETS Design Features

Measurement/modelling – monitoring and verification

New Zealand generates a 'National Inventory' each year, which measures all greenhouse gas emissions and sequestration. This is generated based on Intergovernmental Panel on Climate Change (IPCC) Guidelines (Ministry for the Environment 2007). It has been produced, with gradual improvements, for several years already. New Zealand must surrender enough assigned amount units to match net emissions as measured in this inventory.

A domestic emissions trading system issues emission units to the private sector by sale or gift. It makes private actors responsible for reporting information that can be used to model greenhouse gas emissions from their chain of production. Private actors must surrender emission units that match the inferred emissions and claim emission units to match sequestration.

Methods used to measure/model emissions associated with each point of obligation in each chain of production may not be exactly those used to generate the national inventory. However, the total emissions implied by both processes (central and devolved) need to be consistent so that in an all-sources, all-gases system the total units surrendered by private actors will match the national inventory and New Zealand compliance will be assured. The New Zealand government must cover any difference.

Agriculture

The two main greenhouse gases emitted in the agricultural sector are methane (CH_4) and nitrous oxide (N_2O). Methane is emitted from enteric fermentation in domestic livestock and from the breakdown of animal excreta in some situations. Nitrous oxide is emitted directly from agricultural soils and animal excreta on agricultural soils, and indirectly from nitrogen used in agricultural fertiliser.

New Zealand's National Inventory methodology uses a detailed livestock population characterisation and livestock productivity data to calculate feed intake for the four largest categories in the New Zealand ruminant population (dairy cattle, beef cattle, sheep and deer).[8] Roughly speaking, the amount of methane and nitrous oxide emitted is calculated using emission factors per unit of feed intake.

For each livestock category, the best available productivity data are used to compile the inventory. These data are from Statistics New Zealand and industry statistics. To ensure consistency, the same data sources are used each year. This ensures that the data provide a time-series that reflects changing farming practices, even if there is uncertainty surrounding the absolute values.

Animal numbers are provided by Statistics New Zealand from census and survey data conducted in June each year. For sheep, dairy cattle, non-dairy cattle and deer, the populations within a year are adjusted on a monthly basis to take account of births, deaths and transfers between age groups.

Obtaining data on the productivity of ruminant livestock in New Zealand, and how it has changed over time, is a difficult task. Some of the information collected is robust (eg the slaughter weight of all livestock exported from New Zealand are collected by the Ministry of Agriculture and Forestry from all slaughter plants in New Zealand and this information is used as a surrogate for changes in animal liveweight over time). Other information, for instance liveweight of dairy cattle and liveweight of breeding bulls, is collected at irregular intervals from small survey populations, or is not available at all. The data include average liveweights, milk yields and milk composition of dairy cows, average liveweights of beef cattle (beef cows, heifers, bulls and steers), average liveweights of sheep (ewes and lambs), average liveweights of deer (breeding and growing hinds and stags).

Nitrous oxide emissions from fertiliser directly applied are calculated using nationally consistent emissions factors and data from the New Zealand Fertiliser Manufacturers' Research Association (FertResearch).

These data aim to estimate consistent national level estimates. They do not take account of spatial variation. They will not necessarily be consistent with the sum of estimates based on data from specific farms or even processors.

An alternative is to estimate emissions based on farm-level data. These would in principle be more accurate (as long as the data quality is high). The primary option for this approach to measurement would be based on the OVERSEER model.

Farm-based measurement: the 'OVERSEER' model

OVERSEER is a model developed by AgResearch (a New Zealand Crown Research Institute) for

8 Detailed information on the inventory methodology for agriculture is given at http://www.mfe.govt.nz/publications/climate/nir-jul07/html/page16.html

national use to calculate annual average nutrient budgets for individual farms. Its original aim was to help farmers optimise farm production. Almost coincidentally it calculates nutrient loss and methane and nitrous oxide emissions to the environment, and the nutrient loss aspect has made it attractive to regional councils. It provides a potential tool for estimating annual average methane and nitrous oxide emissions from farms.[9]

It can be operated in simple or detailed modes. The former considers the whole farm as a single unit, while the latter sub-divides the farm into blocks. The data inputs for OVERSEER include: farm type (eg sheep/beef), productivity (eg t/y milk solids for dairy), soil type, soil drainage

class, slope, rainfall, stocking rate, dry matter production, fertiliser use, supplementary feed, and area for effluent irrigation.

If OVERSEER is run for each individual property and the estimates are summed, they will not necessarily add up to the current national methane and nitrous oxide estimates. If the farm level measurement option is chosen, New Zealand may need to use data from a year before agriculture enters the ETS to calibrate OVERSEER so the government does not subsidise, and is not subsidised by, the agricultural sector unintentionally. Gradually OVERSEER and the national inventory may be able to be adjusted so they are consistent.

9 The model and detailed descriptions about it can be downloaded from the AgResearch website <http://www.agresearch.co.nz/overseerweb/>. It is reasonably straightfoward to run.

Enforcement

The ETS will work on a self-assessment basis much like most OECD countries, where inaccuracy of any reports provided leads to penalties. Random audits will be undertaken by the administration agency.

Point of obligation and assessment

In any industry, there is a vertical chain of production and consumption, with several 'layers' from initial production to final consumption. The point of obligation could in theory be in any layer. For example, in the dairy sector milk solids are produced on farms and sold to processing plants; these process the milk solids into products; they export these or sell them domestically to further processors or to retailers; the products are finally sold to households who consume the products.

The 'points of obligation' in an emissions trading system are the entities in each industry that are required to report a defined set of information. This information is used to model the GHG emissions relating to each chain of production and consumption. The points of obligation must then surrender sufficient emission units to match those GHG emissions.

Three considerations affect the choice of point of obligation. First, the government wants to obtain comprehensive coverage so that all emissions in the economy are included in the emissions trading system and hence controlled under the cap. Second, the government wants to minimise transaction costs for both the private sector and the government. Third, the government wants to provide the most clearly targeted incentives to reduce emissions. For agriculture, not all activities that affect emissions can be easily measured at a small number of points – for example processing plants. There is a tradeoff between transactions costs and accuracy of targeting. Only mitigation activities that affect emissions as assessed at a point of obligation will be encouraged by the system. Others could be added through offsets but this creates new problems.

One key consideration that does not affect the choice of point of obligation is equity. The point

in the chain at which emissions are assessed and the point at which any free allocation is provided are completely separate decisions in a liquid market. The first is a technical decision; the second is a political one.

The point of obligation does not affect incentives to abate (except to the extent that the assessment of emissions must be inaccurate) or how the economic burden is borne through the economy. Wherever obligations are placed, prices will change throughout the value chain. Since economic burdens are shared through the vertical chain of production and consumption, parties with no legal obligation also have incentives to respond.

A commonly heard argument is that people will respond more if they face the need to buy permits directly and that this means the point of obligation should be at the point of direct emissions. This argument does not hold water. If it is based on an assumption that the mechanics of compliance are a good educational tool, this seems unlikely to be the best educational process. If it is based on an assumption that corporate and firm structures put inefficiently low weight on price signals, this seems a more systemic problem that the private sector should address internally rather than using the form of government regulation to improve the efficiency of their own internal processes. If the private sector responds inefficiently to the price signal, they bear the cost – there is no externality.

Agriculture

The choice of point of obligation is a trade-off between accuracy of measurement (and hence targeting of incentives for reduction, relative to minimisation of measurement and transaction costs), and the political costs of directly involving large numbers of farmers.

To capture the major sources of agricultural greenhouse gas emissions in an ETS, the government has identified a range of options for the point of obligation to surrender units, including the farm level, processor/company level, and sector body level. In terms of providing incentives for behaviour change, the farm level obligation represents the best option not because directly reporting their activities changes their incentives but because the activities that can be reported at the farm level are a wider set than those that can be reported at a processor level. For example, the application of nititfication inhibitors can only be monitored on-farm. This technology will not be encouraged with a processor level obligation. Emissions estimates will be more accurate and farmers will have more options for how they respond to the price signal. A farm level obligation is, however, unlikely to be feasible for all agricultural emissions in the short term. This is owing to a range of reasons, including administrative complexity and the difficulty of measuring and verifying emissions.

The government's initial preference is to bring the agricultural sector into the ETS with a company/processor level point of obligation. This would include emissions from:

- nitrogen fertilisers at the fertiliser company level;
- the dairy sector at the dairy processor level; and
- other animal agriculture at the primary (meat) processor level.

This approach would create incentives for land use change toward lower emitting land uses and reductions in marginal production (or reduction in growth).

It would not, however, increase farmers' incentives to improve productivity (which can be achieved, for example, by fattening lambs for slaughter more rapidly or producing more milk-solids per dairy cow), which directly lowers emissions per unit of production. Productivity in dairy has been rising at around 1% per year and this rise could potentially be accelerated. No data on farm animal numbers or age classes is available at the processor level, though some could be collected.

Animal farmers are required to maintain good stock records for tax purposes. Processors collect data on production (eg milk solids, meat) from each farmer. By combining these data at the processor level, most of the controllable variation in methane emissions and a large amount of the

variation in nitrous oxide emissions from livestock deposition could relatively easily be captured.

Under a processor level point of obligation there would be no pressure for emissions reduction per animal through changed farm management practices such as nitrification inhibitors and feeding pads. This is particularly relevant for nitrous oxide at present and this problem will be exacerbated in the future as potential mitigation innovations become (or should become) available.

The government is open to considering sector body or farm level options for emissions from both nitrogen fertiliser and livestock. This will be a subject for further engagement with the sector.

Dairy farms are already producing nutrient budgets using OVERSEER under the 'Dairying and Clean Streams Accord'. Therefore it would be relatively cheap to apply this for greenhouse gases as well. Sheep/beef farms could use this model with the help of fertiliser companies (around 30,000 properties). This could however impose relatively high costs on very small properties. Properties that are small in area or production (possibly measured as potential production rather than current production, which may change) may need to be exempt under a *de minimus* rule.

Nitrogenous fertilisers are supplied by a small number of companies that would provide the easiest monitoring point. The associated emissions depend to some extent on farm-specific factors (soil type, time and concentration of application) that require specialised modelling such as with OVERSEER. However, our knowledge of this is relatively weak. The most appropriate fertiliser response to the ETS in the short term will be simply to use nitrogenous fertiliser more efficiently and hence use less.

Two other options could offer a compromise between a full farm-level point of obligation (with high accuracy and cost) and a processor and fertiliser company level of obligation (with lower accuracy and low cost): Farm-level monitoring for specific sub-groups in the agriculture sector with all other emissions at the processor level; or voluntary farm-level monitoring (eg through offset projects).

Farm level obligations could be brought in only for dairy farms (defined as properties with more than a certain number of dairy animals or farms that own a share in a cooperative). These farms are highly emissions intensive and will soon be implementing OVERSEER anyway.

Farm level obligations could also be mandatory for catchments where Regional Councils are using OVERSEER as the basis for managing water quality. This could include Taupo, Lake Rotorua, and parts of the Manawatu and later the Waikato River catchment and parts of Southland. The additional costs of reporting greenhouse gases would be low.

Requiring some farmers to report at farm level while others are covered at a processor level raises three related issues. First, how consistency can be maintained with the National Inventory as the regulation moves between levels and hence methods of measurement. Any reduction in obligation on a farmer must be matched by a change in the National Inventory and hence New Zealand's obligation if the taxpayer is to be protected. Second, two separate methodologies for reporting could lead to perverse behaviour such as moving dairy animals from farms covered at farm scale to those covered at the processor level during non-milking periods to reduce monitored farm emissions. Third, whether it is equitable to treat similar farmers differently.

The equity issue cuts two ways. Farmers that report at the farm level are probably not that disadvantaged by having high compliance costs given that they are included precisely because they have relatively low costs of inclusion. However, they may not perceive it this way, particularly because the pass-through of costs from processors to farmers may not be transparent.

Farmers reporting at farm level have the advantage of increased flexibility. They can benefit from on-farm mitigation options, which could reduce their average emissions obligation considerably relative to what they would face under a processor-level obligation. Other farmers may feel they are unfairly excluded. However,

although farmers who are included may gain as a group, some individual farmers will have much higher emissions than average because of factors beyond their control (eg soil type or topography). They will suffer from mandatory farm level reporting. They may feel that this is inequitable relative to similar farmers who are not included.

Use of offsets

To improve targeting of incentives at farm level

If the point of obligation in agriculture is at the processor level, farmers could be enabled to create offsets where they would compare their farm level measurements of emissions with the average emissions implied by the processor-level measurement. They would receive NZUs for the difference. This idea creates two challenges.

First, the farm level measurements would need to be consistent with, or more conservative than, the processor level so that the offsets would not create a liability for government if all farmers chose this option.

Second, and more challenging, is the problem of 'adverse selection'. Only those farmers whose farm level emissions are lower than the national average for their animal numbers and production will choose to participate in the offsets programme. This means that every offset will lower farmer obligations more than it lowers national emissions as measured in the Inventory.

One final problem with offsets is that they tend to create a precedent that farmers are paid for all emission reductions. This would be politically awkward in a situation where all other sectors are facing costs but could potentially be handled within the pool of freely allocated allowances in the agriculture sector.

The government has noted that there is the potential for an offsets mechanism to be used in the NZ ETS, but stopped short of agreeing to introduce one due to concerns around the technical and administrative challenges involved. If offsets were to be included, it would be preferable to have them be defined as voluntary opt-ins to the longer-term farm level ETS rather than create a separate set of rules. This would require defining rules for any farm level free allocation at least for the voluntary period. To protect against extreme adverse selection, the short-term free allocation should be lower than current emissions and if possible the group of farmers eligible should be restricted as far as possible – for example to those for whom short-term action is considered to have significant long-term consequences.

Alternative short-term policies may be preferable. If the motivation is developing and demonstrating new technology and practices, grants could be made available but not explicitly linked to measurements of emission reductions. In this case any grant funding should be linked to a responsibility to allow the farm practice to be evaluated to maximise the learning benefits.

Thresholds

Where the programme is compulsory, the gains from including small players relative to the administrative and regulatory compliance costs they will face is an issue. This is particularly salient in agriculture, where the ideal points of obligation include many very small players.

Agriculture

Because the point of obligation has not been chosen, the above issue has not yet been addressed. It is assumed that if the point of obligation is at the farm level the threshold would be considerably lower than for industrial processors. It would need to be based on something easily observable and preferably unchanging or slowly adjusting: for example, farm parcel area combined with a measure of potential productivity, or value added in GST returns in the previous three years. Ideally, lifestyle properties and very small or very low total productivity properties would be excluded. To avoid an acute change in obligation at the point of the threshold, the obligation to participate could be introduced at one threshold but the level of emissions that must be covered could be gradually increased with farm size for those above the threshold. Small farmers just over the threshold would then not be

significantly disadvantaged relative to their peers. If free allocation of units is also linked to the same threshold, the disadvantage of being above the threshold will be reduced or removed.

For those who are below the threshold, any actions to encourage mitigation could be similar to those discussed earlier.

Conclusion

New Zealand believes that agriculture can be brought into emissions trading. Significant challenges remain in defining appropriate points of obligation and emissions accounting systems, and there is likely to be an acute trade-off between the cost of farm scale monitoring and the benefits it brings in terms of close targeting of mitigation opportunities.

If New Zealand can develop and implement these proposed policies effectively it can also help others learn about mitigation and policy design.

Brief Bibliography

Kerr, S 2007, *Review of the New Zealand Emissions Trading Scheme,* accessed on 24 December at: http://www.mfe.govt.nz/publications/climate/review-proposed-nz-ets-nov07/review-proposed-nz-ets-nov07.pdf

New Zealand Government 2007, *The framework for a New Zealand Emissions Trading Scheme,* accessed on 24 December from: www.climatechange.govt.nz/nz-solutions/trading-scheme-reports.shtml

Ministry of Agriculture and Forestry 2007, *Forestry in a New Zealand Emissions Trading Scheme,* Wellington, New Zealand, accessed on 24 December from: http://www.climatechange.govt.nz/nz-solutions/forestry.shtml

Ministry for the Environment 2006, *New Zealand's Greenhouse Gas Inventory 1990–2004*, Wellington.

Ministry for the Environment 2007, *New Zealand's Greenhouse Gas Inventory 1990–2005,* Wellington, New Zealand, accessed on 24 December 2007 at: www.mfe.govt.nz/publications/climate/nir-jul07/html/index.html

Also see a series of short background articles on emissions trading in New Zealand at: www.motu.org.nz/climate

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