Emissions Trading – a challenge or opportunity for the Dairy Industry?

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Introduction

Emissions Trading is a policy tool used for controlling pollution by providing economic incentives for achieving reductions in the emissions of targeted pollutants. The overall goal of an Emissions Trading Scheme (ETS) is to reduce emissions.

Under an ETS, companies or groups are issued emission permits and are required to hold an equivalent number of permits (or credits) which represent their right to emit a specific amount of the pollutant in question. The total amount of allowances and credits available must be less than the targeted cap on the pollutant.

Companies that increase their emissions above their cap must buy credits from those who pollute less – thus Emissions Trading. In effect, the buyer is paying for the right to pollute, while the seller is being rewarded for having reduced emissions. Thus, in theory, those that can easily reduce emissions most cheaply will do so, achieving the pollution reduction at the lowest possible cost to society.

History of Emissions Trading

The first major environmental success of the emissions trading concept was demonstrated in the 1980's U.S. program to phase out lead from motor fuel. This was followed by the highly successful U.S. Environmental Protection Agency sulphur dioxide (SO_2) emissions trading program, which continues to prove the concept on a large scale. To reduce acid rain, an overall cap on SO_2 emissions was imposed on electric power plants. Power generators that find it expensive to cut sulphur emissions can buy allowances from those that make extraordinary cuts at low cost.

The SO_2 program was so successful that emissions were reduced faster than required and at costs far below forecasts. There has also been steady growth in the trading of allowances, from 700,000 tons of registered trades in 1995 to approximately 12 million tons in 2001. The SO_2 market has now reached a value of approximately $2 billion each year for registered trades, with another estimated $2 billion a year in unregistered trades.

Greenhouse Gas Emissions Trading Schemes

Application of flexible, market-based mechanisms for reducing greenhouse gas emissions has achieved widespread political support. This broad acceptance of emissions trading was reflected in the **Kyoto Protocol**, which established several emissions trading mechanisms. Signatory countries to this treaty adopt legally binding commitments to reduce emissions to levels below those experienced in 1990.

The **European Union Greenhouse Gas Emission Trading Scheme**[1] (EU ETS) commenced operation in January 2005 and is the largest multi-country, multi-sector greenhouse gas ETS world-wide. It covers over 11,500 energy-intensive installations across the EU, which represent close to half of Europe's emissions of CO_2. Average daily volumes of carbon traded on the EU ETS in 2007 were just over 4 million tonnes, up 89% on December 2006, with annual volumes of over 1,000 million tonnes, up 128% on 2006.

[1] www.europeanclimateexchange.com

Currently carbon is trading at about €23.23/tonne in the EU ETS up from €17.50 at the beginning of 2007.

Ironically the second largest emissions trading body in the world is the **Chicago Climate Exchange**[2], in the only western country to stay out of the Kyoto Protocol. The Chicago Climate Exchange (CCX), launched in 2003, is the world's first and North America's only active voluntary, legally binding, integrated trading system to reduce emissions of all six major greenhouse gases, with offset projects worldwide. On the CCX trading volumes were around 2.5 million tonnes per month in 2007 with peak daily trades of over 300,000 tonnes CO_2. In 2007 22.9 million tonnes CO_2 was traded through the CCX.

Even Arnold Schwarzenegger now has an ETS in California based on a cap and trade approach, along with trading schemes established by nine North East US states.

Closer to home, the **NSW Greenhouse Gas Reduction Scheme**[3] (GGAS) commenced on 1 January 2003. It is one of the first mandatory greenhouse gas emissions trading schemes in the world. GGAS aims to reduce greenhouse gas emissions associated with the production and use of electricity by using project-based activities (eg. forest plantings) to offset the production of greenhouse gas emissions.

The **Australian Federal Government** now plans to introduce a National Emissions Trading Scheme[4] by 2010, with the detailed design finalised by the end of 2008. The aim of the ETS will be to reduce greenhouse gas emissions by 60% by 2050. Initially, this scheme will only apply to 700 medium and large companies and over 70% of greenhouse gas emissions in the covered sectors (agriculture is not a covered sector initially).

From 1 July 2008, corporations will be required to register and report if:

- they control facilities that emit 25 kilotonnes or more of greenhouse gas (CO_2e[5]), or produce/consume 100 terajoules or more of energy; or
- their corporate group emits 125 kilotonnes or more greenhouse gas (CO_2e), or produces/consumes 500 terajoules or more of energy.

The final thresholds imposed in the ETS after 2010-11 will be 50 kilotonnes of CO_2 equivalent or 200 terajoules of energy. This will include many of the large agricultural processors and certainly fertiliser manufacturers.

A **cap and trade** approach is the most widely used scheme design, in which total emissions are 'capped', permits may be allocated up to the cap, and trading allowed to let the market find the cheapest way to meet any necessary emission reductions. The Kyoto Protocol and the EU ETS are both based on this approach. The intention is, however, to then slowly reduce the size of the cap to reduce total emissions over time.

The above summary of the EU ETS, CCX and NSW ETS above were provided to show that carbon is well on its way to being the world's largest traded commodity. As agriculture is in the business of using carbon (from photosynthesis) to produce carbon-

[2] www.chicagoclimatex.com
[3] www.greenhousegas.nsw.gov.au
[4] www.greenhouse.gov.au/emissionstrading/index.html
[5] CO_2 equivalent: The universal unit of measurement to indicate the global warming potential (GWP) of greenhouse gases, expressed in terms of the GWP of one unit of carbon dioxide. Methane has a GWP of 21 and nitrous oxide has a GWP of 310.

based products, we will need to be far more astute if we are to benefit from these growing new markets.

Emissions Trading and Australian Agriculture

Greenhouse gas emissions from agricultural production, forestry and land use will not be included within the Australian ETS initially. However, any abatement of emissions from agriculture will be eligible to generate offsets. Offset credits can only be generated by new projects or actions to abate emissions that are not covered by the ETS in the first instance. For example, offsets cannot be created from energy efficiency measures or measures to limit use of transport fuels, as liability for these emissions will rest with the power generator and the fuel distributor respectively. However, farmers who plant trees on their farm, or perhaps apply nitrification inhibitors with their fertiliser (not yet recognised, but likely), can generate an offset that can be traded to a company needing to purchase emission credits in the future[6].

While farmers will not initially be liable for their direct emissions under this scheme, the ETS will indirectly impact on agriculture through effects on energy prices, transport costs and the cost of inputs which require considerable energy for their production, such as fertiliser.

However, ABARE[7] modelled the impacts of an ETS on agriculture and found that the ETS impacts on farm input costs would be relatively modest in the short term, with real increases above inflation of 5% for petrol, 10% to 15% for diesel and less than 3% on fertiliser over 20 years.

Myths and Opportunities for the Dairy Industry

It is important that farmers and the Industry receive sound advice in responding to an ETS and the trading of offsets.

Tree plantings

The most obvious way in which farmers can generate emissions offsets (credits) is through planting trees on their more marginal lands. However, professional advice must be sought first to ensure that the area and species proposed will comply as a tradeable offset, as there are clear rules.

As a rough guide, a hectare of trees may absorb anywhere between 8-20 tonne CO_2/year for the first 30yrs (depending on rainfall), and at a carbon price currently at $38 (€23)/tonne CO_2, this may generate between $300 and $760/ha annually[8].

The key message therefore is that tree plantings should take into account a range of benefits, like shelter, riparian habitats, salinity etc., as carbon credits alone may not justify the effort for small-scale plantings.

Soil Carbon

There are significant technical and logistical barriers to accurately accounting for soil carbon stocks. Article 3.4 of the Kyoto Protocol focused on changes in the rate of net soil sequestration. Australia rejected adoption of this Article in 2001 for calculation of its national inventory, due to a concern that it would incur a net liability.

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6 www.pmc.gov.au/consultation/docs/early_action_discussion_paper.pdf
7 www.abareconomics.com/publications_html/ac/ac_07/a1_sept.pdf
8 www.dpi.vic.gov.au/privateforestry

Some key points need to be made here:

- The amount of carbon found in a soil can be viewed as a balance between inputs (plant residues and fire) and losses due to decomposition and mineralisation; basically a big, but slowly changing input:output equation. If you grow more pasture or crops during a good season then soil carbon stores will increase, but if the same farm experiences a drought, then more carbon may be lost than added to the soil, and you go backwards.
- The factors limiting the amount of crop or pasture residues entering the soil as new carbon are limited by solar radiation, temperature range, availability of water and nutrients; most of these are out of the control of the farmer apart from fertiliser and irrigation. In most of Australia, water availability sets an upper limit on plant production and therefore soil carbon storage.
- It is important to first know the composition of the carbon in your soils, before any judgment can be made about management impacts, as some fractions do not change much over time (eg. charcoal) and others can change greatly (eg. humic fraction).
- Soil carbon sequestration is difficult to monitor and quantify, particularly over short time frames (decades).
- Carbon rights may be traded separately to land rights. However, this is where farmers may get into trouble, as once traded you no longer own the right to disturb that carbon i.e. essentially even ploughing the field will create a liability that you may have to pay to the owner of the soil carbon.
- Likewise, from the point above, if you have traded the carbon in your soil, and there is a protracted drought, essentially the soil carbon store starts depleting and a liability may be created.

Farmers need to be warned as there are a number of ‘evangelical’ consultants promoting the big profits farmers can make from trading soil carbon. However, much of this advice is not based on locally proven science and certainly not recognisable in any credible ETS.

For an excellent article on the subject see “Managing the soil carbon cycle” by Jeff Baldock, Jan Skjemstad and Terry Bolger, published in the Grassland Society of Southern Australia Newsletter No. 270, November 2007.

Pastures and Crops

One of the great myths circulating at the moment is that as farmers grow crops and pastures, of which almost 50% is carbon, this carbon must be included as a credit to the farmer.

Crops consumed by humans recycle this carbon back to the environment usually within 12 months. However, a portion of the nitrogen fertiliser used on the crops or pasture is always lost as nitrous oxide gas (310 times GWP), actually creating an overall negative greenhouse balance.

Likewise, pastures consumed by ruminants eventually lead to products consumed by humans, recycling the carbon back to the environment within a short time frame. However, here the ruminants convert some of this carbon into methane (21 times GWP) again creating an overall negative greenhouse balance.

The litter and waste from pastures and crops either degrades on the soil surface and re-enters the environment or a portion of this joins the roots in adding to soil organic carbon (dealt with above). All in all, the production of pastures and crops is either largely carbon neutral, or in most cases carbon positive due the extra methane and nitrous oxide produced.

Future Options and Research

While there are a number of management practices[9] that can reduce greenhouse gas emissions from farms, at this stage none of these options are recognised in Australia as tradeable offsets, apart from reducing stock numbers or nitrogen fertiliser use.

New Zealand is in the process of developing a method for recognising a nitrification inhibitor spray, that reduces losses of nitrous oxide gas from urine, as a valid abatement action. Coatings are now commercially available for nitrogen fertilisers that can substantially reduce gaseous losses.

Research on dietary supplements for dairy cattle[10] have shown up to 21% reductions in methane with 15% increases in milk solids, while research on tannin from the black wattle has shown potential to both reduce methane and improve nitrogen efficiency in the animal. The recent 3rd International Greenhouse and Animal Agriculture conference[11], held in New Zealand last year summarised a range of options[12] currently being developed to assist farmers in reducing emissions.

Although much of this research is still in its early stages, these options are likely to be recognised as abatement strategies in the near future and will provide sound opportunities for farmers to engage in emissions trading in the near future.

Some Issues in Applying at ETS to Agriculture

There are a number of reasonably significant problems in applying an ETS to agriculture, including the trading of offsets:

- The agricultural industries are highly trade exposed (i.e. increased cost from complying within Australia may make products cheaper from other countries) and therefore may need to be insulated against this through the free allocation of emission permits. New Zealand proposes to allocate free permits to farmers, equivalent to 90% of their 2005 emissions, to insulate them from the ETS impacts on their trade competitiveness from 2013 onwards.
- There are over 130,000 farms in Australia, each with their own unique production systems, making it difficult to develop appropriate methods for accounting of abatement across all these production systems.
- Verifying and monitoring of on-farm emissions and abatement actions will not only be a challenge, but could also create very high transaction costs eroding any real profits farmers may be able to make from small (but meaningful) abatement actions. However, there may be methods of aggregating abatement activities across farms which could make participation more cost effective for groups of farmers.
- The reliability and uncertainty associated with standard emissions estimation methods means that many abatement actions could well be smaller than the error in estimation.

[9] www.greenhouse.unimelb.edu.au
[10] Dr Chris Grainger, DPI Ellinbank (www.greenhouse.unimelb.edu.au)
[11] www.confer.co.nz/ggaa2007
[12] Australian Journal of Experimental Agriculture, 48(1&2) 2008 www.publish.csiro.au/nid/72/issue/4052.htm

- Any offsets or abatement action must be additional[13] to what should have taken place anyway i.e. just changing from less than best practice to current accepted best practice cannot be claimed as abatement, even though it may reduce emissions from your farm.
- The Australian Government is currently developing the National Carbon Accounting System[14] (NCAS) to track greenhouse gas sources and sinks from the land. The intention is for this model to become the definitive tool for verifying changes in emissions from the land-based sector. New Zealand is aiming to provide a simpler input:output nutrient budgeting tool (OVERSEER[15]) that is not only of value for nutrient budgeting, but will also be able to report and validate on-farm abatement actions, against which farmers should be able to claim future credits.

Conclusions

What is really clear is that emissions trading for the agricultural industries is far from clear at this stage! Also clear is that dairy farmers currently have very few offsets available to trade under an ETS, apart from tree plantings and reducing stock numbers and nitrogen fertiliser use. Farmers should take sound advice, based on locally proven science, before entering into any carbon or offset trading schemes.

In the future, agriculture is likely to be included in an ETS one way or another. Watching developments in New Zealand should give Australian farmers a good idea of how this may emerge. Tools like the OVERSEER model can be very useful to this end, as a means of not only reporting on abatement actions (and claiming the credits), but also for managing nutrient budgets on the property.

Research is also actively underway to develop win-win on-farm abatement options for farmers. This research is focusing on the feeding, breeding and animal management aspects for reducing methane emissions, as well as fertiliser strategies and formulations to improve the efficiency of nitrogen cycling in grazing systems. The goal of this research, both in Australia and New Zealand, is to provide farmers with clear, proven and profitable strategies to improve efficiency, while also being able to engage profitably in a future emissions trading scheme.

[13] Additionality: Emission reductions over and above the general trend or "Business as usual" scenario.
[14] www.greenhouse.gov.au/ncas
[15] www.agresearch.co.nz/overseerweb