

The New Zealand Emissions Trading Scheme: What has gone wrong and what might we achieve?

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Introduction

New Zealand's initial attempt to mitigate the problem of climate change is moribund, so why is this? The Kyoto Protocol, which we ratified in 1997, bound us to keep our net emissions at 1990 gross emission levels between 2008 and 2012, but also tied us to particular patterns of thinking about greenhouse gases. Not all of these patterns are rational, nor are they all helpful. Nonetheless, with a rather unique emissions profile for a "first world" nation, we could offer the world valuable solutions for developing nations if only we would accept the opportunity. Forestry could easily make us fully greenhouse gas neutral while solving erosion problems and improving profitability of our hill country farms, but for this we need a rational approach to emissions trading and commitment from our populace.

In this article I shall outline some of the key modes of thinking introduced by the Kyoto Protocol; highlight where we are going wrong with emissions trading; and show how forestry could be at the heart of solutions to this global problem.

Kyoto commitments and rules

A rise in CO₂ concentration from 280 ppm in 1800 to 395 ppm today is reported to be promoting changes to the Earth's climate that will be deleterious (IPCC, 2007). Climate scientists are warning us that emissions of CO₂, NH₄, N₂O and other compounds collectively known as greenhouse gases (GHGs) are warming our planet and that weather will become more extreme. Of course some CO₂ is essential for plant growth. We have begun to respond to the risk posed by this phenomenon.

The Kyoto Protocol was crafted in 1992. It comprises 28 articles that commit signatories to monitor, report on and reduce GHG emissions. It goes further, however, and sets out rules for international emissions trading where each country is given "Assigned Amount Units" (AAUs) representing tonnes of CO₂-equivalent that they have committed to reduce their emissions to between 2008 and 2012, the first "commitment period". Typically AAUs are set relative to a nation's emissions in 1990, and nations were allowed to choose their targets. If a country's emissions dropped below its level of AAUs then it would have AAUs to sell, while other countries could meet their targets by purchasing surplus AAUs. Under the terms of the Protocol, only nations in the Organisation for Economic Cooperation and Development (OECD) listed in "Annex I" of the

Protocol are assigned AAUs and have GHG emission reduction targets, while other nations can earn other kinds of carbon credits by reducing emissions. These latter credits are known as "Certified Emission Reduction" (CER) credits. Countries such as Japan, New Zealand, and the 29 nations of the European Union (EU) have started domestic GHG emissions trading schemes (ETSs) in order to translate their international commitments into domestic behavioural changes.

Not all credits are created equal. Removal units (RMUs) are earned from sequestration in sinks such as new forests in Annex I countries, and are sometimes regarded as inferior credits because of uncertainties about future emissions from those sinks. The EU emissions trading scheme bans trading in AAUs to avoid large influxes from "economies in transition", such as Russia and the Ukraine (Flachsland et al., 2008). The EU bans AAU trading with economies in transition because these countries were originally command economies, and their transition to market economies has led to massive reductions in industrial processes and associated GHG emissions since 1990 (Figure 1) that would have occurred irrespective of concerns about GHGs.

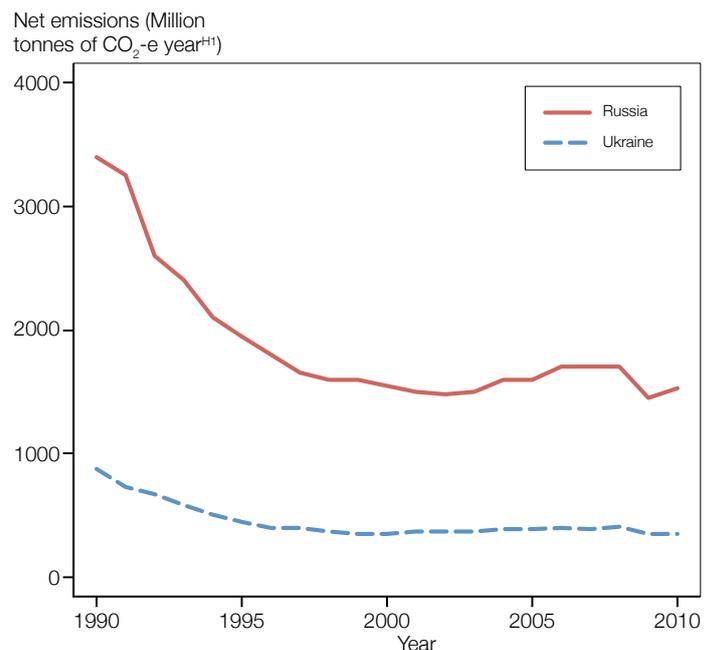


Figure 1: Net emissions of GHGs from Russia and the Ukraine by year (Source: United Nations Climate Change Secretariat)

Surplus AAU credits from economies in transition (sometimes labelled “hot air” credits) are so numerous that if they were traded in the EU they would swamp the market and lead to very little behavioural change, just as “Emission reduction units” (ERUs) derived from these AAUs (see below) are currently swamping the New Zealand market and undermining New Zealand’s ETS and response to climate change. Europeans justify the exclusion of AAUs from economies in transition using a concept called “additionality” to identify acceptable credits generated by behaviour that is “additional” to normal behaviour and has been taken specifically to mitigate climate change. Additionality has to be assessed, leading to additional layers of bureaucracy (Valatin, 2012).

The Kyoto Protocol originally defined ERUs as credits obtained by reducing emissions below a nation’s levels of AAUs, but the term has since been narrowed to mean credits resulting from a joint development implementation where one first world nation invests in emission reductions in another. ERUs from economies in transition are now considered to be a way for these countries to launder excess “hot air” AAUs. There are two tracks for generating ERUs. Track two involves oversight from an international board, the Joint Implementation Supervisory Committee, but track one allows host countries to approve projects, assess verifiability and issue credits themselves. There is evidence that track one projects, which produce the majority of ERUs, are being used to launder surplus, “hot air” AAUs (Alessi and Fujiwara, 2011). Conversion from one to the other is routine and many joint development implementation projects are in economies in transition.

Certified Emission Reduction (CER) credits can also be controversial. As non-annex I countries do not need to account for emissions, it can be profitable for them to engage in activities that produce GHG emissions in order to either reduce or sequester them and so generate CERs. A classic case is the production of CFC-22 which has a by-product, CFC-23, that is 11700 times worse as a GHG than CO₂, and yet the cost of scrubbing CFC-23 is about \$1 per tonne. Data show that CFC-22 plants produced significantly less CFC-23 during periods when no credits could be claimed than when credits could be claimed (Schneider, 2011). While this is an extreme, it highlights a larger problem with CERs, that when people are rewarded for reducing pollution but they are not penalised for generating pollution this will inevitably create perverse incentives. These perverse incentives can only be avoided through expensive, somewhat ad hoc and expensive bureaucratic judgements about “additionality”.

We need also to understand that paying people to reduce GHG pollution, such as through ERUs or CERs awarded for pollution reduction, is radically different from paying people to sequester GHGs, and brings into question what we mean by the term “GHG neutral”.

GHG “neutrality”

The Kyoto process has encouraged people to think irrationally about what it means to be “GHG neutral”. For instance, “Greencarbon”, a company devoted to measuring and brokering carbon credits, runs a New Zealand website (<http://www.greencarbon.co.nz/certification-overview/step-3--purchase-carbon-credits>, accessed on November 29th 2012). A quote from that website is as follows:

“A wind farm provides electricity from wind, a plentiful renewable source. Carbon Credits are awarded for the carbon emissions that have been avoided as compared with electricity generation by burning fossil fuels.

The Te Apiti Wind Farm by Meridian Energy is located in the lower North Island of New Zealand. It is a 90MW wind farm made up of 55 Vestas 1.65MW wind turbines. The wind speeds at the site are on average 9.3 m/s giving an annual output of over 325 GWh. The wind farm reduces GHG emissions by approximately 203,125 tCO₂e/year...

.... In order to be able to promote your business as ‘Carbon Neutral’, and earn the label of ‘Green Carbon: Carbon Neutral Certified’, you must first Measure your carbon footprint, Reduce your emissions where possible, and then purchase and retire the correct amount of carbon credits.”

These quotes are typical of those engaging in carbon trading. The idea is that we can claim “GHG neutrality” or “carbon neutrality” by purchasing carbon credits to offset our emissions, but purchase of credits derived from lowering pollution below the level of a free allocation (essentially a kind of domestic emission reduction unit) does not confer GHG neutrality. This can easily be seen by using the example above. Suppose Meridian Energy generated enough domestic ERUs through wind power generation to reduce its GHG emissions to exactly half of its free allocation of credits (In the NZ ETS, companies get an allocation of free NZUs that means they are allowed to pollute without penalty up to a certain level). It could then use the credits it generated to account for its remaining emissions and claim to be GHG neutral even though it was still emitting 50% of its original allowed GHG pollution. This kind of irrationality arises from the Kyoto concept that we need only reduce emissions down to our level of AAUs, and below that level we can sell AAUs. Meridian Energy could be said to have reached some kind of target if it reduced its GHG emissions to 50% of its allowed pollution, but it is irrational to reward it with saleable credits that people can use to claim “GHG neutrality”. International ERUs suffer from the same kind of irrationality when they are derived from Assigned Amount Units (AAUs). Unfortunately this irrationality has contributed to the undermining of New Zealand’s emissions trading scheme. Only credits

derived from sequestering GHGs in sinks can be sensibly used to confer GHG neutrality on purchasers' activities, and these credits are an important key to changing the way we live and solving the problem of climate change.

New Zealand's ETS

New Zealand is fortunate that the Kyoto Protocol apparently allowed us to keep our net GHG emissions (emissions minus sequestration) at 1990 gross emission levels between 2008 and 2012. In fact our gross emissions have grown by 19.8% since 1990, the sixth largest increase among developed countries, while our net emissions have grown by 59.5% since 1990, the second greatest increase among developed nations (UNFCCC, 2012). Had we been required to stabilise either our net emissions to net 1990 levels or our gross emissions to gross 1990 levels then we would have failed utterly. Clearly, in order to actually achieve real world outcomes that are meaningful in the battle against climate change, we need to rethink our approach to emissions trading.

New Zealand implemented an emissions trading scheme in order to promote changes in our behaviour that reduce our net GHG emissions and allow us to meet our international commitments. The scheme has been introduced sector by sector, with forestry fully in the scheme from 2008, energy and industry in from July 2010, and the entry of agriculture into the scheme has recently been postponed indefinitely. Owners of forests established on non-forest land after 1989 can choose to accrue domestic carbon credits (known as New Zealand Units (NZUs) in our emissions trading scheme), and those established prior to 1990 must surrender NZUs if land use is changed. If post-1989

Spot price of NZU (NZ\$)

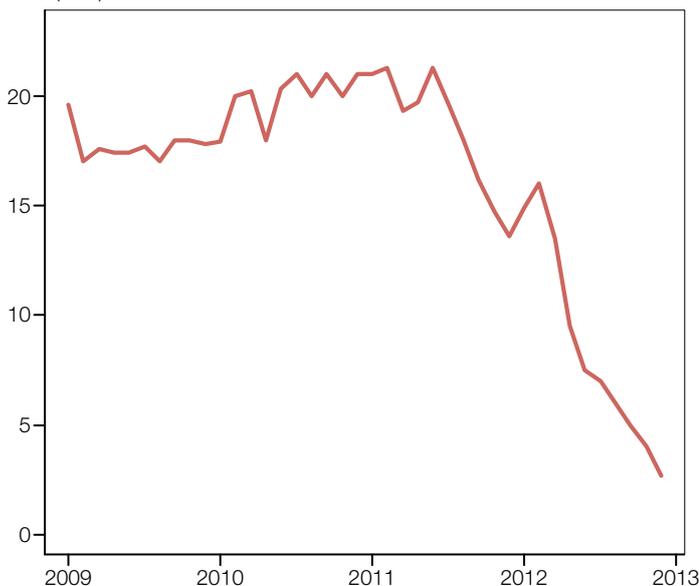


Figure 2: Spot price of New Zealand Units versus time (Summarised from <https://www.comtrade.co.nz/>, accessed November 30th 2012)

forest owners have accrued credits then they must surrender credits at time of harvest to reflect the loss of carbon storage in the landscape. This surrender at harvest means that our domestic removal units have credibility, as any future leakage will be accounted for. Emitters have to surrender credits, with free allocations of 50% available to the energy and industrial sectors until 2013, and there is a fixed price option where emitters can purchase credits from the government for \$25 (effectively a price cap).

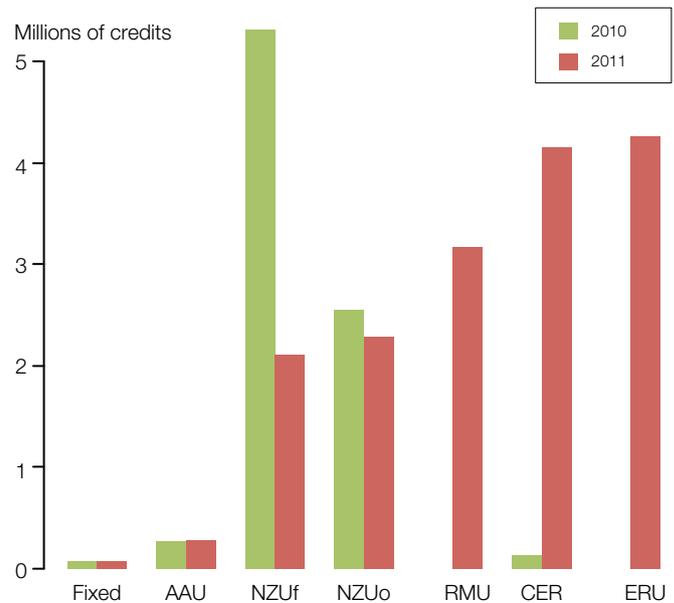


Figure 3: Volume of different types of credits surrendered in the New Zealand ETS during the last half of 2010 and during 2011 (NZETS, 2012). Fixed=Fixed price option at \$25/credit, NZUf=NZUs from forest sequestration, NZUo=other NZUs

Our ETS is failing to change behaviour, partly because of low credit prices, and partly because we have taken a piecemeal approach to implementing it.

The latest spot price for NZUs is \$2.90, and the trend in prices is shown in Figure 2. Figure 3 shows credits surrendered by New Zealand GHG emitters during the last six months of 2010 and all of 2011. Note that prices of NZUs dropped as people in New Zealand started buying foreign CERs and ERUs. New Zealand has remarkably few restrictions on purchases of foreign credits, and so credits from economies in transition, which are often derived from AAUs that are not admissible in the European trading scheme, can be purchased freely for use in the New Zealand system.

The piecemeal approach to our emissions trading scheme, in particular the total exclusion of our agricultural sector, has further reduced its effectiveness and its credibility. New Zealand's GHG emission profile (Figure 4) is closer to that of a developing nation than a first world one. On average developed nations have far lower percentages of agricultural emissions and waste (17% versus New Zealand's 50%), and far higher emissions from energy (81% versus New Zealand's 43%)

according to the World Resources Institute (2012). By excluding agriculture from our ETS, we give a free ride to the very sector that emits more GHGs than any other single sector in the country. In addition to the impact on the New Zealand scheme's credibility and perceptions of unfairness, this exclusion reduces the likelihood that new forest sinks will be planted in New Zealand because marginal and eroding lands where we should sensibly plant trees for carbon sequestration are predominantly owned by farmers. If farmers were required to purchase credits for their emissions then they would rapidly become interested in growing their own credits via forestry if that was the least cost alternative. It is likely that farmers with no marginal land would enter into joint ventures with those that did own some. Hill country farming would become more profitable, and erosion would be mitigated.

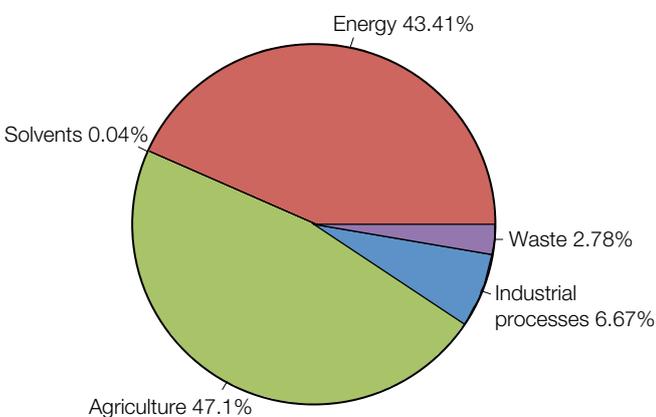


Figure 4: New Zealand's gross emissions by percentage in 2010. Our total emissions in that year were 71.7 M tonnes of CO₂-e (Source: United Nations Climate Change Secretariat).

There is, however, one respect in which our ETS has a sound design. When I discuss afforestation as a climate change mitigation option with foreigners, their responses are often to assert that RMUs are undesirable because forests are temporary sinks and ultimately sequestered CO₂ will be returned to the atmosphere. I then explain how our ETS keeps owners of forest planted after 1989 honest through monitoring, that it requires purchasing of credits to account for harvesting, and yet due to interest earned on credits generated throughout a rotation such a scheme still has the capacity to promote afforestation. This is often a revelation for them.

What forestry could achieve

More than twice as much carbon is stored in the Earth's biomass than is stored in the atmosphere, and estimates of storage in plant matter range from the 500 billion tonnes (Mahli, 2002) to 650 billion tonnes in forest biomass alone (FAO, 2010). Global emissions of GHGs were estimated to be 49 gigatonnes CO₂-e in 2004 (IPCC, 2007). If the FAO's estimates of total forest storage and forest area (FAO, 2010) are accurate, implying an average forest storage of CO₂-e of 596

tonnes/ha, then we would need approximately 1.4 billion hectares of new forest to return atmospheric CO₂ concentrations to 280 ppm. This is approximately 1/3 of the deforestation we think humans have caused.

Surprisingly, New Zealand could be completely GHG neutral for between 60 and 100 years by planting radiata pine on approximately 2.4 million hectares (9% of our land area, or a bit more than double our current plantation area) of our marginal lands. Typically radiata pine sequesters between 25 and 35 tonnes of CO₂ per hectare per year. Our total emissions in 2010 were 71.7 M tonnes of CO₂-e (Source: United Nations Climate Change Secretariat). If we assume a sequestration rate of 30 tonnes per hectare per year then establishing 2.4 million ha would sequester enough CO₂ to account for all our GHG emissions over at least 60 years. If our carbon forests were not harvested, studies suggest that we would continue to benefit from sequestration for at least 60 years and possibly up to 100 years (Woollons and Manley, 2012), and that on warm and wet sites after some two hundred years natural succession would produce native forests on those sites that contained similar reservoirs of carbon (Hall, 2001).

A recent study identified that 4.6 M ha of New Zealand is either highly or very highly susceptible to erosion, and 2.5 M ha of that was in the North Island alone (Bloomberg et al., 2011). Much of this land could be afforested and would form the basis of a sink to completely offset our national GHG emissions. After a protracted heavy storm it can look like the land shown in Figure 5. Clearly reducing emissions might be a better financial prospect than afforesting all of it, but we need a strategy to encourage people to make those calculations; an alternative ETS.



Figure 5: Erosion in the North Island hill country after a severe storm

A revitalised ETS

We can make rapid progress to help mitigate climate change by adopting the simple principle that those who emit GHGs should either sequester them or pay other people to sequester them. This means that CERs and ERUs should be unacceptable in our ETS. This may sound unrealistic now that the rest of the world has adopted irrational approaches to carbon trading, but New Zealand has recently withdrawn from the second commitment period for Kyoto and so we have an opportunity to fashion an entirely new ETS that has integrity. Moreover, our ETS could show the way for developing nations to participate fully in carbon trading because our economy and emissions profile have many similar features to those of developing nations.

Immediately imposing full accountability for emissions on all sectors would be very disruptive, and so some sort of staged entry into the scheme for emitters would be wise. However, adopting a copy of the AAU approach has led the world, and especially us, into complications and difficulties that have undermined carbon trading. We could simply say that emitters have to account for a gradually increasing proportion of their emissions without giving them any free credits. Sequestering GHGs should be the only way to generate NZUs.

Under this scenario, economic actors would quickly discover that without a limitless stream of bogus credits from overseas the credit price would rise, and they would begin to find innovative ways to reduce emissions and to explore cheap sequestration – the original intention of developing emissions trading schemes. It is very likely that much of our eroding hill country would be devoted to CO₂ sequestration and so hill country farming would become more profitable, erosion would be reduced, and ultimately we would have more native forest in our landscapes.

We should arrange for independent management of the value of our NZU currency just as our independent Reserve Bank carefully manages the integrity of our dollar currency, except that instead of using the Official Cash Rate, an independent agency would foster the integrity of NZUs by managing percentages of emissions for which credits would be required. An annual 5% decline in our net emissions, for instance, would see New Zealand greenhouse gas neutral within 20 years. The agency's job would be to meet such a target by manipulating percentages of emissions for which credits are required across all sectors on an annual basis. Just like the Reserve Bank, the agency would have to use clear and open processes to ensure minimal surprises.

Concluding remarks

New Zealand has so far failed to respond adequately to climate change, and our GHG emissions are among the fastest rising in the world. Our ETS has firstly, suffered from not having an inclusive scheme and

leaving out the single most polluting sector. Secondly, it has encouraged irrational approaches to GHG neutrality and unrestricted purchasing of foreign credits in a world where AAUs have been assigned in an uneven fashion across first world nations and where developing countries have tied developmental assistance to credits in ways that further undermine credit trading schemes. However, we could be GHG neutral through a combination of afforestation of our eroding lands and progressive innovation in reducing GHG emissions. With an appropriate ETS design we should expect that the latter would ultimately predominate, but afforestation would buy us time to change.

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