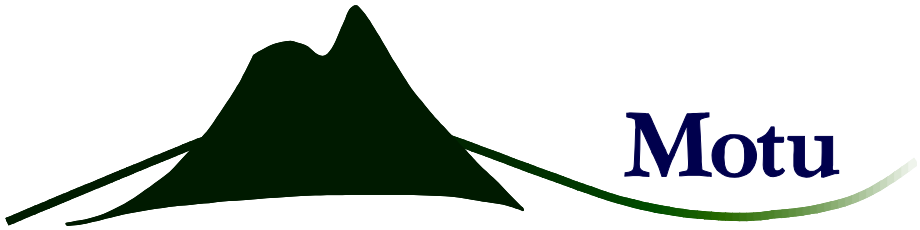

Preliminary Evidence on Responses to the New Zealand Forestry Emissions Trading Scheme

Eric Karpas and Suzi Kerr

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Author contact details

Eric Karpas
Stanford University
ekarpas@stanford.edu

Suzi Kerr
Motu Economic and Public Policy Research
suzi.kerr@motu.org.nz

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Motu Economic and Public Policy Research

PO Box 24390
Wellington
New Zealand

Email info@motu.org.nz
Telephone +64 4 9394250
Website www.motu.org.nz

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Abstract
New Zealand is the first country to implement a Greenhouse Gas Emissions Trading Scheme (ETS) that includes a forestry component as part of its contribution to global climate mitigation and as a strategy for compliance with the international climate change agreement the Kyoto Protocol. The goal of this paper is to provide information on forestry's role in the New Zealand ETS such that a foreign policymaker will be able to understand the intricacies and issues of the New Zealand system and be able to apply this knowledge to the design of his or her own ETS. This paper also aims to provide useful documentation of the system as it stands in 2010 for the New Zealand Parliament to use in future reviews of the system. The paper first provides a brief outline of the role of forestry in New Zealand's ETS, including the reasons for its inclusion in the greater system and the rules by which forestry operates within the system. This paper then analyses these rules, indicating the reasons behind the inclusion of certain provisions where the reasoning may not be immediately clear. Finally, this paper provides both quantitative and qualitative data on how well the system is working so far, whether the system is operating as predicted, and why any discrepancies between predicted and actual outcomes arise.

JEL codes
Q23, Q54, Q58

Keywords
Forestry; emissions trading; carbon trading; climate change; climate change mitigation; government policy; New Zealand

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1. Introduction

New Zealand is the first country to implement a greenhouse gas Emissions Trading Scheme (ETS) that includes a forestry component as part of its contribution to global climate mitigation and as a strategy for compliance with the international climate change agreement the Kyoto Protocol.[1]

The goal of this paper is to provide information on forestry's role in the New Zealand ETS and a preliminary evaluation of the operation and effectiveness of the system in 2010. This could be useful to both foreign policymakers, who will be able to understand the intricacies and issues of the New Zealand system and apply this knowledge to the design of their own ETS, and to the New Zealand government for use in future reviews of the system.

The paper draws on previous literature, official documents, registry and monitoring data, and a set of interviews with a wide range of people involved in the design and implementation of the system: government officials, foresters, carbon market operators, environmental NGOs, and researchers. The paper finds that the forestry ETS is working relatively smoothly from an administrative point of view and a reasonable number of participants have already registered. The inclusion of forestry in New Zealand's ETS has reduced deforestation and changed thinking about management and new planting, but with only limited observable change to behaviour so far. The markets in which units are sold are evolving slowly and linking in predictable ways to international markets.

The key barrier to new planting is uncertainty about international and domestic policies, which drive the value of future carbon credits on which the profitability of new planting depends. Until this uncertainty abates, new planting levels are likely to be low. If long-term carbon prices become firmer, through either an extended or a new international agreement or a linkage to a larger market such as the European Union ETS, foresters are poised to respond on a large scale.

Under the 1997 Kyoto Protocol, industrialised countries (known as Annex I countries) committed to take responsibility for reductions of greenhouse gas emissions relative to a 1990 baseline in order to reduce the level of climate change. Within the Protocol, reductions are encouraged by assigning each country a target level of emissions and a matching assigned

[1] During the process of photosynthesis, forests remove carbon dioxide from the atmosphere and fix it in plant biomass (e.g. the wood and leaves). Thus, forests are carbon "sinks", meaning that they store carbon in a place where it has no significant impact on the climate. However, when a forest is cleared, the carbon is released from the biomass over time and returned to the atmosphere as carbon dioxide, making the forest a source of carbon emissions rather than a sink. Therefore, forests are hugely significant to the global climate system in that their presence and planting can decrease the total greenhouse gas concentrations in the atmosphere, while deforestation and harvesting can increase it.

amount of units representing emissions. They may then choose to sell units to countries that are emitting over their assigned amount, or purchase from countries emitting under their assigned amount in order to match actual emissions to units surrendered. As a result of this trading of units, emissions will be reduced in a more cost-effective manner.

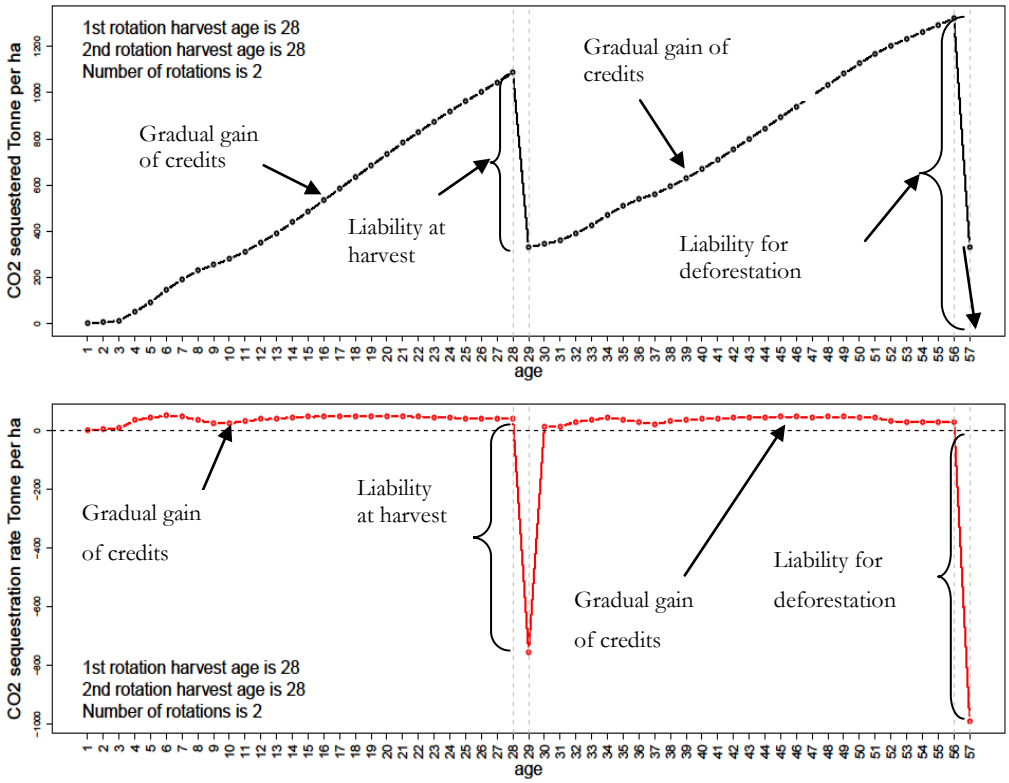
In order to comply with their responsibilities under the Kyoto Protocol, many countries have established or are in the process of establishing domestic emissions trading schemes. New Zealand is the first country outside of Europe to implement such a system.

The reason that New Zealand has included the forestry sector in the ETS is that some of the most cost-effective net emissions reductions in New Zealand may come from reduction of deforestation and/or increased reforestation and afforestation.[2] By incorporating forestry into the ETS, deforestation activity will occur only where it is cost effective to do so, since those who deforest will have to have the proper amount of permits to surrender or else pay the penalties. Moreover, the system rewards those who participate in reforestation and/or afforestation activities "by passing the carbon units earned under the Kyoto Protocol to forest owners" in the form of New Zealand Units (NZUs). [3,4]

In the New Zealand ETS, the responsibilities a forestry participant faces are based on the year of forest establishment and split along the 1990 Kyoto baseline into two categories: pre-1990 and post-1989 forest. Entry of post-1989 forest into the system is voluntary. Post-1989 participants can earn credits from 2008 (the beginning of the first commitment period under the Kyoto Protocol) for the net increases in the carbon stocks of their trees, and they may choose to sell these credits on the carbon market. However, these participants are also liable for any net decreases in the carbon stocks of their forest from 2008 and must surrender credits to the government if there is a net decrease, but only to the extent of the net units issued. If their post-1989 forest land is deforested, they must repay the net units issued to the deforested land. Figure 1 shows a visual representation of this process for a single-age, single-species forest (assuming harvest followed by replanting for rotation one and harvest followed by land use change for rotation two).

[2] Afforestation is the act of planting new forest species on land that has never been in forest (or has not been in forest for a very long time). Reforestation is the replanting of forest species on land that has recently been in forest but is no longer.
[3] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 8
[4] An NZU is New Zealand's carbon credit, equivalent to one tonne of carbon dioxide.

Figure 1: Credits and liabilities over two forestry rotations[5]



On the other hand, pre-1990 participants are unable to earn credits for increases in the carbon stocks of their forest and are not liable for emissions at harvest as long as they do not deforest the land. However, they are liable for any deforestation activity that they undertake. If a pre-1990 forest is deforested, that forest is mandatorily entered into the ETS and participants are liable to surrender credits equivalent to the full decrease in carbon stocks of their forest. There is a one-off free allocation of credits to pre-1990 participants as compensation for losses in land value.

If a forest owner replants their forest after harvest, it is not considered deforestation. However, measures are put in place to prevent foresters from cheating the system by deforesting young, regenerating trees. Thus, when a forest owner harvests and replants their trees, they must let the new trees grow for at least nine years before deforesting. If the forest owner does not wait, they are fully liable for the mature trees that were recently harvested in that area.[6]

Analyses of forestry's impact on climate change and potential policy solutions to take advantage of forestry mitigation opportunities have been performed for more than a decade,

[5] Data taken from the look-up tables provided by MAF in the Climate Change (Forestry Sector) Regulations 2008, Schedule 4.
Note: In the first graph of Figure 1, there is an arrow added onto the end of year 56. This arrow is to show what would happen to the stock in year 56 if the land were not replanted after harvest (stocks would go to nearly zero). Since Figure 1 is a graph showing 2 rotations with the assumption that replanting will occur ad infinitum, the arrow needed to be added in order to correct for the deforestation assumption after period 2.

[6] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 26

with early New Zealand papers such as Maclaren and Wakelin (1991) first identifying the opportunities in New Zealand. More recently, Maclaren and Manley (2010) discuss forestry's potential to offset New Zealand carbon emissions and Kerr et al. (2004) discuss design issues for a forestry component of an ETS.

After an ETS was proposed in government as a possible policy solution to New Zealand's Kyoto responsibility, one of the first papers discussing the forestry sector's involvement in the New Zealand ETS was Kerr and Sweet (2008), which addressed some of the critical logistical issues surrounding forestry, including the risk that allowing foresters some choice over their monitoring regime would lead them to choose the option that provides them the greatest gain and hence to bias in the amount of carbon rewarded, and the costs associated with having many small forest owners as points of obligation. That paper also touched on the issues surrounding free allocation of units to owners of pre-1990 forests, discussing the necessity of compensation for "stranded assets" as a way to address political and equity concerns and, by raising forest sector support for the system, to improve responsiveness.

Evison (2008) discusses the scheme's effect on the profitability of radiata pine and Maclaren et al. (2008) explore the effect on a wider range of species. Both of these studies suggest that carbon forestry has significant potential for profitability with the scheme in place; however, both studies also mention the riskiness of the investment. Evison raises concerns about "the lack of an active market" and Maclaren et al. identify worries about "the absence of a clear policy environment" and "cash-flow difficulties at the time of harvest".[7] These are some of the most relevant issues facing the system today, particularly with regard to the uncertainties that the foresters face. Turner et al. (2008) built on this literature, creating models for forest management under the ETS that incorporated some of these uncertainties and risks, particularly those related to carbon price fluctuations.

Jiang et al. (2009) look at both the New Zealand system and the state of the international carbon market, and their conclusions again address the issue of uncertainty in the system. The paper claims that "the success of NZ's ETS will hinge ... on the emergence of an open, viable, and liquid, international carbon market", adds that this "is unlikely to occur unless parties to the Kyoto Protocol make progress on committing to action beyond Commitment Period 1," and describes the ETS's vulnerability to and reliance on what occurs on the international landscape.[8]

Essentially, the academic landscape with regard to the forestry ETS, prior to the 2009 revision of the scheme by the new National Government, was relatively optimistic despite

[7] Evison, 2008, p. 44; Maclaren et al., 2008, pp. 3, 30

[8] Jiang et al., 2009, p. 19. Moyes (2008) is another article that discusses the New Zealand ETS as a whole.

presenting caveats about the uncertainty in the system. After the 2009 revision to the New Zealand ETS law, however, the academic landscape became slightly less optimistic; Mason (2010) suggests that less new planting, less demand for forestry NZUs, and a slower process of emissions reduction would result from the revised policy. Bertram and Terry (2010) address many of the issues and potential flaws in the system, ranging from worries about future liabilities incurred as a result of present sale of credits to worries about the "uncertainty over [the NZU's] long run value". Their suggestion that "the ETS was a product of necessity ... [that will] soon prove unfit for purpose" implies that in some people's perception the ETS still has many issues that need to be ironed out. By contrast, Maclaren and Manley (2010), on the impact of carbon trading on forest management practices, reaffirm that carbon still has potential for profitability although there is significant price risk under the current version of the law.

Because this is the first time forestry has been included in an ETS and because of the significant international and domestic uncertainties surrounding such a policy, the mere passage of time in these early stages can lead to major shifts in response to the system. Moreover, as time passes, the policy and the environment in which it operates evolve. Amendments to the system in 2009, a weak international agreement in Copenhagen, and the entrance of the industrial and transportation sectors into the system in July 2010 all affect its operation.

This paper uses qualitative and quantitative data to determine what issues are currently of most relevance to those involved with the scheme and how strongly those issues are affecting behaviour. We capture a snapshot of the performance of the scheme as it stands at a time when the market and demand-driven incentives have begun to develop.

The paper first gives background information on forestry and emissions in New Zealand. It then provides a detailed discussion of the forestry ETS rules – responsibilities, mapping and monitoring, and NZU allocation – including explanation of the reasons behind some key choices. This is followed by discussion of predictions of the system's potential, data and interview evidence on the actual performance so far, and outstanding issues that might need further policy or institutional development. We conclude with suggestions for potential complementary policies.

2. The New Zealand Forestry Sector

In New Zealand, forest species fall under one of two categories: indigenous and exotic. Indigenous forest is protected under the Forests Act 1949, which was amended in 1993 in order to halt unsustainable forest management. It promotes sustainable management such that a forest

will "provide the full range of products and amenities in perpetuity while retaining the forest's natural values".[9] Only indigenous forests with sustainable management plans can be logged, meaning that "only single trees and small groups of trees can be felled for timber production" at a given time, rendering these forests mostly invulnerable to felling of trees for logging.[10]

Indigenous forest land is also protected from logging by a voluntary agreement, the New Zealand Forest Accord of 1991, in which major plantation foresters and a group of NGOs agreed that no plantation forestry will occur where there may be damage to indigenous forest species, and any harvesting of such species will be done sustainably. Additional protections for indigenous forest were agreed to in the 2007 New Zealand Climate Change Accord, which was an extension of the 1991 agreement and had provisions such as "avoid[ing] perverse outcomes such as the loss of indigenous forest".[11] As a result of these measures, only about 2% of indigenous forest is available for timber production in New Zealand.[12]

Exotic forest land (that is to say, forest comprised of non-native species) is not protected and is the form of forest land most commonly cleared and most often commercially harvested. Of the exotic species, radiata pine is the dominant species and makes up approximately 90% of the forest cover.[13] Douglas fir makes up 6% of the forest cover, and the remaining 4% is composed of a set of miscellaneous species, none of which is particularly common. Generally, exotic forest species are grown commercially for approximately 25–32 years and then they are cut down. In total, forestry contributes approximately 1.1% of New Zealand's GDP.[14]

2.1. The Integral Role of Forestry in New Zealand's Greenhouse Gas Budget

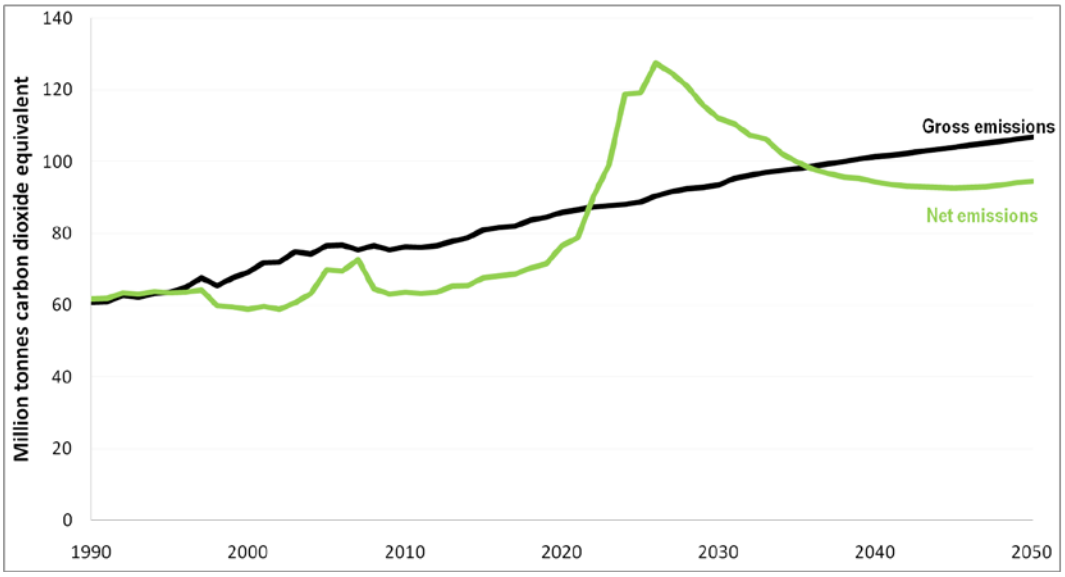
New Zealand relies heavily on forest carbon sequestration as a mode of compliance with the Kyoto Protocol. In 2009, a quarter of New Zealand's gross emissions (17.3 million tonnes of carbon dioxide equivalent CO_2-e) were offset by forestry sequestration.[15] New Zealand's existing post-1989 plantation forests are expected to sequester 89.3 million tonnes of CO_2-e over the first commitment period; New Zealand's assigned amount for this same period is 309.6 million tonnes.[16] This sequestration is nearly enough to offset New Zealand's growth in emissions since 1990.[17] These sequestration numbers do not take into account any behavioural changes since the implementation of the ETS in 2008. In comparison, the entire European Union (as of 2003) was

[9] Forests Act 1949, s2.
[10] New Zealand Ministry of Agriculture and Forestry, 2011
[11] Environment and Conservation Organisation of Aotearoa New Zealand, 2007
[12] Raison et al., 2001, p. 187
[13] New Zealand Ministry of Agriculture and Forestry, 2010d, p. 2
[14] New Zealand Treasury, 2010
[15] New Zealand Ministry for the Environment, 2011b
[16] New Zealand Ministry for the Environment, 2011c
[17] Ministry for the Environment, 2009

predicted to sequester only 19.2 million tonnes of carbon over the course of the first commitment period.[18]

As Figure 2 also shows, this happy state of affairs is unlikely to continue in business as usual. Because of the uneven age-class structure of New Zealand forests, a large amount of harvesting around 2020 will make New Zealand forests a net source before growth in replanted forests makes them a sink again.

Figure 2: New Zealand's total and net greenhouse gas emissions and removals (historical and projected as measured under Kyoto), 1990–2050[19]



With current low forestry profitability, new planting is close to zero. Only carbon payments could induce the high levels of new planting that would change this projection of high forestry emissions to one where forestry continues to positively contribute to New Zealand compliance. If there were no uncertainty, under the current ETS and with a carbon price of $20, some estimates suggest that new forestry could by 2015 additionally offset all agricultural emissions, or nearly 50% of gross emissions.[20]

2.2. Indigenous Peoples and the Forestry Sector

Starting in the 1980s, the New Zealand government began to settle outstanding Treaty of Waitangi claims with Māori, New Zealand's indigenous population.[21] The land returned to Māori was largely publicly owned and often forested. In some cases, "people who [were] cash poor

[18] European Commission, 2003, p. 28
[19] Data sourced from New Zealand Ministry for the Environment, 2009. Additional data were also provided by the Ministry for the Environment.
[20] Kerr, 2010
[21] The Treaty of Waitangi (1840), considered New Zealand's founding document, established a partnership between the Crown and Māori iwi. It made provision for British settlement and governance while protecting Māori property rights. Critical differences between the Māori- and English-language versions of the original document and breaches of the Treaty by British settlers led to the foundation in the 1970s of the Waitangi Tribunal. Its role is to investigate claims brought by Māori of breaches of the Treaty, and to make recommendations for recompense. The government began settling these claims in the 1980s; the process is ongoing (Waitangi Tribunal, 2011a and 2011b).

[became] asset rich", and since some of the land granted would be more profitable if it were used for agriculture rather than forestry, there is a strong incentive for some Māori to deforest some areas.[22]

2.3. Other Values of New Zealand Forest

New Zealand forests, especially indigenous species, have many other values to New Zealand citizens that go beyond industrial use and use as a carbon sink. Firstly, the tourism industry is an important sector in the New Zealand economy. Tourism directly and indirectly contributes approximately NZ$15 billion (9.1%) to the country's GDP, and is responsible for 184,800 jobs (9.6% of the workforce).[23] Much of this tourism is fuelled by New Zealand's "clean, green" image and "100% Pure" brand. As a result, the tourism revenue is strongly reliant on the survival of New Zealand's unique indigenous forest species, as well as on New Zealand's image as an eco-friendly country.

New Zealand's forests are also integral to the protection of the environment, the prevention of soil erosion, and preservation of water quality. Water quality protection is particularly important to New Zealand. Forests protect water quality by blocking sediments and taking up nutrients that may enter bodies of water and cause problems, such as eutrophication, that diminish water quality. Recently many forests in New Zealand have been cut down to convert the land to dairy, which is very nutrient intensive. As a result, a number of water bodies are under threat of quality degradation due to the double hit of fewer trees and increased nutrients.[24]

The indigenous forests also have strong cultural significance, especially to Māori, who have traditionally used the forests for sustenance, including food and medicine, and as "significant spiritual domains".[25] Thus, indigenous forests have existence values for New Zealanders.

3. Forestry in the New Zealand ETS, the Rules That Surround It, and the Reasons for These Rules

This section details the main features of forestry in the New Zealand ETS, and explains the reasoning behind the inclusion of certain rules in the system. It begins with the context of the Kyoto rules and explains how the system categorises forest, the basic rules behind who gets

[22] Gauntlett, 1998
[23] New Zealand Ministry of Tourism, 2010
[24] Parliamentary Commissioner for the Environment, 2009a, pp. 95–107
[25] Manaaki Whenua Landcare Research, 2010, p. 7

credits and who faces liabilities, the rules behind the mapping and monitoring of carbon stocks, the rules behind the physical allocation of credits, and how the New Zealand system links to the international system. More rules that may be useful to know, such as penalties for non-compliance and how credits are treated under tax law, can be found in the Appendix. For further information on the structure of the program, consult the New Zealand Ministry of Agriculture and Forestry (MAF)'s *A Guide to Forestry in the Emissions Trading Scheme* or the New Zealand Climate Change Response Act 2002 and the Climate Change (Forestry Sector) Regulations 2008.

3.1. Relevant Rules of the Kyoto Protocol

New Zealand's system is embedded in the Kyoto Protocol and is heavily influenced by its rules. After 2012, some of these commitments and rules may be changed. New Zealand has agreed to take responsibility for limiting its annual net greenhouse gases to 1990 levels during the first commitment period, 2008–2012, or purchase units from other countries to cover any excess. "[P]romotion of sustainable forest practices, afforestation, and reforestation" is one acceptable method of reducing domestic net emissions. [26] Kyoto is essentially a global, intergovernmental emissions trading scheme with Assigned Amount Units (AAUs) as the basic international unit. Under the Kyoto Protocol, each country receives a certain number of AAUs and must either reduce emissions or trade so that they emit, on net, at or below the amount of greenhouse gases that they have AAUs to cover. Currently, New Zealand's annual allocation of AAUs is equivalent to New Zealand's gross emissions in 1990.[27] The complex forestry rules that apply to New Zealand's international compliance are based on Article 3.3 of the Kyoto Protocol:

> The net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period, shall be used to meet the commitments under this Article of each Party included in Annex I. The greenhouse gas emissions by sources and removals by sinks associated with those activities shall be reported in a transparent and verifiable manner and reviewed in accordance with Articles 7 and 8.[28]

[26] United Nations Framework Convention on Climate Change, 1998, p. 3
[27] New Zealand Ministry of Agriculture and Forestry, 2010b
[28] United Nations Framework Convention on Climate Change, 1998, p. 3. The Intergovernmental Panel on Climate Change (2003) elaborates on this.

The other key component of the Kyoto rules is the "fast forest fix":

> Carbon accumulated between 1990 and 2008 as a result of afforestation/reforestation activities is not credited within the 2008–2012 accounting period. However, at the time of harvest, if all carbon stock changes had to be accounted for, this would result in debits resulting from harvesting for land afforested/reforested since 1990 being greater than credits accounted for on that unit of land. For the first commitment period, this was addressed with the Afforestation/Reforestation Debit Rule (Fast forest fix). This rule ensures that activities that increase carbon stocks relative to 1990 are not counted as debits under Article 3.3.[29]

This rule is particularly relevant to New Zealand because its forests can be harvested at a young age.[30]

3.2. How does the New Zealand ETS Categorise Forests, and What Responsibilities Do Participants of Different Types Face?

As well as indigenous and exotic, New Zealand's forests are split into two further categories, determined by the year that the forest was first established: pre-1990 and post-1989.

3.2.1. Baseline Years: Distribution of Costs and Benefits

In an ETS, the choice of baseline year dividing forest that incurs only liability from forest that is eligible for credit is a decision that has massive implications for the distribution of costs and benefits. It is equivalent to the initial allocation of units in a cap and trade system.[31] The earlier the baseline for forests to receive credit, the higher the benefits for foresters and the higher the costs for the government, since the government will have to provide credits to a larger area of forest and will get payments for deforestation liability on a smaller area, while the forestry sector has a larger area of forestry that is eligible to receive credits and less liability.

It would have been possible to provide credits only for forests planted after 2008 while still holding foresters liable for deforestation of forests that existed in 1990. This would have

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[29] New Zealand Ministry for the Environment, 2008, unpaginated. Section 4.2.5.3.2 of the IPCC's *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (2003), "Harvesting of Afforestation/Reforestation lands during the commitment period," states that it is good practice to identify the afforestation and reforestation lands on which harvesting occurs during the first commitment period, and to track the amount of credits received previously for these lands. This way the debits for harvesting on afforestation and reforestation lands can be limited to the amount of credits received previously for the same land.

[30] If the fast forest fix is not extended beyond 2012, some forests that are harvested will face net costs.

[31] A baseline could be set by assigning a counterfactual level of forest if a regulator was able to predict reforestation or deforestation at a property level with any accuracy. Using a specific year creates an implicit counterfactual that any forest that exists at that point will remain forever, while no new forest would be planted after that year. This is clearly unrealistic for a 1990 baseline – there has always been some deforestation of existing forest and there were high levels of new planting without a carbon reward. However even if a regulator knew the aggregate levels of deforestation and replanting with certainty , which is not feasible, applying these average levels of deforestation and new planting to specific pieces of land is extremely difficult. A 3% deforestation rate on land that is harvested each year would require that the regulator identify which 3% of forest land will not be replanted. Similarly, if the regulator knew there would be 60,000 hectares of new planting, it could occur on any currently non-forested land across New Zealand. Regulators are unable to predict the location of change with any accuracy.

minimised the government's devolution of credits but would also have meant that the government would have retained liability for the harvest of forests planted between 1990 and 2008. Owners of forests planted between 1990 and 2008 would also have had no incentives to change management of their forests, including deciding not to extend rotation or not to harvest. If most of these forests were harvested (which they would be with no carbon returns), the net value of the devolved credits and liabilities in the long term would not be that high. Thus, the government does not lose much by devolving credits and liabilities.

Considerable political pressure was applied to encourage the government to offer to devolve all credits (and liabilities) for forests planted post-1990. For forest that will not be harvested (which could be a lot in a devolved system if carbon prices are high) this carbon has considerable value. For rotation forests planted in the 1990s, the value is much smaller, because of the offsetting liabilities. According to Peter Weir of Ernslaw One (a large forestry company), the New Zealand government chose to maintain the Kyoto Protocol 1990 baseline in the domestic ETS because it was the baseline associated with the least economic and political cost. By mimicking Kyoto, the government had a baseline that was easily justifiable to UN auditors as well as to domestic constituents.[32]

More pressure was applied to not hold landowners liable for deforestation on land that was in forest in 1990, with much concern about the arbitrary nature of the date. Some specific tracts of land suffered significant losses and their owners were particularly vocal, but the government resisted pressure to accept liability. It was concerned about the potential for forestry companies to move forest so that it could claim credits on new forest without facing liability for the old forest. Owners of pre-1990 forest would also have liked a date earlier than 1990 for the credits and liabilities. However, under current Kyoto rules this would have imposed a further net cost on government as well as creating data issues (identifying whether land was or was not forested before 1990).[33]

Although the "artificial"[34] and "arbitrary"[35] choice leads to some inequities, many recognise that "policy is about drawing lines in the sand"[36] and that "any year would be arbitrary".[37] Thus, it seems that people do not find the 1990 choice to be a major problem with the policy. It is certainly notable that an issue with such large distributional implications has

[32] Interview with Peter Weir of Ernslaw One, 22 July 2010. In fact the UN auditors should have no interest in our domestic policy baseline – they are concerned only about our Kyoto compliance.
[33] Interview with David Rhodes of Forest Owners Association, 21 July 2010
[34] Interview with Phil Taylor of Blakely Pacific, 12 August 2010
[35] Interview with Alex Thompson of Parliamentary Commissioner for the Environment, 5 August 2010
[36] Interview with Phil Taylor of Blakely Pacific, 12 August 2010
[37] Interview with Alex Thompson of Parliamentary Commissioner for the Environment, 5 August 2010

come to be so resolved in the public mind – a sign that the government's strategy in selecting 1990 to reduce costly argument over the baseline date was successful.

3.2.2. Indigenous, Pre-1990 Forest

Indigenous forests that have been determined to be established prior to 1990 are not included in the ETS. MAF justifies this on the basis that carbon stocks in these forests have been determined to be in a "steady state overall".[38] This seems unwise because the application of the ETS to exotic forestry but not to indigenous forests could put indigenous forests at risk of deforestation.[39] However, because of their age the forests are mostly protected by the Resource Management Act, the Forest Accord and the Forests Act 1949, and thus are relatively invulnerable to deforestation. Because they were planted before 1990, New Zealand cannot earn credits for increasing these indigenous forest carbon stocks under the Kyoto Protocol, so there is no benefit to including them.[40]

3.2.3. Exotic, Pre-1990 Forest

Like the indigenous forests, pre-1990 exotic forests also cannot earn credits for increased stocks because of the Kyoto Protocol.[41] However, unlike the indigenous forests, since there are no controls over exotic forests such as the Forests Act or the Forest Accord, the pre-1990 exotic forests do incur a liability to the landowner if more than two hectares is deforested in any given five-year commitment period. If the landowner goes over the two-hectare limit, they mandatorily enter into the ETS as a participant and must surrender NZUs equivalent to their emissions from deforestation.

All types of forest covered by the ETS were entered together in 2008, as early as was politically possible given the timing of New Zealand's Kyoto Protocol commitments, and before other sectors. The reason for this was that landowners have considerable control over the timing of deforestation. If a landowner is anticipating a large liability if they clear their land after the ETS commences, they have a strong incentive to clear land before this. Ideally, forestry would have been liable for deforestation from the date of the announcement, to avoid this perverse incentive.

[38] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 8
[39] Conversion to plantation forestry is the main threat to scrub land. Between 1996 and 2002, nearly all scrub that was cleared was converted to exotic forest.
[40] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 8
[41] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 9

A pre-1990 participant can apply for one of two exemptions to the ETS: the tree-weed exemption[42] or the 50-hectare exemption.[43] If they are granted these exemptions they are free from liability for deforestation.

3.2.4. Post-1989 Forest

For post-1989 forest, both exotic and indigenous forests fall under the same rules in the ETS. Indigenous forest is still protected by the Forests Act, but technically under the ETS there is no distinction between the policies regarding the two types of forest if they were grown post-1989.

Entering a post-1989 forest into the ETS is voluntary. A participant may choose to enter all, some, or none of their forest into the system. If a post-1989 forest enters the ETS, then it may receive NZUs for any net increase in carbon stocks from period to period and is also liable for any net decrease in carbon stocks below the last reported value of the total carbon in that participant's forest land. If a post-1989 forest is not entered, it faces no liability for deforestation.

A post-1989 forest may be entered into the system after 2012, but the landowner will receive credits only for carbon sequestered after 2013.[44] The Kyoto "fast forest fix" is built into the New Zealand system. It limits the liability of a forest participant to the amount of NZUs previously granted (net any that a participant has already surrendered to the government) for a given Carbon Accounting Area (discussed below). This would initially seem to be an odd policy in that a forest participant can enter some post-1989 forest into the system, grow it out over the course of a return period and obtain credits for it, and then harvest it without full liability. This means that the participants might harvest inefficiently early.[45]

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[42] One exemption to mandatory participation in the ETS for deforesting pre-1990 land is if the deforestation activity is for the purpose of the removal of "tree weeds". Tree weeds are defined as trees that inhibit the growth of other species or the health of the ecosystem. A prominent example of these tree weeds are the "wilding pines" found in certain areas of New Zealand. These groups of pine species tend to prevent the regeneration of native forest floor species, compete with native trees and plants that have been known to provide valuable ecosystem services, and are seen as "visually intrusive" in the places where they invade (New Zealand Department of Conservation, 2010). They also spread very far and very rapidly; seeds of wilding pines can travel up to 30 km (interview with Alex Thompson of Parliamentary Commissioner for the Environment, 5 August 2010). This makes their invasions difficult to control, as the seeds can grow on land far from the parent tree. As a result, it is difficult to know whose trees the seeds came from and who is liable to remove them. The New Zealand government included this exemption because certain areas of the country such as the Marlborough Sounds have taken great steps to control and reduce the spread of these wilding pine species, and without the exemption the ETS could greatly undermine these efforts by imposing a liability on those who cut them down (Climate Change Response Act, 2002).

[43] Another exemption for which a participant owning exotic, pre-1990 forest may apply is when the participant owns a total of less than 50 hectares of pre-1990 forest land. If the forest land is controlled jointly between two or more people, none of the parties controlling the property "at that time is permitted ... to have owned more than 50 hectares of pre-1990 forest land. For calculation purposes, each ... [party's] proportionate interest is treated as a divided interest"(New Zealand Ministry of Agriculture and Forestry, 2010b, p. 29). This exemption was included in the ETS by the New Zealand government because "the compliance costs for including very small pre-1990 forest holdings within the emissions scheme exceeds [sic] the benefits of doing so" (New Zealand Parliament, 2009). Note that this applies only to exotic forests; all pre-1990 indigenous forests are automatically excluded from the ETS.

[44] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 8

[45] But from a climate point of view only. New Zealand as a whole does not bear this liability under international rules. The foresters gain full credit for increases in carbon stocks after harvest.

In the context of a voluntary system, this waiver of liability increases efficiency by increasing generosity and thus increasing opt-in.[46] It reduces the penalty to forest participants who enter immediately with older existing forests. Otherwise they might decide instead to hold plots of forest land out of the system until after harvest and some potential gains through optimal management of carbon would be lost. It has little cost to government because the alternative would be that they gain the credits and bear the limited liability – foresters would be unlikely to opt in with full liability for existing forests.

Criteria for a post-1989 forest

Forest can be classified as post-1989 under the following three conditions:

- The land was not in forest on 31 December 1989, and was afterwards established as forest land;
- The land was in forest on or before 31 December 1989, was deforested before 1 January 2008, and then was later reforested;[47] or
- The land was in forest on or before 31 December 1989, was exempt from ETS rules and deforested after 31 December 2007, then was later reforested – provided any liability has been met. [48]

Table 1: Summary of rights and obligations

	Pre-1990	**Post-1989**
All forests	• Not eligible for credits	• Voluntary participation • Receives credits for sequestration • Liable for net decrease in carbon stocks
Indigenous	• Protected under Resource Management Act, Forests Act and Forest Accord	• Poorly protected under Forests Act and Forest Accord

[46] For formal analysis of this issue see van Bentham and Kerr, 2010
[47] This is done so that those who have deforested pre-1990 land prior to the entry of the forestry ETS into force in 2008 have an incentive to reforest this land (since if it were to be reforested and classified as pre-1990 land, they could not earn credits for it and would not spend the money to replant it). New Zealand will not receive Kyoto credits for this land.
[48] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 12

	• No liability for deforestation	
Exotic	• Mandatory participation if deforestation occurs • Liable for deforestation • Receives compensation credits	

3.3. Points of Obligation

The party that is the point of obligation for the ETS is liable for any deforestation or decreases in carbon stock. For post-1989 forest, the point of obligation is also the person who receives the credits for increases in carbon stocks. The underlying principle in identifying the point of obligation is that the party that controls the use of the land should be the point of obligation. It is their behaviour that the system aims to influence. Those with legal control are also easily identifiable for legal purposes.

3.3.1. Pre-1990

For pre-1990 land, the person who is considered the point of obligation is the owner of that land, unless another party "has control over forestry land and the landowner cannot control that deforestation".[49] This situation may occur, for example, in a scenario where there is a registered lessee on the land, and the lease allows the lessee to change land use.[50]

3.3.2. Post-1989

For post-1989 land, the person considered the point of obligation is usually the landowner. However, it may also be a registered lessee, the holder of a registered forestry right,[51] or a party to a Crown Conservation Contract.[52] If there is a registered lease or a registered

[49] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 8
[50] A "registered lessee", in relation to the Land Transfer Act 1952 or the Deeds Registration Act 1908, is a person who has purchased a lease on the land.
[51] A "registered forestry right" is when somebody owns the right to the forest on a certain plot of land, but does not own the land itself. This right is governed by the Forestry Rights Registration Act 1983.
[52] A Crown Conservation Contract is an agreement with the government to aid the sequestration of carbon on post-1989 forest land managed by the government under the Conservation Act 1987.

forestry right on the land, then permission from the landowner must be obtained before the lessee or the owner of the forestry right may be registered as a participant in the system, and vice versa.

3.3.3. Public Information about Liabilities

Some market players have expressed concern that liabilities for ETS credits may, under some special circumstances, fall on landowners who are unaware of this risk.

One possible source of this uncertainty occurs at the time land is purchased. The public can find out whether all or part of the land within a land title is subject to the Climate Change Response Act by searching land titles through New Zealand's Land Information System, which is operated by Land Information New Zealand. A landowner of any post-1989 forest land in respect of which the holder of a forestry right or lease, or party to a Crown Conservation Contract, is a participant, or a prospective transferee, holder of a forestry right or lease, or party to a Crown Conservation Contract, who has the consent of the participant, can then apply for further information on the land through MAF. A *caveat emptor* regulatory position is taken with purchasers of land; they are expected to investigate these forestry liabilities themselves.[53]

3.4. Mapping Forest Land and Measuring Carbon Stocks

3.4.1. Mapping Forest Land and Defining Carbon Accounting Areas

When a post-1989 forest enters the ETS or a pre-1990 participant deforests and submits an emissions return, the participant is required to provide a shapefile, which is a digital map that delineates a participant's area of forest land.[54] In a shapefile, which is formed from a satellite or aerial image, the participant uses an online mapping tool provided by MAF to map virtual polygons around the shape of their forest. Polygons may contain only pre-1990 or post-1989 forest. Where the boundary is unclear (for example, the two types of forests share a border area where both types may be found), the ambiguous area will be split down the middle by the edge of the polygon. The participant then submits the shapefile to MAF, who will use it to determine future changes in carbon stocks.

For post-1989 participants, there is one more step before submission of the shapefile: the participant must choose how to define their Carbon Accounting Area (CAA). A CAA is the

[53] Some market players also expressed concern about another potential source of liability uncertainty. If a lessee became a participant in the ETS (with the permission of the landowner, as is required) and collected units for carbon sequestered as trees grow on the leased land, but then went bankrupt or was otherwise unavailable to bear liability, they were concerned that the liability would transfer to the landowner. This is not the case, however: the debt is treated as an unsecured debt to the Crown, and the Crown takes the normal debt recovery actions. In 2011 MAF released a guide on land transactions in the ETS that is intended to clarify issues of liability when ETS land is transacted, which is available from www.maf.govt.nz/forestry/forestry-in-the-ets under Additional Resources.

[54] New Zealand Ministry of Agriculture and Forestry, 2009

basic unit of carbon accounting; the stocks in each CAA are measured at the end of each period, and total liabilities and credits are determined and recorded for each CAA. A CAA may be comprised of one or more polygons, and which polygons go in which CAAs can be arranged in any way that the participant wishes.

This participant's-choice model of CAA assignment was done in order to allow for added flexibility and for individual circumstances to be taken into account. Some people may want the simplicity of having just one CAA to manage. Others may want instead to group their CAAs by characteristics such as age.

Another consideration landowners may want to take into account is liability. Since a participant's maximum liability is capped at the number of NZUs previously allocated to a given CAA, the participant may want to organise their CAAs so as to "maximise the benefit of the liability cap".[55]

3.4.2. Measuring Carbon Stocks

Carbon stocks will be reported at the beginning and at the end of each emissions return period so that MAF can assess the change in stocks and the necessary liabilities and credits to be given out.[56]

Currently, New Zealand uses look-up tables to determine the stocks of carbon in each forest. In the look-up table system, "well-established forest growth modelling techniques" are used to approximate the amount of carbon stored in forest biomass for a given forest species at a given age in a given location. These approximations are then provided in a series of tables that participants use to approximate the total stocks in their forest. For the New Zealand ETS, tables are available for radiata pine, Douglas fir, exotic hardwoods, exotic softwoods, and indigenous forest. Especially in the case of indigenous forest (where many species are generalised under one category), this system has a high margin of error which can result in significant under-reporting or over-reporting of stocks. However, until the field measurement approach has been finalised, this is the most accurate tool available and establishes a useful default amount of carbon stocked in a given tree of a given age in a given location.[57]

There are two key reasons why the look-up tables are a particularly useful approach for measuring carbon stocks. First, they are incredibly cheap to maintain and to use. Second, they make it impossible to manipulate the system; there is a specific number of credits that a person

[55] New Zealand Ministry of Agriculture and Forestry, 2009, p. 18
[56] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 13
[57] New Zealand Ministry of Agriculture and Forestry, 2010c, pp. 6–8. Location is limited to region and only varies for *Pinus radiata*.

may claim for a given species in a given place at a given age, and these numbers cannot be tinkered with by forest owners.[58]

MAF is currently developing a field measurement approach to determine carbon stocks. This will involve more individualised on-site calculations that will boost accuracy of the measuring of carbon stocks.[59] It will provide incentives to change forest management and will better target high carbon sequestration locations for new forests.[60] Although it will be more costly than the look-up table approach, the increased accuracy benefits are predicted to outweigh the extra cost in the case of larger plots of land.

As a result, the field measurement approach will be mandatory once per commitment period for participants with more than 100 hectares. Participants with less than this threshold must continue to use the look-up tables. Look-up tables will still be used to measure deforestation in pre-1990 forest. If voluntary use of the field measurement approach was allowed for small forests it would create an adverse selection problem; it is likely that only those who stood to gain from using the field measurement approach would do so. The look-up tables (excluding indigenous) are generally unbiased; if they were conservative, the adverse selection would be less likely to create overall bias and more people would be encouraged to use the more accurate field measurement approach.[61] Implementation of this approach will commence in September 2011.[62]

3.5. How are NZUs Allocated?

3.5.1. Post-1989 Forest

Once a post-1989 forest is registered in the system, the participant in control of that forest will be granted NZUs based on the net increase in carbon stocks in that forest during the time between the submission of each emissions return. Credits will be granted only for increases in stock from the beginning of 2008.

Voluntary emissions returns may be filed between the first of January and the thirty-first of March each year.[63] A mandatory emissions return must be filed at the end of the first commitment period, and be submitted between the first of January and the thirty-first of March 2013. Credits for net increases in stocks will be delivered to a participant's account within two

[58] Some small foresters could alter the age slightly if records are poor but there is little Kyoto forest in the younger age classes that might benefit most from this.
[59] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 15
[60] Manley and Maclaren, 2010
[61] Information provided by Peter Gorman, MAF Sustainable Programmes.
[62] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 19
[63] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 19

weeks of submitting the return, and credits for net decreases in stocks must be surrendered within 20 working days of filing the return.[64]

3.5.2. Pre-1990 forest

In order to compensate pre-1990 forest landowners for the loss in value of their land as a result of the ETS, these landowners will be given a free allocation of NZUs (unless they have been granted an exemption from liability).[65] In order to receive this allocation they do not have to participate in the ETS, but they must provide "verifiable information" about their landholdings. They also must have an account with the New Zealand Emissions Unit Register (NZEUR), which is the central registry where NZU accounts are held and through which NZUs may be transferred between parties or surrendered to the government.[66]

Allocation of NZUs for pre-1990 forest will be free and will occur in two tranches. In the first tranche, which will occur before the end of the first commitment period (31 December 2012), 38% of a given participant's allocation will be granted. In the second tranche, which will occur after 31 December 2012, the remaining 62% of the allocation will be granted. This two-tranche system was chosen because the government believes that there is a possibility international rules may change to allow offsetting after 2012, thus causing the ETS's impact on pre-1990 land values to decrease.[67] This would allow the government to reduce the allocation in the second tranche and thereby cut costs.

The amount of units that will be allocated to each pre-1990 participant will be determined by the pre-1990 Forest Land Allocation Plan. This plan was finalised at the beginning of July 2010 and came into force on 20 July 2010. There will be three levels of allocation:

- 18 NZUs per hectare for any land that is or was Crown Forest Licence[68] land transferred to Māori under a treaty settlement on or after 1 January 2008,
- 39 NZUs per hectare for any land that was transferred on or after 1 November 2002, or to a body corporate prior to this date where there have been changes in ownership (including beneficial ownership)[69] since acquiring this land, and

[64] There is no limitation on how many NZUs the government will give out for post-1989 forest; however, the government has the ability to regulate procedures for transactions involving approved overseas units (Climate Change Response Act 2002, s30G).
[65] Note that if landowners apply for a free allocation of allowances they must join the ETS, and if they apply for an exemption then they are barred from any free allocation. Both application processes are handled by MAF, which ensures that this condition is not broken.
[66] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 10
[67] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 28
[68] A Crown Forest Licence is an arrangement where government-owned land is licensed out to a commercial foresting firm that will control all business operations.

- 60 NZUs per hectare to any group to whom the above categories do not apply. [70]

The Pre-1990 Forest Land Allocation Plan was not unveiled with the rest of the forestry ETS because of a number of points of contention. The first concerned the distinction between 39 and 60 NZUs per hectare and what constitutes a transfer of ownership. The distinction between 39 and 60 was put in place by the government because as of 1 November 2002, the government claims to have announced their intention to regulate deforestation. As a result, the government believes that people involved in transactions for forest land after that date could have reasonably incorporated this into the price of the land. However, this situation does not take into account land transfers that occur which do not involve a purchase or sale, such as the transfer of land to a family member as part of an inheritance. Under the initial plan, a transfer such as this, which does not involve sale or purchase (and therefore does not incorporate emissions controls into the value of the land), would still have caused the allocation to be reduced to 39 NZUs per hectare. These provisions are corrected for in the current plan and are no longer a point of contention.

Another hotly contested issue was the 2002 date, at which the law assumes that people purchasing forest land would have been able to incorporate the future regulations into the price. However, according to forest owners, the likelihood of knowing about future regulation in that year was very small; the only evidence of future policy change available at that time was a press release by the then-minister Jim Anderton.[71] Furthermore, Treasury papers written in 2005 indicate that there was still significant government uncertainty in how forestry regulations would be handled;[72] a carbon tax was still a likely option for a long time past 2002, and if that regulation had been passed instead of the ETS it would not have included forestry.[73] This date was not changed in the Order that has come into force and remains contentious.

3.6. How is the New Zealand ETS Linked to the International System?

NZUs are directly convertible on a 1-to-1 basis to New Zealand AAUs assigned under the Kyoto Protocol. Total registry holdings of AAUs are subject to the rules of the Commitment Period Reserve.[74] The Commitment Period Reserve is a rule set in place by the Kyoto Protocol which states that during the commitment period of 2008–2012 no country may sell AAUs such that their holdings are below 90% of their 1990 emissions baseline, or such that their holdings

[69] "Beneficial ownership" is when a person has all of the benefits of ownership of an asset but is not technically the owner of the asset itself. For example, an older, retired forest owner may give another person the rights to handle that forest as if they were an owner although that person does not actually hold title to that forest.
[70] Climate Change (Pre-1990 Forest Land Allocation Plan) Order 2010.
[71] Interview with Peter Weir of Forestry Company Ernslaw One, 22 July 2010
[72] Interview with David Rhodes of NZ Forest Owners Association, 21 July 2010
[73] Interview with Geoff Keey of Greenpeace, 28 July 2010
[74] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 7

fall below five times their most recently reviewed inventory of units (whichever is lower).[75] This rule was put in place so that in this experimental and early stage of the agreement when there is no effective international penalty for non-compliance, no country sells so many units as to drive themselves into non-compliance either deliberately or by mistake.[76]

Section 18CB of the Climate Change Response Act further restricts the exchange of AAUs with NZUs, stating that no "imported AAUs", which are AAUs allocated through Kyoto to a party other than New Zealand and purchased by a New Zealand entity, can be surrendered to meet ETS obligations by a participant. This provision has been put in place for two reasons: first, the European Union's ETS does not allow AAUs to be surrendered, so if in the future the New Zealand system were to link with the EU system, having this provision allows the two to be compatible.[77] Second, there is a perception that certain countries' AAUs do not have environmental integrity due to "hot air"[78], so the government inserted this provision as a compromise with the concerned Green Party.[79] Further regulations related to this section of the law will in the future allow for the trading of some types of imported AAUs, but as of July 2010 no action has been taken to ease this restriction.[80]

Certified emission reductions (CERs) from Clean Development Mechanism (CDM) projects may be surrendered despite environmental integrity concerns, but tCERs and lCERs (temporary and long-term credits from CDM afforestation projects) may not be surrendered. Emission reduction units (ERUs) from joint implementation projects may be surrendered.[81,82] Essentially, overseas assigned-amount units and international forestry units are disallowed, but project-related Kyoto units are allowed. Thus the NZU price should be closely related to CER and ERU prices.

4. Some Initial Predictions of System Performance

4.1. Predictions of Participation

If a forester takes the most conservative position with respect to the sale of carbon credits, no post-1989 forest can lose by participating in the program (excluding the administrative costs, which are not inconsiderable for small foresters). Some may, however,

[75] United Nations Foundation for Convention on Climate Change, 2001. Or see Baron (2001) for a discussion of the decision, its workability and implications.
[76] Baron, 2001, p. 6
[77] Phone Conversation with the Ministry of the Environment, 19 July 2010
[78] "Hot air" is a phrase used to describe a scenario in which a country is given more emissions trading units than their emissions would be under business as usual, such that the trade of these units increases global emissions – though not relative to the levels negotiated in Kyoto. These concerns are most closely tied with former Eastern Bloc countries.
[79] Phone Conversation with the Ministry of the Environment, 19 July 2010
[80] Phone Conversation with the Ministry of Economic Development, 15 July 2010
[81] For discussion of "joint implementation" see Kerr and Leining (2004).
[82] Nuclear-based CERs and ERUs are also unable to be used (Climate Change (Unit Register) Regulations 2008).

benefit more by delaying participation until after harvest because of the fast forest fix. Moreover, the carbon benefits from most existing post-1989 forests are only temporary because most were planted well before 2000 and the carbon stock in 2008 was already higher than the "safe" level to which it drops after harvest. Small foresters can only benefit from this temporary sequestration without risk if markets are sophisticated.[83]

There is a very wide range of predictions of what the total participation in the forestry ETS will be in commitment period one. David Rhodes of the Forest Owners Association speculates that 80% of people who can register their forest land will register their forest land, since "you can't play if you're not in the game".[84] However, Peter Weir of Forestry Company Ernslaw One speculates that only 25% of people who can register will register.[85] An A C Nielsen survey commissioned by MAF predicted that 37% of post-1989 forest land will be registered into the system before 2012.[86] The survey also found that an additional 20% of forest land may be registered after 2013, and 4% of land is unlikely ever to be registered. For 38% of the remaining post-1989 forest land, whether or not it will join is uncertain. A more difficult issue is how many new participants will enter forestry and how much new planting and management change the system will induce.

4.2. Predictions of New Planting and Changes in Management

The New Zealand government expects an increase in planting of post-1989 forest, better management of existing post-1989 forests so that sink efficiency is improved, and a significant decrease in deforestation of pre-1990 forest.[87]

The reasons for these expectations can be made clear with an illustration: without an ETS, a new forest in the Central North Island would have an expected net present value (NPV) of approximately $3000 per hectare, where value comes solely from the sale of logs. In contrast, under the ETS with a constant NZ$25 per tonne CO_2-e price, this same piece of new forest would have a NPV of approximately NZ$5900 per ha.[88] If instead the forester expected carbon prices to increase in real terms over time, this NPV would be even higher: if the price of carbon increased at 8% per year, the forester could earn an NPV of $8300. Thus, forestry becomes much more profitable with an ETS and foresters are expected to respond by planting new forests.

[83] Coleman, 2011
[84] Interview with David Rhodes of Forest Owners Association, 21 July 2010
[85] Interview with Peter Weir of Ernslaw One, 22 July 2010
[86] A C Nielsen, 2010, p. 2
[87] Heyl, 2009
[88] This is calculated using MAF look-up tables, 2009 log prices, an 8% discount rate, a 28-year harvest age and forestry costs and yields given in Zhang et al., forthcoming.

The size of this positive impact on planting can be explored using a few different sources. One is Motu's Land Use in Rural New Zealand (LURNZ) model.[89] Assuming a certain and constant NZU price of $25 between 2008 and 2020, the latest LURNZ projections predict that on average an additional 42,000 hectares of forests would be planted annually over this period, relative to a case with no carbon price. This additional planting would sequester an additional 12 million tonnes of CO_2 over this period. [90]

The New Zealand government's projections of total new planting given in the *Fifth National Communication under the UNFCCC* provide another source of estimated planting. They project that under the rules of the current ETS, with a NZ$25 per tonne CO_2-e price until 2013 and a NZ$50 per tonne after that, 30,000 hectares per year of new planting will occur by 2020. If the carbon price rises to NZ$100 per tonne, they project new planting of up to 50,000 hectares per year by 2020.[91] The difference between the LURNZ model projections and these government projections gives some indication of the level of uncertainty inherent in providing future estimates of planting.

A third source for potential planting impacts is the latest forestry intentions survey, completed for MAF in 2010.[92] Survey respondents indicated that between 2010 and 2012 they intend to plant new area equal to 23% of 2010 post-1989 forest area (130,000 hectares), increasing this total area to approximately 700,000 hectares. The LURNZ model predicts very similar levels of planting over this period (within 10% of these figures). [93]

4.2.1. Potential for Farm Forestry

There also seem to be strong potential gains in farm forestry. One broker suggests that an average sheep and beef farm can have up to 20% of its land area in non-productive use.[94] If the farmer planted forest in these non-productive areas, the farmer would have an extra source of income through forest credits. Although farm forestry appears to be a valuable opportunity for carbon sequestration, there are some significant barriers to taking advantage of it.

First, the unproductive land on many farms is scattered in small parcels. As a result, farmers may have difficulty managing their forest (or being able to claim that their land

[89] More information on Motu's Land Use in Rural New Zealand (LURNZ) model is available at http://www.motu.org.nz/research/group/land_use_in_rural_new_zealand_model
[90] Zhang and McDonald, 2011
[91] New Zealand Ministry for the Environment, 2009
[92] A C Nielsen, 2010
[93] LURNZ predicts a change of 131,000 hectares over the 2008–2012 period (the shortest prediction period that LURNZ will run is four years). While the MAF intentions survey suggests planting of 130,000 hectares from 2008–2012, the provisional 2010 National Exotic Forestry Description (NEFD) report shows that new planting between 2008 and 2010 was only cumulatively 12,000 hectares (New Zealand Ministry of Agriculture and Forestry, 2010a). Subtracting this number from the LURNZ estimates leaves a LURNZ prediction of 119,000 hectares of new planting for 2010–2012. It should be noted that this new planting is not only due to the ETS; improved forestry prices will also be contributing to planting decisions.
[94] Interview with Nigel Brunel of OMFinancial, 4 August 2010

constitutes forest land given the rules for minimum width of a forest area) if the trees are planted in many small blocks throughout the farm. For example, riparian boundaries are generally not eligible for credit. Fencing costs may also be high for small blocks. Thus, although 20% of a farm's area may be unproductive, not all of this area may be suitable for carbon forestry. Also, land that appears unproductive may really be used in a very low intensity way, or for managing events such as drought.

There are other reasons why farmers may be reluctant to convert land to forestry. They may have skills in livestock management but not in forestry, so may find forestry relatively less profitable or more risky. Some properties may be more valuable for alternative uses if they are primarily pasture. This could be particularly important if land is in a location where it could be subdivided or turned into a lifestyle property; many New Zealanders do not find *Pinus radiata* attractive. This is probably less important for indigenous reversion, but that is less profitable under the ETS. Finally, converting to forest is a long-term commitment and gives up future flexibility; and this loss of options has a cost.

It has also been suggested that a bigger issue may be bringing about the change in mindset required for farmers to begin forestry activity on their land. They suggest that many farmers have been trained in a farming culture that sees brush on their property as a nuisance to be cleared, and bringing forest onto their land goes against what they have been taught. Moreover, many farmers are in their profession because they enjoy working with livestock; they get pleasure out of raising animals that they perhaps do not get out of growing forest; some farmers will not want to convert land for forestry for this reason. Thus, there are psychological barriers to overcome as well as logistical and financial ones. As a result, although there is certainly significant potential for carbon sequestration in farm forestry, it may be more difficult than expected to take advantage of that potential.

5. The Performance of the System Thus Far

5.1. Carbon on the Market

5.1.1. Market Data

We expect that the NZU price will be closely related to CER prices (in particular never higher, because CERs are a substitute for NZUs) and that CERs will be closely linked to

European Union Allowances (EUAs), for which they are partial substitutes. NZUs cannot be used in the European ETS so may be less valuable than CERs.[95]

Figure 3 shows that, on the international market, EUA prices have been fluctuating between €11 (approximately NZ$19.86) and €14 (approximately NZ$25.28) since approximately March 2009.[96] When forestry first entered the New Zealand system in 2008, international prices were much higher, reaching nearly €30 (approximately NZ$54.17). However, at around the time of the 2008 recession, the international market prices slumped steeply, reaching a low point in February 2009 at a price that was lower than €8 (approximately NZ$14.45). Through March and April there was a modest price recovery and the international price has been fluctuating since then.

Figure 3: EUA prices from December 2004 to December 2009[97]

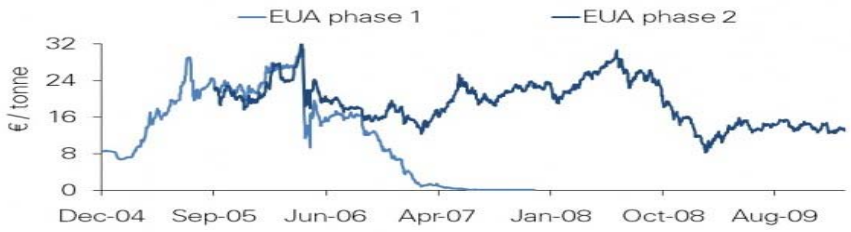
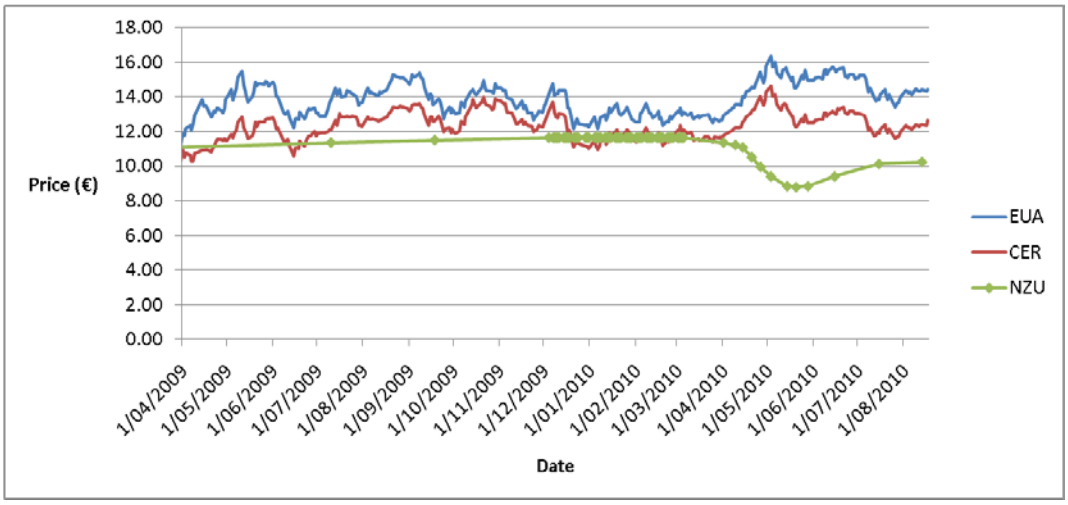


Figure 4 shows that CER prices in this period were following approximately the same fluctuations, but at a price approximately €1 to €2 lower than the EUA. These prices are closely linked because the EU market is a major source of demand for CERs. The price of the EUA is currently higher than that of the CER because the purchase of CERs is limited by the European Union ETS. As a result, there is a potential oversupply of CERs on the market, which decreases their price relative to the EUA.

[95] Correspondence with Oliver Belton of Permanent Forests International, 2 June 2011
[96] Using an exchange rate at 30/07/2010 of .5538 Euros per NZD.
[97] Zelljadt, 2010

Figure 4: Daily futures contracts for CERs and EUAs alongside NZU trade history[98]



The New Zealand market is clearly closely linked to these international markets. On the New Zealand domestic market, there were few early trades and these were between NZ$20 per credit in March 2009 and NZ$21 from January 2010 until March 2010. In March 2010 the price began to decline until it bottomed out in May 2010 at about NZ$16. Since May 2010, prices have begun to climb again and in April 2011 were around NZ$22.[99] These are still around NZ$2 (€1) less than CERs but are now considerably lower than EUAs.

From these data, it is apparent that for the most part the EUA market, the CER market, and the NZU market are closely related, with the NZU price and the CER price matching one another particularly closely – as expected, given that CERs can be used for New Zealand compliance. However, in March/April 2010 the NZU price diverges from the CER price and decreases. This decrease was likely due to "speculation that ... attempts to delay the emitters' entrance to the market has [sic] been successful".[100] However, after 1 July passed and the ETS came into effect, the price began to recover and converge with the CER price again. As of mid-August, the price had yet to fully recover. The current gap between the CER and NZU prices may be due to the NZU's partial dependence on the domestic market (because of international transaction costs and because NZUs are not accepted in the EU ETS), but it is too early to be sure.

5.1.2. Carbon Market Interactions

New Zealand on the international market

To date there have been few sales of carbon credits from New Zealand firms to overseas buyers, although significant sales have been made to the Norwegian government. However, New

[98] European Carbon Exchange, 2010; OMFinancial, 2010
[99] OMFinancial, 2011
[100] Point Carbon, 2010b, p. 2.

Zealand has the potential to make significant international sales. Some claim that New Zealand's carbon credits have a great reputation on the international stage that gives New Zealand a competitive advantage in the carbon market. New Zealand's carbon credits are transparent and are the product of a system with a binding national cap and a strong monitoring regime that has imposed a carbon price on large parts of the economy. Moreover, New Zealand is the only country outside Europe with a federal ETS.[101] In contrast, other countries such as those in Eastern Europe may be selling "hot air" credits that have questionable environmental integrity. Since the buyers of credits such as Norway and Denmark want to maintain a good environmental reputation, they may prefer New Zealand's more legitimate credits. [102]

Aggregation deals

Unique to New Zealand's market are brokers' deals that aggregate credits. Since "a majority of New Zealand forests are in small [forest owners'] hands", it is difficult for many to sell credits since they do not have enough credits to attract buyers. Thus, some brokers in New Zealand are working on aggregation deals, where they put credits from many small forest owners into a single pool to be sold to a single buyer. The revenue from the sale is then split proportionally among the owners of the pooled credits. This is a relatively easy transaction for the brokers, and some of these transactions have already gone through successfully.[103] One caveat is that the prices that the small forest owners receive are a little bit less than they would prefer, but since their credits would not sell otherwise they are optimistic about the situation.

Usage of brokers

At the moment, there are a few brokerages on the market. Only one of them (Westpac) is a big bank, and only one of them (OMFinancial) is a brokerage that deals in financial instruments other than carbon. A few carbon-only intermediaries, such as Carbon Market Solutions and the New Zealand Carbon Exchange, also have a strong presence on the market. Competition between brokerages has been relatively strong and has been gaining momentum. Commissions for brokers of deals with smaller foresters have been running at about 5%, while commissions for deals with larger foresters remain undisclosed.[104]

Approximately 40% of all carbon market transactions have gone through brokers or intermediaries.[105] One reason why a large number of domestic deals have been made without the use of an intermediary is the small size of New Zealand; it is very easy for buyers and sellers of

[101] Correspondence with Nigel Brunel of OMFinancial, 3 June 2011
[102] Interview with Nigel Brunel of OMFinancial, 3 August 2010
[103] Interview with Nigel Brunel of OMFinancial, 3 August 2010
[104] Interview with Nick Brittain, formerly of Carbon Market Solutions, 13 August 2010
[105] Interview with Nigel Brunel of OMFinancial, 3 August 2010

credits to network without the help of a broker, making these deals more common than they might be in a larger country.[106]

The domestic carbon market

Because the domestic carbon market is an embryonic market, it has been for the most part "limited and illiquid"[107] (although it has been improving since 1 July 2010), and brokers report observing a lack of supply in the market.[108] Although nearly all of the foresters who wanted to sell have sold, many are holding back their credits because they have rotations to be harvested in coming years and are worried about the liabilities that they may face.

Transparency in the market is particularly lacking, given that the NZEUR does not publish data on the size or prices of individual transactions. However, the lack of transparency is a "hallmark of a new market" and transparency will likely improve over time.[109] Large, high-profile international trades such as Ernslaw One's 500,000-credit deal with Norway have been instrumental in helping both foresters and banks realise the potential value in the sale of carbon credits.[110]

Another important thing to note is that few (if any) forward contracts have been made, although some parties are looking to make them and may be currently negotiating for them.[111] This number of forward contracts is also likely a result of the fledgling state of the market and the political uncertainty about the future.

Purchases at the price cap

Currently, the New Zealand government will sell NZUs to firms at NZ$25. This effectively caps the price of an NZU at $25. One worry the forestry sector has is that emitters will choose to purchase their NZUs at the NZ$25 cap rather than purchasing cheaper forestry units.[112] A few firms have stated that they may consider purchasing at the cap, although this seems to be a counterintuitive decision given that units are trading materially under that. This may be economically irrational but is still a commonly expressed view. Stated reasons for this are all based on market uncertainty. A number of people do not trust the system and as a result choose instead to buy at the government cap, which has zero transaction costs and is seen by

[106] Interview with Peter Weir of Ernslaw One, 22 July 2010
[107] Interview with David Rhodes of Forest Owners Association, 21 July 2010
[108] Interview with Nigel Brunel of OMFinancial, 3 August 2010
[109] Interview with Nick Brittain, formerly of Carbon Market Solutions, 13 August 2010
[110] A handful of individuals are selling small volumes of NZUs on www.trademe.co.nz, which is a goods auctioning site that is the New Zealand domestic equivalent of eBay. On TradeMe, the prices of the transaction are recorded for the public to view, and the results of these transactions, when and if they go through, would send some price signals to the market. Another carbon trading platform has been launched at www.carbonmatch.co.nz
[111] Interview with Nick Brittain, formerly of Carbon Market Solutions, 13 August 2010
[112] Interview with David Rhodes of Forest Owners Association, 21 July 2010

emitters as a "risk-free investment" because they do not have to worry about what may happen to the value of the credits that they purchase if the system fails.[113]

In addition, some firms have enough market power that they can pass the full cost of the cap on to their consumers. As a result, they may buy at the zero transaction costs cap and see little impact on their profits.[114]

As the market develops and the uncertainty about the ETS dissipates, the number of people purchasing credits from the government instead of from the market (including from the forestry sector) should decrease significantly.

5.2. Participation

5.2.1. NZEUR Registration

As of June 1 2011, there are seven participants registered with NZEUR for deforestation of pre-1990 forest land. 1,132 participants are registered for owning post-1989 forest land. There are 35 participants with "registered forestry rights", and 11 participants are "registered lessees" of post-1989 forest land. Of the 1,178 participants registered for post-1989 forest, the large majority are individuals and privately owned companies. Seven participants are local government bodies (Ashburton District Council, Hawkes Bay Regional Council, Mackenzie District Council, Marlborough District Council/Kaikoura District Council (listed as one participant), Southland District Council, and Wellington City Council).[115]

As of August 20 2010, there were no official reports on the percentage of potential participants that had entered. MAF was "swamped" with applications, to the point where they had had to roll over the processing of some applications past the deadline because they could not process them fast enough.[116] This occurred because many people waited to submit due to uncertainty in the system, and as deadlines approached they all submitted at the same time.[117] Thus, although there was initial hesitancy, it seems that there were many people interested in registering for the system.

5.2.2. Forest Ownership

According to the National Exotic Forest Description (NEFD) of 2008, out of New Zealand's approximately 1,761,000 hectares of plantation forest, 89% is privately owned, 4% is

[113] This is of course only an issue if they do not surrender them immediately for compliance. Interview with Nigel Brunel of OMFinancial, 3 August 2010.
[114] Interview with Nick Brittain, formerly of Carbon Market Solutions, 13 August 2010
[115] New Zealand Emissions Unit Register, 2010
[116] Interview with David Rhodes of the Forest Owners Association, 21 July 2010
[117] Interview with Phil Taylor of Blakely Pacific, 12 August 2010

owned by a registered public company, 2% is owned by state-owned enterprises, 2% is owned by central government, and 3% is owned by local government bodies. [118] Of this land, around two-thirds is pre-1990 forest, so relatively unaffected by the ETS.

According to the Forest Owners Association, the five biggest private companies (Hancock Natural Resource Group, Kaingaroa Forests, Matariki Forests, Global Forest Partners LP, and Ernslaw One) own approximately 43% of New Zealand's forest land. The next 10 biggest owners of forest have approximately 15% of forest ownership. MAF owns about 3.5% of forest land. All others (those who own less than 10,000 hectares of forest land) comprise about 38% of the total forest ownership.[119] This high concentration of forest land ownership could suggest that a small number of participants led to a high percentage of post-1989 forest land being enrolled, but post-1989 forest ownership is much more dispersed.

5.2.3. Data on the Sizes and Locations of Registered Forest

This section provides an indication of the size and location of registered forests. As of 10 August 2010, MAF had processed 384 applications, covering 110,173 hectares (out of around 592,000 hectares) of post-1989 forest.[120] Thus, approximately 17.8 percent of post-1989 forest had been registered. Two hundred and eleven other applications had been received but not processed. Figure 5 shows the sizes of the approved plots, and Figure 6 shows the locations of these plots.

Figure 5: Post-1989 applications to the ETS by plot size

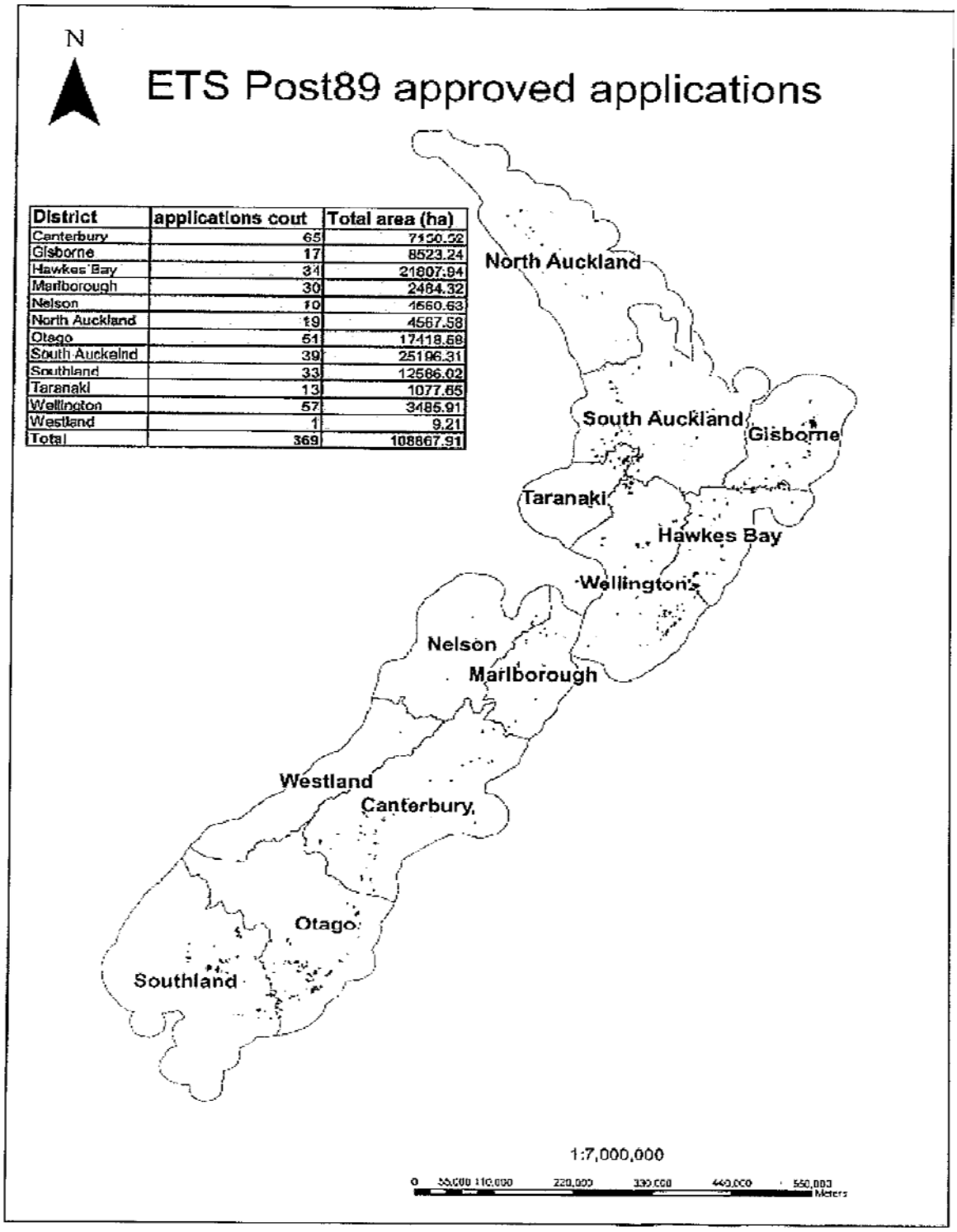
Plot Size (in hectares)	Percentage of applications
1–50	59%
51–100	13%
101–500	22%
501–1000	1%
1000+	5%

[118] New Zealand Ministry of Agriculture and Forestry, New Zealand Forest Owners Association, and New Zealand Farm Forestry Association, 2009, pp. 20–21. In the 2009 NEFD (New Zealand Ministry of Agriculture and Forestry, 2010d), ownership changed slightly (92% private, 1% registered public company, 1% state-owned enterprise, 3% local government, 4% central government), and overall there was a decrease in forest land to 1,751,000 hectares. However, data from the most recent Forest Owners Association Facts and Figures uses 2008 NEFD numbers; we use these same numbers here for consistency.

[119] New Zealand Forest Owners Association and the New Zealand Ministry of Agriculture and Forestry, 2010, p. 9.

[120] All data in this section is provided by personal communication with MAF Sustainable Programmes, August 2010.

Figure 6: Approved post-1989 applications to the ETS by area and location



District	applications cout	Total area (ha)
Canterbury	65	7150.52
Gisborne	17	8523.24
Hawkes Bay	31	21807.94
Marlborough	30	2464.32
Nelson	10	1660.63
North Auckland	19	4567.58
Otago	51	17418.58
South Auckalnd	39	25196.31
Southland	33	12586.02
Taranaki	13	1077.65
Wellington	57	3485.91
Westland	1	9.21
Total	369	108867.91

From these figures, it is apparent that a large majority of the participants claiming credits were owners of small plots of forest, and a majority (61%) of the credits were for North Island forests. However, the applications received (including unprocessed applications) by 10 August 2010 were relatively evenly spread over each island (51.5% South Island, 48.5% North Island).

5.2.4. Compliance Costs

For the most part, compliance with the system has been relatively simple and low-cost. It is said that registering for the system is "very easy",[121] that MAF provides "excellent service",[122] and that compliance is "dirt cheap".[123] Transactions on the NZEUR have been described as "very simple ... and transparent".[124] However, although compliance certainly seems to be one of the least contentious points in the system, there are still a few minor issues to sort out that particularly affect smaller forest owners.

The compliance stage that seems to be causing the most difficulties is the mapping stage. In the case of mapping, the costs incurred are the time it takes to map and the $550 cost of submission to MAF. Additional costs may be incurred if a forester hires a consultant to do the mapping or if it takes MAF more than 4.25 hours to process the map (which may occur if the participant's map has large numbers of errors, and which incurs an hourly fee of $130).[125] However, these costs are generally negligible in comparison with potential profits, and "giving up ten grand to claim ten mil" doesn't seem to concern most of the people who are currently entering the system. Since most large firms have significant GIS expertise available, they are less likely to have problems with mapping. Difficulties in mapping generally arise with foresters who own small and middle-sized plots of forest land, and are for the most part caused by lack of experience with GIS technology.[126]

In a few cases a lack of photographic evidence has caused some difficulties in determining the age of trees. For the most part, though, foresters have records of when their forests were planted. And for those who are not in possession of adequate records, it is often easy to tell whether the tree is post-1989 or pre-1990 simply by observing the size of the tree.[127]

The final minor issue with compliance is that due to MAF's rollovers of some applications past the deadlines (see section 5.2.1), many smaller foresters have not received their unit allocations in a timely manner. Once the uncertainties about the scheme have been ironed out, the problem of a flood of applications being presented to MAF is unlikely to recur.

Despite these issues with mapping, allocation, and age determination, however, most foresters are able to register for the system and monitor their stocks with "minimal fuss".[128]

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[121] Interview with Peter Weir of Ernslaw One, 22 July 2010
[122] Interview with Phil Taylor of Blakely Pacific, 12 August 2010
[123] Interview with Bryan Smith of Wellington City Council, 10 August 2010
[124] Interview with Peter Weir of Ernslaw One, 22 July 2010
[125] New Zealand Ministry of Agriculture and Forestry, 2010b, p. 20
[126] Interview with Peter Weir of Ernslaw One, 22 July 2010
[127] Interview with David Rhodes of Forest Owners Association, 21 July 2010
[128] Interview with David Rhodes of Forest Owners Association, 21 July 2010

Thus, the decision of whether or not to participate in the system is, for most foresters, probably not based on the cost of compliance with the system.

5.3. Behavioural Change

5.3.1. The Shadow of Uncertainty

Because forestry is a long-term investment with many business decisions being made 20 to 30 years in advance of the sale of the product, foresters must predict the future to undertake risk management and decision-making analysis. However, the ETS is mired in uncertainties that make decisions difficult for foresters. Very little carbon is sequestered in the first few years of growth, so the carbon prices that are critical for new planting, if timber price expectations alone do not justify it and hence the planting is "additional", are more than five years ahead.

Most of the uncertainty that those involved in the forestry ETS are facing is over the future of international agreements. After the Copenhagen Conference of the Parties failed to produce a binding successor to the Kyoto Protocol, people seemed to be less hopeful that the 2010 conference in Cancún would be fruitful. In a 2010 survey of people from 118 countries, it was found that only 37% of people believed that a binding successor to Kyoto would be reached in Cancún; this is a significant decrease from the 59% of people in their previous survey who believed that a successor agreement would be reached in Copenhagen.[129] Even though significant progress was made on many fronts in Cancún, an extension to the Kyoto Protocol in its current form seems even less likely and the form of its successor is still unclear. A complete breakdown of cooperation is even less likely, but the exact form of future cooperation and how international trading will operate within that is highly uncertain.

A failure to produce an alternative to the Kyoto Protocol before its expiration in 2012 poses a significant threat to the New Zealand system, as New Zealand's rules mimic the Kyoto Protocol's rules. Our market is small and built on the assumption of links to international markets as a way to manage variability and risk, provide liquidity and achieve more ambitious future mitigation targets. Our price is closely linked to the CER price. Without an international agreement or strong bilateral linkages with other countries with binding commitments, these trades will not be possible.

Even if other countries do take on mutually recognised commitments, uncertainty surrounds whether they will put a price on their carbon emissions.[130] If they choose to put a

[129] Point Carbon, 2010a, p. 34

[130] Some commentators have talked about the importance of having a carbon price implemented by New Zealand's trading partners. For foresters it does not matter if our trading partners have a carbon price, only that there are carbon buyers and sellers available and a high international

price on carbon by implementing an ETS and allow private sector links to other countries' markets, then private companies will begin to engage in trade and the international market will develop much more rapidly.

The uncertainty on the international scale directly translates into domestic uncertainty. Without international action, there is a higher likelihood that the New Zealand government will extend the transition period and the $25 cap, push back or even remove agriculture from the scheme, or even repeal the ETS in its entirety. Although the latter is rather unlikely given the costs of unravelling the scheme, many believe that the first two options are not entirely far-fetched.[131] For example, Minister of Agriculture David Carter has stated, "There's no point in disadvantaging New Zealand farmers while agricultural producers elsewhere are causing more emissions".[132] If these changes are made to the scheme (especially the pushback or non-inclusion of agriculture), the development of the domestic market will remain slow.

A survey commissioned by MAF suggests that this uncertainty is playing a major part in registration for the scheme. For medium and small foresters, uncertainty is the second most cited reason for not joining, after lack of knowledge about it. For large foresters, all of whom know about its existence (85% reported that they knew "a lot" about the scheme, and 10% knew "a moderate amount"), uncertainty and not seeing the benefits of the scheme are the two primary reasons for not registering.[133]

On the other hand, people involved in the forestry ETS see great profitability in the scheme if the government retains it, especially if a strong international agreement is reached and international carbon markets develop further. However, due to the enormous uncertainties, the forestry sector has not been so eager to respond to the system, especially with respect to new planting.

5.3.2. New Planting

Participants can respond to the ETS in three ways: new planting, extended rotations, and changes in forest management. No significant changes in the latter two can be observed at least

carbon price. The entry of our trading partners (or potential competitors) is important for the issue of "leakage" which affects other sectors and creates political pressure against tightening of the New Zealand ETS.

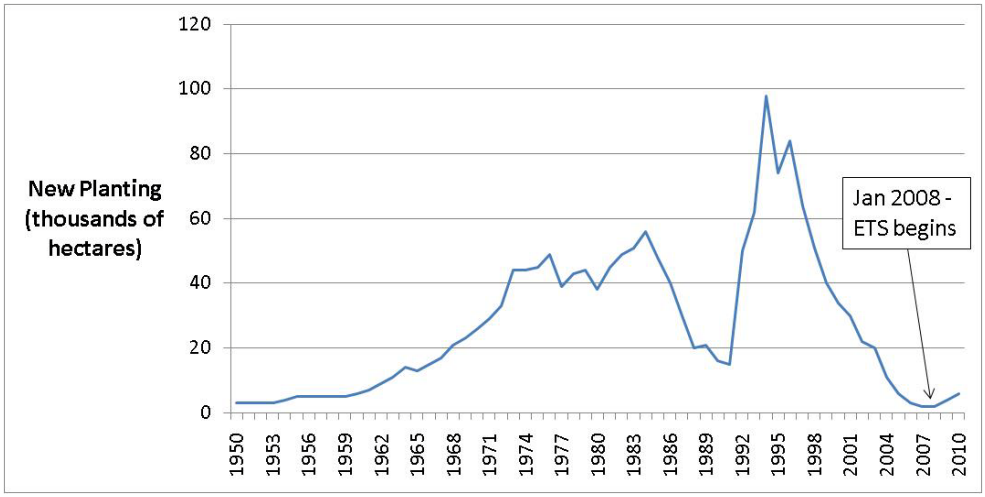
[131] According to an interview with Geoff Keey of Greenpeace on 28 July 2010, complete dissolution of the ETS seems to be highly unlikely. This is because dissolution will involve one of two options in relation to forestry, both of which are unpalatable to the government: compensation to forestry owners that could involve large payouts to foresters at a time when civil services are being cut back; or ending the programme without compensation, which would cause large monetary losses in the forestry sector for foresters who have planted in anticipation of carbon rewards, creating vitriol between the government and forestry participants. It would be extremely hard to regain trust and would make it extremely costly to recreate a system when strong international cooperation does emerge. According to an interview with Nigel Brunel of OMFinancial on 3 August 2010, ending the scheme before 2012 is especially unlikely because it would result in high deforestation rates and a Kyoto liability for the government.

[132] Hotton, 2010

[133] A C Nielsen, 2010, pp. 17–18, 25. 15 large forest owners (more than 1000 hectares) were surveyed, along with 142 medium forest owners (between 100 and 1000 hectares) and 176 small forest owners (less than 100 hectares).

until the large harvests predicted in the 2020s, simply because of the current age of most New Zealand post-1989 forests (post-pruning/thinning and pre-harvest).[134] The only marker that can be adequately assessed is new planting. Below is a graph of new planting since 1920, from the *National Exotic Forest Description 2009*.

Figure 7: New planting in New Zealand, 1950–2010[135]



At the moment, the amount of new planting for ETS-related carbon forests is negligible. The small amount of new planting that has occurred in 2008 and 2009 is "largely attributable to the Afforestation Grants Scheme", not the ETS.[136] The reason for this is that since foresters see the uncertainty present in the system, there is great hesitancy to invest in new forest just for the sake of carbon credits. At the moment, most forest participants still have "a policy of growing for the best wood value",[137] meaning that any new planting undertaken is done primarily because the participant feels that the timber will be profitable, not because of the value of the carbon stored within the stock. If the carbon price falls the forester will still have valuable timber, thus reducing their risk. This is reflected in the MAF-commissioned survey discussed in the previous section, which shows that only 7% of foresters considering conversion of land to forestry are planning that forest be used only for carbon sequestration.[138] Further evidence that a majority of foresters are not planting solely for carbon purposes is that foresters are not planting on marginal land, but rather are still planting on the land that gives them the best timber values.

An interesting consequence that becomes visible here is that any new planting that occurred during 2008/09 was almost certainly for carbon sequestration purposes only: timber

[134] A very small number of firms may be spending less on pruning and thinning in response to the ETS, but that is a minor impact that may have been undertaken anyway. (Interview with Bryan Smith of Wellington City Council, 10 August 2010)
[135] New Zealand Ministry of Agriculture and Forestry, 2010a
[136] New Zealand Ministry of Agriculture and Forestry, 2010d
[137] Interview with Peter Weir of Ernslaw One, 22 July 2010
[138] A C Nielsen, 2010, p. 35

prices in these years were so low that new planting would only be profitable if foresters were pricing in the carbon sequestration value.

More significant evidence that new planting as a result of the system is minimal can be found in the MAF-commissioned survey. In the survey, it was found that only 9% of post-1989 forest owners are actively considering converting more land to forest, in comparison to the 44% who are not considering it at all.[139] None of those actively considering it are large foresters, mainly because large foresters have no more land to convert (60% report this).[140]

Another barrier to investment in new planting is an increase in the price of land. Because of the added value that the potential for carbon forestry brings to land, prices of carbon-viable land plots have increased. However, the owners of this land have unrealistic expectations about the land's value, given the current uncertainty. If there were no uncertainty, it is likely that the forest participants looking to plant new forest would purchase the land at the current price. However, they are reluctant because they are nervous that if they purchase this land and the system is discontinued, the value of the land will go down, causing them to experience a capital loss and rendering any trees that they planted for carbon on that land unprofitable.[141]

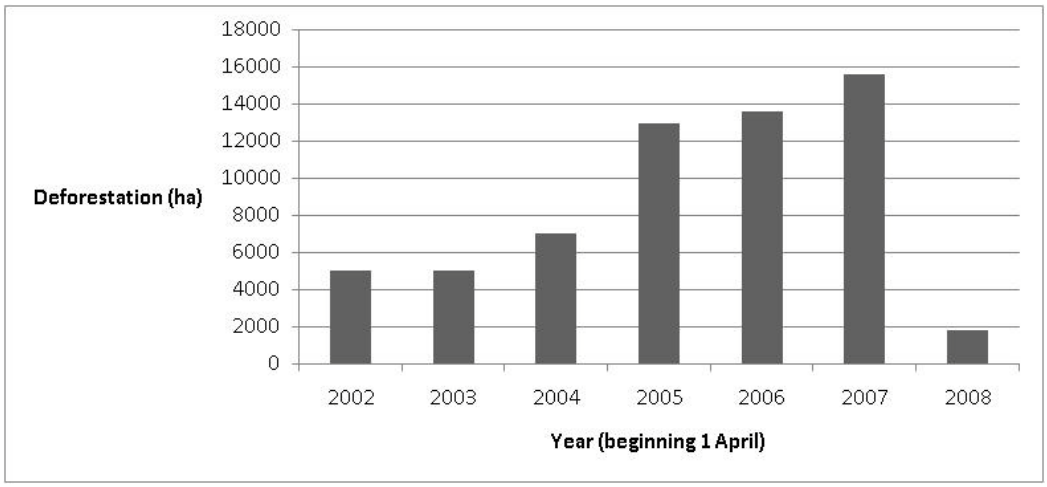
A final issue of note is that there are currently not enough seedlings available in the nurseries for every forester to be able to undertake new planting, and the supply of radiata seedlings is not expected to be at that level for another 2–3 years.[142] However, this does not seem to have any significant impact on forest participants' current planting decisions.

5.3.3. Deforestation

Due to the liability imposed on those who deforest, rates of deforestation should slow in New Zealand under the ETS. This is because some marginal land that may have been deforested and converted to another land use without the ETS is no longer economic to deforest once the price of carbon is internalised. Evidence suggests that this response is occurring as a result of the ETS. For example, it has been estimated that only 1800 hectares of planted production forest were deforested in the year to March 31 2009, compared to 15,600 hectares in the year to March 2008. Most of this occurred before 31 December 2007.[143] Furthermore, of these 1800 hectares deforested in the year to March 31 2009, 1500 hectares were post-1989 forest.[144]

[139] A C Nielsen, 2010, p. 33
[140] A C Nielsen, 2010, p. 34
[141] Information from this paragraph from interview with Phil Taylor of Blakely Pacific, 12 August 2010
[142] Interview with Maurice Murray of Murray's Nurseries, 9 August 2010
[143] Manley, 2009, p. 5, estimates that deforestation in the year to 31 Dec. 2007 was 20,000.
[144] New Zealand Ministry of Agriculture and Forestry, 2010d, p. 5

Table 2: Annual levels of national deforestation, 2002–2008[145]



Further evidence can be found in MAF's 2009 Deforestation Survey, which measures forest owners' intentions to deforest. In the survey, an ETS scenario with all forest owners participating would only see 3500 hectares deforested in 2009;[146] by contrast, without an ETS 7000 hectares would be deforested in 2009.[147] Over time, the Deforestation Survey shows that this is expected to slow significantly; in the period from 2013 to 2020, 17,000 hectares are expected to be deforested with an ETS (approximately 2400 hectares per year, a decrease in deforestation).[148] In that same period, MAF predicts that 63,000 hectares of land will be deforested (approximately 9000 hectares per year, an increase in deforestation) if there is no ETS.[149]

The rate of conversion of land from forest to dairy has also slowed since the introduction of the ETS.[150] It is plausible that a substantial amount of this slowing could be due to a lack of capital investment as a result of the recession hitting a heavily indebted sector, but based on the findings of the Deforestation Survey, it seems that the ETS has certainly had some impact.

It is also important to note that it is possible that deforestation has continued as usual; people may be harvesting their forests but not yet replanting (instead waiting out the allowed grace period for replanting) because they are waiting to see how the ETS policy will resolve itself after 2012. If the policy does not survive or is watered down, they may change land use.

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[145] Data collated from years 2005–2009 of the New Zealand Ministry of Agriculture and Forestry National Exotic Forest Description (NEFD), accessible online at http://www.maf.govt.nz/news-resources/publications.aspx?title=National%20Exotic%20Forest%20Description, last accessed 18 May 2011.
[146] Manley, 2010, p. 5. The 2010 NEFD report shows that only 1800 hectares were eventually deforested.
[147] Manley, 2010, p. 5
[148] Manley, 2010, p. 5
[149] Manley, 2010, p. 5
[150] Interview with Geoff Keey of Greenpeace, 28 July 2010

5.3.4. General Feelings and Predictions of Future Planting Practices

There is a wide variety of predictions about future planting in response to the forestry ETS, and these opinions reflect uncertainty about the future direction that the policy will take.

In general, people involved in the forestry sector of the system seem confident that if the government and the international arena resolve the major policy uncertainties, there will be significant new planting. Despite the possibility that the strength of the ETS will be decreased as a result of the lack of international policy, many involved share cautious optimism about the future of new planting. If the system is maintained as-is and the price of carbon increases, "the market would go ballistic".[151]

What will happen to the New Zealand policy, however, is of great debate. There is general belief that the ETS is here to stay; even without a new global agreement, New Zealand will likely keep the system, possibly even joining in to a regional scheme that maintains the ETS incentives.[152] Some believe that without a commitment by the USA, Australia, Japan, and New Zealand's other trading partners, however, the form that the ETS will take may be even more watered down than its current form. According to these individuals, if there is not a "comparable effort from the rest of the world", then the entrance of agriculture into the scheme may be pushed back or not included at all. [153] If agriculture does enter the New Zealand scheme, agricultural profits will decrease with a related decrease in the price of marginal land. As a result, more land will be converted from agriculture and into forestry. Furthermore, it is likely that the government will extend other transitional measures such as the NZ$25 price cap if New Zealand's trading partners do not put a price on carbon by 2012.[154] Some believe that if these things occur, the price of carbon will be kept low, along with domestic demand for forestry credits.

International and subsequent domestic uncertainty does not seem to be resolving itself quickly, which suggests that new planting will not occur quickly. Over the course of the first commitment period and in the short run thereafter, many do not expect new planting to occur at all. Even if the uncertainty is resolved before the 2012 end of the Kyoto Protocol, the New Zealand forest industry will need to undergo a "mindset change" before any substantial new planting is undertaken.[155] Many people, especially those who are farmers but who are considering placing forests on their marginal land, will have to learn how to manage their forests and weigh

[151] Interview with Bryan Smith of Wellington City Council, 10 August 2010
[152] Interview with Alex Thompson of Parliamentary Commissioner for the Environment, 5 August 2010
[153] Interview with David Rhodes of the Forest Owners Association, 21 July 2010
[154] Interview with Peter Hardstaff of the World Wildlife Fund, 27 July 2010
[155] Interview with David Rhodes of the Forest Owners Association, 21 July 2010

their land-use options. Nurseries will have to produce a new stock, which will also take time. Thus, New Zealand's uptake of new planting are predicted to be slow initially, even if the uncertainty is resolved, but once people and markets adjust to the system there will be much more new planting.

In summary, people involved with the forestry side of the system seem to be relatively confident that if current carbon prices are sustained and policy becomes stable, New Zealand will see new planting, resulting in "fewer cows and more trees".[156] If international and domestic policies also impose a cost on agricultural production, forestry will become even more attractive.

5.4. Steps for Future Improvement

5.4.1. Force Majeure

One provision that is particularly important to forest owners is the inclusion of a force majeure clause. Under the current system, if a fire, windstorm, or other natural disaster outside of the participant's control fells the forest species, the participant is immediately fully liable for the emitted carbon. This is especially a problem for owners of small, concentrated forest plots who may have their entire forest holding uprooted by such a disaster. Insurance is available for carbon in such forests, but at least until recently was very costly.[157] Therefore, without force majeure provisions, the ETS initially "present[ed] far too much risk for some would-be investors".[158]

5.4.2. The Instant Oxidisation Rule

The Kyoto rules currently run under the assumption that when forest land is harvested, all of the carbon in the harvested wood is instantly released back into the atmosphere and all carbon on deforested land is released. However, this is far from the truth. Much of the carbon remains sequestered in wood products or in woody litter on the land for years after the harvest of the forest. If New Zealand can change its own rules or successfully change the international rules, then forest participants may face a lower liability at harvest. One caveat is that there will be increased costs of monitoring and measuring the stock of carbon in harvested wood products. However, these costs may not be as high as the potential gains from moving away from the instant oxidisation assumption.

In addition, current Kyoto rules make a landowner who deforests pre-1990 land liable for the carbon stock in the forest at the time of deforestation. This is a much larger amount than

[156] Interview with Geoff Keey of Greenpeace, 22 July 2010
[157] A new insurance product was launched in 2011 which may have solved this problem.
[158] Correspondence with Peter Weir of Ernslaw One, 19 July 2010

the average carbon stored in a forest that would have been managed as a rotation forest. Setting this rule more efficiently would reduce the need for compensation for pre-1990 forests and might lead to a little more deforestation on land with valuable alternative uses.

5.4.3. Offset Planting

Another change that the forestry sector would like to see in the New Zealand ETS is a system of offset planting. This is where a forester can essentially relocate pre-1990 forest from one place to another without facing a liability (since currently a pre-1990 participant can cut down and replant in the same spot without penalty, but if the participant deforests and relocates the forest, they will face the pre-1990 liability and then be essentially starting a post-1989 forest). The forestry sector feels that "since the atmosphere sees no difference" this type of relocation should be allowed, provided it is the same species, accumulates the same amount of carbon and at minimum has no adverse impact on biodiversity.[159] This would have a similar effect to reducing the liability on deforestation. A forester could pay that lower liability, plant a new forest and claim the credits on that area. The value of the new carbon would almost offset the liability loss.

Currently, offset planting is not allowed in the New Zealand ETS because it is not allowed in the Kyoto rules. In Kyoto this is useful because it protects against the removal of forests that have specific benefits in their current location (e.g. the Amazon rainforest). However, in New Zealand's case, this rule has restrictive economic and environmental impacts that reduce efficiency.[160] New Zealand is lobbying on the international level to allow for offset planting for certain cases like New Zealand.

5.4.4. "Averaging"

Another suggestion that has been brought up by people involved in the forestry sector is a provision for "averaging", where foresters have the option of selling credits only up to a long-term average of their stock but equally face no penalties at harvest as long as they replant.[161] This would be done to prevent forest owners from overselling their carbon credits. This mechanism is sought in particular by farm foresters, and the New Zealand Forest Owners Association suggests it as an option.[162] This could be implemented by government or through a sophisticated private actor.[163]

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[159] Interview with David Rhodes of Forest Owners Association, 21 July 2010
[160] Interview with Alex Thompson of Parliamentary Commissioner for the Environment, 5 August 2010
[161] Interviews with David Rhodes of Forest Owners Association and Peter Weir of Ernslaw One, 21 and 22 July 2010 respectively
[162] Interview with Peter Weir of Ernslaw One, 22 July 2010
[163] Coleman, 2011. Carbon debt markets enable foresters to achieve the equivalent of averaging through a different mechanism.

Foresters with larger holdings would not want this to be compulsory because they are already able to do this on their own; they do not need a government regulation that forces them to stop selling their credits at a certain point when they are easily able to calculate this risk and make decisions on how much to buy or sell themselves. It is seen as a "mother knows best" policy that has potential to "cut [foresters] off at the pass" by limiting the potential profits they may make through sales of credits.[164]

5.4.5. Biodiversity Protection

Protecting biodiversity is another aspect of the forestry Emissions Trading Scheme that needs to be improved. Two parts of the current forestry ETS law can be seen as harmful to biodiversity. First, pre-1990 indigenous forest species are not included in the ETS. Although it is true that the Forests Act 1949 protects relatively mature forests from clearance by timber companies, they may still be vulnerable to clearing for agricultural purposes. The protection of indigenous forests is devolved to Regional Councils under the Resource Management Act; some may struggle to effectively protect all indigenous forest. In some cases, pre-1990 indigenous forests could be endangered by the ETS.

Second, biodiversity is threatened when fast-growing plantation forest is planted in areas where it may out-compete indigenous species when, for example, wilding pines spread onto neighbouring land. This is mainly a problem with small plantation foresters, since most of the large plantation forest companies signed the New Zealand Forest Accord, which is meant to protect indigenous forests from such results.[165] Potential biodiversity is also threatened where land is reverting to native forest but has not yet reached a level of maturity that allows it to be protected by the Forest Accord. Without the ETS, this land (and other land still in low productivity pasture) may have become native forest because timber returns alone are too low. With the added incentives from the ETS it might be cleared and converted to exotic forest.

MAF's look-up tables – which define the rate at which different sorts of forests earn carbon credits – initially allocated indigenous forest anywhere in New Zealand with three NZUs per hectare per year. The indigenous species mānuka and kānuka have been estimated to stock an average of 7.0–9.2 tonnes of carbon dioxide equivalent per hectare per year over the first 40 years of a forest's life.[166] Thus, MAF's original look up tables did not fully internalise the benefit of sequestration to owners of these indigenous species. This provided too little incentive to

[164] Interview with Peter Weir of Ernslaw One, 22 July 2010
[165] Interview with Geoff Keey of Greenpeace, 28 July 2010
[166] Trotter et al., 2005. According to Trotter et al., mānuka/kānuka forest sequesters carbon at a rate of 1.9–2.5 tonnes per hectare per year, which is equivalent to 7.0–9.2 tonnes of carbon dioxide equivalent per hectare per year.

allow reversion of land to indigenous forest. However, MAF updated their look up tables in October of 2010, and now a hectare of indigenous forest earns 305.1 NZUs over the first 40 years of its life (an average of 7.6 NZUs per hectare per year). For many indigenous forests, this is probably overly generous. However, this adjustment to the look up tables should help protect biodiversity in New Zealand.

Another way that biodiversity can be protected and collateral damage to the environment mitigated is through further restriction of wilding pines. Currently, post-1989 wilding pines may secure credits for carbon sequestration and incur a liability if they are cut down on land that has entered the ETS. Although the tree-weed exemption is present (see section 3.2.3), it only solves the problem of the liability; it does not resolve the perverse incentive to encourage growth of wilding pines for the sake of gaining carbon credits.[167] This may be controlled under the Resource Management Act but where it is not, wilding pines may be present in greater abundance than they should be and may cause significant damage to indigenous species and ecosystems.

5.4.6. Number of Free Allowances Granted to Emitters

Another issue that some commentators believe needs to be amended in order to solidify the domestic market and keep New Zealand at a Kyoto surplus is the number of free allowances granted to emitters. Currently, eligible emitters receive free allowances on an intensity basis (i.e. per unit of output) dependent on the degree of perceived trade exposure beginning from a prescribed allocative baseline. This rate is reduced at 1.3% per year. Moreover, in the first commitment period emitters have a two-for-one deal where they need to surrender only one NZU for every two tonnes of carbon equivalent that they emit, and the price of an NZU is capped at NZ$25 (so effectively, emitters are paying a maximum of NZ$12.50 per tonne). These measures reduce domestic demand for forestry units.

5.4.7. The Need for Complementary Policies

The ETS provides a strong framework for New Zealand's climate change policy, but like many complex policies it will need other complementary policies surrounding it in order for incentives to mitigate climate change to be realised to their full potential. With respect to the forestry sector, complementary policies that stimulate new planting or forestry demand may have significant effects on New Zealand carbon sequestration and are therefore imperative to consider when thinking about ways to decrease New Zealand's carbon footprint.

[167] Parliamentary Commissioner for the Environment, 2009b, pp. 5–6

New Zealand currently has three policies in place that partly complement the ETS but are largely substitutes: the Permanent Forest Sinks Initiative, the Afforestation Grants Scheme, and the East Coast Forestry Project. Three other policies have been suggested as potential complements to the ETS. The first and arguably most important complementary policy to consider implementing is a program to educate forest owners and potential farm foresters on the workings of the ETS and the potential profit opportunities from earning carbon credits. At the moment, there is a large amount of confusion and misinformation regarding the ETS, and this makes behavioural change very difficult. A survey of potential post-1989 participants showed that out of the 98% of foresters who are aware of the scheme, only 47% claimed to know "a lot" (14 percent) or "a moderate amount" (33%) about the ETS.[168] A significant portion of potential new planters have not acted simply for a perceived lack of knowledge about the scheme. Furthermore, the same survey found that increased perceived knowledge about the system is directly correlated with positive perceptions about it; 50% of people who knew a lot about the system felt positively towards it, whereas only 5% who had "heard of it but know hardly anything or nothing about it" felt positively towards the system.[169] This shows that increasing education about the scheme may improve people's perceptions of the scheme and could induce participation. Among others, the Canterbury School of Forestry has offered popular workshops to disseminate this knowledge.

Wider education about the value of the policy and the importance of certainty would also lead to pressure on government to firm up current policies, with positive impacts on future new planting.

Another suggestion is to create incentives to use wood where possible in infrastructure, rather than carbon-intensive steel or concrete.[170] This may have the double benefit of increasing demand for timber and therefore increasing new planting (if increased domestic demand does not simply displace existing log exports) and decreasing domestic demand for carbon-intensive products. As long as steel and concrete production are partly protected within the ETS, because they are "trade exposed", the climate externalities from them are not fully internalised and this could be a useful policy. Because New Zealand exports so much of its forest products, however, domestic timber demand may not have strong price impacts. Nevertheless, development of timber-based construction technologies and dissemination of information about their potential value could lead to greater international demand for timber in the longer term.

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[168] A C Nielsen, 2010, pp. 16–17. This figure includes all forest owners surveyed, large and small. Large forestry owners were likely to have better knowledge.
[169] A C Nielsen, 2010, p. 22
[170] Interview with Denis Hocking of the Farm Forestry Association, 27 July 2010

In addition, if current research is successful in reducing the cost of converting wood products into biodiesel, then this has the potential to further lower New Zealand's carbon footprint and to create additional demand for new planting. A recent study coordinated by New Zealand's Parliamentary Commissioner for the Environment suggests that wood-based biodiesel equal to approximately 10% of New Zealand's 2008 diesel consumption could be produced cheaply at about NZ$1.85 per litre.[171] Others (e.g. Hall and Jack, 2009) suggest that the cost of this biodiesel may be much higher. Because the ETS covers transport fuels, no additional incentive-based policy would be required to encourage efficient levels of biofuel supply.

6. Conclusions

Currently it seems that the forestry component of the New Zealand Emissions Trading Scheme is slowly gaining steam. Deforestation activity has noticeably decreased and owners of post-1989 forest land have begun to register for the scheme. Compliance costs have proven to be relatively low, and although the market is still fledgling, opaque, and illiquid, it is becoming gradually less so. NZU prices are roughly linking to international prices for Clean Development Mechanism and European units in ways that makes sense.

However, in order to achieve the large scale of new planting that modelling suggests would be efficient, there are still significant obstacles to overcome. The most important of these is uncertainty. Because of the significant uncertainties surrounding the future of international and domestic ETS policy, potential forest planters are hesitant to make large, long-term investments into carbon forestry, and so few have begun to plant new forest. On a positive note, there is reason to be optimistic that if this uncertainty is resolved, carbon sequestration could make a significant contribution to New Zealand's climate mitigation effort and provide a useful model for other countries' efforts.

[171] Parliamentary Commissioner for the Environment, 2010, p. 37

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8. Appendix: Other Important Forestry ETS Rules

The information in this appendix is sourced from New Zealand Ministry of Agriculture and Forestry and New Zealand Inland Revenue Department ETS guides. [172]

8.1. How Does the New Zealand ETS Define a Forest?

According to the MAF Guide, which is a summary of the Climate Change Response Act, a forest is defined as an area of land of at least 1 hectare that contains forest species that have a crown cover of more than 30 percent on each hectare and an average crown cover width of at least 30 metres. A forest species is defined as "trees capable of reaching five metres in height at maturity in the place they are growing", excluding tree species that produce fruit and nuts. Fruit and nut trees are excluded because they do not contain much carbon and it would be more costly to define the removal of these trees as deforestation.

If an area of forest temporarily does not meet the crown-cover or height standards due to harvesting or due to natural occurrences (e.g. wind-blown trees), but is likely to in the future, the land is still considered forested land.

8.2. How Does the New Zealand ETS Define Deforestation?

According to the MAF Guide, deforestation is defined as "forest clearing followed by a change to another land use", such as agriculture.

8.3. How is Compliance Monitored and What are the Penalties for Non-Compliance within the System?

8.3.1. Monitoring

MAF will monitor the system by "reviewing registration applications and emissions returns to ensure they comply with the legislation" and by performing "spot checks and detailed site audits".[173] Participants must by law also keep 20 years' worth of records on "transactions, measurements, calculations, and other relevant information", which may be audited at any time by MAF.

If a participant is found to be non-compliant with the ETS, they may face civil and/or criminal penalties depending on the offence. As a side note, in the case of non-compliance of a body corporate, the government may pierce the corporate veil and find directors and other managers subject to penalty as well.

[172] New Zealand Inland Revenue Department, 2009;New Zealand Ministry of Agriculture and Forestry, 2010b
[173]New Zealand Ministry of Agriculture and Forestry, 2010b, p. 35

8.3.2. Civil Penalties for Non-Compliance

If an individual has not submitted an emissions return on time, has submitted an inaccurate return, or has failed to submit a return, the individual will have to pay a fine of NZ$30 for each NZU that they have not reported. This penalty was chosen because it is more expensive than the current market price of an NZU. The NZU has a maximum price of NZ$25 (which the government will guarantee by selling units to firms at NZ$25) until the end of the first commitment period in 2012 in order to reduce price uncertainty and allow for a smooth transition of participants into the system. This penalty may be reduced or dismissed at the discretion of MAF, in order to prevent participants who have made genuine mistakes or who have unique and legitimate personal circumstances from suffering harsh penalties.

If a participant knowingly fails to comply with obligations or provides false information, they may be liable to surrender double the units that they owe as well as pay NZ$30 per unit.

In all cases, interest will accrue on all unpaid penalties until they are paid in full and the necessary units have been surrendered.

8.3.3. Criminal Penalties for Non-Compliance

If a participant fails to collect information, submit an emissions return, or notify MAF that they are an obligatory participant, there is a graduated series of fines that increase with each offence (NZ$8000 first, NZ$16000 second, NZ$24000 for each subsequent offence).

If a participant fails to appear before the chief executive of MAF or an enforcement officer when required, without a "reasonable excuse", the participant must pay a fine of NZ$12000, or NZ$24000 if they are a body corporate.

If a participant knowingly provides false information or wilfully attempts to obstruct officers, the participant must pay a fine of NZ$25000, or NZ$50000 if they are a body corporate.

If a participant knowingly evades the ETS with intent to "deceive and obtain material benefit or avoid material detriment", the participant will pay a fine of NZ$50000 and/or receive up to five years' imprisonment.

8.3.4. Withdrawal from the ETS and Transfer of Forest Land

A post-1989 participant who wishes to withdraw all or some of their forest from the system may do so at any time. However, the participant must immediately notify MAF. Then, within 20 days of their withdrawal, the participant must submit one final emissions return and

"surrender...any outstanding balance of units on the land". Thus, it is not possible for a participant to avoid liabilities by withdrawal from the system.

Similar rules apply for the transfer of forest land from one party to another, whether the land is post-1989 or pre-1990. When forest land is transferred, the transferor *and* transferee must notify the MAF, and the transferor must file one final emissions return to correct for any outstanding liabilities.

8.4. The Forestry ETS and Taxes

8.4.1. Income Tax Rules for Pre-1990 Forest

Emission unit transactions for pre-1990 forest are treated for tax purposes as being on the capital account, so "no income tax liabilities arise from, and no income tax deductions are created by, these transactions". In other words, pre-1990 participants will not be involved with any tax activity as a result of their allocation, purchase, surrender, or sale of NZUs. However, because this only applies to "transactions in emissions units which are related to pre-1990 forestry land", a pre-1990 participant will have to pay income taxes on NZUs if they purchase NZUs and then later resell them, as these units were not involved with the pre-1990 land itself.

The only other exception to this rule is for certain businesses such as "property developers and land traders", as these businesses hold the NZUs on revenue account. As a result, their tax rules will be similar to those that apply to post-1989 forest land.

8.4.2. Income Tax Rules for Post-1989 Forest

For post-1989 forest, emission unit transactions are treated as being in the revenue account. Although there are still no tax deductions or liabilities upon the allocation or surrender of government-allocated NZUs, the sale and purchase of NZUs are subject to the income tax laws.

NZUs sold on the market will incur tax liabilities. If NZUs are purchased on the market, deductions are available only if the purchased units are considered "replacement units", meaning that they are replacing units that have already been sold (for example, if one participant sells 10 NZUs and then purchases 20, they can get immediate tax deductions on the first 10 units since these are replacing the ones that have already been sold). A deduction is only available on the additional units purchased at the time that the additional units are surrendered.

8.4.3. Goods and Services Tax Rules for Both Post-1989 and Pre-1990 Forest

In the case of both post-1989 forest and pre-1990 forest, the Goods and Services tax on allocation, surrender, purchase (either by a business from government, another business, or from overseas), and sales (either by a business to another business or overseas) of NZUs is zero-rated. This means that there is a GST on the NZUs "for the purposes of measuring taxable supplies made by businesses", but the rate is 0 percent and therefore there is no actual GST paid on the NZUs.

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