

CLIMATE CHANGE AND FORESTRY

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»» OVERVIEW

The roles forests can play in responding to climate change offer many opportunities and challenges for New Zealand forestry and may generate major changes to forest management. The previous government enacted an emissions trading scheme (ETS) in late 2008 and forestry is the first sector to be involved, effective retrospectively from 1 January 2008. The scheme is currently under review but the forestry provisions of the scheme remain operative.

» DRIVERS

These potential opportunities and threats will be driven by:

- › international climate change agreements;
- › global carbon trading (through international and domestic mechanisms);
- › the price of carbon;
- › international perceptions of forestry's role regarding climate change;
- › public perceptions and consumer demands of forestry.

» THREATS

The following obstacles may prevent the forestry sector from taking advantage of potential opportunities:

- › uncertainty about future international climate change agreements and how they may be translated into domestic policy;
- › a lack of international acceptance and/or knowledge of carbon credits generated from New Zealand forests;
- › the price risks associated with carbon;
- › the high cost of land acting as a barrier to new carbon forestry;
- › enhanced risks from wind, fire and pests.

» OPPORTUNITIES

Although there is uncertainty surrounding future policies and mechanisms addressing climate change, opportunities should arise from the:

- › generation of carbon credits from forests under an ETS, with likely effects flowing on to species choice, management practices and regime length;
- › greater demand for wood as a sustainable substitute to materials that produce intensive greenhouse gases;
- › enhanced viability for using woody biomass as an energy source arising from increasing demand for sustainable sources of energy and the implementation of an ETS;
- › encouragement of new forest investment (for example, through the Afforestation Grant Scheme) and the mitigation of risks affecting sustainable catchment management.

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»» INTRODUCTION

The forestry sector has a positive story it can sell to consumers and communities that are becoming increasingly concerned about climate change. In addition to forests sequestering and storing carbon:

- › wood products can meet demand for low carbon-intensity products;
- › new forests can assist with adapting to the expected impacts of climate change on land management;
- › a changing climate may provide opportunities for new species or enhanced growth potential for

existing forests due to changes in temperature, rainfall and increases in atmospheric carbon dioxide;

- › carbon credits can be generated;
- › woody biomass can be used as a sustainable energy source in wood processing and, in some cases, electricity can be sold back into the national grid.

However, forest owners may also have to manage increased vulnerability to adverse climatic events, weeds, insects and fire.

»» AN EMISSIONS TRADING SCHEME AND FORESTRY³³

An ETS will have significant implications for the forestry sector. The currently enacted, but being reviewed, ETS is the first internationally linked domestic emissions trading scheme where forest sinks can be used by emitters to meet obligations to surrender units.³⁴

An ETS follows the Kyoto Protocol and treats forests differently depending on when they were first established. Under New Zealand's implementation of the Kyoto Protocol, forests first established before 1990 (called pre-1990 forests) do not earn carbon credits as a result of their growth but they do incur liabilities if deforested. The previous government recognised the impact this has on land-use flexibility and proposed to help affected owners through the free allocation of New Zealand Units (NZUs).

Currently owners of post-1989 forest land can choose to enter the ETS. Owners who enter the scheme receive all of the credits and associated liabilities linked with this forest land: they receive NZUs if their forests' carbon stocks increase as a result of tree growth and they must surrender NZUs if those stocks decrease (for example, due to harvesting or fire). Where the owners opt not to

enter the ETS, the Crown takes responsibility for changes in the carbon stocks and for the associated credits and liabilities.

The forestry sector will also be affected if an ETS is rolled out over other sectors, particularly liquid fossil fuels (transport), stationary energy and alternative land uses such as sheep and beef farming.

› FACTORS INFLUENCING NEW FOREST ESTABLISHMENT

An ETS will influence new forest investment in a number of ways.

Larger-scale landowners, including Māori, may be able to lessen the risk from the unknown future price path of carbon by having a number of forests at different ages. Thus, the new trees in one forest will offset, at least partially, the harvest at another. This may result in different investment and planting strategies to the present.

In addition, the financial sector may promote a range of schemes for managing potential liabilities, such as transferring harvest liabilities to buyers or holders of carbon credits. Such parties may be in a better position to manage the associated risk within a wider portfolio of carbon instruments.

Risk will remain a prime consideration.

The other potential obstacle to new forest investment is that forestry profits have been squeezed by the increasing costs of land (the single largest input) and returns that are static to falling. The price of typical hill country forest land (according to Quotable Value's Grazing Land Price Index) has increased in real terms by 100 percent, or doubled, in the past four years and by 150 percent in the past 10 years. During the same time, log prices have fallen by 5 percent and 25 percent respectively.

³³ The following commentary is based on the Climate Change (Emissions Trading and Renewable Preference) Bill, as referred to the Finance and Expenditure Select Committee in December 2007.

³⁴ A unit is equal to one tonne of carbon dioxide.

Analysis shows that even at relatively low carbon prices participation in the ETS will have a demonstrable positive effect on internal rates of return, while high carbon prices will have significant positive effects. However, any net gain is likely to find its way to land values, which will exacerbate the already high costs of land.

Land value may not be so important if a potential forest investor already owns land (for example, a farmer). However, risk will remain a prime consideration. Risk is considerably reduced where the forest investor opts for “carbon farming” with no intention to completely harvest the forest. Under a suitable growing regime, future carbon liabilities (for example, from partial harvest or from thinning) are more than covered by future carbon credits. Such regimes will involve long-lived species that can grow wood and sequester carbon over a long period of time – probably in excess of 100 years. These carbon farming regimes may suit the Permanent Forest Sink Initiative (PFSI) – see section on “Other climate change policy initiatives”.

There is potential under an ETS for new forest investment, particularly by existing landowners, perhaps in conjunction with outside investors. At this early point in the currently enacted ETS, the amount of new activity cannot be gauged.

The cost of land will be very important in these investment decisions. It is the single largest input cost and, in present value terms, represents approximately 30 percent of total costs for an average North Island hill country location. For a non-harvested Douglas-fir regime, analysis suggests that net present values of \$500 to \$1000 per hectare can be achieved at a constant carbon price of \$30 per carbon dioxide-equivalent tonne, excluding the land cost.

With traditional forest growing, returns from the sale of logs for lumber and other products depend

on location and harvest costs. However, areas that have been historically unattractive for “traditional” rotational-harvest forests (due to high harvest costs) may pass investment hurdle rates when carbon is factored into the investment profile, either as an adjunct to traditional returns or as stand-alone carbon farming.

»» SILVICULTURAL MANAGEMENT AND POST-1989 FORESTS IN AN ETS

This section applies to post-1989 forest owners who participate in the currently enacted ETS, which is being reviewed.

» CHOICE OF SPECIES

Where the investment objective is focused on long-term carbon sequestration, there could be a shift from radiata pine to long-lived high-volume species such as Douglas-fir, redwoods and eucalypts. In addition, an ETS will improve the economics of establishing indigenous forests, as returns from carbon provide a much earlier income stream compared with a timber-only investment.

Rotation ages are likely to become more variable as a result of an ETS.

» INITIAL STOCKING

Most establishment regimes are currently designed to gain full site occupancy quickly. For post-1989 forests under the currently enacted ETS, it is unlikely that there will be a significant shift in stocking rates where timber production is still a core objective. However, if carbon is the primary objective, then stocking rates may fall to facilitate a “plant and leave” regime to minimise tending costs and maximise carbon profitability.

» PRUNING AND THINNING

It is conceivable that mainstream forestry will shift to regimes that produce more wood (and capture

more carbon) per hectare. Such volume-maximising regimes will probably not include pruning, as they do not tend to recognise the benefits.

Production thinning does not provide much profit but it reduces silviculture costs and/or produces wood for use. Parts of the sector still undertake thinning but it may become less common as post-1989 forest owner participants in an ETS factor in the impacts of thinning on the forests' carbon stocks.

› ROTATION AGE

Rotation ages are likely to become more variable as a result of an ETS. For post-1989 forest land, owners will consider not only log prices, but also the carbon balance in the forest (whether it is better to continue to accrue units or meet liabilities) and the price of carbon, which will be a significant new factor that comes into the felling decision. If anything, rotation lengths are likely to increase.

››› DEFORESTATION OF PRE-1990 FOREST

The commentary in this section applies to owners of pre-1990 forest land that is subject to the currently enacted ETS, which is being reviewed.

Economic analysis has been used to determine the key drivers influencing the decision to deforest. The analysis covered scenarios with different species (radiata pine and Douglas-fir), growth rates, present ages of the trees, values of the deforested land and carbon prices and some variations of carbon price paths.

The analysis determined that the key influences on deforestation will be the:

- › price of carbon;
- › carbon content of the forest;
- › age of the forest.

However, a number of forest owners are likely to behave differently from that indicated by the

economic analysis due to:

- › non-economic factors that are important to them;
- › broader economic factors (for example, owners partway through a large deforestation programme will base their decisions on enterprise economics rather than the single-hectare approach in the analysis).

In the short to medium-term, deforestation activity is expected to slow down. Deforestation that continues after the introduction of the current ETS will be from either exempt areas, where the forests are more likely to be mature, or non-exempt areas, where forests are likely to be younger and to hold less carbon (and thus incur fewer liabilities).

››› WOOD FLOWS AND THE ETS

Wood flows from the pre-1990 forest estate will be largely unaffected by an ETS because the vast majority of pre-1990 forest owners are expected to continue to harvest and replant their forests. Any effect on wood flows will therefore result from the harvesting decisions of those post-1989 forest owners who choose to participate in the ETS.

As rotation ages are likely to become more variable as a result of an ETS, it is not possible to gauge the effect that carbon will have on wood flows from post-1989 forests – it will depend on the price of carbon at the time of decision making and future carbon price expectations:

- › In periods of low log prices, the ongoing accrual of carbon may mean the owner delays harvesting until log prices improve.
- › In times of static log prices but low carbon prices, the owner may harvest to try to mitigate the cost of the liability of reduced carbon stocks as a result of harvest.

On sites that are marginally profitable in pure-forestry terms, an ETS could result in post-1989 forest owners adopting a no-harvest or long-rotation regime to capitalise on carbon returns.

The degree to which the above considerations will impact on an owner's harvest profile (and therefore wood flow) will also depend on the size and age distribution of their forest holding. Large estates with a wide spread of age classes will be more able to balance their carbon profile, and harvest management could be undertaken largely irrespective of the price of carbon.

Single or narrow-age class estates will be more influenced by their carbon profile and the price of carbon, as there is less ability to spread activity over market fluctuations. Wood flows from these estates will be affected by carbon factors.

Douglas-fir is New Zealand's second most important wood production species after radiata pine, although at a much lower share of the national harvest. Compared with radiata pine, Douglas-fir is a long-lived species amenable to multiple production thinnings.

It is conceivable that some post-1989 owners of Douglas-fir stands may change from the present clearfell regime to a long-rotation multiple thinning regime (or even a non-harvest regime). However, the shifts in the wood flow from this species will not be significant to the overall national wood flow.

»» OTHER CLIMATE CHANGE POLICY INITIATIVES

» THE AFFORESTATION GRANT SCHEME

The Afforestation Grant Scheme (AGS) was first flagged in the discussion document *Sustainable Land Management and Climate Change: Options for a Plan of Action* (MAF, 2006b), released in December 2006. The Scheme is administered by MAF and has been allocated \$50m over five years.

Under the AGS, a government grant is available for planting new forests on Kyoto-compliant land (that is, land that was not forested as at 31 December

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1989). Grant recipients will own the new forests and earn income from the timber, while the Crown will retain the carbon credits generated under the Kyoto Protocol and take responsibility for meeting all Kyoto harvesting and deforestation liabilities.

The AGS offers an alternative to the ETS to encourage greater levels of greenhouse gas absorption by increasing the area of new Kyoto-compliant forest in New Zealand.

Another objective of the AGS is to establish this new Kyoto-compliant forest in areas where it will help reduce the likely impacts of climate change and generate other environmental benefits, for example, where it will reduce soil erosion, nutrient leaching and flood peaks.

» THE PERMANENT FOREST SINK INITIATIVE

The PFSI is a government programme, also administered by MAF, which enables private landowners to receive Kyoto-compliant carbon credits (AAUs³⁵) when they establish new permanent forests. These forests may be of exotic or indigenous species. The PFSI operates through a covenant mechanism.

The PFSI may enable landowners to make better economic use of their land, particularly isolated and erosion-prone land that is currently marginal for uses such as agriculture or conventional production forestry.

The PFSI remains an option for post-1989 forest landowners wishing to differentiate their forestry practices from normal clearfell forestry. Some believe that there is an opportunity in the carbon

35 An Assigned Amount Unit (AAU) is a tradeable unit of 1 tonne of carbon dioxide-equivalent greenhouse gases allocated to Annex 1 (Developed countries) based on their emissions at 1990.

market to receive a premium for units generated under the PFSI compared with units from normal clearfell forestry. Such PFSI forests may be marketed as having greater environmental credentials.

Perceptions of market demand and the price of units generated from New Zealand forests in the post-2012 period will have a significant influence on investments in new carbon forestry.

»» THE CARBON MARKET AND FORESTRY

The currently enacted New Zealand ETS is the first internationally linked domestic emissions trading scheme where emitters can use forest sinks to meet obligations to surrender units. Because this ETS is the only scheme to include forestry, it is unclear how units generated from New Zealand forests will be perceived internationally in the carbon market. There will need to be a degree of learning internationally as carbon market participants understand how a New Zealand ETS deals with issues such as permanence.

Perceptions of market demand and the price of units generated from New Zealand forests in the post-2012 period will have a significant influence on investments in new carbon forestry, as much of the carbon uptake occurs in this period. Market demand and price will be influenced by factors such as:

- › post-2012 demand in a New Zealand ETS;
- › acceptance of New Zealand forestry units into foreign emission trading schemes and the costs of potential alternative sources of supply of offsets in these markets;
- › the nature of any post-2012 international climate change agreement(s).

However, existing post-1989 growers must decide

whether or not to join an ETS. As previously mentioned, economic analysis shows an ETS will add positively to the rates of return (over time and subject to risks) for an existing post-1989 plantation. The decision will largely be based on the expected price of carbon.

If the expected price increases at more than about 7.5 percent per year, there is likely to be less incentive to join as the cost of meeting the liability on harvest becomes greater than the value obtained from the sale of units in the near term.

› CARBON PRICES AND INTERNATIONAL EMISSIONS TRADING

In 2007, the carbon market was worth about €40 billion, which represents a trading volume of 2.7 gigatonnes of carbon. The market was dominated by trading in the European Union Emission Trading Scheme (EUETS). While the voluntary market grew significantly in 2007, it was small compared with the compliance market (with a trading volume of 75 megatonnes of carbon).

Units generated from forestry activities are explicitly excluded from the EUETS.

The EUETS is a “permit-based” system that also allows for limited use of units generated from developing countries under the Clean Development Mechanism. Units generated from forestry activities are explicitly excluded from the EUETS, and current proposals for Phase III of the EUETS continue to exclude forestry until at least 2020.

International prices for carbon are likely to be based on the expected supply of, and demand for, units. The Kyoto carbon market has the potential to be oversupplied if AAUs from Russia and Eastern Europe enter the market. However, these parties may decide to bank their units. Demand for these particular units is also uncertain and is likely to be

driven by market acceptance of greened AAUs generated from Green Investment Schemes.

Pricing within a New Zealand ETS will largely be set by international markets. European Union Allowances (EUAs³⁶) are the primary units of trade in the EUETS. They have tended to trade at the greatest price in the global carbon market. Certified Emission Reductions (CERs³⁷) that are stripped of delivery risk (which Project/Primary CERs contain) are also known as Secondary CERs and can be used to meet EUETS obligations.

The cap on the use of CERs in the EUETS, problems with registry systems (the International Transaction Log in particular) and more attractive settlement terms for EUAs have seen CERs trade at a discount of 10 to 25 percent to EUAs. As emitters in a New Zealand scheme can surrender either Secondary CERs or NZUs in the absence of a deluge of AAUs, the Secondary CER is what the NZU is most likely to trade against.

› THE VOLUNTARY CARBON MARKET

A small but growing part of the world carbon market is in the voluntary sector. The voluntary sector operates beyond the compliance obligations and its market is driven by factors such as the desire to demonstrate greater social responsibility through carbon neutrality.

The US, which has an underdeveloped compliance market, is a major voluntary market. This market in particular has shown much more willingness to accept forestry credits than Europe, where they are not allowed into the EUETS despite being valid under the Kyoto Protocol.

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Like the CER market, the voluntary market focuses on three things:

- › additionality (put simply, proving that an emission-reducing project would not have occurred without the credits being issued);
- › permanence (proving that the emissions reduction is robust through time);
- › measurement (being able to measure it).

Existing post-1989 forests may be able to sell offsets into the voluntary market for the carbon sequestration that occurred in the period up to the end of 2007. The forest management practices that increase carbon sequestration in pre-1990 forests may also generate offsets for the voluntary market.

A key development in the voluntary market is the amalgamation of standards for estimating emissions and for the creation of offsets. Already, inventory standards focus on The Greenhouse Gas Protocol (<http://www.ghgprotocol.org/>) and the International Organisation for Standardization (ISO) (<http://www.iso.org/iso/home.htm>). These define how an entity estimates its emissions and therefore the offset required.

In the project space, which defines the supply side of the voluntary market, increasing attention is focusing on ISO 14-064-02 and The Voluntary Carbon Standard (VCS) which in its most recent release contains updated guidelines for the Agriculture, Forestry and Land Use projects. Four types of activities are eligible under the VCS:

- › Afforestation, Reforestation and Revegetation (ARR);
- › Agricultural Land Management (ALM);
- › Improved Forest Management (IFM);
- › Reducing Emissions from Deforestation (RED).

³⁶ An EUA equals 1 tonne of carbon dioxide.

³⁷ CERs are permits generated through the Clean Development Mechanism (CDM), a mechanism for project-based emission reduction activities in developing countries. Certificates will be generated through the CDM from projects that lead to certifiable emissions reductions that would otherwise not occur.

There are numerous voluntary standards available. A thorough comparison of carbon offset standards is available in the report *Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards* (Kollmus et al, 2008) at http://assets.panda.org/downloads/vcm_report_final.pdf.

Since voluntary standards are particularly sensitive to double counting, opportunities to generate offsets are unlikely where a sector is already covered under New Zealand's Kyoto Protocol accounting.



Photo courtesy of Red Stag Photography.