

Less hot air in the greenhouse, please!

Foresters have plenty to offer to a world grappling with greenhouse gas (GHG) emissions and global warming. Afforestation of pasture increases carbon stored in biomass on the landscape. In addition, because trees store carbon as they capture energy and then release the same carbon into the atmosphere when their wood is burned, wood is a GHG neutral fuel. Or is it? Wood combustion can release nitrous oxide which is 296 times more potent per molecule (assuming a 100 year global warming time horizon, according to the 3rd Intergovernmental Panel on Climate Change assessment report) as a greenhouse gas than carbon dioxide. Bio-energy is not a simple matter.

It is therefore timely to devote this issue of the Journal to bio-energy, and I am very grateful to Associate Professor Shusheng Pang who first suggested the theme and then acted as guest associate editor for this issue, which will particularly appeal to forest engineers. Using forest residues as bio-energy will help to slow the greenhouse effect.

But wait, there's more that foresters can do to reduce global warming.

The NZ Institute of Forestry proposes to facilitate a domestic enterprise-to-enterprise "gray" market for "carbon credits" that would help New Zealand meet our government-to-government commitments under the Kyoto agreement and also help to slow global warming. Enterprises that burn fossil fuels or emit prodigious amounts of methane would be able to purchase credits from GHG sequesterers, such as forest owners. Emitters could then claim to be GHG neutral which will be a tangible asset as consumers increasingly discriminate against emitters. Our economic transformation will be swift when consumers finally begin to boycott GHG emitters, and those with gray credits will be less vulnerable. Forest owners will be partially rewarded for an environmental service that they have hitherto provided for free.

What can the Institute do? It seems unwise for the NZIF to actively engage in credit transactions, because we are not a business and we shouldn't expose the Institute to the risks associated with trading on a large scale. We can set some of the ground rules and act as an advocate for the environment, however. Piers Maclaren has pointed out that a GHG market is unusual because both sellers and purchasers have an interest in overestimating credits. Consequently, our expertise will be needed simply to ensure the integrity of the process.

A set of standards for estimating GHG sequestration by New Zealand's forests, similar to the NZIF forest valuation standards, is urgently needed. Superficially it seems obvious that stand carbon content can be estimated by equations that Dr John Moore (formerly of Scion Ltd.) recently developed, and that all we need are accurate mensurational estimates of stems to drive these equations. However, the following questions must first be resolved by an independent party. Precisely how should these mensurational estimates be derived? How should allometric relations be scaled for different sites? Which growth and yield models should be used for estimating future sequestration? Which afforestation projects should be eligible for the scheme? How much sequestered carbon

should be allocated as credits when forests are destined to be clearfelled? What requirements should there be for replanting, or for refunding of credits at time of harvest? We alone can set these standards well, and we should begin this task immediately.

Secondly, fair ground rules for credit transactions are urgently required. We need to figure out what these rules should be. It is logical for emitters to pay sequesterers, and this should be our guiding principle. It has been suggested, however, that emitters who reduced their emissions might also be entitled to sell credits. This is troubling because it is inconsistent with the principle of emitters paying sequesterers, and would bring the scheme into disrepute. Consider, for example, a power generator that creates a wind farm and shuts down one of its two coal-fired plants, thereby reducing its GHG emissions by 50%. Suppose it could earn credits for its 50% reduction. Then it could use its new credits to offset its remaining 50% GHG emissions and claim to be GHG neutral! It would clearly not be GHG neutral, because it would have reduced its net emissions by 50% not 100%. According to the ground rules that we should set, the power generator in question should be advantaged 50% not 100%. They would need to buy credits from sequesterers in order to be GHG neutral, but by virtue of their emission reductions they would need to buy 50% fewer such credits.

We also need to distinguish between net carbon emissions and greenhouse effects. For instance, while it's true that almost half our national GHG emissions come from livestock as methane (37.2 Mt CO₂-equivalents in 2003), farms are, apart from (relatively minor) fossil energy inputs in the use of machinery etc., in themselves carbon neutral. The action of the farms on the environment is not to release extra carbon into the atmosphere; pastures fix atmospheric carbon dioxide and then livestock release the carbon as methane. Unfortunately for farmers, methane is approximately 23 times worse as a greenhouse gas than carbon dioxide (assuming a 100 year global warming time horizon). While livestock farming could be said to be carbon neutral, potential effects on global warming clearly are not neutral, and the Kyoto treaty recognises this difference. We should expect farmers to either purchase credits from foresters or plant more woodlots if they wish to claim neutrality with respect to global warming, even though they could be said to be already carbon neutral. We need to set up a trade in "green house gas equivalents" rather than carbon *per se*. We should call them "greenhouse gas credits".

Lastly, the grapevine says that our government is about to initiate incentives for tree planting as part of its greenhouse policy. It will be interesting to see what emerges; whether the incentives simply raise land prices, for instance, and also whether foreign governments seek to impose tariffs on our wood exports in response to a perceived subsidisation of wood production. Clearly greenhouse policy has many pitfalls for governments. The NZIF's contribution to solving the greenhouse problem is much easier, so let's get on with it!

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