MAF Climate Change Technology Transfer Plan for Action 2010 – 2015

Forestry Sector Workshop
2 February 2010
Rotorua

1 Status of this document

This document reflects the contribution of the workshop attendees and is not the confirmed opinion of MAF or any sector/industry organisation.

2 Introductions

Attendees were asked to provide two to three points about themselves that would help others understand the perspective they were bringing to the workshop.

Brett Gilmore (Pan Pac Products Ltd. and the Integrated Forestry Company in the Hawkes Bay) wanted to know more about climate change. He thinks there needs to be more caution about what is "pushed down" to people.

Mark Dean (20 yrs in science at Scion and Ernslaw One Ltd. Based in the South Island) has gone from an esoteric background to the reality of the forestry sector. He thinks there is a lot of overload out there, so people have "zoned out", possibly because it's convenient to be in denial. Believes the forestry sector doesn't have a lot to be ashamed about.

Dave Lowry (Hancock Forest Management Ltd. (operational forestry, technical aspect)) is a little sceptic and cynical about climate change in terms of how it's dealt with in the media.

Patrick Milne (NZ Farm Forestry Association) wanted to ensure that the farm forestry perspective is incorporated into the workshop.

Denis Hocking (NZ Farm Forestry Association) is a long time tree hugger with a chainsaw. He is getting more concerned about the attitudes towards climate change since many people are in denial. He wants to see the farm forestry approach used and promoted.

Russell Dale (CEO of Future Forests Research Ltd.) has a background in the forestry industry and is involved in all technical and operational aspects of forestry. He thinks that wherever people sit on the spectrum of belief, they need to look at the way NZ uses land, which is its most valuable resource. Land management needs to be thought more of.

James Treadwell (Rayonier NZ Ltd. manages Matariki estate and is the person in charge with ETS and climate change) wanted to hear what other people were going to say. He is concerned with "what's being put out there" and believes there are a lot of opportunities for forestry. He sees a big role in farm forestry.

Kit Richards (Environment Manager for P F Olsen; forestry services provider; team leader for Future Forest - Environment Theme (reporting for CEO)) is concerned as he thinks people don't have a clue about what is going on and have therefore given up. He thinks the big issue is volatility and that there is no way of dealing with it. He wanted to know how to avoid missed targets and investments and thinks there is a lot of mismanaged NZ land.

Brian Richardson (Group manager for Scion Research) thinks that everything NZ does is affected by climate change. He wants to support the role of various stakeholders but there needs to be a scientific basis for the decisions made. There needs to be the capability to address any long term issues.

Tim Payn (Scion Research) has a lot of interest in the multi-function of forests.

Katherine McCusker (MAF Senior Policy Analyst – Technology Transfer, Climate Change) is putting together all the work from the sectors. She has a practical pragmatic approach and wants to find the win-wins were that address climate change and sector issues. She also wants to know what links could be made to utilise the knowledge and resources available.

Angus Gordon (Self employed, background in engineering) has interest in building long term resilience but not necessarily using the same tools.

John Vaney (Regional Team Leader for MAF policy) said that there had been a similar meeting with farmers and foresters a few years ago that had got some good feedback. He hadn't done technology transfer for a long time (MAF) but was keen to see how people dealt with it, and wondered who was going to pay for it. He is involved with technology transfer in the forest service and is keen to see how it can be done in the broader climate change area. Feels the message needs to be publicised.

Don Hammond (Hammond Resource Management Ltd) a consultant with over 30 years of forest industry experience. "I am not a climate Change cynic, but remain somewhat sceptical about some of the information being spread around. More importantly I am cynical about the approaches taken by various governments to respond to this threat (perceived or real)." His real concern was that the Crown's focus is three years which they consider long term. "This is not even the planning horizon for forestry let alone a crop of trees. We consider long term to be in the order of 50 years with 10 years being relatively short term. The Forestry Allocation Plan is due by July.

Graham West (Scion Research, project leader for intensive forest leaders and fourth generation farmer) was present for his grandchildren: he wants to have an answer when they ask him what he did about climate change.

Colin Maunder (Timberlands Ltd. (environment and fire management)) is unsure whether or not climate change is happening or not but agreed with the volatility issue. He thinks that efforts in technology transfer will help, whether climate change is real or not.

3 Background

3.1 Overview of MAF CCTT Plan for Action

An introduction to the strategic framework and background to the plan was provided at each of the workshops by either Katherine McCusker or Annie Perkins. This summary reflects information provided across all workshops, in addition to the supplied background paper (see Appendix A), so that all sectors benefit from the same information.

3.1.1 Origins of the draft plan for action

The draft plan's themes and targets were developed at a high level by a research and technology transfer group. They were then worked through on a cross-sector basis through the Climate Change Technology Transfer Subgroup (CCTTSG). The plan is a living document and there will be continuing opportunity for feedback. Priorities will change as the plan is worked through with or by the sectors and/or as more information comes through from scientific or political sources, nationally and internationally.

3.1.2 Purpose of the plan and today's workshop

Through developing the plan to an implementation level, MAF wants to determine how to sensibly invest government funding to help farmers develop sustainable and resilient businesses.

MAF is particularly interested in:

- Setting meaningful targets which help business sustainability.
- Determining what practical information needs to be delivered to farmers and how;
- Determining how to best integrate government and industry action within and across sectors.

MAF will be using the information from this workshop series to take action from March 2010 onward and has funding available to support climate change technology transfer over the next five years. Some actions highlighted through this process may be supported from this fund; others from alternative sources, such as industry or industry/government partnerships. Others may evolve into Sustainable Farming Fund projects. MAF expects that initially action (and funding) will focus on raising general awareness and implementation of existing tools and technologies.

It is likely that different sectors will use the plan in different ways. As an example, the dairy sector has already set its targets. Other sectors aren't in that position. MAF is flexible about time and is interested in taking advice from the sectors about priorities.

3.2 Focus on the Forestry Sector

Russell Dale provided background to his involvement with the draft plan for action project. "The important thing I felt was the connection between technology transfer and the work Future Forests is doing.…We help them understand how to implement technologies, put together a list of various projects that have been funded by people that have a connection with climate change.

From being in the Climate Change Technology Transfer Sub Group (CCTTSG), my sense is that the forestry people have a better understanding of the issues. We see opportunities there but it has had a direct impact on our business. We need to make sure we send the right signals through so that investments are worth it.

We haven't got land uses in the right place and we need to get the best return from the land. If we are going to sustain our resources, it's actually good business. There is volatility and as forest owners, there are some things that we can do to mitigate that risk."

3.3 Discussion following the background session

- **Forestry** works with local government. Crucial that technology transfer gets to the council level.
- Has to be a blanket approach.
- Difficult for sector to advise on best way forward without secure funding
- There is a difference between agriculture and forestry. Major role in climate chance energy use area, wood products going out have a climate change advantage.

4 The workshop process

4.1 Step 1: Assessment of relevance and usefulness of targets and themes

- The first two columns of each table in Section 4 were provided to the workshop. These had been developed by through an earlier MAF CCTTSG workshop process (see Appendix A).
- The CCTTSG was aware that some themes and targets may be more relevant to some sectors than others. Defining areas of relevance/focus was the first stage of the workshop process.
- Attendees worked in small groups to assess the relevance of themes and usefulness and relevance of targets on a scale of **0 (not relevant/useful) to 5 (very relevant/useful)**
- The full list of themes presented was:
  - Capability and capacity
  - Efficient use of resources: water
  - Efficient use of resources: energy
  - Nutrient management
  - Greenhouse gases including methane
  - Resilience to extreme weather events

- Soil management
- Carbon sinks
- Emissions trading scheme (ETS) impacts
- Sustainable systems

This document only contains tables relating to those themes considered relevant to the sector by the workshop attendees.

4.2 Step 2: Gap analysis and definition of actions, timeframes and priorities

Each group was then asked:

- Whether there was anything missing from the supplied target, or whether they would suggest making any changes to it?
- How would they amend the target?
- What specific actions would be needed to reach the target, especially for this sector?
- When would action need to take place (1 to 2 years or 3 to 5 years)
- What was the priority for this target (0 = low to 5 = very high)? Some groups chose to prioritise actions rather than targets.

In amending or developing targets the groups were asked to aim for SMART targets, i.e. targets that were:

- Specific
- Measurable
- Achievable
- Realistic
- With a Timeframe

4.3 Step 3: Review and summary of key messages/issues

At the end of the day attendees were asked to reflect on key messages/issues raised during the workshop.

5 CCTT Plan for Action: Forestry Sector themes and targets

Groundwork has done its best to make these tables faithfully reflect the workshop experience. However to ensure suggested actions have been captured in the right place for subsequent analysis across sectors, some interpretative changes have been made during the editing process. Significant interpretative changes have been indicated by square brackets [ ] surrounding text. Some amended/new targets did not conform to the SMART model but Groundwork has not tried to correct this.

Capacity and capability	**Targets**	**How relevant is this topic/theme to this sector? (0-5)**	**How useful and relevant are the targets? (0-5)**	**Who assessed this theme?**
Goals for climate change technology transfer are ambitious and will not be achieved with current capability. There is an urgent need for skills and experience to support land managers in moving toward more sustainable land use systems. These skills and experience are in short supply - they must be developed now. This requires a financial commitment to employ, educate and up skill the right people with the right skills. The technological solutions to management of climate change issues are limited in number and efficacy. It is critical that in a country the size of New Zealand all climate change technology transfer is aligned toward common goals. This includes primary sector and government funded programmes.	A. Develop the required capability to achieve the sector-specific targets by 2015. B. Increase alignment of sector and public investment on extension to deliver the knowledge required to achieve the desired outcomes in climate change and sustainable land management. C. In partnership with the sectors, develop a programme to up-skill people so they can provide advice/support to advancing issues of adaptation and sustainability. D. Have the right people trained in the right areas at the right time. E. Have climate change integrated into tertiary and vocational land based courses by 2015. F. Provide opportunities for land managers to up-skill themselves on climate change and sustainability issues so they can increase their business resilience and profitability by 2015. G. Provide learning opportunities specifically for Iwi/Maori to increase awareness and encourage the uptake of new knowledge and foster Maori innovation in climate change and sustainable land management.	4-5		Colin Maunder Graham West Don Hammond John Vaney

Capacity and capability					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
▪ Why 2015? Seems too far out ▪ What "people" will be up-skilled? ▪ Who is going to take central lead role across all sustainable land use? ▪ Best ways of influencing stakeholders? ▪ Need a proactive approach highlighting benefits (how do you value the benefits). ▪ Freedom to operate should not be constrained. ▪ Staff in companies? ▪ Delivery mechanisms? ▪ Central government doesn't do extension. ▪ Local government has same capacity. ▪ No centralised technology transfer system. ▪ If being done – is fragmented across industry. ▪ Who is the forestry entity? Target B: Alignment variable. TLAs appear to be the drivers of this – good representation in the regions. Major room for improvement. Target C: Good idea, but how?	A. [Amended target] Urgently need to develop a cohesive strategy plan across sectors to develop future capability by 2011 or sooner.	i. MAF to take leadership role in driving this forward across sectors.	6 months		
		ii. MAF/Wood Co partnership [to develop capability in forestry sector.]	√		5
	B. [No change?] Increase alignment of sector and public investment on extension to deliver the knowledge required to achieve the desired outcomes in climate change and sustainable land management.	i. Identify existing extension skills. Government needs to pick the winners in terms of future skill sets and not fund others.			
		ii. [Build on existing capacity] by setting up dedicated extension officers regionally (set up by TLAs particularly regional councils).			
		iii. Programmes to up-skill key people/influencers/drivers.			
		iv. Set up an awareness programme. Programmes must push business imperatives (positive).			
	C. [No change] In partnership with the sectors, develop a	i. [Determine what the partnerships are: NZFOA/NZFAA?	12-18 months		4

	programme to up-skill people so they can provide advice/support to advancing issues of adaptation and sustainability.	ii. Identify early adopters – variable at levels 2 to 5.	12-18 months		4

Capacity and capability - continued					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
Target D: Don't really know – but more needs to be done, 7 should be covered here. Probably a key target to demonstrate the opportunities etc.	D. Have the right people trained in the right areas at the right time.	Unsure of action needed [to achieve Target D] but more needs to be done.			
	E. Have climate change integrated into tertiary and vocational land based courses by 2015.	Address this area			
	F. [Amended target?] Develop delivery, extension, mechanisms, training and education for the wider mass.	i. Re-train the trainers/educators. 4 per region.	√		4
		ii. Have packaged systems – deliver knowledge in ready to use form, not raw.			4
		iii. Participate in field days.			4
		iv. Key client interactions (Scion/industry).	Years 2 - 3		4
		v. Forestry insights (kids in schools).			4

	H. [New target?] Address culture – covering hearts and minds of urban people and existing forest growers on target land.	i. Explicit publicity about forestry and climate change ▪ Climate change adaptation communication messages. ▪ Eagerness to learn about adaptation and climate change. ▪ NZ wood/forestry insights. ▪ Pitch the profit/resilience message and not the climate change message.	6-12 months (immediately).		5

Efficient use of resources - Water	Targets	How relevant is this topic/theme to this sector? (0-5)	How useful and relevant are the targets? (0-5)	Who assessed this theme?
Water efficiency is a key issue for New Zealand in areas where water is considered to be constrained in availability for the primary sector. These are mostly traditional summer dry areas such as the east coast of both islands. Availability of water has also become an important issue in areas such as the Waikato. As rainfall becomes increasingly variable, and temperatures and evapotranspiration increase, water efficiency and mitigation of extreme events will need to improve just to maintain current levels of production. Improving water use efficiency benefits both the environment and the water user.	A. Ensure land managers have the necessary incentives, information and technologies to improve the efficiency of water use. B. Increase land managers' resilience to drought by providing information about efficient use of rainfall and irrigation, case studies and decision-support tools. C. Support water efficiency measures such as greater strategic development and use of water storage. D. Align relevant action plan targets with the target determined by the Primary Sector Water Partnership: i.e. 80 per cent of extracted water used by the sector will be under a self management approach to meet benchmarks[1] of water efficiency by 2016.	2 Because of issues regarding resource sharing and property rights.	Targets not very relevant for forestry. Targets B, C, and D are relevant. Forestry is an efficient user of water in terms of water/tonne product.	

[1] Benchmarks set under the Primary Sector Water Partnership

Efficient use of resources - Water					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
▪ Benefits of forestry on water. ▪ Rainfall will increase in some areas. Missing beneficial input of forests – ecosystem service. ▪ Water efficiency target for productivity. This theme focuses on extraction and use: ▪ What about supply and ownership? ▪ Forestry importance? Issues are different to farmers. Impacts of change in water supply. What do forests do? ▪ Improvements in building the understanding of crop water use. ▪ Provide base-line information on the value of clean water in terms of multiple use benefits.	A. Ensure land managers have the necessary information and technologies to select genetic resources for sites more prone to droughts.	i. Add trait for water use efficiency and drought into tolerance genetic selection programmes ▪ E.g. Dry East Coast, if temperature rises and rainfall decreases, will need different species.	2-5	5	5
		ii. Make international links [re drought tolerant genetic resources]	Ongoing		4
		iii. Conduct research and raise awareness [re drought tolerant genetic resources]	√ →		4
	B. .[Amended target B?] Build a decision support tool that ranks the "irreversibilities" of water quality to guide the decision–making process.	i. Information gathering. ii. Ranking system. iii. Water yield model built-on including rainfall and land use and flow mitigation. iv. National/regional issue/planning level. v. NIWA.		√	Low priority for forestry – baseline funding?
	C. [New target?] Provide information and technologies for landscape design to manage water flows.	i. Provide information on water use by forests and other land uses (see other target)	1-4		4

Efficient use of resources - Energy	Targets	How relevant is this topic/theme to this sector? (0-5)	How useful and relevant are the targets? (0-5)	Who assessed this theme?
There is an opportunity for New Zealand's land based businesses to reduce energy costs and related carbon emissions by adopting energy efficient practices and technologies (including on farm generation where appropriate). There is significant scope to make cost-effective efficiency improvements in irrigation, cultivation, harvesting, heating and cooling systems, transport, and processing of primary products when it occurs on-farm or in a vertically integrated operation (e.g. in a horticultural pack house or winery). To gain the best use of resources, the initial focus of this approach will be on energy intensive activities.	A. Ensure land managers have the necessary information and technologies to improve the efficiency of energy use. B. Continue to develop and disseminate information about energy innovation choices, including case studies, decision-support tools and cost benefit analysis. C. Demonstrate leading edge energy efficiency and renewable energy.	5. Relevance to forestry: Conventional energy (reduce emissions): ▪ Energy very important, direct impact on profitability (diesel fuel – machinery, electricity for processing) ▪ Risk of increasing fuel prices – logging Energy for transport (reduce emissions): ▪ Transport large component of forest profitability ▪ Encourage efficient transport systems (private/ public partnerships)	All 5	

Efficient use of resources - Energy					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
	A. Ensure land managers have the necessary information and technologies to improve the efficiency of energy use.	[No actions were completed for this target. Unclear whether intention was to keep or discard it in favour of targets below]			
	B. Continue to develop and disseminate information about energy innovation choices, including case studies, decision-support tools and cost benefit analysis.	[No actions were completed for this target. Unclear whether intention was to keep or discard it in favour of targets below]			
	C. Demonstrate leading edge energy efficiency and renewable energy.	[No actions were completed for this target. Unclear whether intention was to keep or discard it in favour of targets below]			
	D. [New target?] Establish benchmarks for energy-use in litres/tonne wood produced [and encourage efficiency via diesel efficiency rebates].	i. Survey contractors (logging, trucks). ii. Analyse litres/km/tonne. iii. Incentivise energy efficiency through diesel efficiency rebates or similar.		√	3

Efficient use of resources – Energy - continued					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
	E. [New target?] Increase wood use for energy and move stationary energy from non-renewable [sources] to sustainable wood.	i. Develop infrastructure solutions to facilitate smooth transition of 10 schools per year from coal-fired to wood-fired boilers.			5
		ii. Work with industry to change from coal to wood (pellets/chips)	√		4
		iii. Promote the benefits of wood as energy, important to forestry as another market for forest produce.	√		5
		iv. Firewood moisture content standard	√		3
		v. Energy efficiency education campaign			
	F. [New target?] Develop and Implement National Building Codes to reflect the relative thermal efficiency of different building systems/materials (D Lowry).	i. Move to 150mm framing in house (direct correlation with thermal efficiency)	√	√	5
		ii. Continue with 'Wood is Good' campaign (NZ Wood)	√		5
	G. [New target?] [Consider use of] wood for bio-oil/bio-fuel (alternative transport fuels)	i. Keep a watching brief of international developments – look for NZ opportunities.	√		5

Nutrient management	Targets	How relevant is this topic/theme to this sector? (0-5)	How useful and relevant are the targets? (0-5)	Who assessed this theme?
Nutrient management is one of the key primary sector issues that must be addressed. Because nutrients have a catchment-scale effect, all of the sectors are interdependent. Within the climate change programme the objective is to reduce nitrous oxide emissions. Many of the management tools to reduce nitrous oxide are the same as those used to reduce nitrogen leaching and run off.	A. Provide information to 80% of land managers on nitrous oxide mitigation options and their costs and benefits by 2015. B. Align action plan targets with those developed by the Primary Sector Water Partnership, i.e.: i. 80 per cent of nutrients applied to land nationally are managed through quality assured[2] nutrient budgets and nutrient management plans by 2013. ii. 1.7 million hectares[3] of intensively farmed land will have implemented nutrient management plans, in the context of their wider farm management planning, to achieve improved environmental outcomes and reduce on-farm operating costs by 2016. C. Ensure that nutrient management is integrated into the wider farm system through self management regimes. To gain the best use of resources, the initial focus of this approach will be on intensively farmed areas. Once achieved, the targets will ensure that not only are the majority of nutrients applied using nutrient management approaches, but also that land uses that contribute to approximately 2/3 of total nitrogen losses and 1/3 of total phosphorus losses are engaged in self management regimes to ensure best practice is achieved across the farm system.	3, Because of unrecognised/ unrewarded environmental services.	Not	

[2] The people undertaking and processes used will be subject to independent quality assurance
[3] Land with dairy, arable and horticultural operations

Nutrient management					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
▪ The existing targets are not really relevant for forestry but they may be for other sectors so have not edited these. ▪ Phosphate loss very low without erosion therefore need erosion minimisation in targets. ▪ Recognition of environmental services/nutrient balance. How? Technically-land use models financial payment? ▪ Intensively farmed land implements nutrient management plans as part of resource consent. ▪ Boron deficiency caused by dry conditions.	[D. New target?] Erosion minimisation for phosphate reduction (Note – mostly class 6 and 7 land not intensive).	See actions on land use optimisation tool under GHGs, Soil Management and resistance to extreme weather events.	√		3
	[E. New target?] Develop optimisation model for land use recognising role of forestry in catchment management.	See actions on land use optimisation tool under GHGs, Soil Management and resistance to extreme weather events.		√	4
	[Add to Target C?] Intensive farms need nutrient management plan as part of resource consent.			√	2

Greenhouse gases (GHG) including methane	Targets	How relevant is this topic/theme to this sector? (0-5)	How useful and relevant are the targets? (0-5)	Who assessed this theme?
The CCTT Plan for Action requires land managers and those advising them to understand a new area – that of greenhouse gases (GHGs). This includes new terminology, where the GHG come from, how to estimate them for their farms, how to mitigate them to reduce cost and new benchmarks. Greenhouse gas emissions for agriculture can only be measured experimentally while emissions at farm, regional or national scale are estimated. Ruminants produce methane as part of their normal digestive process. As a greenhouse gas methane is 21 times more potent than carbon dioxide when you compare their heat-absorbing abilities over a hundred years. Technologies and practices to reduce emissions are likely to come out of research that: ▪ Deals with the quality and type of feed ▪ Modifies the composition of the bugs that produce methane in the rumen ▪ Modifies farm systems We currently do not have the technologies available to extend to farmers to significantly reduce methane production. Initially the action plan will look at increasing farmers understanding of how increasing feed efficiency will decrease methane per unit of product and improve profitability. Getting away from that dichotomy between farming and forestry. Oliver octopus – multiple objective modelling. Using the model to put options in front of people to give more outputs while meeting other objectives.	A. Ensure the common language of GHGs is understood and widely used by land managers by 2015. B. Provide information to 80% of land managers on GHG, where they come from and how to estimate them for their business by 2015. C. Establish benchmarks for GHG for different farming systems by 2015. D. Demonstrate GHG scenarios and options on focus, research and monitor farms and other properties providing industry leadership by 2012.	1. Relatively low because only fuel use and methodology of where you account for the carbon of deforestation are relevant. No animals and fertiliser inputs.	1-2 Useful but not a big deal. 0 1-2 Don't use much fertiliser 4. Opportunities in here because it's about land use e.g. alternative species.	

Greenhouse gases (GHG) including methane					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
	[B. Amended target/subtarget?] Make land use decision making tools (in development now) accessible via the web for free [NB: See also under Resilience to extreme weather events and soil management]	i. Continue MAF-funded project run by Scion with an eternal steering group to develop this land-use decision making model.	√ (12 months)		5 small forest owners and Maori 1-2 for corporate forestry
		ii. Develop implementation plan to role out land-use decision making model effectively making maps available that are needed to integrate the information well (work with consultants on this first).	√ (mapping is urgent should happen concurrently with previous action).		
	[D. Amended target?] Use demonstration farms (case studies) and monitor farms to show the financial and environmental incentives around GHG.	i. Initiate collaboration across agriculture/forestry. Monitor farms are currently farm focussed only so to shift to a multiple objective and land use approach rather than just farming or just forestry. In each region have demonstration farms so local examples are available.	√		5

Greenhouse gases (GHG) including methane - continued					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
	[E. New target?] Full access to terrain and spatial information for implementing property planning.	ii. Discuss with MAF – Progress in parallel with the modelling. There is no point in developing a model unless it can be used and applied well.	√ (urgent)		5 small forest owners /Maori 1-2 corporate forestry

Resilience to extreme weather events	Targets	How relevant is this topic/theme to this sector? (0-5)	How useful and relevant are the targets? (0-5)	Who assessed this theme?
Adaptation to climate change is likely to benefit from experience gained in reaction to extreme climate events, specifically by implementing proactive climate change risk management plans. Climate change in New Zealand will increase the frequency of extreme weather events, challenging the resilience of many of our land based businesses.	A. Provide tools, knowledge and skills so land managers can make well informed timely decisions.	5. Includes wind, drought, extreme rainfall, snowfall. Potential to destroy crops. Potential to impact on profitability of crops. 30yr rotation, so there is a high likelihood of encountering one or more extreme weather events.	5	Mark Dean Brett Gilmore Dave Lowry Patrick Milne
	B. Provide tools so that land managers can increase farm profitability and their resilience to the impacts of a changing climate.		5	
	C. Identify a suite of practices, technologies and tools to adapt to a changing climate and manage risk from extreme weather events by 2013.		3	
	D. Provide demonstrations of why increased resilience is needed and the benefits of increased resilience to the farming operation.		4+	
	E. Increase investment analysis skills and tools to future proof major on-farm investments.		5	

Resilience to extreme weather events					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
Management practices need to be aligned with territorial authorities (TLAs). Good predictions of adverse events – when and to what extent. Records of institutional knowledge - budget for targets. TLAs need to be included in CCTTT: When and who is going to provide the tools.	[A Amended target/New sub target?] Use records of historical events and trends to improve predictability of adverse/extreme weather events.	i. MFE, MAF, NIWA and relevant experts to collaborate on project to: ▪ Use historical data to improve predictability of adverse climatic events. ▪ Build new spatial models to incorporate the probability of these adverse events. Regional resolution a minimum	√		5
	[New target?] Involve TLAs in CCTT to address serious need to align regional plans with new information.	i. Involve TLAs in CCTT discussions and forums. They seem to be aware of change being afoot, but unsure if it's being implemented into their planning horizons. There is a real need to extend the district planning cycle or view from the current 10 year frame to 20-50 years.	√		3
	[E. Amended target/New sub target?] Provide tools to] optimise land use decisions.	i. Develop a tool to optimise land-use decisions. Incorporate both the true economic financials and environmental costs and benefits under varying scenarios of extreme weather events [NB: See also under soil management]		√	5

Soil management	Targets	How relevant is this topic/theme to this sector? (0-5)	How useful and relevant are the targets? (0-5)	Who assessed this theme?
Soils underpin our land based systems. Soils physically anchor plants, support livestock, provide a source of water and nutrients and regulate emissions to air and water. They are supported by an extensive biological system that aerates the soil and cycles nutrients and organic matter. When soils are water logged, compacted, lack aeration, or contain too much nitrogen they are more likely to lose nitrogen to the atmosphere as nitrous oxide. Soils are both a source and store of carbon. Most soil carbon is locked up. However unless we alter our management practices, more of this carbon may be released into the atmosphere, as temperatures and mineralization rates increase. By increasing the amount of carbon locked in the soil, land managers can benefit from: ▪ Increased water holding capacity and infiltration rates ▪ Improved soil structure, less erosion and more ability to cope with compaction ▪ Improved nutrient cycling and cation exchange rates With increased frequency of drought, high rainfall events and high wind the risk of soil loss increases in the arable, outdoor vegetable and pastoral sectors increases. Greater uptake by land managers of current best management practices would increase the resilience to extreme weather events and reduce soil loss. Forestry experiences major issues with soil/sediment loss during and immediately after	A. Implement changes in soil management to build more resilient rural businesses. B. Increase the uptake by land managers of Code of Practices and best management practices. Work on this theme links to a number of other programmes including the Forestry and Horticultural Code of Practices, Hill Country Erosion and Regional Council work.	4 Many other issues. Defaults for forestry.	1 Fine but more work needs to be done at more basic level – education and tools (land use capability erosion mapping etc).	Russell Dale James Treadwell Kit Richards Denis Hocking

harvest.				

Soil management					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
▪ Land managers understand soils and land forms. ▪ Land erosion/hazard mapping (2yr) available and widely used (includes climate factors). – Apply to Best Environmental Practice, links to extreme weather. ▪ Tools to assist land use decisions e.g. Future Forest Research's land use optimisation MAF land use tool.	[A. New Target?] Make soils and landform an increased component in major education topics for ALL land managers.	i. Deliver soil and landform education through Industry Training Organisations, tertiary and secondary education.		√	5 (almost no cost)
		ii. Deliver soil and landform education through Extension services.	√		5 (almost no cost)
		iii. Deliver soil and landform education through whole farm plans.	√		5 (almost no cost)
Decision support tools in the field needed. Basic measurement i.e. soil moisture content and response of different soils to climate change and different species interactions.	[B. New Target] Ensure soil erosion hazard ranking/mapping tool [is available and widely used] – key drivers are soils/geology/land form/climate.	i. Develop existing national datasets – Scion/Landcare/NIWA with MAF funding. ii. Produce national web based/GIS based erosion hazard assessment/classification tool that can be linked into our environmental practices and underpin the current National Environmental Standard and make it available to all land management sectors (NZ wide). iii. Link to industry Forest Best Environmental Practice and National Environmental Standards (NES).	√ (1 year to finish the tool, 2 to have the tools widely used by forestry industry)		5 ($500k)

Soil management - continued					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
	[C. New target?] Restore and broaden 'soil conservator' roles.	i. National soil conservation/land management refocus co-ordination [by?] Environmental Protection Agency (EPA).	√		4
	D. [New target?] Land use optimisation: multi-dimensional economic/environmental services and disservices.	i. Support and fund development of existing programme after completion of B version in 2012.	√		5
		ii. Coordinate via MAF and MFE CRIs and councils – develop into major policy and land use development tool.	√		5

Carbon sinks	Targets	How relevant is this topic/theme to this sector? (0-5)	How useful and relevant are the targets? (0-5)	Who assessed this theme?
There are increasing opportunities for forest owners and farmers with areas in trees to receive an income from carbon trading. Carbon forestry presents both opportunities and risks. Carbon stock forests have a different objective to commercial forests and may need to be managed differently. There are market opportunities for businesses that undertake carbon foot printing, life cycle analysis.	A. Provide appropriate tools and information to support the uptake of business opportunities of carbon foot printing and life cycle analysis by 2011. These will be demonstrated to potential users (from TT strategy) B. Provide an integrated programme to foresters and farm foresters on the impacts of a changing climate on forestry; the opportunities and management of risks of carbon farming.	4. Has a benefit but understated risk. Needs more information and long term models including risk management. Role for MAF with education attached to registration? Longer term technical and political risk.	Note that life cycle analysis being done for forestry. Need more co-ordinated approach across sectors.	

Carbon sinks					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
Need to consider carbon storage in "harvested wood products" and possible management decision impacts.	[New/amended Target A: Establish a] co-ordinated approach to life cycle assessment across sectors.	i. MAF to co-ordinate work being done by different sectors.			
	[New/amended Target B: Provide] more analysis of all aspects of risk for carbon forests.	i. Define responsibility for carbon farming risk analysis:]MAF Role? NZIF Role?			
	[New target? Addition to Target B?] Consider carbon storage in "harvested wood products".	i. Continue current work on consideration of carbon storage in "harvested wood products" including international negotiations.			

Emissions Trading Scheme (ETS) impacts	Targets	How relevant is this topic/theme to this sector? (0-5)	How useful and relevant are the targets? (0-5)	Who assessed this theme?
The ETS is the price-based mechanism for GHG and is a key part of overall climate change policy. It involves all significant GHG and all sectors.	A. All foresters and farm foresters able to make informed decisions on ETS by ? (date dependant on legislation). B. Give all land managers the opportunity to be aware of ETS understand their obligations and make informed decisions by ?. (date dependant on legislation).	4		

Emissions Trading Scheme (ETS) impacts					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
Would not support review of ETS, get on with it, classify outstanding issues and then improve over time. ETS decision making to all sectors equally to informed decision making on ETS – current and future. Targets include the certainty of current legislation, which is a very high priority (3 months urgency). Also equity across the sectors – an ongoing challenge (forestry appears to be its poor cousin) and post 2012 developments for offsetting promotions.	[Amended Target A? Enable all sectors to] make informed business decisions taking the ETS into consideration as part of the decision model.	i. Identify new business opportunities arising from the ETS. ii. [Implement a] more co-ordinated approach to communication.		Ongoing	3+
	[New Target C? Raise awareness of forestry ETS obligations.	i. [MAF to enable] sustainable programmes advisors to be the first port of call for enquiries (establish 0800 number?).	6 months		
		ii. More available information (pamphlets, website, regular updates/newsletter, road show/conferences.	6 months		
		iii. Enable more one-on-one consultancy with MAF Sustainable Programmes Advisors.			
		iv. [Establish means via licensing process to assess risk and financial impact of potential new forestry] Critical to maintain viability of existing production forests.			

Emissions Trading Scheme (ETS) impacts					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
		v. Forest Sector Perspective has too much focus on farms and how trees can help. Need to consider existing forests and climate change risks/weather.			
		vi. Minimise and simplify plan.			
		vii. Focus resources.			
		viii. Define who has the central role.			
	[New Target D?] Provide more certainty in policy/ETS legislation.	i. Crown in next 3 months needs to address all the specific operational details around ETS. Needs to: ▪ Ensure equality across all sectors (forestry seems to be poor cousin0 ▪ Be more capable at handling clean green energy related projects. ▪ Clarify post-2012 developments for offsetting promotions.	Immediately		

Sustainable systems	Targets	How relevant is this topic/theme to this sector? (0-5)	How useful and relevant are the targets? (0-5)	Who assessed this theme?
Farming systems have changed enormously over the last 50 years and will continue to do so in the future. The average New Zealand land based business has increased in size, complexity and has to meet increased demands from markets and regulation. To adapt to a changing climate and/or to reduce greenhouse gas emissions our land managers will need to further up skill their management skills. To do this they will need good information on system options including integrating different land use options, changes in stock/crop policies, management systems and financial returns. This includes the interaction between soil, plants and animals in a system that is economically, environmentally and socially sustainable.	A. Provide appropriate tools and information to land managers so they can make informed decisions at a property or catchment level.	4 (large scale plantation forests are lower than mixed land use)	At high level is OK but not a target.	Tim Payne Angus Gordon Brian Richardson

Sustainable systems					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
[Too broad. Focus on continued development of land use decision tool.] Development of a whole system of qualification tool that predicts/measures all risks, benefits and outputs, applies scores and then allows that tool to be a baseline decision support module for the commercial community (banking/insurers). Develop forest options tool: Economic return plus environmental (social) benefits ranking. Develop/adapt SPIF as NZ tool for ranking forest options v. other land uses at farm/catchment scale – economic/environmental/social. Build knowledge of foresters such as relationships between climate variability and productivity and critical points. Have tools that help estimate risk and how likely. Integrated land use. Environmental sessions.	A. Implement a [land use decision] tool to assess economic options for forestry and other land uses (i.e. integrated) by the end of 2012 and then provide ongoing support and training.	i. Develop [land use decision] tool by Dec 2011. [Adapt [Australian Scenario Planning and Investment Framework?] (SPIF) as national, regional and local screening tool for ranking forest options vs. other land uses at farm/catchment scale – economic/environmental/social][4]	1 to 2		
		ii. Validate [land use decision tool] under different systems [to provide benchmark data].	1	to 5	
		iii. Provide ongoing support [for land use decision tool] (Overseer model).	1	to 20	
		iv. Include environmental benefits/impacts as a rating/score [in land use decision tool].	1	to 5	
		v. Train people to use [land use decision tool] such as Fitec, Schools of Forestry, professional development of forestry/AgResearch professionals. 2 to 5	2	to 5	

[4] It was not clear from the workshop notes whether the land use development tool and the adapted SPIF tool were one and the same. If they are not, then development of the SPIF tool needs to be captured as an action.

Sustainable systems					
Is anything missing from the targets? Would you change anything in the targets?	**How would you amend the targets?**	**Specific actions, especially for this sector, to reach the [amended] targets.**	**Action done (yrs)**		**Priority (0-5)**
			1-2	**5**	
		vi. Raise awareness and demand [for land use decision tool] ▪ Raise awareness of bankers, insurance, investors, farmers, foresters, advisers to get uptake. ▪ Raise awareness of eco system services - land managers and advisers. ▪ Market clean green for land management e.g. UK supermarkets, Europe etc. ▪ Green economics.	1 to 5 1 to 20		
		vii. Coordinate with other systems ▪ Need to be able to communicate with other schemes. ▪ Equivalency one front page (minimise paperwork and time). ▪ [Enable] tools to talk to each other (hub) e.g. Farm Max Overseer.	2+		

6 Step 3: Key take home messages

At the end of the workshop, attendees were asked to consider what actions crossed themes and what key messages had emerged from the day.

Tools to assess, manage and account for risk

- [Need way of determining] risk management in relation to the whole catchment, big picture, what's the risk of taking this forest out of the catchment. A tool for the regulators, planners e.g. if a dairy farm is here this costs x amount for the catchment.
- Ranking strategy, wouldn't need to be experts but need to be able to make decisions based on the risk matrix, use it in some manner
- Forestry mitigates some risks that aren't accounted for at the moment, e.g. the banks don't account for it because they don't understand it. How can they make decisions at that level, when they have no background or tools.
- Australia has some risk management tools we could use.
- What is the governments' attitude towards the risk the country carries if something catastrophic happens to forestry as a consequence of climate change? E.g. protocol.
- How are farmers going to account for their emissions?

Additional themes for consideration

- Biosecurity is a huge factor. There are new pests/risks and many changing effects/ranges of existing pests.

Drivers for change in the sector

- Forestry being hit by ETS first which is a preventing others from entering the industry. MAF should be promoting forestry.
- Need to get trees in the ground now but no one will plant if there's a possibility of losing land rights. The government needs to help develop the market to encourage planting (e.g. NZ wood).

Market issues

- The government should be working hard to promote NZ wood. Need people out there enthusiastically wanting to buy wood.
- There was a surge in planting in early 90s which slowed down in late 90s resulting in very uneven age class [in growing stock]: will affect the balance of trees absorbing [CO2] in the future.

Appendix A

MAF Climate Change Technology Transfer Plan for Action 2010 – 2015

What is the purpose of this action plan?

New Zealand depends greatly on our climate and land resources, or 'natural capital.' The primary sectors generate wealth and also contribute greatly to social and cultural values. To sustain New Zealand's economic prosperity and quality of life, the sectors recognise the need to adapt to climate change and mitigate greenhouse gases.

The expected impacts of climate change and associated climate warming and increased incidence of extreme weather events will expose many sectors of the economy (particularly the rural sectors) to increased risk and new opportunities. New Zealand farming and forestry practices will need to change to adapt to climate change. The right information will need to be packaged and delivered in the right way at the right time to help implement changes effectively at a national, regional, catchment, community and individual farm level.

To this end MAF has proposed a Climate Change Technology Transfer Plan for Action to provide land managers[5] with sufficient information, technologies and systems to enable and encourage the adoption of land management practices that help to:

- reduce total greenhouse gas emissions, improve the efficiency of resource use and minimise the liabilities;
- adapt to a changing climate; and
- take advantage of new business opportunities relating to climate change.

The defined purpose of the action plan is:

To promote more resilient land based businesses by supporting and co-ordinating sector and government initiatives and providing up to date, relevant information on climate change to land managers and their advisers.

Its goals are to:

- Ensure New Zealand land managers and their advisers have the necessary information and technologies to adapt to, manage or mitigate the impacts of climate change at both the farm and regional/community level.
- Achieve demonstrable improvements in understanding and implementation of available technologies that address climate change and sustainability issues by the primary sector.
- Ensure that land based businesses can make informed decisions for their businesses that improve their financial viability and sustainability.
- Identify the drivers of change to increase uptake and ensure investment is well targeted.

[5] Throughout this document the term land managers have been used as a generic term that includes farmers, foresters, growers and agri-business advisors and Maori.

How will the action plan achieve this purpose?

The primary sectors have seen the need to work collectively to achieve their climate change adaption goals. This document outlines the sector's overarching action plan to address the impacts of climate change in the future. The action plan already builds on the specific initiatives of the various sub-sectors and will continue to look for opportunities to leverage existing activity as more specific actions and targets are developed.

The approach aims to achieve by:

- Undertaking a stock take of information and technology transfer activities funded by government on topics that relate to climate change.
- Reviewing extension activities being undertaken by sectors and other groups.
- Remaining aware of science projects and programmes that will deliver outcomes of value to farmers.
- Identifying the key needs of farmers and land managers.
- Developing information and technology plans to deliver these outcomes to farmers.
- Working in partnership with central and regional government.
- Providing active engagement with land managers so they can make better informed decisions.

What activities will be within the action plan's scope?

The action plan will cover all **land based** industries: dairy, sheep, beef, deer, arable, horticulture, forestry, farm forestry, pigs, poultry.

Activities of organisations that directly influence land owners (land based industry organisations, rural professionals & advisors, supply companies and processors and those that provide training for the rural sectors) are also within scope.

Greenhouse gas emissions and activities that are under direct control of land managers will be included in the plan's scope.

Excluded from scope are emissions and activities that are beyond the farm gate including processing of primary products, except when processing occurs on farm or is a vertically integrated operation (e.g. a horticultural pack house or winery).

How is the action plan being developed?

To help develop the action plan, MAF established a Climate Change Technology Transfer Sub-Group (CCTTSG) which represents the following sectors/organisations:

- Arable (Foundation for Arable Research)
- Dairy (Dairy NZ)
- Federated Farmers
- Forestry
- Fertiliser (Fertiliser Manufacturers Research Association)
- Horticulture (HortNZ) and NZ Winegrowers
- Sheep and Beef (Meat and Wool NZ)
- Iwi/Maori
- Local Government New Zealand
- Ministry of Agriculture and Forestry MAF

Other horticultural sectors and the Pork and Poultry Industries are not specifically represented on the CCTTSG but are still contributing to the development of this action plan.

The CCTTSG reports to MAF's Research, Innovation & Technology Transfer Working Group (RITTWG) which is part of a wider climate change programme.

In March 2008, a CCTSG workshop started a process which determined a number of common (cross-sector) themes and targets for the action plan. The next stage is for the various primary industry sectors to examine these themes and determine sector-specific actions, targets and priorities. This will be done through a series of workshops and meetings between now and February 2010.

As sector/partner strategies are developed and the action plan gains momentum, the targets will be refreshed and updated. Sector specific actions and targets will be defined on a short-term (1 to 2 year) and long-term (5 year) basis. From the CCTTSG's perspective, priorities for short-term action are likely to be:

- Integrating climate change issues into existing extension and training programmes
- adapting existing tools to respond to climate change management options
- monitor, focus, demonstration farms and forests
- workshops, conferences, field days
- web based information and tools
- sector publications
- rural media
- individual farm plans eg Land Environment Plans and risk management plans
- DVDs, interactive games, case studies and fact sheets