MAF Climate Change Technology Transfer Plan for Action 2010 – 2015

North Island (NI) Meat and Fibre Sector Workshop
4 February 2010
Taupo

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.

Geoff Burton (Private farm consultant) was asked to be a part of this workshop. “My main issue is whether we continue to contribute to the information, how we can assist with the extension of this info?”

David Cameron (Member of MAF’s Climate Change Technology Transfer Subgroup and manager of land management for Greater Wellington regional council) has been working with landowners in Masterton for over 30 yrs. “My role is to ensure regional councils become actively involved with the technology transfer process and to make sure regional councils play a key part in technology transfer.”

Neville Wallace (Federated Farmers) came with an open mind, “but at the same time John Key has promised it will only cost $300k per farm.”

Neil Henderson (Gisborne) “I started as a global warming believer. I believe 90%of farmers don’t think that cows are the main problem of GHG.”

Roger White (Sheep and Beef Council) indicated his interest in sustainable systems. He thinks that there is an opportunity to get that on track a bit more. “It’s important that someone fronts up, finds out about technology transfer and disseminates it to the locals.”

Barbara Hunt (Meat and Fibre, Federated Farmers) came as she had a lot of questions but her primary concern was “how can we be green when we’re in the red?”

Garth Coleman (Hawkes Bay Sheep and Beef Council) was interested in “how we’re going to get farmer buy-in given that this is an issue controlled or promoted by (government) and we are forced to conform.”

Colin Dewes (Taumarunui Sustainable Land Management Group) came with an interest in sustainability, and “to get some real figures on some of things that have been banded around, and to get definites on what affect we’re having.”

Tony Rhodes (PGG Wrightson) explained his involvement in a number of sustainable farming systems, namely three clusters of farms in Wairoa, Taumarunui and [location TBC]. “In regards to technology transfer I want to clear up any misconceptions that it’s a one way process – effective engagement must have ability for movement of questions and answers in both directions. Technology transfer is a downward process, which isn’t enduring or effective.”

Mark Illston (Chair of GHG Reference Group) thought human capital has been exhausted and farmers are getting “more pressure from the top.”

Margaret Brown (AgResearch and a sheep and beef farmer from Manawatu) led a MAF, Sustainable Farming Fund and Pastoral Greenhouse Gas Research Consortium project looking at ways to raise farmers’ awareness and understanding of Climate Change. Her interest was the same as Tony as she leads an adult education sector and is passionate about farmers needs around transfer and working with the farmers to make the way they receive the information is what they want.

Earle Wells (Local Bay of Plenty Chairman of New Zealand Deer Farmers' Association, Whakatane) came with an open mind. "Sustainability is fine but it seems to be adding costs all along the line; from $3 per animal it's gone up to $7 per animal.

Richard Denley (Local deer farmer) came to listen and learn. He asked EW "How much do you allow in your budget for the environment and sustainability."

Tony Pearse (Deer Industry New Zealand producer manager and sheep and deer farmer just out of Mosgiel) was involved in the production of a Landcare manual for Wellington. He commented that he was "having some difficulty with climate change, I trained as a geologist, there may be a con job going here in some respect. Learning technology transfer information is a key role for my portfolio and farms."

Collier Isaacs (Manager of strategy and services at Landcorp) a "reluctant contributor" explained that "sustainability needs to make money and keep customers happy. If you can't measure it – you can't manage it."

Dick Lancaster (Farmer and retiring consultant, Taumarunui Sustainable Land Management Group) facilitated the Taumarunui land management and highlighted some issues to address, "how do we bring farmers on board? And in regards to sustainability it should only be used when using these words - triple bottom line."

Richard Porritt (Taumarunui Sustainable Land Management Group and a hill country farmer) came to learn and see "what we can sort out, it's all a bit airy fairy".

Ross Richards (Chair of the Taumaranui Sustainable Land Management Group) has been involved with the Sheep and Beef council for a number of years. His main concern was "to be able to receive knowledge you have to accept the validity of the information and the issue. We are constantly being told that cows are worse than cars (media). Every year we dig up and release millions of years of fossil fuels. For every action there is a reaction and I am terrified of the reactions."

John Davis (Uptake Fertiliser Taupo) was interested in the sustainable side of fertiliser but "my real interest is in soils, fertilizer and conservation of our soils."

Katherine McCusker (MAF Senior Policy Analyst – Tech Transfer, Climate Change) Was project advisor at MAF SFF before she took on this job and a farm consultant before that. Highlighted that she "enjoys working with farmers and wants to get some sensible and pragmatic information out of the workshops."

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. This goal is valuable regardless of the continuing scientific debate about climate change or political developments.

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 $9.5 million 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 rather than implementation of specific 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 and is awaiting Board sign off. 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 Questions following the background session

Q: To what extent do MAF want to hear what they want to hear? You can't really change decisions made at cabinet level.

A: We need to focus on the assumption that there is likely to be some change, so we need to discuss how do we manage that risk and how do we spend that money well…a sensible and pragmatic approach.

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: Arable and Vegetable 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.	3.3	5	Barbara Hunt Roger White Garth Coleman Collier Isaacs Tony Pearse Neville Wallace
	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.		5	
	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.		4	
	D. Have the right people trained in the right areas at the right time.		4	
	E. Have climate change integrated into tertiary and vocational land based courses by 2015.		2	
	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.		5	

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?
	G. Provide learning opportunities specifically for Iwi/Maori to increase awareness, encourage the uptake of new knowledge and foster Maori innovation in climate change and sustainable land management.		2	Barbara Hunt Roger White Garth Coleman Collier Isaacs Tony Pearse Neville Wallace

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**	
[All comments transferred into amended targets and/or actions]	A. Develop the required capability to achieve the sector-specific targets by 2015.	i. "Train the trainer"	√		2
		ii. Train people to facilitate various sectors.	√		2
		iii. Develop resources on specific topics for facilitators to utilise.	√		2
		iv. Feedback from farmers on facilitation outcomes	√		2
	B. Increase the alignment of sector and public investment in extension.	i. Cross-sector provider workshops (Don't "reinvent the wheel")	√		1
	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.	i. "Train the trainer"	√		2
		ii. Train people to facilitate various sectors.	√		2
		iii. Develop resources on specific topics for facilitators to utilise.	√		2
		iv. Feedback from farmers on facilitation outcomes	√		2
	D. [Delete? Not specifically commented on by the group. Should be an outcome of A to C?]				

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**	
[All comments transferred into amended targets and/or actions]	E. Have climate change integrated into tertiary and vocational land-based courses by 2015.	i. Adjust/design curriculum to convene climate change themes e.g. university and polytechnics.		√	4
[All comments transferred into amended targets and/or actions]	F. Provide opportunities for land managers, Iwi and Maori to up-skill themselves on climate change and sustainability issues so they can increase their business resilience and profitability by 2015. (Combined targets F and G).	i. Workshops ii. Monitor farms iii. Community groups iv. Professionals vi Online resources Re iwi/Maori: Package in a culturally appropriate way but feed the information through the existing structures.		√	3

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 evapo-transpiration increase, water efficiency 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.	4 for Deer/Sheep and Beef, "right place, right time"	5. How limiting is water operationally?	Richard Dent Earl Wells Tony Pearse Collier Isaacs
	B. Increase land managers' resilience to drought by providing information about efficient use of rainfall and irrigation, case studies and decision-support tools.		5. Efficiency of water use.	
	C. Support water efficiency measures such as greater strategic development and use of water storage.		4+	
	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.		4- ?	

[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**	
[All comments transferred into amended targets and/or actions]	A. Ensure land managers have the necessary incentives, information and technologies to improve the efficiency of water use.	i. Build awareness of not compromising water quality - it should be a culture.	Targets are all interlinked i.e. target A needs to start first, then B, C and D. 1 → ongoing		5
[All comments transferred into amended targets and/or actions]	B. Increase the land/farms resilience to drought by providing land managers with information and encourage action about efficient use of rainfall and irrigation including cost benefit analysis.	i. Add appropriate land use ii. Stock class and production system match iii. Build awareness of not compromising water quality - it should be a culture.	2, 3, 4 → ongoing		5
[All comments transferred into amended targets and/or actions]	C. Support water efficiency measures such as greater strategic development and use of water harvest and storage without compromising quality.	i. Add multiple use, potential water use e.g. power, irrigation etc ii. Implications for others on my use of water – without compromising quality of water. iii. Become more active “support encourage and lead” iv. Build awareness of not compromising water quality - it should be a culture.	2, 3, 4, 5 → ongoing		5

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**	
[All comments transferred into amended targets and/or actions]	D. Align relevant action plan targets with the target determined by the Primary Sector Water Partnership: i.e. 80%of extracted water used by the sector will be under a self management approach to meet benchmarks[2] of water efficiency by 2016.	i. Sector needs to be pro-active and get involved in the Primary Sector Water Partnership. Has not to date as irrigation and extracted water less relevant under extensive farming.		3, 4, 5 → ongoing	5

[2] Benchmarks set under the Primary Sector Water Partnership

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.	2.5	2	Neville Wallace Neil Henderson Dave Cameron Geoff Burton
	B. Continue to develop and disseminate information about energy innovation choices, including case studies, decision-support tools and cost benefit analysis.		4	
	C. Demonstrate leading edge energy efficiency and renewable energy.		3, useful but a bit "woolly".	

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**	
Amalgamate the three targets. ETS is more of a priority.	A. Continue to develop and disseminate information about energy efficiency and innovation choices including case studies, decision-support tools and cost benefit analysis.	i. Identify sources of information	√		3
		ii. Identify the pathway for information transfer. Potential pathways: Mystery Creek Fieldays, farmers weekly, rural newspapers	√		3
		iii. Continue to develop and disseminate information	√		3

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[3] nutrient budgets and nutrient management plans by 2013. ii. 1.7 million hectares[4] 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.	5, Fertiliser is the most expensive input. Supply is running out around the world. Loss of nutrients is expensive and has downstream environmental effects.		Katherine McCusker Ross Richards Dick Lancaster Richard Porritt John Davis

[3] The people undertaking and processes used will be subject to independent quality assurance
[4] 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**	
[All comments transferred into amended targets and/or actions]	A. Provide information to 80% of land managers including nitrogen conservation and nitrous oxide options and costs and benefits by 2012. (NB: Need to provide information faster if ETS entry in 2015)	i. Need to work on costs and benefits of nitrogen loss and nitrogen conservation options. The word 'mitigation' has negative associations.	√		
		ii. Smarten up Overseer and enable it to talk to FarmMax or similar.		Ongoing	
		iii. Need to provide education on understanding the nitrogen losses and how to keep it in the system, total nutrients equals better balanced soil. Increase information on importance of soils and research in soil science.	2-3 years		
		iv. On farm workshops, hands on demonstrations.	2-3 years		
	B. [No specific comment made by group]				
[All comments transferred into amended targets and/or actions]	C. No change.	i. Education process that includes cost and benefits of nutrient managements. Understanding of nutrients and the purpose of the nutrient budget. ii. Set up a credible quality assurance system. iii. More research needed on trace elements, soil biology, pasture palatability, soil carbon and nutrient loss and uptake to increase efficiency of nutrients and animal growth to make and increase on the returns/hectare.	2-3 years		

Greenhouse gases including methane (GHGs)	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 greenhouse gases 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.	2	5	Dick Lancaster Katherine McCusker Geoff Burton Richard Ross Richards John Davis
	B. Provide information to 80% of land managers on greenhouse gases, where they come from and how to estimate them for their business by 2015.		4	
	C. Establish benchmarks for greenhouse gases for different farming systems by 2015.		4 to 5	
	D. Demonstrate GHG scenarios and options on focus, research and monitor farms and other properties providing industry leadership by 2012.		5	

Greenhouse gases including methane (GHGs)					
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**	
[All comments transferred into amended targets and/or actions]	A. Ensure GHG language, origin, outputs, and benchmarks of GHGs for different farming systems are understood by all land managers by 2015. Need to educate population as a whole about GHGs (To replace targets A-D).	i. Collate information	√		
		ii. Establish who will deliver (MAF, AgResearch, Farmer groups?): ▪ Identify the people for the delivery of the information ▪ Train them ▪ Pathways (2 ways)	√		
		iii. Delivery: ▪ On the farm ▪ Interactive ▪ Small groups ▪ Farmer media		√	
		iv. Monitoring effectiveness of delivery and uptake.		√	
		v. Establish benchmarks for GHGs. ▪ Carbon cycle and nitrogen cycle ▪ Sources of GHG ▪ How produced and managed? Where sources vary – different animal classes and types. How does feed type affect this?			

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. B. Provide tools so that land managers can increase farm profitability and their resilience to the impacts of a changing climate. C. Identify a suite of practices, technologies and tools to adapt to a changing climate and manage risk from extreme weather events by 2013. D. Provide demonstrations of why increased resilience is needed and the benefits of increased resilience to the farming operation. E. Increase investment analysis skills and tools to future proof major on-farm investments.	5 i. Land: ▪ Affects production (draught) ▪ Animal health ▪ Land stability and infrastructure ii. Financial: ▪ Production ▪ Cost of production ▪ Loss of capital iii. People: ▪ Stress or tension ▪ Confidence ▪ Level of discretionary expertise	Very little use in current form.	Margaret Brown Tony Rhodes Colin Dewes Mark Illston

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**	
[All comments transferred into amended targets and/or actions]	A. Provide accurate short and long term weather forecasts.	i. Break down stereotypes about"long term" climate events – eliminate "El Nino".	√		5
		ii. Increase awareness of current resources: climate update NZ Meteorological Society, NIWA climate data for specific locations. NB: Some of these services are not currently user-friendly.	√ Ongoing		5
	B. Provide tools and processes that enable individual land managers to integrate their own observations and regional data to better understand risks.	i. Provide more localised data: ▪ Soil moisture deficits e.g. evapo-transpiration, rainfall, soil temperature. ▪ To make farm specific decisions	√	Deliver	4
		ii. Increase availability and development of tools: ▪ Proofed with farmer	√	Deliver	4
		iii. Provide access to information: ▪ Radio weather forecasts to provide more localised information – are all regions detailed and or serviced?	√	Deliver	Non-MAF funded
		iv. Provide up-skilling opportunities: ▪ To better understand climate information ▪ To enable the information to be used in farm management	√	Ongoing	4

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 harvest.	A. Implement changes in soil management to build more resilient rural businesses.	5. i. Underpins the system – farm and industry, soil health (not hydroponics promotion). ii. Measurable as the basis for management, improvement (mitigation), link to nutrient management is immediate, implications for water: drainage and drought.	4. Relevant but is meaningless at farmer level. Rate it a 2 in the real world – presentation needs to be improved.	Richard Denley Earle Wells Tony Rhodes Collier Isaacs
	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.		3	

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**	
[All comments transferred into amended targets and/or actions]	A. Implement changes in soil management to build more resilient rural businesses at farmer level to increase their understanding of what their soil health status is and its implications and look at what linkages exist.	i. Consolidate the available information into a farmer friendly user tool kit (visual/DVD) – keep it simple. ▪ Develop a practical visual soil assessment system to build base understanding of the measure, its implications and how to fix.	Immediate 2,3,4,5	Ongoing	5 for year 1 and 2 4-5 over time
		ii. Develop a clear pathway to added advice and encouragement for planning and action (based on cost benefit)..	Immediate 2,3,4,5	Ongoing	5 for year 1 and 2 4-5 over time
		iii. Measure ability to progress over time: physical change, financial benefit, sustainability.	Immediate 2,3,4,5	Ongoing	5 for year 1 and 2 4-5 over time
[All comments transferred into amended targets and/or actions]	B. No change	i. [Identify the opportunities, costs and benefits of improvement and build these into an appealing operating code of practice]			

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 technology transfer 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.	5, highly relevant. i. Potential financial gain/loss ii. Influence or distort price of land iii. Sustainability – is it? iv. Loss and gain of opportunities v. Ponzi schemes	2. Need qualifications and focus.	Neil Henderson Mark Illston Colin Dewes Richard Denley Tony Rhodes Margaret Brown

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**	
[All comments transferred into amended targets and/or actions]	A. Provide appropriate tools and information to support uptake of business opportunities.	i. Provide tools to assist farmers to make informed decisions re: carbon sinks.	√ Ongoing		5
		ii. Increase people's awareness of the cost of compliance and the risks – weather losses, carbon market collapse.	√ Ongoing		5
	B. Increase farmer and community understanding that planting forestry is a non-sustainable mitigation option.	i. Disseminate available information through the media.	√ Ongoing		5
		ii. International recognition of NZ's forest/timber/carbon sequestration/end use.	√		

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 greenhouse gases and is a key part of overall climate change policy. It involves all significant greenhouse gases 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)	4.5,	5. By date, 2015? ▪ Vital ▪ Hypothetical until date is confirmed.	Neville Wallace Neil Henderson Dave Cameron Geoff Burton

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**	
▪ Needs to be more specific ▪ Needs to be more measureable	A. All land managers and land owners be sufficiently aware and informed, and understand their obligations under the ETS such that they can make informed decisions by 2015 (floating date, not all agreed on a firm date because legislation could change). B. All land managers and land owners are aware of the economic, social and environmental impacts of the ETS on their operations by 2015 (floating date, not all agreed on a firm date because legislation could change). These two targets are interdependent [and actions contribute to both targets].	i. Need an education strategy that accommodates the uncertainty of the final detail of the legislation. It must be a partnership approach with two way transfer of knowledge and information between landowners and policy makers (critical). Critical to understand the potential cost to the sector: compliance, asset value and profit	√		5
		ii. [Develop and disseminate] ETS case studies [Develop and disseminate] ETS case studies Stage 1: Identify potential advisors incorporating MAF, AgResearch, land owners and managers.	√		5
		[Develop and disseminate] ETS case studies Stage 2: Provide training incorporating MAF, AgResearch, land owners and managers.	√	√ on-going	5
		[Develop and disseminate] ETS case studies Stage 3: Disseminate the information, two-way.	√	√ on-going	5
		[Develop and disseminate] ETS case studies Stage 3: Monitor buy-in/out.	√	2-5	5

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.	5, social – don't damage other people's right/use of environment.	Very broad, not "smart".	Roger White Barbara Hunt Garth Coleman

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**	
▪ Questions about who provides the appropriate tools, how, from where and at what cost?	A. Provide a pool of user-friendly information, tools and resources and make it easy to access and keep up to date.	i. All farmers NEED broadband [Lobby for full implementation of rural broadband services by ?]	√		5+++
		ii. Create a database (national but regionally area specific) of resources i.e. contacts, points of reference, articles.		√	3
		iii. Promotion of information sources by media, newspapers, internet, to community groups and professionals.		√	5
		iv. Sponsored activities as a motivator or farmer attractant (i.e. bee around a honey pot).		√	4
	B. Foster culture of being aware of environmental, financial and social implications of each management decision. “It’s all about maintaining the future for yourself including the community and the industry.”	Promoted by all of the above targets			

6 Key messages/issues

6.1 Uptake issues

- Success of technology transfer is about farmer buy in. The effects on farmers and their community is important.
- If [farmers are] going to understand, they need some confidence about the information. It's going beyond technology transfer, back to when the decisions were made and being able to engage with people that aren't thinking about it.
- Technology transfer will be a voluntary action. There is a lot of uncertainty about why we're doing this. Until that is resolved and there is more certainty, the uptake will be slow.
- To get voluntary action, we need to provide some knowledge they [farmers] are interested in.
- The way that it [the plan] is done or put together will have a profound effect on the way people voluntarily respond. In regards to the information that needs to be transferred, we need some more engagement.
- Farmers and growers are being bombarded with these issues. Is it reasonable that we can deliver a technology transfer programme that will influence them to change their beliefs and or behaviours?"
- For uptake to occur there needs to be [evidence of] some sustainable profit.
- Give some credit to farmers for what they're doing right, because there's constant negative feedback.
- Feedback required on what's being done [well] at the moment instead of the image of what people aren't doing.
- ETS and GHG themes are in a different realm to the other themes in that the others are more sustainable land management based - we can see them.

6.2 Dealing with uncertainty and volatility

- people need to start thinking about the impact of risk within the primary industry business. How vulnerable the business is to risk, the nature of the risk, and how people need to think about their business and the way they operate. Some people don't think about the bad years."
- No good processes for helping people capture the concept of risk. How do you put it all together?

6.3 Policy development

- Farmers need to be on the ground floor [in the policy process] to understand these issues.
- needs to be more contact between MAF policy and rural support network.

6.4 Gaps/opportunities

- There's an opportunity for us to go into tertiary systems and provide these activities so that people have an understanding of it. The people aren't coming out to provide the service[s needed].
- AgResearch could and should be a major part of this.
- Hope that land management staff within regional councils are encouraging sustainable land management. There is no consistency within regional councils at a national level.
- There needs to be a lot of research in the area of nutrient management, i.e. some standardisation and understanding of available products.
- There's more information out there than we realise, that isn't being used.

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 and 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 e.g. Land Environment Plans and risk management plans
- DVDs, interactive games, case studies and fact sheets