

# MAF Climate Change Technology Transfer Plan for Action 2010 – 2015

Fruit Sector Workshop  
5 February 2010  
Hastings

## 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.

**Alistair Mowat** (Innovation Leader, Sustainability for Zespri) said that “growers feel they are getting an unnecessary burden and snowed under. They need access to tools and technology generated elsewhere.”

**Mike Butcher** (Technical Manager of Pipfruit New Zealand (NZ) Inc) wants to see MAF “get their ducks in a row.” He tried to establish a bio diesel hub in the Hawkes Bay, but no manufacturer in NZ would give a warranty on a Ute or light tractor using Biodiesel blends over 5% (B5). “You can’t use Biodiesel without risking the warranty.”

**Annie Perkins** (Groundwork Associates, Professional facilitator) said she had a small scale vegetable garden and is passionate about supporting farmers and growers learning.

**Henry Pak** (Avocado Growers' Association & Industry Council Ltd) is based in the Tauranga area and is at the initial stages of trying to deal with the whole climate change issue.

**Marie Dawkins** (Manager, Summerfruit NZ) has had an initial look at climate change and is scoping a report on the potential impact. The issue is still quite raw and information is hard to pin down. She is interested in technology transfer and how to get information out. “There needs to be new ways of getting people to read information or participate because you can’t keep pushing information out there. There are many ways of communicating without adding costs.”

**Mal McLennan** (Chair of the Advisory Group for Sustainable Winegrowing) thinks that the industry is committed to sustainability but it has taken a while for the whole industry to buy-in. He began the sustainable path in 1995 and thinks it’s about best practice. He isn’t a big fan of the word sustainability, “it’s a marketing term being thrown around too much and it’s losing its credibility. It’s about improving what we’re doing using the best technology and practices going forward - raising the bar.” As a wine grower he thinks “there should be more ownership in the process of the finished product. There has to be more awareness of consumer requirements, good growers, and more wineries to take ownership of what happens after their product leaves the gate.”

**Alan Thorn** (CEO, NZ Avocado Growers Association) has a background in forestry research. “Our growers are reasonably resilient and innovative but I’m unsure if they have the capability and/or capacity to respond to something as slow as climate change.” He questioned if there was a desire for change in the horticulture/agriculture sector, if the sector is buying into it, and what the market impact would be. He said that unless it affected the grower’s pocket dramatically, there wouldn’t be a lot of change in the orchard. “They would be most worried about whether there was a crop for the next year.”

**Ru Collin** (Director of HortNZ) described climate change as a bit like the word sustainable “i.e. what does it encompass?” He thinks the information pouring out about climate change is unclear, “but there’s some good work to do around natural resources, air, land, and water.” He added that as the weather changed, they

would have to produce a plan B, an alternative to how the company ran and how they grew things. "With climate change in mind, we are the good guys in the room, outside of the debate because of the rules."

**Chris Ward** (HortNZ - Agriculture ETS advisory group and adaptation committee) has a lot of information about the need for change. "Greenhouses are energy intensive and the industry needs to get some carbon credits. Climate change is a world phenomenon, which is relative. Australia, India and China are beginning to have water deficits and overheating problems, so their food production will drop. Climate change may benefit NZ more than any other country and I am looking forward to being on the technology advisory board."

**Tim Oliver** (Kiwifruit Industry) has a kiwifruit grower background and has been certified organic for 16 years. He has an interest in soil health and biology. "Resilience is not really organics. High priced produce in an international market, Zespri has to jump first. I'm not worried about climate, its weather. Climate change is a slow process that we can adapt and roll with."

**John Arthur's** (Olives NZ Executive member) company is the largest olive grove in NZ. Olives are a dry weather crop. "The technology inputs into agriculture or horticulture happen naturally and will continue to do so. The only things that will change or speed it up will be positive financial impacts and for that to happen, there has to be impetus from the consumer confirming that's what they want. There needs to be a driver from the consumer (top end), I don't know why there would be a drive from the bottom end for no return."

**Chris Hale** (Pipfruit NZ Inc) said that as far as they were concerned, they were trying to promote their best practice, which was probably a better way of talking about sustainability. "Climate change is seen by growers as an extra compliance cost and the market impact is a really important facet. Why would you put the effort in if there was no extra return? The buy in for climate change is a problem as far as growers are concerned. It has to be led by best practice and show increased production, efficient use of water, energy and nutrients. Plant protection (background) changes in the levels of pests and diseases that may be detrimental, which may make compliance costs required by overseas markets."

**Peter Holley's** (Mission Estate) company was the first in NZ to gain the international standard ISO 14000 in 1998. In 2006 he was part of a Hawkes Bay capability study for Landcare. There is currently ground-breaking work done on the management of the sivol [?] virus and he is working up a national study funded by government. "The industry really wants to have a solution to improve productivity, the quality of products and soil health."

**Phillip Manson** (NZ Winegrowers Science & Innovation manager) thinks that arable farmers aren't focused on inputs and outputs. He thinks that horticulturalists are more engaged with their end product and are unaware of environmental issues. He has done a bit of work on GHG calculators and that aspect of carbon. "I want to know where to implement and how to build up people's education tools and knowledge. There should be less focus on climate change in terms of the impacts on production; it's about the immediacy of financial and market access components of industry responses."

## 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 fruit sector

The information below is derived from a summary circulated by Ru Collin after the workshop.

- Horticulture needs support to identify its positive attributes towards carbon emissions, its 'biological worth' for the lack of a better term. The science needs to be resourced and completed to prove our 'worth'. Some sectors have completed their footprints and life cycle analysis, but the whole industry needs to complete this and then show the positive result towards ETS, GHG and climate change.
- The climate change debate has been a good one to date in that growers are improving their efficiency of use of natural resources.
- Horticulture is the 'good guy' on the block. The sector sequesters carbon in the soil; produces low nitrate levels and emits low carbon dioxide levels compared to pastoral farming. We are generally innovative and proactive to climate change. We are reacting to become more 'market accepted' through good agricultural practice (GAP), and telling our stories through examples like the 'greening continuum'. We are demonstrating improved efficiency and are responsive to market signals. Note the Pipfruit footprint indicates that approx 25% is attributable to the supply chain from conception to free alongside the ship. With trade moving from west to east, the transport footprint which is well over 50% will be dramatically reduced further. In stark contrast, 73% of Hawkes Bay's greenhouse emissions come from pastoral farming.
- NZ has a variable climate. The weather prediction being used to prepare for climate change over 50 years indicates that Hawkes Bay will get 13% less rain in spring and will be 2.2°C warmer. The impacts mean that less winter chilling will occur, pest and disease pressure will change and probably increase, crop options will change and increase and water use may increase. However, the catchment will still come from the mountains and high hills.
- Climate change is not necessarily a bad thing for New Zealand. For instance in Pipfruit NZ's recent GHG assessment of 64 countries that exported in 2007/08 only four have times more water than what they need. The other 60 are 'water deficient' so the embodied water held in each NZ grown apple that is imported contributes to the importing countries requirements. There must be a value in that, and one would hope demand for NZ apples would increase.

## 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 5 were provided to the workshop. These had been developed through earlier MAF workshop processes (see Section 3.1.1 and 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: Fruit 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?
<p>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.</p> <p>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.</p>	<ul style="list-style-type: none"> <li>A. Develop the required capability to achieve the sector-specific targets by 2015.</li> <li>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.</li> <li>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.</li> <li>D. Have the right people trained in the right areas at the right time.</li> <li>E. Have climate change integrated into tertiary and vocational land based courses by 2015.</li> <li>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.</li> <li>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.</li> </ul>	4	4	<p>Tim Oliver Chris Ward John Arthur</p>

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	
Training the trainers probably needs to be ongoing. Where does NIWA fit in?	A. Develop the required capability to achieve the sector-specific targets by 2015.  D. [Amended target] Have the right people trained in the right areas at the right time. Need to be more specific about who will deliver what. "Right time" is too general  E. [Amended target] Have climate change integrated into tertiary and vocational land based courses by 2015. Involve NIWA, they have capacity to train the trainers, bring 2015 date forward.  Bring other 2015 (sector specific targets) forward also.	ii. Assist horticulture product groups to deliver relevant technology transfer. <ul style="list-style-type: none"> <li>▪ Significant progress needed by 2012</li> <li>▪ At the five year mark, review progress and modify as required)</li> </ul>	√	√	
		iii. HortNZ to coordinate with product groups. Face up to the fact that individual land owners will make the decisions, always have, always will.			
		iv. Provide information on probabilities of changes etc from NIWA but pushing "systems" or models etc may not result in a very receptive land-owning community..		√	
Combine the last two targets (F and G).	F. [Amended target] Provide opportunities for land managers and Iwi/Maori to increase awareness, encourage the uptake of new knowledge and foster Maori innovation in climate change and sustainable land management and up-skill themselves on climate change and sustainability issues so they can increase their business resilience and profitability by 2015.				

<b>Capacity and capability (continued)</b>					
<b>Is anything missing from the targets? Would you change anything in the targets?</b>	<b>How would you amend the targets?</b>	<b>Specific actions, especially for this sector, to reach the [amended] targets.</b>	<b>Action done (yrs)</b>		<b>Priority (0-5)</b>
			<b>1-2</b>	<b>5</b>	
	G. [New target] Ensure local government is well informed of climate change ramifications.	Green party "good environment" examples on the web. All very real and applicable for farmers. Works well in Britain.	√		

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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?
<p>Water efficiency is a key issue for New Zealand in areas where water is considered to be constrained in availability for the primary sector.</p> <p>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.</p> <p>As rainfall becomes increasingly variable, and temperatures and evapotranspiration 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.</p>	<p>A. Ensure land managers have the necessary incentives, information and technologies to improve the efficiency of water use</p> <p>B. Increase land managers' resilience to drought by providing information about efficient use of rainfall and irrigation, case studies and decision-support tools.</p> <p>C. Support water efficiency measures such as greater strategic development and use of water storage</p> <p>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<sup>1</sup> of water efficiency by 2016.</p>	<p>5 – But availability and access is important (RMA).</p> <p>Efficiency should be business as usual.</p> <p>Extreme event management.</p> <p>Practical extension/transfer of irrigation knowledge demand to crop/management of water use.</p> <p>Infrastructure and access to water.</p> <p>Drought management application of irrigation mitigates impact.</p> <p>Dams/Catchments.</p> <p>RMA</p> <p>Water resource quantification.</p> <p>Accurate modelling/measurement.</p> <p>Allocation justifications.</p>		

<sup>1</sup> Benchmarks set under the Primary Sector Water Partnership  
 Contributions to the MAF Climate Change Technology Transfer Plan for Action 2010 – 2015

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	
	C. [Amended target] Infrastructure investment in weather capture and storage to provide reliable resources. (Highest priority, 5)	i. Invest in infrastructure: <ul style="list-style-type: none"> <li>The disadvantage is the lack of infrastructure/investment to capture this opportunity.</li> </ul>	√		5
	NZ's competitive advantage is our natural abundance of waterfalls (even under climate change – distribution may change)	<ul style="list-style-type: none"> <li>Ensure that the concept of embodied/virtual water equals the usage per unit produced divided by the total available water.</li> </ul>	√		3
	A. [Amended target] Provide science knowledge in efficient water usage, up-skilling at grower level to support practices that underpin efficiency. (Priority 4)	<ul style="list-style-type: none"> <li>Ensure that the concept is recognised by International Plant Protection Convention (IPPC)</li> </ul>	√		5
		<ul style="list-style-type: none"> <li>Ensure NZ horticulture uniquely positioned to capture this advantage.</li> </ul>	√		5
	B. [Amended target] Increase land managers' resilience to drought by providing information about efficient use of rainfall and irrigation, case studies and decision-support tools. (Priority 3)	ii. Change policy to enable commitment to infrastructure.	√		5a
		iii. Educate industries in need to capture water, has to future proof industry.	√		4
	D. [Amended target] 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 <sup>2</sup> of water efficiency by 2016. Benchmarks are sector defined no Primary Sector Water Partnership (PSWP) (Priority 1).	iv. Invest in understanding crop water usage and transfer into orchard operations via applied decision support tools.	√		5b

<sup>2</sup> 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?
<p>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).</p> <p>To gain the best use of resources, the initial focus of this approach will be on energy intensive activities.</p>	A. Ensure land managers have the necessary information and technologies to improve the efficiency of energy use.	5	5. Need to get the information out there.	Peter Holley Alistair Mowat Chris Hale
	B. Continue to develop and disseminate information about energy innovation choices, including case studies, decision-support tools and cost benefit analysis.		5. Its about regulatory framework.	
	C. Demonstrate leading edge energy efficiency and renewable energy.		5	

<b>Efficient use of resources - Energy</b>					
<b>Is anything missing from the targets? Would you change anything in the targets?</b>	<b>How would you amend the targets?</b>	<b>Specific actions, especially for this sector, to reach the [amended] targets.</b>	<b>Action done (yrs)</b>		<b>Priority (0-5)</b>
			<b>1-2</b>	<b>5</b>	
<p>Land owners are generators of electricity. Wind energy costs \$17,000 per turbine which takes about 50 years to pay off. The capital cost versus return per kilowatt is not enough.</p>	<p>A. [No change] B. [No change] C. [No change]</p>	<p>i. Measure and monitor energy use, collate and disseminate actionable/usable information that can be transferred to improve energy efficiency (to be done at the same time as target E's first action).</p>	√		5.
		<p>ii. Training programmes to use the information and put it into practice (to be done after target A, B and E's first action):</p> <ul style="list-style-type: none"> <li>▪ Set up networks of innovative best practice</li> <li>▪ Coordinating various government agencies that have resources and programmes to provide practical solutions.</li> <li>▪ Develop a tool-box that you take out to growers to show benefits of energy efficiency.</li> <li>▪ Get clarity upfront about who benefits and has access to the information. These actions should not be packaged up for delivery on a user pay basis. Separate out the public good vs. commercial.</li> </ul>	√		5

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	
	D. [New target] Create the network and enabling tools to develop low GHG energy emissions that can be integrated across or within value chains e.g. generate energy to cool, use waste energy for heat disinfestation.	i. Industry assessment by sector to identify potential synergies and sharing of cycle assessment.			
		ii. Identify potential processes that exist within specific industries where energy saving and carbon credits can be exchanged for energy and or carbon credits.  <ul style="list-style-type: none"> <li>▪ E.g.                             <ul style="list-style-type: none"> <li>– Mini hydro schemes</li> <li>– Solar voltaic cells (solar energy)</li> <li>– Biomass comes off an orchard and goes to a freezing works. They generate power and heat to run their plant and they return a carbon credit to the orchard to offset emissions, this is related to the production of kiwi fruit.</li> </ul> </li> </ul>			
	E. [New target] Ensure a continued availability of energy to meet the present and future requirements of the rural sector.	i. Comprehensive national review of generation capability and what additional investment is required to ensure that future demand can be adequately met.	Immediate		5

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?
<p>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.</p> <p>Climate change in New Zealand will increase the frequency of extreme weather events, challenging the resilience of many of our land based businesses.</p>	<ul style="list-style-type: none"> <li>A. Provide tools, knowledge and skills so land managers can make well informed timely decisions.</li> <li>B. Provide tools so that land managers can increase farm profitability and their resilience to the impacts of a changing climate.</li> <li>C. Identify a suite of practices, technologies and tools to adapt to a changing climate and manage risk from extreme weather events by 2013.</li> <li>D. Provide demonstrations of why increased resilience is needed and the benefits of increased resilience to the farming operation.</li> <li>E. Increase investment analysis skills and tools to future proof major on-farm investments.</li> </ul>	1		

<b>Resilience to extreme weather events</b>					
<b>Is anything missing from the targets? Would you change anything in the targets?</b>	<b>How would you amend the targets?</b>	<b>Specific actions, especially for this sector, to reach the [amended] targets.</b>	<b>Action done (yrs)</b>		<b>Priority (0-5)</b>
			<b>1-2</b>	<b>5</b>	
Delete target A and B. Replace the word “resilience” with “management”.	E. [Amended target] Increase investment analysis skills and tools to future proof major on-farm investments. <ul style="list-style-type: none"> <li>▪ Build to supply reliable water</li> <li>▪ Create a land use protection tool</li> <li>▪ Create/develop Agribusiness mechanisms such as income equalisation and ‘red’ incentives</li> <li>▪ Generate crop alternative options</li> <li>▪ Create/develop an accurate weather prediction tool</li> </ul>	i. It’s about preparedness and management for recovery from a short term disruption, this isn’t preparedness for long term events or increased frequency of short term events.		1-5	
		ii. Provide education about potential risk and details of climate change.		1-5	
		iii. Educate about mitigation tools		1-5	
		iv. Establish long term needs regarding: <ul style="list-style-type: none"> <li>▪ Accurate weather forecasting – microclimates use local weather data</li> <li>▪ Accurate frost prediction</li> <li>▪ Accurate wind modelling</li> </ul>		1-5	

<b>Soil management</b>	<b>Targets</b>	<b>How relevant is this topic/theme to this sector? (0-5)</b>	<b>How useful and relevant are the targets? (0-5)</b>	<b>Who assessed this theme?</b>
<p>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.</p> <p>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.</p> <p>By increasing the amount of carbon locked in the soil, land managers can benefit from:</p> <ul style="list-style-type: none"> <li>▪ Increased water holding capacity and infiltration rates</li> <li>▪ Improved soil structure, less erosion and more ability to cope with compaction</li> <li>▪ Improved nutrient cycling and cation exchange rates</li> </ul> <p>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.</p>	<p>A. Implement changes in soil management to build more resilient rural businesses.</p> <p>B. Increase the uptake by land managers of Code of Practices and best management practices.</p> <p>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.</p>	5+	3	<p>Tim Oliver Chris Ward John Arthur</p>

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	
<ul style="list-style-type: none"> <li>▪ Needs to be industry led.</li> </ul>	B. [Amended target] Codes of practice – are these available for all sectors for soils.	i. Link/associate improved soils to quality and quantity of production. Argos project is doing some of this.		√	5
	C. [New target] Structure: Improve soil structure to reduce erosion and increase ability to cope with compaction	ii. Need to acknowledge soil changes are long term. Long term demonstration needed.		√	2
	D. [New target] Include soil biology measures if and when they are available – volume and diversity.	iii. Too much ‘muck and mystery’ is associated with soil additives, conditioners, seaweeds, conventional fertilisers, etc. More leadership is needed in educating others on what to apply.	√		4
	E. [New target] Nutrient cycling: Improve nutrient cycling and cation exchange rates				
	F. [New target] Water: Increase water holding capacity and infiltration rate	iv. Nutrient budgeting to be more widely used – industry specific.	√		3-4
	G. [New target] Reduce erosion by developing/implementing some wind erosion measures.	v. Additional soil tests needed, not just NPK and pH etc.	√		2-3
		vi. Measure Brix levels more over time		√	1
		vii. Soil to plant influences		√	3
		viii. Soil to weed influences		√	2

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?
<p>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</p> <p>There are market opportunities for businesses that undertake carbon foot printing, life cycle analysis.</p>	<p>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).</p>	<p>5</p> <p>Adds high relevance, which hasn't really been developed. Comes down to definition. It's about measurement and definition of where you are as an industry. It's also about access and acceptance.</p>	<p>5.</p>	<p>Peter Holley Chris Hale Alistair Mowat</p>
	<p>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.</p>		<p>5</p>	

<b>Carbon Sinks</b>					
<b>Is anything missing from the targets? Would you change anything in the targets?</b>	<b>How would you amend the targets?</b>	<b>Specific actions, especially for this sector, to reach the [amended] targets.</b>	<b>Action done (yrs)</b>		<b>Priority (0-5)</b>
			<b>1-2</b>	<b>5</b>	
	A. [Amended target] Provide appropriate information to support the uptake of business opportunities of carbon foot printing and life cycle analysis by 2011	i. These will be demonstrated to potential users (from tech-transfer strategy).	√		4
	B. [Amended target] Provide an integrated programme to foresters and farm foresters and growers on the impacts of a changing climate on forestry; there are increasing opportunities for forest owners, forest and "growers. Carbon forestry and "soil carbon stocks" presents the opportunities and management of risks of carbon farming.	i. Run workshops to capture learning.	√		5
		ii. Network: bring international specialists to engage with the innovative growers, farmers, and foresters developing carbon sink solutions.	√		4
		iii. Encourage NZ specialists to be involved in the international standards process.	√		4
		iv. Communicate, commercialise and promote our innovative developments.	√		4
		v. Access international expertise on carbon sink information.	√		4
	C. [New target] There should be an organisational opportunity to share carbon sink information with different producing sectors (rather than people doing their own thing) e.g. HIP (Horticulture information portal).	i. Establish the portal.	√		5

<b>Carbon Sinks (continued)</b>					
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	
	D. [New target] Provide appropriate tools and information that captures the learning and understanding from the farm, forest, and orchard systems to communicate to international standard organisations.	i. Run workshops to capture learning.	√		5
		ii. Network: bring international specialists to engage with the innovative growers, farmers, and foresters developing carbon sink solutions.	√		4
		iii. Encourage NZ specialists to be involved in the international standards process.	√		4
		iv. Communicate, commercialise and promote our innovative developments.	√		4
		v. Access international expertise on carbon sink information.	√		4

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?
<p>The ETS is the price-based mechanism for GHGs and is a key part of overall climate change policy. It involves all significant GHGs and all sectors.</p>	<p>A. All foresters and farm foresters able to make informed decisions on ETS by? (date dependant on legislation)</p> <p>B. Give all land managers the opportunity to be aware of ETS understand their obligations and make informed decisions by? (date dependant on legislation)</p>			

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<b>Emissions Trading Scheme (ETS) impacts</b>					
<b>Is anything missing from the targets? Would you change anything in the targets?</b>	<b>How would you amend the targets?</b>	<b>Specific actions, especially for this sector, to reach the [amended] targets.</b>	<b>Action done (yrs)</b>		<b>Priority (0-5)</b>
			<b>1-2</b>	<b>5</b>	
<p>Majority of horticulture crops are less than five metres, therefore they are not formally assessed under Kyoto protocol.</p> <p>Carbon sequestering should be revisited under ETS ie. soil carbon (note: charcoal, biochar → sink option).</p> <p>Some impacts occur through resources used like fertiliser.</p> <p>Relevant, in that horticulture sectors want to know expected impact of ETS.</p> <p>Impacts – the scheme and the carbon markets that are created. Impacts may be broader than ETS itself.</p> <p>Some sectors more responsible for emissions that horticulture E.g. dairy and meat.</p>	A. [Amended target] Provide land managers with information required on ETS to make informed decisions (including analysis of impacts) once finalised.	i. Provide information packaging to land managers outlining details of ETS and specific impacts (in easily understood language).	√		
		ii. Illustrate the effect of mitigation actions through fact sheets, “focus orchards/vineyards, and case studies” (this is really part of best practise).	√	√	
	B. [Amended target] “Foresters and farm foresters” are “sinks” and land managers are “source” of emissions (see targets).	i. Provide awareness of supporting legislation following ETS in action.	√	√	
		ii. Assess range of international methodologies of life cycle assessment (competing standards a challenge).	√	√	

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?
<p>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.</p> <p>To adapt to a changing climate and/or to reduce GHG emissions our land managers will need to further up skill their management skills.</p> <p>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.</p>	<p>A. Provide appropriate tools and information to land managers so they can make informed decisions at a property or catchment level.</p>	<p>5</p> <p>Umbrella that encapsulates other themes – vehicle for delivery.</p>	<p>1</p> <p>Lacks specifics.</p>	<p>Marie Dawkins Mal McLennan Nick Henry Pak.</p>

<b>Sustainable systems</b>					
<b>Is anything missing from the targets? Would you change anything in the targets?</b>	<b>How would you amend the targets?</b>	<b>Specific actions, especially for this sector, to reach the [amended] targets.</b>	<b>Action done (yrs)</b>		<b>Priority (0-5)</b>
			<b>1-2</b>	<b>5</b>	
Tools, information, platforms to share tools. All other themes are subsets of this theme: sustainable systems.	A. [New target] Ensure that we are not creating barriers for disinvestment in Horticulture.	i. Decide on the main components of the system – it needs guidelines.	√		5
	B. [New target] Provide tools to develop or enhance integrated sustainability systems.	ii. Develop knowledge base of climate change methodologies e.g. life-cycle assessment etc.	√		5
	C. [New target] Platforms/hubs for generic information that sectors can access (reduce duplication by having access to work already done).	iii. Provide a mechanism for sectors to leverage off specific initiatives.	√	√	5
	D. [New target] Don't create undue compliance.				
	E. [New target] Target date for this theme dependent on dates set for sub tending themes.	iv. This theme must integrate with the goals set for this target (note the action plan).		√	5

<b>Waste Management</b>					
<b>Is anything missing from the targets? Would you change anything in the targets?</b>	<b>How would you amend the targets?</b>	<b>Specific actions, especially for this sector, to reach the [amended] targets.</b>	<b>Action done (yrs)</b>		<b>Priority (0-5)</b>
			<b>1-2</b>	<b>5</b>	
<p>[Needs to be a new theme/target defined for this sector]</p> <p>Issues:</p> <ul style="list-style-type: none"> <li>▪ Processing waste to “settling ponds”</li> <li>▪ There are water use packing/processing issues.</li> <li>▪ Organic waste composted and back to vineyard.</li> <li>▪ Disposal of plastic containers, nets, and packaging (note: agricultural recovery work)</li> <li>▪ Implication – energy to move waste.</li> </ul>					

## 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. Note some of the points below have also been derived from a summary circulated by Ru Collin immediately after the workshop.

### Information needs

- Resourcing of information exchange is important. There is a lack AND overload of information. It's difficult finding information on the MAF website. How information is presented is important e.g. 3-4 scenarios of what could happen summarised region by region – not one big booklet with 100 assumptions.
- MAF's development around climate change has a lot of policy and strategy with many information gaps that need to be addressed. Action needs to take place and people need to be informed.
- Much information has been produced about the possible effects of climate change, but as yet no sure paths offered. The climate change definition is still unclear.
- Need to get clarity about climate change to growers so they can understand how it will impact on their business. We need to discuss variability in all of the models in layman's terms. Need money and people available to help people understand climate change.
- A key area is providing helpful and useful information about climate change and about its implications to land managers...once that's done, we'll be in a better situation to develop scenarios and various possibilities that could take place. We need better communication with industry.
- Policy and information/research needs to have not been addressed i.e. lack of stuff to transfer.
- Horticulture and agriculture are at different stages. Need different plans for the two sectors.
- Technology transfer plan needs to be coherent, integrated, easily communicated and understood by growers.
- Clarity on the market signals on climate change coming back to producers.
- Addition in the theme, efficient use of energy, description of the topic: 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 *tree management costs which include the use of agrichemicals or production and or use of agrichemicals (specific to fruit sector or any energy related activities)*, 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.

### Funding

- Many projects are so big it's hard for small sectors to get their head around funding.

### Barriers to uptake

- The industry is an aging population; they won't be around when it's 2 degrees Celsius warmer. How do I convince these growers to make a change when they'll be retiring in 10-15 years?
- There is no encouragement to use alternative energies when you're charged to use those facilities. There needs to be attitude changes.
- Industry does not want to stand there with egg on its face when it tries to implement some sort of change with its growers and find that that change can't be brought about. Biodiesel is a good example. I'd be very circumspect before I call in any organisation to offer advice to the industry until I know everything behind it.

### Extension leadership

- Horticulture industry is led by HortNZ and market forces, not the government. Support and use HortNZ to coordinate technology transfer in the product groups. People won't be going to MAF as font of all wisdom: [MAF is a] potential facilitator in this area.
- For MAF to gain success in effective tech transfer, entities like HortNZ remain important. However product groups become critical. Industry bodies could transfer the information to their growers but as a service for MAF
- Climate change is both a public and private good and we haven't got a lot clear about the public good component (not articulated in current document). Determine public good and commercial benefit for components of the technology transfer program.
- MAF doesn't have the resources or the extension team to effect technical transfer. However industry is available, providing they accept the findings to be transferred. MAF need to spend a lot more time with the industry representatives.

- Learn from grass roots in the industry, plus the scientists, as to what constitutes “Best practices”, “Healthy soils”, etc.
- Need to get various fruit pasturing groups working together on all aspects.

## Drivers

- Quality, safe, and credible products that can be effectively marketed as sustainable.
- Provide a national competitive advantage for NZ producers in key markets.
- Ensure cost savings, efficiency and competitiveness.
- Create wealth and improve the overall wellbeing of NZ.
- The market is missing – turning to competitive advantage is critical to add value, not just cost.
- If you show the economic advantage to the grower, they’re going to follow along and want to move forward.
- If business as usual is going to happen, usually driven by market demand, why does it have to have a climate change title?
- There will always be improvement of soil management, whether or not there is climate change.
- Turning climate change into a competitive advantage – market perspectives and perceptions.
- Priority is sustainability and mitigating/managing and adapting to climate change is part of sustainability.
- Resilience is a target in its own right, (climate change is a different issue) which we’re trying to achieve all the time.

## Key areas for focus

- Find an accurate and reliable weather prediction model
- MAF turning climate change into a competitive advantage for NZ horticulture and viticulture.
- Urgent investment in water storage required to supply reliable water for the sector.

## Additional areas for focus

- Biosecurity –as weather changes, so will pest and disease pressure from domestic and external incursions. There are concerns over current reduction in MAFBNZ border activities; expression of current latent or non-expressed diseases and new pest/host relationships.
- Alternate crops – a plan B; plans need to be identified nationally and at a regional level. In regionalisation this might be investigation of different cultivars of whatever is currently grown to take advantage of regional conditions.
- Water quality: addressing groundwater salinity due to inundation of aquifers by rising sea levels (from national knowledge database).
- Need to alter some of the carbon sink resource relationships to suit NZ standards. Only avocados are part of the Kyoto protocol but there are a lot of other systems in NZ that could be looked at.

## Appendix A

# 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 GHGs.

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<sup>3</sup> with sufficient information, technologies and systems to enable and encourage the adoption of land management practices that help to:

- reduce total GHG 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.

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<sup>3</sup> 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 adaptation 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.

GHG 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

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