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Workshop Summary

For A Scoping Report On Environmental Assessment Of The NZ Emissions Trading Scheme

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Disclaimer

This is a working document prepared by project consultants. It is primarily a compilation of material and opinions presented by participants at the workshop and does not purport to resolve conflicting views.

The sectoral material summarised in this document does not necessarily reflect the views of the project team. The document has not been reviewed by Government departments for clarification, and does not represent Government policy.

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1. INTRODUCTION

A team of consultants[1] contracted by the Emissions Trading Group held a workshop on 25 January 2008 to gather information for a scoping report on the environmental effects of the Government's proposed emissions trading scheme (ETS).

The scoping report will *identify potential environmental effects of the ETS and closely related measures at a high level, to identify possible response measures to address these effects, and to develop terms of reference for possible further investigations of particular areas of concern or uncertainty.* The Government anticipates releasing the scoping report publicly during the course of select committee consideration of the Climate Change (Emissions Trading and Renewable Preference) Bill.

The workshop served as an information-gathering exercise for the consultants, to help them identify potential environmental effects across various sectors of the economy.

Those attending the workshop included 32 stakeholders (including Maori, business, and environmental NGOs, as well as local government officials) and 16 officials from central government departments, in addition to the four project consultants and two observers from the office of the Parliamentary Commissioner for the Environment.

Participants were invited to attend as individuals rather than representatives of their sectors or organisations – input was accepted as personal knowledge, views and information, rather than as an industry or organisation position.

2. METHODOLOGY

Most of the workshop was conducted in small break-out groups that considered particular sectors of the economy, listed below.

- Stationary Energy — *Electricity Supply & Demand*
- Transport — *All transport modes*
- Land use — *Dairy, Extensive Farming and Forestry*
- Industry — *Chemicals, Metals, Ag & Forestry Processing, Mining, Fishing*

[1] The team consists of Jim Sinner (Sustainable Business Group Manager, Cawthron Institute), Judy Lawrence (PS Consulting), Roland Sapsford (Sustainability Solutions) and Paul Blaschke (Blaschke and Rutherford).

- Waste *Solid Waste*
- Services *Tourism and other services*

There is some overlap between sectors, e.g. virtually all sectors use transport and energy. These linkages are noted where they have significant environmental implications.

For each sector, the workshop collected information and views on the following three questions:

1. How will activity in the sector change as a result of the ETS?

E.g. will output increase, decrease or be unaffected by the ETS? Will there be fuel-switching or changes in other inputs or production practices? What information is available to answer this question, where are the gaps in information and how could we get a better understanding?

2. What will be the domestic environmental effects of the changes referred to in (1)?

Where are these effects likely to be concentrated and when are they likely to occur? What information is available to answer this question, where are the gaps and how could we fill these gaps?

3. What additional policy measures might be needed to capture any potential positive effects and minimise potential negative effects of the ETS?

Response measures could well be outside of ETS design, and could include such things as additional monitoring and assessment, national policy statements or environmental standards under the RMA or other statutes, additional funding for new or existing programmes, additional research, moral suasion, etc.

Effects of the ETS and closely related policy measures are being assessed against a base case scenario based on environmental and resource management policies as at 1 Jan 2008. The closely related measures include the preference for renewable electricity generation capacity and the biofuel sales obligation among others. See Appendix 1 for a description of the policy scenario being assessed and the base case scenario. The assessment aims to identify effects from 2008 to 2020.

3. SUMMARY OF STAKEHOLDER INPUT AT WORKSHOP

The remainder of this document consists of summaries, by sector, of the information and views presented during the breakout sessions.

3.1. Energy Supply - With an emphasis on electricity

Policy Drivers & Assumptions

- Timing and nature of major investment decisions in transmission and power supply (i.e. existence of sunk costs will affect pattern of responses through time)
- Price effects of ETS together with direct obligations on some electricity generators and gas/coal/liquid fuel suppliers
- Thermal moratorium - especially if major gas find and depending on way exemptions are interpreted
- Biofuels obligation
- Afforestation Grants Scheme - if it leads to significant increase in feedstock for biofuels
- Methodology for calculating emission factors for electricity

Behaviour Change (what + when)

- Increased focus in geothermal, wind and hydro for electricity generation, including examination of alternatives to thermal for reserve energy
- Liquid natural gas imports less likely
- Possibly reduced gas exploration and reduced coal development
- Reduced investment in fossil fuel plant
- Increased electricity demand due to expanded use of heat pumps e.g. summer air conditioning
- Coal (lignite) to liquid fuel development less likely
- Increased electricity demand due to fuel switching (incl. electric cars)
- Reconfiguration of national grid
- Increased demand for wood and wood residues
- Some increase in direct local supply of energy - household wood use, solar energy
- Increased use of direct heat (e.g. geothermal)
- Possible relocation of industry to energy sources as renewables tend to be more site specific than fossil fuel generation
- Possible closure of large industries
- More exploration of distributed solutions (generation and storage) for major users
- Increase in marketing focussed on "CO_2 free" products
- Investigation of domestic biofuel supply options
- Greater investigation of carbon capture and storage
- Investigation and possible development of marine energy

GHGs & Environmental Consequences (what + where)

- Reduced greenhouse gas emissions from electricity generation, especially in the longer term
- Reduced direct liquid fuel emissions due to biofuel obligation - indirect effects depend on source of biofuel
- Increased pressure on natural landscapes and amenity from wind generation and transmission line developments
- Increased need for location specific (i.e. geothermal and wind sites) demand for land for energy supply purposes
- Pressure for 'energy concessions' on conservation estate

- Conflict over water resources, especially between hydro dam proposals and recreation and ecosystem needs
- Irreversible loss of natural capital from hydro development
- Conflict over coastal marine areas e.g. between energy, fisheries, amenity, aquaculture, recreation etc
- Health impacts of shifts to more direct use of wood - air quality

Cross-sectoral Linkages

- Potential conflict between security of supply and environmental pressures
- Tourism: possible renewables can be tourist attraction e.g. Manawatu wind farms, also potential conflicts over e.g. hydro development, transmission capacity and wind in sensitive areas
- Waste: Possible impact on waste for energy development
- Primary Sector: conflicts over water and land (incl. hydro, wind and transmission)

Response Measures

- Good consumer protection against spurious environmental claims
- Provide clear sustainability standards for biofuels
- Regional energy strategies e.g. proactive development of eco-energy parks (wind plus fuel trees plus recreation)
- Expand targetted policy to improve energy efficiency at household (incl. state houses) and small enterprise level, to avoid adverse health effects and manage load growth due to fuel switching
- Proposed NPS on renewable energy needs to consider adverse effects of renewables as well as facilitation of renewable energy
- More community-based multi-stakeholder forward planning about energy sites esp. wind and marine
- Clarify intent and operation of thermal moratorium
- Consider pro-actively directing investment towards "non-traditional" renewables such as marine and away from further large hydro
- Increase research and planning re effects and location of marine energy sources
- Consider project type mechanisms to generate activity in sectors where price signal weak or complicated by other factors (e.g. households, emissions from wastewater)

Uncertainties, Info Sources, Gaps & Studies

- Operation of thermal moratorium in practice, and meaning of exemptions
- Household decision-making – e.g. heat pumps versus direct wood use
- Path dependence of new investment
- Extent and location of pressure on wild rivers for new hydro
- Rate, location and impacts of marine energy development

3.2. Energy Demand

(includes households, small enterprises and public sector institutions)

Policy Drivers & Assumptions

- ETS leads to increased energy prices for coal, gas and electricity, with coal and gas rising faster than electricity
- NZEECS measures are taken up to their full extent, in response to marketing and price/cost changes
- Effect of ETS price signal mediated through complex and changing public attitudes and awareness (e.g. attitude to climate change, extent to which ETS is seen as solving problem versus increasing motivation to for personal action, fashionable nature of being seen to respond)
- Nature of supporting regulation (e.g. MEPs) and detail of legislation (e.g. emission factors for electricity) will influence choices available to people
- Availability of capital a major driver of how and how quickly behaviour changes amongst different groups
- Nature and direction of Research and Development funding a major driver of direction of longer term change

Behaviour Change (what + when)

Short-medium term:

- Little change in liquid fuel use, small reduction in car travel and increase in demand for public transport in cities
- Reduced stationary energy use
- Increased demand for low-energy/low-carbon technologies and goods and services leading to higher turnover of some appliances for example fridges
- Fuel switching:
- away from coal towards wood and electricity (and possibly gas), for those with access to capital
- away from electricity towards locally gathered wood for lower income households
- Increased demand for household, institution and business energy efficiency retrofits
- Increased demand for "carbon-free" electricity
- Possible increase in demand for gas by households, depending on price effects

Longer term:

As above plus:

- Rising demand for new fuels/technology for process heat as equipment needs replacing
- Increasing community level action (e.g. building on CRAGs) in part driven by frustration with rising energy costs
- Increasing demand for more fuel efficient/carbon-free transport systems
- Increased demand for local solutions and pressure for local government to act (e.g. local eco-energy parks, transport alternatives, community energy action)
- More use of decentralised generation and storage by a range of users, leading to changes in the pattern of electricity demand

- Increased desire for the problem to be "solved" rather than simply presenting a series of price increases
- Reduced sensitivity of demand for energy services to energy prices due to greater energy efficiency
- Increasing demand for renewable electricity and fuel wood, reducing demand for coal and possibly gas

GHGs & Environmental Consequences (what + where)

- Increased pressure on landscape, amenity and natural capital (incl. Conservation land) from demand for renewable energy, especially over medium to longer term
- Health impacts from reduced energy use (and possible increased use of wood) by those without access to income and capital to adjust
- Air quality will generally improve but may be areas of localised deterioration due to increased direct use of wood, esp in provincial and wooded urban areas
- Small reduction in greenhouse gas emissions (largely CO_2) relative to BAU, due to relatively limited price response initially
- Pressure on marine environment from competing uses e.g. marine energy versus aquaculture and recreation
- Possible pressure on amenity and natural character of coast from wood scavenging
- Waste pressure through increased disposal of energy inefficient appliances (e.g. fridges) and need for disposal facilities for new efficient equipment (e.g. CFLs, batteries etc from electric cars)

Cross-sectoral Linkages

- Interaction with other sectors over demand for biomass from wood chip to bioethanol
- Changes in patterns of electricity demand
- Increased demand for energy efficient goods and services

Response Measures

- Increased emphasis on long-term measures to enable reduced emissions, especially in transport, with an emphasis on good urban design
- Proactive local planning and central leadership to help deal with resource conflicts - possibility of multi-stakeholder consultation to assist this
- Significantly strengthen education and adjustment assistance for this sector
- Transition programmes and policies based on good life-cycle analysis of products

Uncertainties, Info Sources, Gaps & Studies

- Extent to which previous experience is a good guide to future reaction
- Existence of non-linear tipping points/cultural factors e.g. An Inconvenient Truth
- Extent, rate and nature of technological change
- Rate and nature of changes in values and beliefs in relation to climate and energy

3.3. Transport

Policy Drivers & Assumptions

- Fuel and energy price increases as a result of carbon price
- Changes to vehicle prices (various NZEECS measures)
- Better information availability, e.g. car fuel efficiencies
- Assume small change in transport fuel prices, at least in short term
- Major assumption is in how much behaviour can be expected to change. Work and daily life-related transport is assumed to be very inelastic but major and/or prolonged fuel price increases are known to have influenced travel demand

Behaviour Change (what + when)

- Change in transportation patterns from increased price and/or awareness, e.g. greater efficiency of transport use, more cycling and walking, public transport, fewer single occupant car trips, change in freight delivery modes, more fuel-efficient cars, reduction in car mileage or numbers, less discretionary travel for holidays and business
- Changes in transportation patterns in response to land use changes, e.g. increased use of transport corridors, improved access to and demand for public transport, reduction in peri-urban commuting, move from road to rail and shipping for long-haul freight distribution
- Short-term effects thought to be limited because the initial price signal low and incentives to change deeply-ingrained behaviour limited to relatively few people
- Efficiency gains for freighting will be limited by internationally low truck mass and dimension regulations and bridge design loads
- Fuel-switching e.g. petrol to diesel. Not possible in all forms of transport
- Decrease in viability of some forms of transport less able to pass on costs e.g. coastal shipping
- Technical innovation for vehicle technology e.g. electric car manufacturing
- Development of novel arrangements for travel offsets
- Incentives to work more from home

GHGs & Environmental Consequences (what + where)

- Reduction in transport emissions: depends on size of price increase but likely to be initially small (limited to reduction in emissions growth)
- Positive effects of greater transport efficiencies: potentially better urban form if less or changed transport required: fewer car parks, fewer arterial roads, more bus and cycle ways
- Changes in land use in response to transport price increases, e.g. less pressure for peri-urban subdivision, increase in biofuel production and local food production, greater pressures on transport corridors, change retail patterns, requirement for new infrastructure for alternative fuels or transport methods/routes, increase in local warehousing
- Changes in pattern of pollution loads and congestion on roads: more pollution/congestion on transport corridors, less elsewhere
- Greater particulate emissions from higher diesel use

- Increased viability of biofuels leads to land use changes and reductions in income from some other types of farming
- Road safety problems, especially more accidents involving cyclists, greater danger from heavier/bigger trucks
- Working at home effects:
  - demand for greater or more flexible telecoms etc
  - changed/greater home energy and local transportation demand
- Lower profitability of some types of businesses
- May become uneconomic to export heavy commodities

Cross-sectoral Linkages

- Strong linkages to energy sector
- Fiscal consequences of shift from private to public transport: funding problems
- Reduced international tourist arrivals could have multiple consequences
- Reduced fuel taxes in Consolidated Fund could lead to fewer resources for conservation etc.
- Higher transport costs likely to have disproportionate effects on lower SE groups (less able to switch work travel patterns)
- Less economic activity in some regional/local areas from more centralized freight routes and tourism
- Better health outcomes if switch to more active travel modes, less air pollution
- Major implications for urban planning

Response Measures

- District and regional planning needs: enabling land use change, urban design strategies, more park and ride facilities, addressing pressures on transport corridors, increased range of services and amenities available in one area, enable increased urban density where required
- Combined response for move from private to public transport: push and pull measures
- Enhance rail corridors
- Better and more public transport, channeling revenue from fuel price into public measures
- Legislated measures to change behaviour**,** e.g. minimum fuel efficiency standards, bylaws to reduce single occupancy trips, requirement for most efficient transport to be used
- Fee differentials for high and low efficiency vehicles
- Lower hurdles for required infrastructure development e.g. greater ability to become “requiring authorities”
- Address barriers to demand elasticity
- More work-from-home programmes
- Awareness and education programmes on how people’s behaviour impacts on the environment, better fuel management. Need to be simple to reach all people
- Invest in safer roads
- Facilitate electric and energy-efficient vehicle entry in NZ

Uncertainties, InfoSources, Gaps & Studies

- Degree and timing of fuel price rise, and elasticity of response, critical to all responses and effects
- Awareness and behavioural effects, e.g. relative role of awareness and monetary incentives to change transport behaviour, influences on behavioural change in the sector (preference for large cars may overwhelm price signals), inter-relationships of differing responses of individuals/organizations/businesses
- Relationship between rise in prices and increase in vehicle efficiency may even out and result in no net change in behaviour
- Inter-relationships between different modes of transport responding in different ways to fuel price increases
- Impacts of allocation of free NZU to transport sector
- Research on appropriate biofuel development for NZ
- Differential impacts on small and large businesses
- Relative population changes very difficult to determine: ETS could lead either to greater concentration, or to greater dispersion. Very difficult to separate ETS-driven changes from other pressures
- Implications of greater work-from-home (incl. perverse energy outcomes) – review overseas studies. Also how to enable if seen as positive

3.4. Land use - Dairy and other intensive agriculture

Policy Drivers & Assumptions

- ETS price signal relative to carbon price (or lack thereof) faced by competitors
- The environmental effects of the ETS will depend on where the point of obligation is for the agriculture sector, and in particular whether land users are exposed to the full price signal[2]
- Changes in cost of energy in 2009/2010 as energy enters ETS
- Compliance cost drivers
- Charge on methane and nitrous oxide flow through from point of obligation if at processor
- Public opinion and market expectations considered greater drivers than price effect in a fast growing and potentially cash rich industry
- High price of carbon required to trigger behaviour change with exception of land use change from sheep and beef to dairy
- Policies and research to reduce animal GHGs

Behaviour Change (what + when)

- First time agriculture emissions have faced direct price signal (agriculture energy emissions will get a price signal earlier than 2013) so sector could factor this into its strategic planning and investment decisions
- Given time lag until 2013, industry may not respond immediately in 2013, since inertia due to high growth and large capital investments between now and 2013
- After 2013 uptake of DCD, feed additives, biochar, herd homes, feedpads
- Less use of nitrogenous fertilizer
- More use of N inhibitors
- Output could decline (or fail to increase) due to price signal if high enough (higher than $50 a tonne)
- Increased cost of energy on the farm will lead to more use of waste for energy (biogas), greater use of feedpads, riparian management resulting in reductions in GHG emissions and nutrient leaching
- Increased investment in research by industry to mitigate emissions (and costs of liability)
- Changes in LU practices on DOC estate due to wilding pines at margins, increased pest management from adjacent land
- Dairy sector could invest some of higher payout into environmental best practice

GHGs & Environmental Consequences (what + where)

- Potential for slowing increase in emissions after 2013, but growth between 2008 and 2013 could be significant given pace of growth in sector
- Base case activities could compensate for some of the growth up to 2013 e.g. deployment of N inhibitors and on-farm management practices
- A focus on efficiency resulting in a decrease in associated environmental impacts –

[2] The Government's preference is for the dairy and meat processors and fertiliser companies to be the Point of Obligation for the agriculture sector, but a final decision has yet to be made.

GHG emissions and water quality effects
- Use of N inhibitors could result in effects on wetlands
- Reduced fertilizer use and nutrients losses to water
- Energy to waste could have associated emissions to air and thus constitute pollution swapping
- Landscape changes in new dairy areas e.g. McKenzie country, locked in before 2013
- Better use of water could result but continued water demand impacts from dairy up to 2013 may slow the effect
- Added ETS cost will hasten landuse change and adoption of new technologies and management practices
- As sheep and beef decline in some areas as a consequence of land price rises some land could revert to indigenous vegetation with positive biodiversity outcomes and some could be used more intensively with negative environmental effects
- A premium on NZUs could result in good environmental outcomes
- Timing of agriculture sector entry to ETS could lock in unsustainable investments which will be slow to respond to ETS
- Regional effects will be different
- Offsets, greater intensification to offset costs, banking of NZUs are likely responses
- Post 2013 if carbon price slows dairy expansion and intensification there could be reduced environmental effects (NB: still higher than current due to delay in agriculture sector entering ETS

Cross-sectoral Linkages
- Effects on waste stream (both positive and negative)
- Reduction in pastoral farming emissions
- Increases in cropping (for dairy feed) and hence their GHG emissions
- Higher value-add products from farming (sheep and beef) incentivised
- Dairy intensification competing for sheep and beef land which also intensifies and uses indigenous regenerating land pressure to remove water from milk using efficient methods, before transport thus reducing energy demand from transport and processing

Response Measures
- Stronger central government signal for local government e.g. guidance material on likely environmental effects and how to manage them through RMA; NPS for biodiversity
- Introduce a NPS and NES for water quality to address nutrient leakage from intensification of agriculture as a complement to ETS and to get consistency across regions so not left to each council to deal with
- More comprehensive and assertive implementation of S15 and S17 of the RMA by councils
- Introduce water pricing and allocation plans
- Councils make dairying a discretionary activity subject to landowners ability to mitigate effects
- There is no incentive for farmers who want to abate before 2013
  - include in ETS legislation a generic clause that will allow the inclusion of new

technologies for mitigation of non-CO_2 GHG emissions as science develops
  - bring nitrous oxide emissions from agriculture into ETS earlier than 2013
  - pilot to demonstrate mitigation measures
  - use some of free allocation to incentivise mitigation
- Link ETS to good environmental performance – constraint on what is eligible for a carbon credit to avoid perverse incentives of ETS e.g. RMA has not protected biodiversity so more efficient to use ETS clause to restrict planting on regenerating areas
- Greater industry leadership and promotion of good environmental practice
- Use ETS just to deal with GHG (a contrary view to those who wanted to augment the ETS as an efficiency measure to deal with perverse effects

Uncertainties, Info Sources, Gaps & Studies

- More proactive use of current RMA to address environmental effects
- Need outcome of Motu Public Policy Research modelling of land use changes
- Review knowledge of effects of N-inhibitors on water quality of rivers, lakes and wetlands by locality and develop best practice guide
- Biochar research needs to include consideration of potential health effects on food
- Understand land ownership drivers better to better anticipate environmental effects of ETS
- Better information and its communication about the ETS and related policies
- Assess price thresholds for behaviour change

3.5. Land use - Extensive farming[3,4]

Policy Drivers & Assumptions

- ETS price signal relative to carbon price (or lack thereof) faced by competitors
- The environmental effects of the ETS will depend on where the point of obligation is for the agriculture sector, and in particular whether land users are exposed to the full price signal[5]
- Will add cost and reduce profits-input costs will increase through price on carbon e.g. for energy use
- Earlier price signal on energy will drive some mitigation where technologies exist, offsets and more intensive farming

Behaviour Change (what + when)

- First time process emissions have faced direct price signal so could be additional attention to these emissions
- Increased costs will reduce investment in weed control
- DOC pilot C- bank project initiated (report back 2009)
- Increased pest control needed by DOC
- Biofuel cropping on marginal land
- Forest planting likely to increase on sheep and beef land due to low margins for sheep and beef

GHGs & Environmental Consequences (what + where)

- Weeds will increase as a problem including wilding pine management
- DOC C- bank project provides an offsetting opportunity versus emissions reduction-seen as transitional
- Potential biodiversity and water and soil benefits if marginal sheep and beef land is "retired"
- Forestry planting and biofuel cropping in conflict with biodiversity, water and soil benefits on same land
- Intensification of smaller areas of land on farms due to price increases could increase environmental effects from sheep and beef-soil compaction, nutrient leakage due to increased fertilizer use

Cross-sectoral Linkages

- Pest control has a potential biodiversity and carbon benefit
- "New" weeds may have biofuels benefits e.g. sycamore and willow

Response Measures

- Those noted for forestry all relevant to extensive farming areas:
  - stronger central government signal
  - use existing provisions of RMA including NES
  - bonds for forestry owners

[3] Note that no stakeholders from the horticulture sector participated in the workshop. Their expertise will be sought for inclusion in the full scoping report.
[4] Note that workshop spent most time on the intensive farming and forestry sectors.
[5] The Government's preference is for the dairy and meat processors and fertiliser companies to be the Point of Obligation for the agriculture sector, but a final decision has yet to be made.

- link ETS and limits to what land and species can be used and where - carbon credits for permanent forest sinks (including a range of non-pine species - sector guidance and leadership - offset incentive scheme
Uncertainties, Info Sources, Gaps & Studies ▪ Further studies of likely environmental impacts of landuse changes and of land value changes ▪ Identification of land areas and location where biodiversity impacts are greatest and full valuation of biodiversity benefits ▪ Assess how small forest owners (including farmers) can coordinate their plantings to gain from ETS with environmental benefits

3.6. Land use - Forestry

Policy Drivers & Assumptions

- ETS price signal relative to carbon price (or lack thereof) faced by competitors
- Credits for forestry provide an incentive for planting
- Afforestation Grant Scheme (AGS) working alongside ETS

Behaviour Change (what + when)

- Rules around pre-1990 forests will result in stranded assets and potential source of wilding pines since no management. Will go for one off pulp and then pulp industry exits after 2013 due to increased energy costs and diminishing wood for pulp
- First time forestry sector has faced a direct price, so can factor this into its strategic planning and investment decisions for post 1989 forests
- NZUs will be banked for security to harvest so few NZUs available for ETS and NZ will have to buy offshore
- AGS will increase value of marginal land
- Greater than $50 a tonne carbon would incentivise new planting while net deforestation below this level
- Some land will convert, some revert to weeds and some to indigenous[6]
- Planting location will still be affected by land competition for dairying since latter not in ETS till 2013
- Planting likely to increase on sheep and beef land due to low margins for sheep and beef
- No incentive for indigenous forestry planting
- Increased cost of energy for forestry will lead to more use of wood waste for energy which could reduce CO_2 emissions depending on the system adopted

GHGs & Environmental Consequences (what + where)

- Increased sequestration of carbon through increased planting due to price signal
- Reduced peak flows and flood risk, and sediment reduction from plantings on erodible land
- Possible increases in sedimentation in coastal and fresh waterways at harvest
- Possible reduction in biodiversity where forests planted in biodiversity rich areas for credits or for biofuels and replace indigenous regeneration e.g. low high country (less than 800m) and lowland and wetland areas. Intensification of farming as a result has same issues. Landscape changes due to increased forestry on hill country
- Better weed control on land in planted forests c.f. land where no income for weed control (decreasing returns from sheep and beef and increased input costs to maintain income)
- Protection of remnant ecosystems on farm where in PFSI
- Increased water use/energy use from irrigation for more intensive land uses
- Biodiversity gain through indigenous re-vegetation as an expanded land use
- Co-benefits on the farm and offsite benefits and negative effects
- C- sequestration may be unreliable (risks)
- Potential low flow impacts but shading benefits to rivers and streams where riparian

[6] 200K ha convertible including 36K ha Ngai Tahu, 17K ha Central plateau

management using trees
- Large land areas could be taken out of production for private and national gain with local impacts

Cross-sectoral Llinkages

- Increases in wilding pines across NZ and need for resources and responsibility for managing on private land and DOC land
- Reduction in extensive farming emissions
- Increases in cropping (for dairy feed) and hence GHG emissions
- Intensification on sheep and beef land remaining after planting with increased nutrient leakage, soil compaction
- Increased energy use for biofuels consumption
- Permanent forests have wider benefits - recreation, tourism
- Incentivises bio-char and bio-oil production
- Incentivises demand for wood as an renewable energy source for households and industry and soil enhancer for household and horticulture use
- Native forest restoration and energy benefits - household firewood and soil conditioner (compost)
- Potential for small-scale energy production (1MW) for woodchip on farms
- Urban planting with many co-benefits

Response Measures

- Stronger central government signal for local government e.g. guidance material on likely environmental effects and how to manage them through RMA; NPS for biodiversity
- Greater use of existing provisions in RMA by councils for compliance and to protect water quality
- Use of NES for forestry activities as a permitted use under RMA
- Possible bonds for forestry owners to manage the wilding pines off their sites, so taxpayer/ratepayer doesn't have to pick up the tab.
- Include in the ETS legislation a clause which mirrors clauses in the NZ Climate Change Accord and the Forest Accord, and with respect to:
  - limitations on what land and species can be used where
  - subject to best practice forestry code (e.g. not harvesting riparian areas)
  - recognize value (premium) of eco-certified post-1989 forests
  - provisions to apply to public and private land
  - verification requirement to show impact of how credits have been generated
- No credits for environmentally damaging forestry
- Issue carbon credits for permanent forest sinks and auditing system for voluntary carbon sinks
- Guidance for sector on best practice and case studies for local government to manage impacts

▪ Local government /SMF support for energy/ecology park for native forest restoration-co-benefits for household firewood and compost ▪ Offset incentive scheme under ETS
Uncertainties, Info Sources, Gaps & Studies ▪ Information needed on location and hectares likely to be convertible to forestry of different species Ref OECD environmental review of NZ ▪ Need social and economic studies of impact of land value increases on environmental values ▪ Assess how small forest owners can coordinate their plantings to gain from ETS with environmental benefits

3.7. Medium & Heavy Industry

Policy Drivers & Assumptions

- "Medium & Heavy Industry" includes cement, steel, aluminium, fertiliser and other manufacturing industries
- ETS price signal relative to carbon price (or lack thereof) faced by competitors.
- Preference for renewable electricity could also be a factor; could undermine security of supply and therefore create price instability, which would deter long-term investment and re-investment in manufacturing plant and equipment.

Behaviour Change (what + when)

- This is the first time that process emissions have faced direct price signal (although some industries addressed these earlier via voluntary agreements) so could be additional attention to these emissions
- Output could decline (or fail to increase) due to price signal
- Could be shift in demand away from steel and concrete toward wood
- Increased cost of energy could lead to more use of waste for energy
- Increased energy cost could make glass recycling less competitive with imported glass
- Timing will depend largely on when plants are due for significant reinvestment.

GHGs & Environmental Consequences (what + where)

- Some decrease in process emissions (relative to base case scenario) per unit of output
- Energy use and associated emissions related to output decline relative to base case, but this likely to cause leakage. Could also be social consequences depending on how adequately any free allocation protects existing production levels
- Any decline in output will mean decrease in associated environmental impacts - mostly air emissions (e.g. particulates) but also discharges to water and reduced waste stream (e.g. used cathodes)
- Energy to waste could have associated emissions to air
- Increase in waste glass to landfill if recycling becomes less competitive

Cross-sectoral Linkages

- Effects on waste stream (both positive and negative)
- Transport of raw material to plants might decline, but could be offset by increased imports.

Response Measures

- Border tax measures to equalize cost of carbon with imports
- Consumer labelling to recognize that NZ product is carbon-efficient and/or has accounted for its carbon (but might not be effective, as sectors are producing mostly intermediate products not consumer goods)
- Ensure that RMA consent process does not inhibit installation of more efficient plant and equipment
- Improved transport infrastructure would reduce costs and also, possibly, reduce transport-related emissions

Uncertainties, Info Sources, Gaps & Studies

- Nothing noted during the workshop for these sectors

3.8. Agricultural & Forestry Processing

Policy Drivers & Assumptions

- ETS price signal relative to carbon price (or lack thereof) faced by competitors
- Preference for renewable electricity could also be a factor; could undermine security of supply and therefore create price instability, which would deter long-term investment and re-investment in manufacturing plant and equipment
- Strong linkage to effects of ETS on land use, because supply of primary product will drive the demand for processing. But the linkage also goes the other way i.e. the competitiveness of the processing sector will have implications for land use

Behaviour Change (what + when)

- Output could decline (or fail to increase) due to price signal
- Could be shift in demand away from steel and concrete toward wood, increasing demand for forest processing in NZ
- More conversion of waste to energy (already utilized in forest processing sector)
- Timing will depend largely on when plants are due for significant reinvestment.
- Could eventually see more on-farm processing, using farm-based energy supply (e.g. methane from animal waste)

GHGs & Environmental Consequences (what + where)

- Decline in output relative to base case, so decline in energy use and associated emissions, but this likely to cause leakage. Could also be social consequences depending on how adequately any free allocation protects existing production levels
- Any decline in output will mean decrease in associated environmental impacts - mostly air emissions (e.g. particulates) but also discharges to water
- Energy to waste could have associated emissions to air

Cross-sectoral Linkages

- Strong linkages to land use effects (see Policy Drivers above)
- Transport of raw material to plants might decline, but could be offset by increased imports

Response Measures

- Same as for Medium & Heavy Industry, PLUS
- Government should acknowledge carbon stored in wood products and give credits to forest owners, and pursue change in Kyoto definitions and methodologies

Uncertainties, Info Sources, Gaps & Studies

- The forestry industry is completing a study on when its members' major plants are due for re-investment – many of them are old and require renewal. Or companies might decide to build new in a developing country without emissions obligations

3.9. Mining, including oil and gas exploration[7]

Policy Drivers & Assumptions ▪ ETS price signal in electricity and liquid fuels, as mining sector is energy-intensive ▪ Preference for renewable electricity could also be a factor, if it has significant effect on domestic demand for fossil fuels (especially gas)
Behaviour Change (what + when) ▪ Output could decline (or fail to increase) due to price signal ▪ Re-mining of tailings and other waste streams is possible if this is more energy-efficient than mining natural deposits
GHGs & Environmental Consequences (what + where) ▪ Decline in output will lead to reduction in energy use and associated GHGs, but this likely to cause leakage ▪ Associated decline in impacts on water, air, biodiversity and landscapes, but possibly "exported" to other countries
Cross-sectoral linkages ▪ Transport of raw material to plants might decline, but could be offset by increased imports
Response Measures ▪ None identified
Uncertainties, Info Sources, Gaps & Studies ▪ None identified

[7] No stakeholders from the mining sector were present at the workshop, although some participants had previous experience in the sector.

3.10. Seafood (fishing and aquaculture)[8]

Policy Drivers & Assumptions ▪ ETS price signal in liquid fuels, as fishing is energy-intensive ▪ Note that fishing industry is already under-taking energy efficiency initiatives with EECA in response to the increased cost of diesel fuel that has already occurred
Behaviour Change (what + when) ▪ Shift in production focus to aquaculture (less energy-intensive than fishing) ▪ Possible use of mussel shells as renewable energy source in cement kilns? ▪ Possible further change in fishing strategies – e.g. aim for higher biomass to increase catch per unit effort ▪ Trawling, which is energy-intensive, could decline relative to other methods ▪ Possible development of more efficient fishing gear & techniques ▪ Fleet rationalisation as least profitable fishers are forced out – perhaps more pressure on inshore fish stocks (as fuel cost makes deep sea fishing less viable)
GHGs & Environmental Consequences (what + where) ▪ More pressure on coastal resources for aquaculture and commercial fishing ▪ If fishers aim for higher biomass, stocks would be less susceptible to collapse ▪ Less trawling would lead to less benthic disturbance ▪ New fishing techniques could cause more or less environmental effects (e.g. seabird bycatch) than existing methods
Cross-sectoral Linkages ▪
Response Measures ▪ Improve process for allocation of coastal space, as this is impeding development of aquaculture, and/or facilitate development of land-based and open ocean aquaculture ▪ Review Fisheries Act to ensure stocks can be managed for maximum economic yield if this means a higher biomass than maximum sustainable yiel
Uncertainties, Info Sources, Gaps & Studies ▪ None identified

[8] No stakeholders from the seafood sector or the Ministry of Fisheries were present at the workshop. Much of the information reported here is based on the consultants' limited knowledge of the sector.

3.11. Solid waste management[9]

Policy Drivers & Assumptions ▪ Price of emissions relative to waste levy and product stewardship requirements that could emerge from Waste Management Bill before Parliament
Behaviour Change (what + when) ▪ Solid waste does not enter ETS until 2013, so the ETS is unlikely to drive any change in waste generation before then (although the waste levy could do so) ▪ Not clear how landfill operators will respond - would expect increased attention to separation of organic waste at source, especially for sites without methane collection ▪ Increased interest in use of waste as an energy source ▪ Reprocessing of recycled materials (e.g. paper and glass) likely to become less attractive relative to importing virgin product from countries without emissions obligations (leakage). Collection and transport of recyclables for export will also become less attractive
GHGs & Environmental Consequences (what + where) ▪ Should be less organic waste to landfill and lower GHG emissions over time, but change likely to be gradual ▪ Potential for increased air emissions from burning waste for energy ▪ Recycling programmes less viable; more recyclables to landfill ▪ Possibility of increased illegal dumping of waste if price gets too high ▪ Overall change in demand for landfill space (relative to base case) is difficult to predict
Cross-sectoral Linkages ▪
Response Measures ▪ Wastewater and closed landfills likely to be exempted from ETS, so projects mechanism might be appropriate to incentivise emissions reductions ▪ Provide composting guidelines and other assistance to businesses and households, and assist councils to design price structures that reward separating organic waste ▪ Review national air quality standards that prohibit incineration of municipal waste to assess whether this could be allowed under strict conditions
Uncertainties, Info Sources, Gaps & Studies ▪ Monitor combined effect of waste levy and carbon charge to ensure it is not leading to significant increase in illegal dumping of waste

[9] No stakeholders from the waste sector were present at the workshop, although some participants had some familiarity with issues facing the solid waste sector.

3.12. Tourism and other service industries

Policy Drivers & Assumptions

- Fuel and energy price increases as a result of carbon price
- Greater awareness of energy/carbon costs of tourism
- Many assumptions and other aspects of analysis as for transport sector: transport costs constitute the highest energy demand for tourism and most service industries. For tourism, accommodation energy costs are the next highest

Behaviour Change (what + when)

- Slightly higher costs of tourism travel and all types of accommodation and services
- Slightly less internal travel by tourists (esp domestic), BUT
- Less overseas travel by NZers because of greater awareness of carbon costs of flying, could result in greater internal travel by NZers
- More moves towards sustainable tourism – carbon neutral. Higher interest in offset schemes and other mitigation measures
- Tourism industry taking leadership in sustainability

GHGs & Environmental Consequences (what + where)

- Higher travel costs for all tourism operators (TIANZ estimate of 3-14% loss of income for operators)
- More group holiday packages and fewer FITs (free and independent travellers) – but doubted by some because FIT is a major attraction for overseas tourists
- Reduced capacity for air freight

Cross-sectoral Linkages

- Many close linkages to travel sector. Some linkages to stationary energy sector (accommodation and services energy demand)
- Reduced economic activity and employment from tourism or reduced numbers of international tourist arrivals could have multiple consequences, especially in regions away from main truck routes
- Concern that tourism could be disproportionately affected by higher travel costs because seen as discretionary travel

Response Measures

- Adoption by operators and sector of travel/energy demand reduction measures

Uncertainties, Info Sources, Gaps & Studies

- Major uncertainty around inclusion of aviation fuel into Kyoto framework. This could significantly reduce number of international tourists and would have major impact on NZ tourism
- Even without aviation fuel inclusion, number and types of overseas tourists (country of origin, demographics, preferences and environmental awareness) could change significantly because of greater international awareness of energy/carbon costs of long-term travel
- Impacts of higher travel costs very hard to predict - relationship of domestic to international tourist numbers, changes in travel patterns, demand for tourism products, etc

4. APPENDIX 1: POLICY SCENARIO TO BE ASSESSED

The purpose of this scoping study is to identify potentially significant environmental effects associated with the proposed NZ Emissions Trading Scheme (ETS) and closely related measures, and to identify where the Government's policy framework may need to be adapted to address significant environmental concerns and opportunities that are likely to arise in respect of those measures.

Table 1 lists the policies included in the "ETS and closely related measures", whose environmental effects will be assessed against a base case scenario. The base case consists of all other policies and measures already implemented as at 1 January 2008 unless otherwise specified below. Table 2 lists base case policies of particular significance.

Measures that are already established and funded – for example, the Permanent Forest Sinks Initiative – are in the base case scenario and their interaction with the ETS will be assessed in that context.

We have also put new waste management policy in the base case category – we have made the assumption that Parliament will enact the Bill, and that it is not driven primarily by climate change considerations. And we have excluded policies that have goals or targets but no definitive measures – however, measures to achieve these goals might be identified in this project as new policy responses to address environmental concerns.

Finally, of policies related to agriculture and forestry, only the ETS itself and the proposed Afforestation Grants Scheme are in the policy scenario (Table 1); other measures in the Government's Plan of Action on Sustainable Land Management and Climate Change are in the base case scenario (Table 2). These are driven mainly by climate change considerations, have in most cases been confirmed and will operate to support the ETS and closely related measures.

Table 3 lists some key assumptions regarding energy supply.

Table 1. Main features of the ETS and closely related measures to be assessed against the base case scenario

Measure	*Main features*	*Comments*
Emissions trading scheme		
Forestry	a. As of 1 January 2008, post-1989 forests[10] eligible to claim sink credits. If claimed, must account for any reduction for harvest or deforestation. b. As of 1 January 2008, owners of pre-1990 exotic forests will be liable for deforestation emissions; will receive some free allocation. c. Owners of pre-1990 indigenous forests are not included in the ETS, but government has signaled openness to further discussion.	Government will allocate 21 Mt for deforestation of pre-1990 exotic forest during CP1, plus 34 Mt thereafter. Distribution mechanism for these units will be determined in allocation plans issued under Order in Council. Deforestation exemptions: Owners of <50ha (must apply) Deforestation of <2ha per 5-year period (automatic) Removal of invading weed trees (up to 1,250 ha).
Liquid fossil fuels	As of 1 January 2009, those who import liquid fossil fuels, or remove them from refinery, are liable for emissions.	Exemption for fuel exported or used in international trips.
Stationary energy	As at 1 January 2010, importers or producers of fossil fuels[11] for generation of stationary energy (e.g. heat and electricity) liable for emissions.	*Both Stationary energy & Industrial processes:* Zero free allocation will be given to fuel suppliers and electricity generators.

[10] Excludes post-1989 land subject to a forest sink covenant under section 67ZD of the Forests Act 1949.

[11] Includes importing or mining coal or natural gas; off-taking geothermal steam; using geothermal fluid for generating electricity or industrial heat; combusting used oil, waste oil, used tyres and waste for generating electricity or industrial heat; and refining petroleum where the refining involves combustion of obligation fuel or obligation jet fuel.

Industrial processes	As at 1 January 2010, industrial facilities will be liable for non-energy industrial process emissions.[13]	Eligible trade-exposed industrial firms will receive free allocation equal to 90% of 2005 emissions from stationary energy[12] and industrial processes from 2010 to 2013, with annual allocations declining to zero by 2025.
Agriculture	As of 1 January 2013, the agriculture sector[14] will be liable for non-CO_2 emissions, though point of obligation yet to be determined.	Sector will be given free allocation in 2013 equal to 90% of 2005 non-CO_2 emissions, with annual allocations declining to zero by 2025. (Energy emissions already covered as of 2010 under "Stationary Energy".)
Waste	As of 1 January 2013, solid waste disposal facilities will be liable for non-CO_2 emissions from operations.	(Energy emissions already covered as of 2010 under "Stationary Energy".)
Closely-related Measures		
Preference for renewable electricity generation	10-year ban on construction of new fossil-fueled thermal baseload generation capacity >10 MW, subject to exemptions.	Exemptions apply, subject to application criteria set out in Climate Change (Emissions Trading and Renewable Preference) Bill currently before Parliament.
Biofuels sales obligation	From mid-2008, oil companies required to sell biofuels as certain proportion of total fuel energy sold, starting at 0.53% and rising to	Based on energy content of diesel and petrol sales (aggregated). Biofuel Bill currently before Parliament. Bioethanol currently has an exemption

[12] This includes both direct emissions from stationary energy and indirect emissions associated with the consumption of electricity. Note that the basis for allocation for electricity consumption will be one that compensates firms for the cost impact. It therefore is likely to be based on the emissions from marginal generation rather than average generation.
[13] Note that the importation of sulphur hexafluoride (SF_6) will not carry obligations until 1 January 2013.
[14] In this context, the agriculture sector includes pastoral and arable farming and horticulture.

	3.4% in 2012.	from petrol excise duty. There is no equivalent exemption for biodiesel; vehicles that use biodiesel are subject to Road User Charges in the same way as vehicles that use petroleum diesel.
NZEECS		
Energywise homes - all actions in 2.1-2.3 (except 2.1.5, 2.2.5, 2.3.2-4), 2.4.1, 2.5.1	▪ Insulation retrofits and clean-heat installation in private and Housing NZ homes. ▪ New minimum energy performance standards, accelerated household appliance retirement (esp fridges). ▪ Building Code changes: increased use of compact fluorescent lighting, higher thermal performance and hot water system standards. ▪ Solar water heating: financial and other assistance.	Some questions remain as to which of these are existing programmes, and what is new for the 2007 NZEECS.
Energywise business - 3.1.1.a&b, 3.1.2.1 and 3.1.2.3, 3.1.3.3,	▪ Business energy audits and capital grants for energy intensive businesses. ▪ Technology transfer for compressed air, electric motors and industrial heat. ▪ Capital grants for woody biomass demonstration projects and pilot scheme for school boiler conversion to woody biomass. ▪ Electricity efficiency programme for commercial buildings.	Some questions remain as to which of these are existing programmes, and what is new for the 2007 NZEECS.
Energywise transport - 4.3.1,4.3.2 and 4.3.6 only	▪ Light vehicle fuel economy labelling introduced by March 2008.	Fuel economy standards for light vehicle fleet still being finalised.

	▪ Average fuel economy standards for new and used vehicles entering the fleet (around 7 litres/100km).	
Afforestation Grant Scheme		
Afforestation grants	Grants by competitive tender for new afforestation that is not in ETS, PFSI or ECFP. Exotic, planted indigenous and "assisted indigenous reversion" are eligible.	Maximum grant rates to be determined. Level of funding not yet known. Grantees enter 10 year contracts with Crown. No obligations after 10 years.

Table 2. Main features of significant policies included in the base case scenario

Measure	*Main features*	*Comments*
Sustainable land management: ***A. Forestry - Creating carbon sinks and reducing emissions***		
East Coast Forestry Project	Erodible land in Gisborne District eligible for grant to assist afforestation, targeted at most highly erodible land. Grants available for exotic forestry, gully planting and native reversion. Since 1992, 37,000 ha planted.	Proposed that ECFP grant be reduced if grantees opt in to ETS, but only for applications received after ETS announcement in September 2007. Can combine PFSI with ECFP without penalty, but if participant later opts into ETS, must refund difference between full and reduced ECFP grant.
Permanent Forest Sinks Initiative	New forests can earn emission units with permanent covenant and harvesting restrictions.	Proposed that PFSI participants have option of switching to ETS (more ability to harvest, but with associated obligations) within 18 months. Scheme will develop methodology for measuring carbon storage.
Public conservation land carbon storage	Six pilot projects on 40,000 ha, in which investors pay DOC to establish forest carbon sinks on specified areas of conservation land. Two options: planting or natural regeneration of land not in forest at 1990; or measured pest control initiatives to increase carbon storage for pre-1990 forest.	Tenders for initial round due on 31 March 2008. Tenders are also invited to sponsor additional conservation activities on public conservation land. Investment term for carbon sink projects is 45 years.
Hill Country Erosion Initiative	$2 million available annually to help hill-country farmers treat erosion-prone land. Covers assistance to farmers for afforestation plus research, training and other support.	Primarily for regional initiatives through regional councils at this stage.
MAF policy on illegal logging	Awareness and action amongst New Zealand producers, suppliers and consumers to reduce	Covers domestic and international illegal logging. MAF researching feasibility and practicality of

	illegal logging.	introducing a regulatory requirement for a supplier's declaration of conformity on all timber and wood products sold in New Zealand.
Forests Act	Provisions for sustainable management of indigenous forest on private land, primarily through Sustainable Management Plans and Permits. Also covers milling and export controls.	
Biofuels R&D	Bioenergy Research & Development (R&D) and other R&D in the Plan of Action related to forestry measurement and management.	Biofuels R&D is part of a larger R&D programme with the wood industry.
B: Agriculture		
Government investment initiatives for agriculture emissions mitigation in the Sustainable Land Management and Climate Change Plan of Action	▪ Adaptation partnerships and community irrigation fund. ▪ Farm level GHG reporting. ▪ GIS infrastructure. ▪ Business partnerships, biochar R&D. ▪ Adaptation, mitigation and inventory R&D fund. ▪ Technology transfer partnerships with industry through SFF and CC funding.	Total investment in the SLM Plan of Action is $175 million over 5 years (38.811 p.a.) A number of initiatives are partnered with industry and are currently being developed but are progressively being implemented over the next 3 years. *Refer NZ Climate Change Solutions SLM and CC Plan of Action A Partnership Approach September 2007 pp 18.*
Waste management		
Waste levy	Levy per tonne of waste to landfill. Default rate of $10/tonne of waste, but regulations can vary the rate (higher or lower) and set a different rate for different facilities and in different locations. Levy revenue is split between local authority and central	Levy proposed in Waste Minimisation (Solids) Bill, and also in Supplementary Order Paper September 2007. Government indicated support for the Bill when SOP referred to Select Committee.

	government and must be used for waste minimisation.	
Product Stewardship Scheme	A product stewardship scheme must be developed and accredited for products declared (by the Minister through Gazette notice) to be "priority products". Other products can apply for voluntary accreditation of schemes.	Extended producer responsibility proposed in Waste Minimisation (Solids) Bill, amended to Product Stewardship Scheme in Supplementary Order Paper Sept 07. Government indicated support for the Bill when SOP referred to Select Committee.
Transport		
Existing funding and expenditure policies	National Land Transport Programme 10 year forward programme (including Northern Busway) plus existing commitments for ONTRACK, including Auckland rail electrification and Wellington rail extension. Existing active living programmes maintained and Walking and Cycling strategy implemented.	These are examples of new initiatives. The base case scenario assumes that other aspects of existing transport funding policy are maintained.
RMA and other environmental management statutes and policies		
Resource Management Act, Conservation Act, NZ Biodiversity Strategy, etc	All existing statutory RMA policies, plans and standards at national and local level, including those that have been formally notified as proposed; all existing Conservation strategies and plans; existing policies, programmes and plans under the Biodiversity Strategy, the Biosecurity Act, the Fisheries Act and other statutes are considered part of the base case scenario.	Any policies, plans, programmes or standards that are currently under development and have NOT been formally notified as proposed are excluded from the base case scenario, but could be identified in this project as new policy responses to address environmental concerns arising from the ETS and closely related measures.

Table 3. Assumptions about energy supply and price

Energy		
For the purposes of this project, we assume:	No major oil and gas finds in New Zealand during the period 2008-2020. International oil & gas prices remain high and rise over the course of the study. Sufficient domestic gas reserves to meet existing commitments.	