Ministry for the
Environment
Manatū Mō Te Taiao

- 4 AUG 2016

16-D-00692

Paul Young
paul@morganfoundation.org.nz

Dear Mr Young

Thank you for your email of 17 May 2016 requesting the following information under the Official Information Act 1982 (OIA):

> *all data and explanatory information on projections of New Zealand's greenhouse gas emissions (gross and net emissions to at least 2030), under all possible accounting methodologies that may be applied to New Zealand's post-2020 climate change commitments*

On 24 May 2016 you clarified the scope of your request, confirming that you seek information on:

> *all data and explanatory information on projections of emissions and removals from New Zealand's Land Use, Land-Use Change and Forestry (LULUCF) sector to at least 2030, under all possible accounting methodologies that may be applied to New Zealand's post-2020 climate change commitments*

The scope has been interpreted to cover LULUCF projections prepared for the period 2021 to at least 2030 under four proposed accounting rules (existing Kyoto, hybrid Kyoto, gross-net and net-net) to support development of New Zealand's Intended Nationally Determined Contribution, including explanatory information.

The attached table lists the documents falling within the scope of your request and notes any OIA provisions that have been applied. The information provided to you in this request shows that our forestry accounting approach for our 2030 target is still not finalised, and that four forestry accounting scenarios are being considered. Section 9(2)(j) has been applied to some of this information as while the Paris agreement was made in December 2015, there are still ongoing negotiations around the details such as accounting and markets.

You will note that the projections provided on 2 September were updated for the Kyoto and modified Kyoto scenarios in the documents dated 10 and 12 November 2015. The United Nations Framework Convention on Climate Change (UNFCCC) projections (gross-net and net-net) were updated at the same time and are provided in *New Zealand's Second Biennial Report to the UNFCCC.*

As discussed in your phone conversation with Charles Rands on July 8, the paper Post-2020 Forestry and Land Use Options for New Zealand's 2015 Contribution requires a significant amount of time to review. We will provide you this paper once it has gone through the necessary review process. We will keep you informed of any delays.

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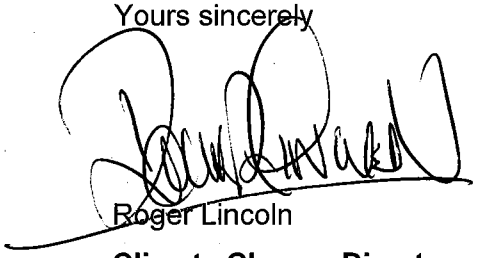
Under section 28(3) of the OIA, you have the right to ask the Ombudsman to review my response to your request.

Yours sincerely



Roger Lincoln

Climate Change Director

Documents falling within the scope of your request

No.	Date	Content	Decision	OIA Section/s applied
1	31 May 2015	Post-2020 Forestry and Land Use Options for New Zealand's 2015 Contribution	**PENDING**	**PENDING**
2	19 June 2015	Forestry & Land Use in New Zealand's Next Climate Change Commitment.	Release in full	n/a
3	2 September 2015	Email: Forestry options annualised projections	Release in part	S9(2)(a)
4	2 September 2015	Existing Framework: Kyoto CP2 Status Quo – 3.3. ARD & 3.4 FM (BAU RL)	Release in part	S9(2)(j)
5	2 September 2015	Hybrid Approach: Hybrid Kyoto/UNFCCC ('Land in transition')	Release in part	S9(2)(j)
6	2 September 2015	Net-Net: UNFCCC land-based accounting – no special rules – base year 1990	Release in part	S9(2)(j)
7	2 September 2015	Gross-net: UNFCCC land-based accounting – no special rules – no base year	Release in part	S9(2)(j)
8	2 September 2015	Four forestry options.xlsx	Release in part	S9(2)(j)
9	10 November 2015	Email: CP2 KP Net Position.xlsx	Release in part	S9(2)(a)
10	10 November 2015	CP2 KP Net Position.xlsx Projections under KP CP2 rules	Release in part	S9(2)(j)
11	12 November 2015	Email: Revised post-2020 projections.xlsx	Release in part	S9(2)(a)
12	12 November 2015	Revised post-2020 projections.xlsx	Release in part	S9(2)(j)
13	13 November 2015	New Zealand's Preferred Approach to International Climate change Accounting of Forestry Emissions in 2021 - 2030	Release in part	S9(2)(a) S9(2)(j) S9(2)(f)(iv) S9(2)(g)(i) S9(2)(k)

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Ministry for Primary Industries
Manatū Ahu Matua

Forestry & Land Use in New Zealand's Next Climate Change Commitment

www.mpi.govt.nz

MPI Technical Consultations 19 June 2015

Outline

1. New International climate change agreement – post 2020
2. Current international forestry approach
3. New Zealand's international objectives
4. Potential future options for our new target
5. Implications for NZ and ETS
6. Questions & discussion

1 New International Climate Change Agreement

- New **international climate change agreement** to apply from 2020
- Expected to apply to **all countries** – so will need to provide a **more flexible** global framework than current Kyoto
- Potential opportunity to seek **more effective forestry** approaches better suited to **NZ's national circumstances**
- **Future rules** however yet to be confirmed

Quick Recap

Different sets of carbon 'accounts' for different purposes:

- **'UNFCCC Reporting'** includes <u>all</u> greenhouse gas emissions and removals in our GHG Inventory from 100% of NZ's area, based on 'land-use' categories (forest land, cropland, grasslands, wetlands, settlements)

- **'Kyoto Protocol Accounting'** focuses on a smaller **subset of human activities** – eg, afforestation, deforestation & forest management – plus 'special accounting rules' – to capture <u>mitigation actions</u> towards our target. (The NZ ETS is based broadly on Kyoto rules)

- **ETS credits and liabilities:** ETS accounting rules for activities which earn credits (eligible post-1989 forests) or emissions liabilities (post-1989 harvest and deforestation), pre-1990 forest deforestation.

Quick Recap

New Zealand's current international climate change targets:

- New Zealand's **Kyoto CP1** target is to reduce net emissions over 2008-2012 to **1990** levels (0% target)
- Our **current target** is **-5% on 1990 by 2020 –** an unconditional commitment under UNFCCC using Kyoto CP2 accounting rules.
- A **conditional target range** of 10 to 20 per cent reduction below 1990 GHG emissions levels by 2020 if there is a comprehensive global agreement.
- A gazetted long-term target of a **50% reduction** in emissions below 1990 levels by 2050.

2 Current International Forestry Rules

- **Kyoto** creates **incentives for new forest planting** in addition to business-as-usual – ie, '1990' – and **discourages deforestation**
- Kyoto **splits forests** permanently into **two parallel systems** based on 1990 'activity start year' => the pre/post-1990 split:
  - **Post-1989 forests ('Afforestation/reforestation') & Deforestation** are **fully credited/debited** (Article 3.3 'gross-net' accounting)
  - **Pre-1990 forests ('Forest Management')** are credited/debited against **business-as-usual emissions only** (Article 3.4 'Forest Management Reference Level')
- Kyoto has **specialised forestry rules** – to capture human actions and exclude non-anthropogenic and legacy effects.
- **Fully debits** the sustainable harvest of our post-1989 forests

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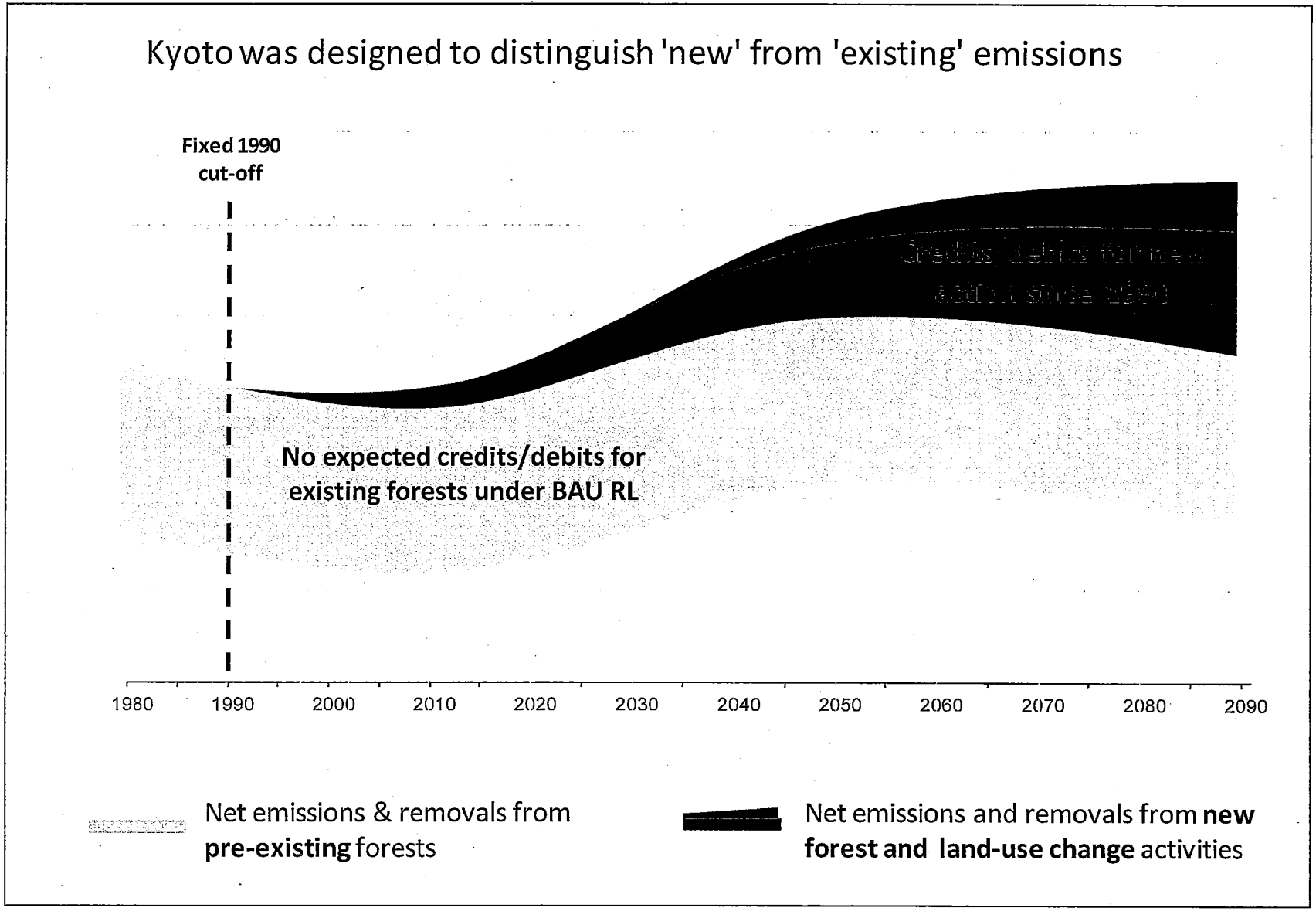
Kyoto Approach



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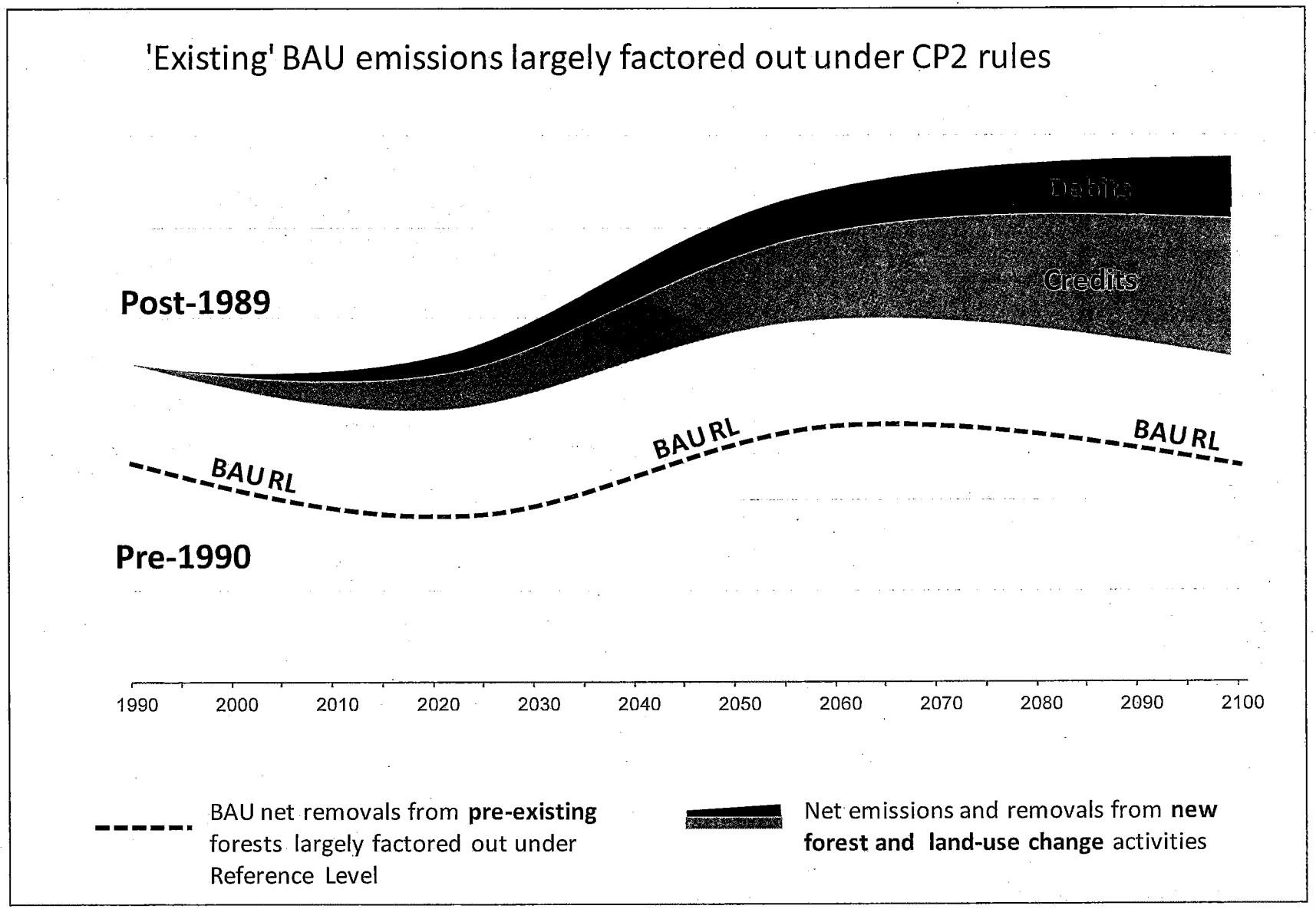
Kyoto Approach



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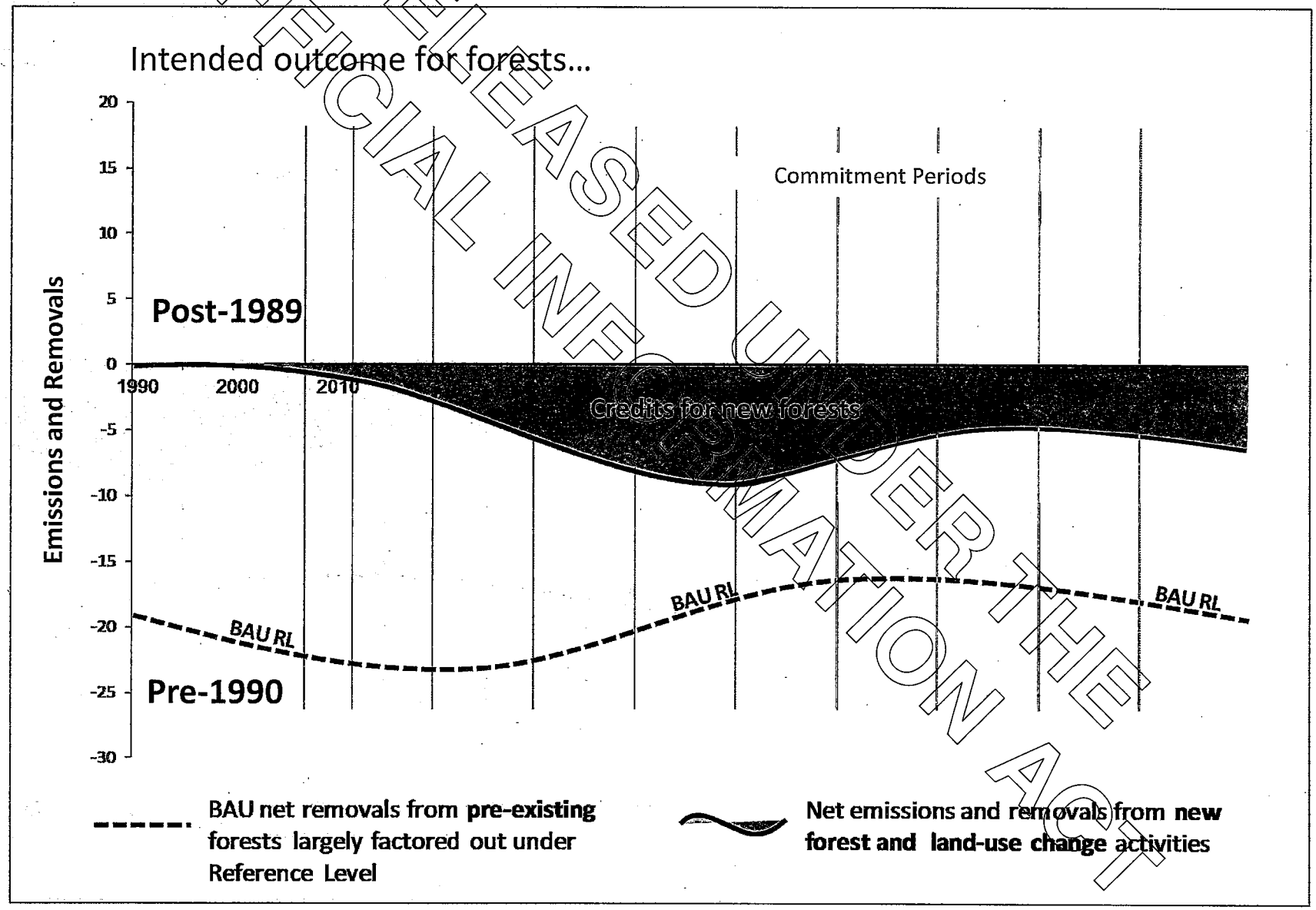
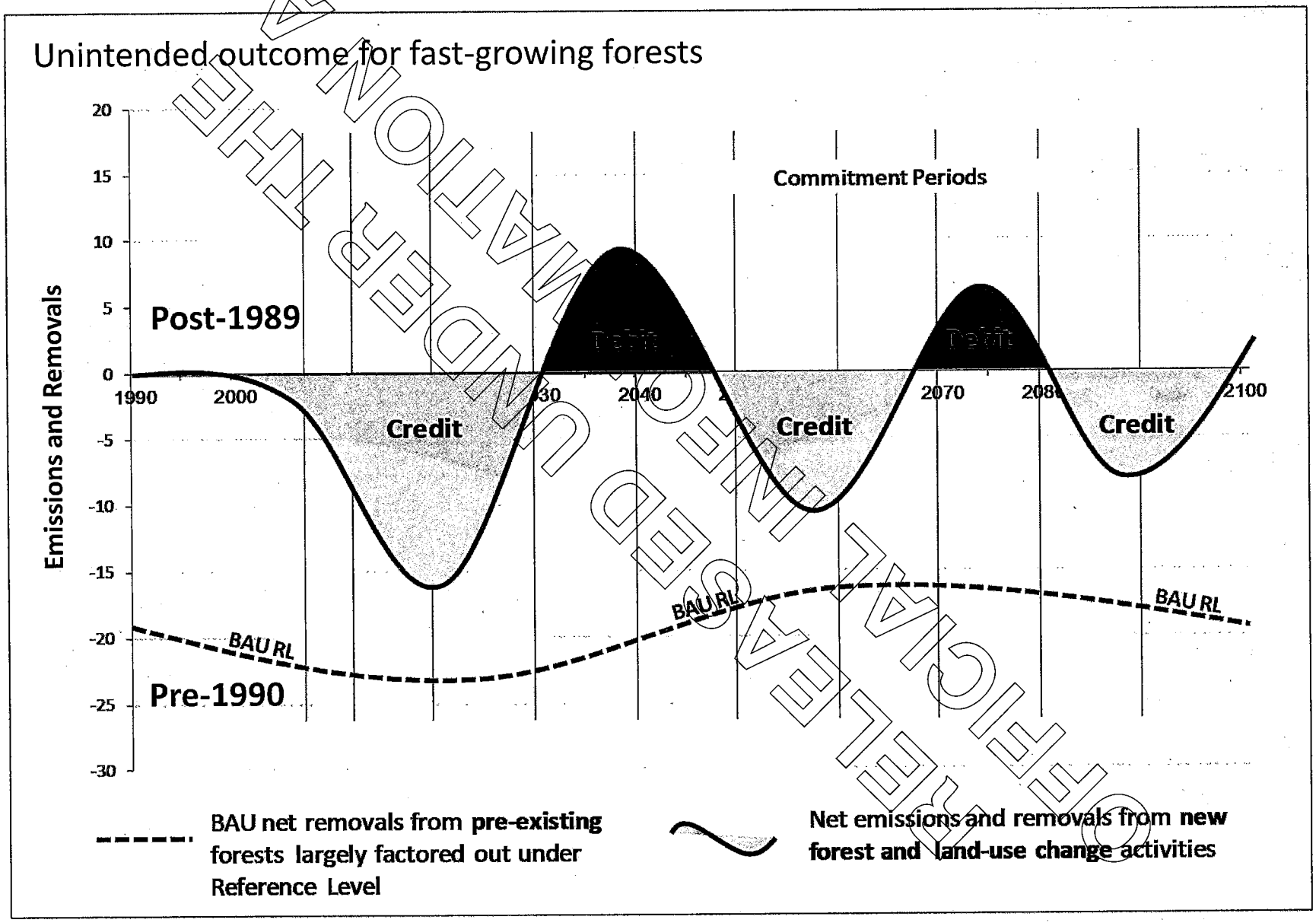
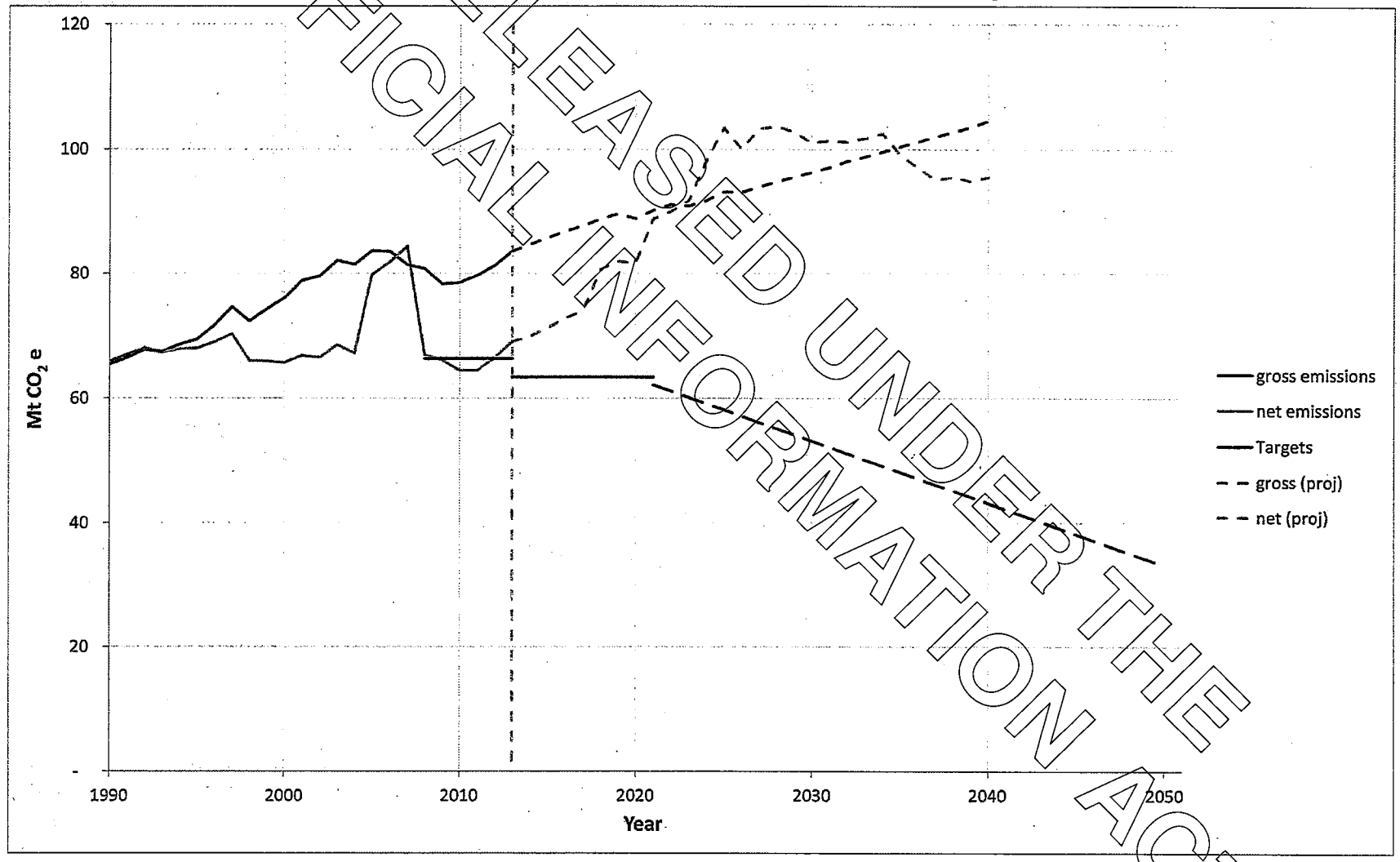
Kyoto Approach



Kyoto Forestry Accounting



New Zealand's Projected GHG Emissions against its Targets



Over the 2020s, NZ's total net emissions become an overall source of emissions under Kyoto CP2 accounting rules (Source: MfE 2014 BIM)

3 Learning from Kyoto Experience

- Great for **incentivising new forest** establishment – credits
- Creates disincentives for **deforestation** – debits
- **Not good** for recognising that new **actions have a life span**
- **New forests** eventually transition to **mature, established forest**
- **Harvesting** and subsequent replanting are part of a normal plantation rotation and **sustainable forest management**

4 NZ's International Forestry Objectives

(1) Keep the good things we've got under Kyoto:

- **Full crediting for new forest sinks**, enhancement of existing forests, & other actions, and disincentives for deforestation

- **Successful Kyoto rules** – Harvested wood products accounting, Flexible land use rule, natural disturbance exclusions

- Ability to take into account **uneven historical rates of forest planting** – via 'Business-as-usual reference levels' for Forest Management (pre-1990 forests)

5 NZ's International Forestry Objectives (cont.)

(2) Improve on what we've got after 2020:

- Work towards an approach that **better manages** New Zealand's emissions from the **planting and harvesting cycles** of production forests over time

- Recognise **sustainable forest management** for its positive, long-term carbon contribution – and minimise international liabilities for sustainable harvest of **all plantation forests**

6 'Averaging' – A model for accounting after 2020?

- A potentially more effective approach to international forestry accounting after 2020 could be based on '**Averaging**', combined with 'new forests' **transitioning** to 'mature, established forests'.

- Averaging was considered previously as a **domestic ETS option**.

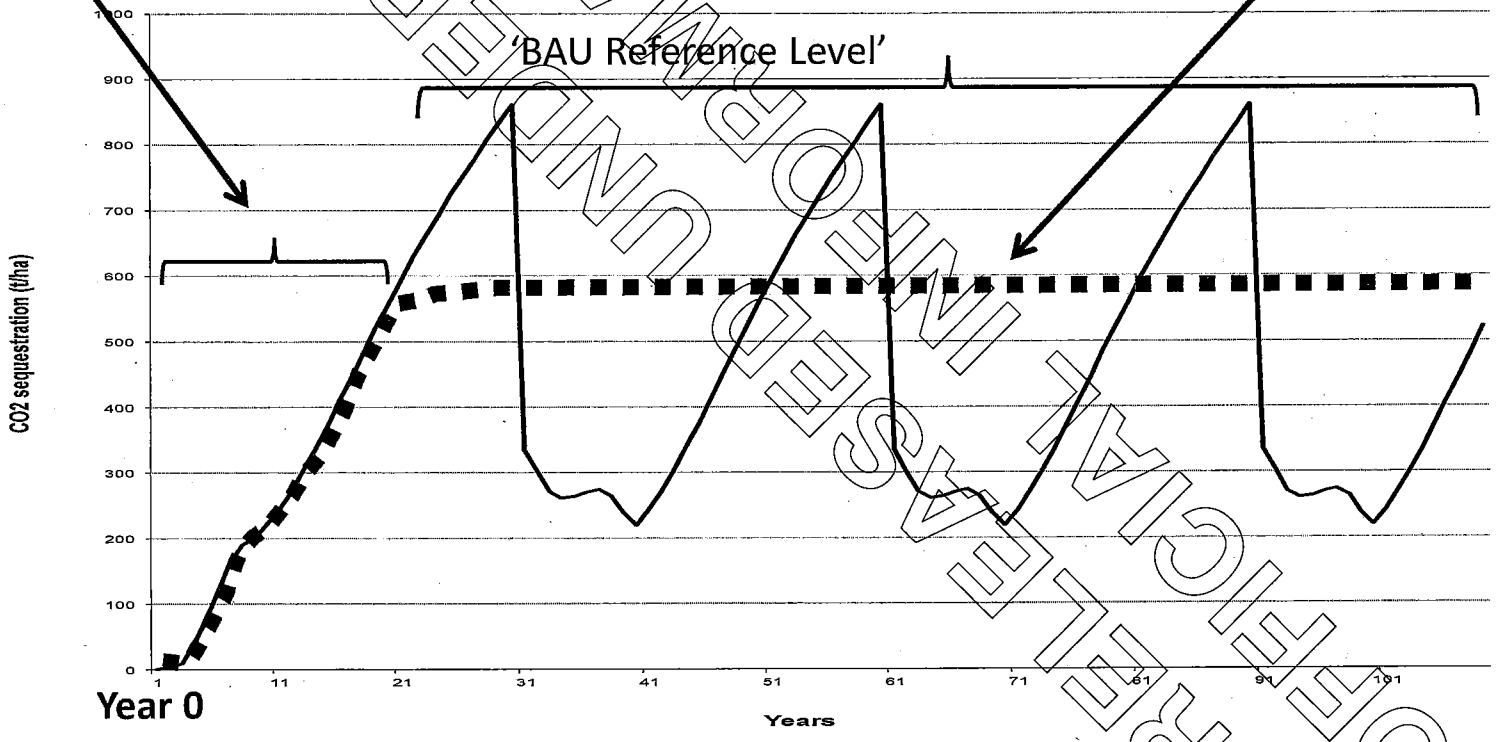
- An **'international averaging'** approach could avoid the need to 'bank and borrow' units across commitment periods, by smoothing out the fluctuations of planting and harvesting cycles over time.

- Averaging may also provide **better incentives to enhance carbon sinks** – by providing credits for permanent long-term carbon – without the future liabilities?

7 How 'Averaging' Works

Full crediting of New Forests

Future carbon stock changes would incur no further credits or debits



Year 0

Current approach: 'Saw-tooth' credit/debit cycle under Kyoto treats sustainable harvest like deforestation

Averaging approach: International crediting new forests up to long-term average only (eg, first 20 years)

8 Potential Benefits of 'Averaging' after 2020?

- **Strong incentives** for **new forest establishment**
- Ensures NZ can **sustainably harvest its production forests** – even under **high carbon prices** – no harvest liabilities if replanted
- Smooth's planting/harvesting fluctuations to **long term average**
- Allows New Zealand to manage **planted forest debit-credit cycle,** avoiding risk of needing to **'bank and borrow'** units across commitment periods ('carry over')
- Possible extension of **Flexible Land Use** rule to all forests, and potential to recognise **longer-live species** and permanent forests.

9 Domestic implications after 2020?

- **No automatic** implications for NZ ETS forestry settings from our international target settings
- Potentially enables Government to introduce **domestic ETS averaging option** to help forest owners manage financial risks of harvest liabilities – if assessed as beneficial
- **Rules under New Agreement** also need to be confirmed before potential value to New Zealand could be realised
- New international framework is an **opportunity for New Zealand** to consider what would deliver best incentives for **forest carbon** *and* **sustainable forest management** over the long term

Questions & Discussion…

Technical consultation questions:

- What should inform our choice of approach after 2020?
- What should we be aiming to achieve with our international accounting?
- Could the current Kyoto approach be improved? (Does 'averaging' have any merit?)

(3)

[redacted] s9(2)(a)

From: [redacted]
Sent: Wednesday, 2 September 2015 5:19 p.m. s9(2)(a)
To: [redacted]
Cc:

Subject: Forestry options annualised projections
Attachments: 1. Existing Framework.docx; 2. Hybid Approach.docx; 3. Net Net LULUCF.docx; 4. Gross Net LULUCF.docx; Four Forestry Options.xlsx

Hello

Please find attached four documents and 1 spreadsheet.

Each of the four forestry options has a brief outline on the accounting principles, a short description on the modelling completed by MPI, the core assumptions described, projections from 1990 - 2050 and also net emissions (cost) relative to the 1990 base year. The assumptions provided still need more time to critique and review. The four documents which explain the projections outlining their construction, issues and limits are:

1. **Existing framework**
2. **Hybrid Approach**
3. **Net Net LULUCF**
4. **Gross Net LULUCF**

The spreadsheet provides the projections based on a 1990 and 2005 base year for the Existing Framework (Kyoto CP2 Status Quo) and also for the Hybrid approach ('land in transition') and contains 6 worksheets:

- **Summary**: a summary of all the options by scenario and associated costs completed by MPI. These are the same costing previous provided to MfE.
- **Costings**: the relative cost saving of progressing to the Hybrid approach compared to the existing framework. Cost are compared to 1990 levels.
- **Hybrid**: projections by transition (time to reach average carbon stock 20 or 28 years) and emissions scenario from 1990 – 2050 both for a 1990 base year and for 2005.
- **KP**: projections by emissions scenario from 1990 – 2050 both for a 1990 base year and for 2005.
- **LULUCF**: Projection of LULUCF under the UNFCCC. Can be used to determine Net-net and Gross-net costings.
- **Drivers**: A quick start at listing the main drivers/activities that impact on projected emissions and removals in the LULUCF sector.

Regards

[redacted] s9(2)(a)

[redacted] s9(2)(a)

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[SEEMAIL] [IN CONFIDENCE] s9(2)(a)

(4)

Existing Framework: Kyoto CP2 Status Quo – 3.3 ARD & 3.4 FM (BAU RL)

Purpose

1. This document provides a brief outline on the existing Kyoto Protocol rule set and general accounting principles if applied post-2020. Provided is a short description on the modelling completed by MPI, the core assumptions, projections and net emissions relative to the 1990 base year.
2. Projections are also provided in an accompanying spreadsheet (named "four forestry options.xls"). Projections are provided within this document on a 1990 base and activity start year. However, the accompanying spreadsheet does provide Kyoto Protocol projections with a 2005 base and activity start year for comparison purposes.

Description

3. This option would continue New Zealand' current approach over 2013-2020. The net LULUCF sink over 2021-2030 under Kyoto CP2 rules would be added to accounting during the commitment period.
4. All CP2 LULUCF accounting rules would apply, as set out in the IPCC 2013 KP Supplement. The CP1 rule of ARDC would not apply.
5. Accounting coverage would include the Article 3.3 activities of Afforestation/reforestation and Deforestation and the Article 3.4 activity of Forest management only. Forest management would be accounted for under a projected BAU reference level. It is assumed that none of the other, voluntary Article 3.4 activities would be elected.
6. The Kyoto hierarchy of Article 3.3 and 3.4 activities would continue, as would their current accounting approaches (gross-net for Article 3.3, BAU RL for Article 3.4 FM). Once an activity is accounted for under Article 3.3, it would remain under 3.3 for all future commitment periods. This means that Article 3.3 AR land (post-1989 forests) would remain permanently under gross-net accounting.
7. The Kyoto 'additionality' principle of distinguishing between forests that were in existence already, at the start of the base year ('Forest management' of pre-1990 forests), and new forest established (or deforested) subsequent to the base year (post-1989 'Afforestation/reforestation' and 'Deforestation') would continue to apply. When combined with the BAU reference level accounting approach applied to pre-1990 forest management, this means New Zealand would expect to receive no debits or credits for its large pre-1990 forest estate (including natural forests) under ongoing, current 'business-as-usual' management (defined by 2009 policies and practices).

Modelling

8. Projections are based on supply side modelling, but do included scenarios that take into account economic drivers and uncertainty. Forest growth is modelled using a growth simulation - much the same as the LUCAS CRA system. Projections of harvesting are provided by SCION and take into account the need for a constant supply of timber to the market and the possible change in forest owner intentions with varying carbon prices.
9. The model has been reviewed by Scion who found the model fit for purpose. Results from the MPI model for CPI have also been compared to that produced by the LUCAS CRA for New Zealand's Kyoto protocol achievement under Article 3.3, where net removals were almost identical over the 2008-2012 period.

10. Uncertainty has been included in the projections through the use of scenarios that represent worst (high emissions), most likely (midpoint), and best case (low emissions). The scenarios incorporate assumptions to address uncertainties relating to future rates of afforestation and deforestation, harvesting rates, harvested wood products and also include the effect of other rules such as flexible land use.
11. 1990 remains the activity start date for land use conversions. A base year of 2005 has been modelled by MPI and provided separately.
12. Kyoto CP2 accounting provisions apply (2013 KP Supplement):
    a. Natural disturbance emissions can be excluded.
    b. HWPs are accounted for based on the Kyoto production approach.
    c. The carbon equivalent forest conversions provisions allows certain deforestation events to be accounted for under Forest management (FLU rule)
    d. FM credits are capped at 3.5% of 1990 gross emissions reported in the first Inventory report for the commitment cycle (CP2 rule).
13. No optional Article 3.4 activities are assumed.
14. ARDC does not apply.

Accounting coverage and approach

Land use/activity	Accounting approach	Critical rules	Activity start year	Baseline
Afforestation/reforestation	Gross-net	AR must be from direct human impact HWP	1990	0
Deforestation	Gross-net	FLU	1990	0
Forest management	BAU reference level	FMRL Cap on credits only	2009 policy base year	BAU projection over 2021-2030

Modelling results

Kyoto CP2 Rules – Status Quo – Emissions Scenarios 2021-2030 (Mt CO_2)			
	Low Emissions	Mid-point	High Emissions
Article 3.3 (A/R/D)	[redacted]	[redacted]	[redacted]
Article 3.4 (Pre-1990) Max claimable credits above BAU would be 21 Mt CO2, debits are uncapped	0	0	0

S9(2)(j)

Note: Negatives are removals, positives are emissions

Modelling Assumptions: Kyoto CP2 Status Quo – 3.3 ARD

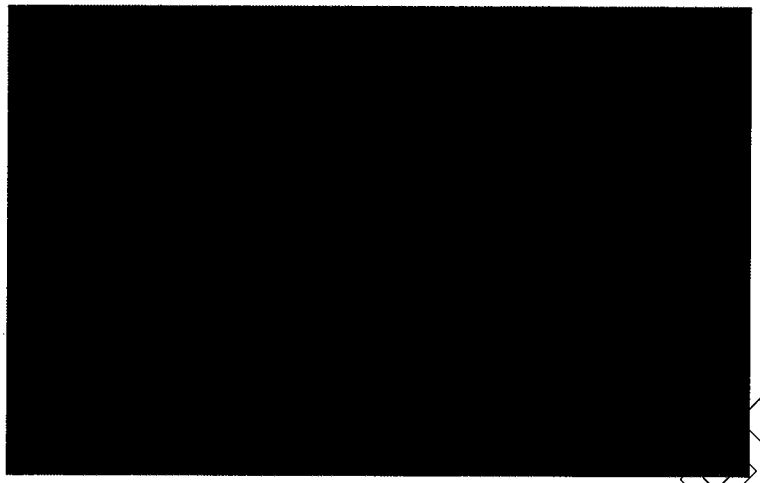
Assumption	Measure	Low emissions	Midpoint	High emissions	Comment
Historical Article 3.3 emissions and removals 1990 - 2013	Mt CO2	Based on 2014 NIR submission for Article 3.3 emissions and removals from 1990 - 2012. 2015 Submission is used for all LULUCF activity data and emission factors.			Latest Submission used for all activity data and emissions factors
Projections 2014 – 2050	MT CO2	Based on MPI model and data sourced under contracts			
Carbon price	$	$25+ +/NZU and other favourable conditions	$12.5 - $25 /NZU and other favourable conditions	$0 – $12.5	Forest owners behaviour is not solely driven by carbon price, rather is a combination of factors, such as: • Wood product returns • Differing rates of return between forestry and other land uses • Nursery capacity • Forest/land owners future intentions • Future international and domestic carbon accounting rules • Land availability, health and safety issues related to topography • Government planting schemes and current private sector interest in participating in forestry schemes administered by the government. • Forest owner's carbon price predictions.
Base Year	Year	1990	1990	1990	1990 is the base year and activity start year as indicted in NZ INDC
Post-1989 HWP	Decay curve	• 2013 start • Delay 100% of emission from round wood exports • Based on pre-1990 planted forest HWP mix • Default half lives	• 2013 start • Delay 50% of emission from round wood exports • Based on pre-1990 planted forest HWP mix • Default half lives	• 2013 start • Delay 0% of emission from round wood exports • Based on pre-1990 planted forest HWP mix • Default half lives	As per 2013 KP Supplementary guidance. Scenarios take into account research underway and the need for verifiable information on final wood products and the limited information that NZ has currently on final wood product for round wood exports.
Pre-1990 HWP for FMRL	Decay curve	• 1990 start • Default half lives • LUCAS model • Same product mix and emission factors as 2015 NIR submission			No variation required as pre-1990 forest HWP is included under the FMRL and as such emissions and removals from HWP are effectively factored out of the accounting unless different from BAU. Also given that MfE is now updating and will likely apply a technical correction to the 2011 FMRL.
Natural forest deforestation	Hectares	25% less than midpoint per year	Rolling average of last 5 years	25% more than midpoint per year	Low and high scenarios are based on assessed variance in natural forest deforestation since 2008 to determine confidence limits in low and high estimates. Calculations include gains from the establishment of grassland from deforestation events. Emissions from natural forest deforestation are assumed to be instant.

Post-1989 Deforestation	Hectares	700 ha per year from 2014 onwards	1,200 ha per year from 2014 onwards	1,400 ha per year from 2014 onwards	Pre-1990 planted forest and post-1989 forest deforestation projections from 2014 to 2020 are based on a combination of the 2011 – 2014 annual Deforestation Intentions Survey's conducted by Canterbury University. The 2011 survey is used for the Midpoint scenario which was undertaken when carbon prices were in the range of $17 - $14, and offsetting was an economically viable option. Respondents indicated that around half (50%) of all pre-1990 planted forest deforestation would be 'avoided' due to the offsetting provision in the NZ ETS. The 2014 survey is used for the high emissions scenario. The survey was undertaken when carbon prices were $4/NZU and offsetting was not economically viable, or a restriction for forest owners in converting pre-1990 planted forest to other land uses. The low emissions scenario assumes a reduction in deforestation due to the higher liability forest owners would face. In this scenario offsetting of pre-1990 planted forest is economically viable, with around 75% taking up the offsetting provision. Even with high carbon prices deforestation is still likely to occur at some level as forest owner's decisions to change land use are not solely driven by carbon prices. Calculations Include gains from the establishment of grassland from deforestation events. Emissions from planted forest deforestation are assumed to be instant.
Pre-1990 deforestation	Hectares	2,800 ha per year from 2014 onwards	4,900 ha per year from 2014 onwards	5,500 ha per year from 2014 onwards	
Pre-1990 Planted forest Deforestation	Age	28	28	28	Based on historical LUCAS data and typical conversion age coinciding with harvest. Emission are assumed to be instant
Post-1989 Planted forest Deforestation	Age	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards varies from 28-32	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards varies from 28-30	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards is 28	From 2014 – 2017 based on average age of post-1989 forest. Deforestation ages vary due to forest owner's response reflecting carbon price and ETS impacts. Calculations Include gains from the establishment of grassland from deforestation events. Emission are assumed to be instant
New Planting	Hectares	• Assumes 3,000 hectares in 2015. • Then a gradual Increase in new planting of 30,000 hectares per year by 2030	• Assumes 3,000 hectares in 2015. • Then a gradual Increase in new planting of 15,000 hectares per year by 2030	• Assume a low carbon price and little incentive for new planting. • With 5,000 hectares of new planting (mostly based on government planting schemes) per year to 2030	New planting projections are based on a combination of consultation with industry, historical trends and economic modelling. The midpoint new planting projections assume a gradual increase from around 3,000 hectares in 2015 to around 15,000 hectares by 2030. However, new planting projections are particularly difficult to quantify as there are numerous factors that influence both investors and commercial forestry objectives. The gradual increase of new planting was considered based on nursery production constraints and the likelihood of the low carbon price not changing significantly in the near future. Includes carbon losses from grassland due to the establishment of forestland
FLU	Percent	75% 'avoided deforestation' from 2016 onwards by pre-	50% 'avoided deforestation' from 2016 onwards by pre-	0%	Percent take-up of FLU base on Deforestation Intentions Surveys. Applied to pre-1990 planted forest deforestation.

		1990 planted forest owners uptake of the NZ ETS offsetting rule	1990 planted forest owners uptake of the NZ ETS offsetting rule		
Post-1989 Harvest	Target Age	32	30	28	Harvest rates provided by Scion under a non-declining total harvest yield provision. Same assumptions on AGB transferred to DW on point of harvest and DW decay as 2015 NIR submission. Rotation ages could become more variable as a result of the NZ ETS. Post-1989 forest land owners will consider not only log prices, but also the carbon balance in the forest (whether it is better to continue to accrue units or meet liabilities) and the price of carbon, which will be a significant new factor that comes into the felling decision. Rotation lengths could increase with increasing carbon prices, but the planted forest will eventually be harvested as the primary revenue source is from timber and forest owners are likely to have forward harvesting and timber supply contracts. With lower carbon prices, there is little liability to post-1989 forest owners to harvest, and harvest is assumed to occur in a normal rotation of 28 years. With a higher carbon price of around $25, the rotation could be delayed while forest owners maximise the returns from carbon, with associated less incentive to harvest. The projections take these variations in carbon price into account through the three scenarios.
Post-1989 replanting	Year	Assumes replanting takes place within 1 year			Typically replanting occurs within 1-3 year timeframe
ARDC	Mt CO2	Excluded from 2013 onwards But included from 2008 - 2012	Excluded from 2013 onwards But included from 2008 - 2012	Excluded from 2013 onwards But included from 2008 - 2012	CP1 only. In the first commitment period of the Kyoto Protocol, the Afforestation-Reforestation Debit-Credit (ARDC) rule meant that New Zealand did not have to account for more emissions than credits received for post-1989 forests. At Durban it was decided that the ARDC rule would not be continued into the second commitment period.
Yield tables and emissions factors	Mt CO2	LUCAS – 2015 NIR submission			Use the same emission factors and yield table are the latest submission.
Pre-1990 planted forest emissions and removals	Mt CO2	Provided under contract by Scion			Pre-1990 planted forest projections, harvest rates, volumes and all emissions and removals provided by Scion for input into MPI model
Natural disturbance		Assumes no natural disturbance above NZ defined base-line			
Non carbon	Non CO2 emissions	Excluded from projections given these are insignificant emissions			

Projections: Kyoto CP2 Status Quo – 3.3 ARD (Mt CO2)

Note: Excludes projections of any FMRL given LUCAS are proposing a technical correction of the 2011 CP2 FMRL for the 2016 NIR submission.



S9(2)(j)

1990	0.51	0.51	0.51
1991	0.47	0.47	0.47
1992	0.22	0.22	0.22
1993	-0.08	-0.08	-0.08
1994	-0.71	-0.71	-0.71
1995	-1.43	-1.43	-1.43
1996	-2.71	-2.71	-2.71
1997	-4.29	-4.29	-4.29
1998	-6.23	-6.23	-6.23
1999	-8.33	-8.33	-8.33
2000	-10.30	-10.30	-10.30
2001	-11.99	-11.99	-11.99
2002	-13.10	-13.10	-13.10
2003	-13.60	-13.60	-13.60
2004	-14.30	-14.30	-14.30
2005	-3.35	-3.35	-3.35
2006	-1.03	-1.03	-1.03
2007	3.81	3.81	3.81
2008	-14.24	-14.24	-14.24
2009	-12.34	-12.34	-12.34
2010	-14.37	-14.37	-14.37
2011	-15.45	-15.45	-15.45
2012	-15.15	-15.15	-15.15
2013	-14.11	-16.55	-17.76
2014	-14.30	-17.13	-18.92
2015	-13.92	-16.74	-18.52
2016	-13.37	-16.20	-17.99
2017	-13.17	-16.01	-17.83
2018	-7.20	-10.76	-12.61

2019	-6.79	-9.77	-12.24
2020	-6.27	-9.27	-11.40
[redacted]	[redacted]	[redacted]	[redacted]

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(5)

Hybrid Approach: Hybrid Kyoto/UNFCCC ('Land in transition')

Purpose

1. This document provides a brief outline on combining the UNFCCC and Kyoto Protocol rule sets and the general accounting principles if applied post-2020. Provided is a short description on the modelling completed by MPI, the core assumptions, projections and net emissions relative to the 1990 base year.
2. Projections are also provided in an accompanying spreadsheet (named "four forestry options.xls"). Projections are provided within this document on a 1990 base and activity start year. However, the accompanying spreadsheet does provide Hybrid Kyoto/UNFCCC projections with a 2005 base and activity start year for comparison purposes.

Description

1. This hybrid approach is based on the GHG Inventory land-based reporting framework, combined with Kyoto accounting rules – in particular, the BAU reference level, flexible land use and natural disturbance.
2. This option would combine the existing UNFCCC Inventory 'land-use roll over' function with the Kyoto CP2 principles of (1) accounting for land use change differently to land management, (2) applying gross-net accounting to new mitigation activities, such as land-use change (i.e., the 'Land converted to' categories), and (3) applying BAU reference levels to land management (i.e., the 'Land remaining land' categories).
3. This would have the effect of applying two different accounting treatments to forests depending on whether they are newly established (in a state of conversion to a new land use) or in an existing land use (a land remaining land category).
4. Business-as-usual reference levels would be applied to all fully-grown mature forests, which would minimise liabilities for sustainable harvest – recognising that it is carbon neutral in the long-term.
5. Full, gross-net carbon accounting would be applied to new forests since the base year – creating incentives for new afforestation/reforestation while smoothing or averaging out fluctuations due to tree growth and harvest.
6. This approach rewards the long term average carbon stored from planting a new forest without incurring future liabilities from harvesting.
7. The other Kyoto CP2 forestry rules and useful principles would also be applied, under this 'hybrid' Inventory/Kyoto principles based approach.

Modelling

3. Projections are based on supply side modelling, but do included scenarios that take into account economic drivers and uncertainty. Forest growth is modelled using a growth simulation - much the same as the LUCAS CRA system. Projections of harvesting are provided by SCION and take into account the need for a constant supply of timber to the market and the possible change in forest owner intentions with varying carbon prices.
4. The model has been reviewed by Scion who found the model fit for purpose. Results from the MPI model for CPI have also been compared to that produced by the LUCAS CRA for

New Zealand's Kyoto protocol achievement under Article 3.3, where net removals were almost identical over the 2008-2012 period.

5. Uncertainty has been included in the projections through the use of scenarios that represent worst (high emissions), most likely (midpoint), and best case (low emissions). The scenarios incorporate assumptions to address uncertainties relating to future rates of afforestation and deforestation, harvesting rates, harvested wood products and also include the effect of other rules such as flexible land use.

6. [redacted] S9(2)(j)

7. [redacted] S9(2)(j)

Liability coverage:

- Accounting includes emissions and removals during the commitment period as a result of the following human activities since 1990, defined using their 'land-based' inventory categories:
    - Land converted to Forest (Afforestation/reforestation)
    - Forest land converted to other land uses (Deforestation)
    - Forest land remaining Forest land (Forest management)
- Accounting could also be expanded to other land use categories, but under this option are assumed not to have a major impact on accounting.

Accounting approaches and rules:

- This option would apply gross-net accounting to the 'land converted to forest' category (i.e., afforestation) up until a transition point (for example, up until the long-term average carbon stock), and then this land would transfer to the 'existing' category, where all sustainable harvest emissions would be accounted for under a BAU Reference Level, instead of the only pre-1990 harvest emissions, as at present.
- It is assumed that all CP2 LULUCF accounting rules would apply, as set out in the IPCC 2013 KP Supplement (except those changed by the 'Land in transition' approach).

[redacted] S9(2)(j)

- Either existing coverage could be maintained, or other/all land uses could be elected.

Accounting coverage and approach

Land use/activity	Accounting approach	Key rule assumptions	Activity start year	Baseline
Land converted to forest – up until roll-over/average	Gross-net	[redacted] S9(2)(j) [redacted]	1990	0
Forest converted to other land uses since 1990 – up until roll-over/average	Gross-net	[redacted] S9(2)(j)	1990	0
Forest remaining forest	BAU Reference Level	[redacted] S9(2)(j)	2009 policy base year	BAU projection over 2021-2030

Modelling results

Hybrid approach over 2021-2030 with 1990 base year (Mt CO_2)			
Options:	**Low Emissions**	**Mid-point**	**High Emissions**
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

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Note: Negatives are removals, positives are emissions

Modelling Assumptions

Assumption	Measure	Low emissions	Midpoint	High emissions	Comment
Historical 1990 - 2013	MtCO2/Hectares	2015 Submission is used for all LULUCF activity data and emission factors.			Latest Submission used for all activity data and emissions factors
Projections 2014 – 2050	MT CO2	Based on MPI model and data sourced under contracts			
Carbon price	$	$25+ +/NZU and other favourable conditions	$12.5 - $25 /NZU and other favourable conditions	$0 – $12.5	Forest owners behaviour is not solely driven by carbon price, rather is a combination of factors, such as: • Wood product returns • Differing rates of return between forestry and other land uses • Nursery capacity • Forest/land owners future intentions • Future international and domestic carbon accounting rules • Land availability, health and safety issues related to topography • Government planting schemes and current private sector interest in participating in forestry schemes administered by the government. • Forest owner's carbon price predictions.
Base Year	Year	1990	1990	1990	1990 is the base and activity start year as per NZ INDC
Post-1989 HWP	Decay curve	[redacted] S9(2)(j)			Research is required to determine a new post-1989 yield table that includes HWP.
Pre-1990 HWP for FMRL	Decay curve	• 1990 start • Default half lives • LUCAS model • Same product mix and emission factors as 2015 NIR submission			No variation required as pre-1990 forest HWP is included under the FMRL and as such emissions and removals from HWP are effectively factored out of the accounting unless different from BAU. Also given that MfE is now updating and will likely apply a technical correction to the 2011 FMRL.
Natural forest deforestation	Hectares	25% less than midpoint per year	Rolling average of last 5 years	25% more than midpoint per year	Low and high scenarios are based on assessed variance in natural forest deforestation since 2008 to determine confidence limits in low and high estimates. Calculations include gains from the establishment of grassland from deforestation events. Emissions from natural forest deforestation are assumed to be instant.
Post-1989 Deforestation	Hectares	700 ha per year from 2014 onwards	1,200 ha per year from 2014 onwards	1,400 ha per year from 2014 onwards	Pre-1990 planted forest and post-1989 forest deforestation projections from 2014 to 2020 are based on a combination of the 2011 – 2014 annual Deforestation Intentions Survey's conducted by Canterbury University. The 2011 survey is used for the Midpoint scenario which was undertaken when carbon prices were in the range of $17 - $14, and offsetting was an economically viable option. Respondents indicated that around half (50%) of all pre-1990 planted forest deforestation
Pre-1990 deforestation	Hectares	2,800 ha per year from 2014 onwards	4,900 ha per year from 2014 onwards	5,500 ha per year from 2014 onwards	

					would be 'avoided' due to the offsetting provision in the NZ ETS. The 2014 survey is used for the high emissions scenario. The survey was undertaken when carbon prices were $4/NZU and offsetting was not economically viable, or a restriction for forest owners in converting pre-1990 planted forest to other land uses. The low emissions scenario assumes a reduction in deforestation due to the higher liability forest owners would face. In this scenario offsetting of pre-1990 planted forest is economically viable, with around 75% taking up the offsetting provision. Even with high carbon prices deforestation is still likely to occur at some level as forest owner's decisions to change land use are not solely driven by carbon prices. Calculations Include gains from the establishment of grassland from deforestation events. Emissions from planted forest deforestation are assumed to be instant.
Pre-1990 Planted forest Deforestation	Target Age	28	28	28	Based on historical LUCAS data and typical conversion age coinciding with harvest. Emission are assumed to be instant.
Post-1989 Planted forest Deforestation	Age	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards varies from 28-32	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards varies from 28-30	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards is 28	from 2014 – 2017 based on average age of post-1989 forest. Deforestation ages vary due to forest owner's response reflecting carbon price and ETS impacts. Calculations Include gains from the establishment of grassland from deforestation events. Emission are assumed to be instant Further work is required to determine if deforestation emissions are calculated at the average carbon stock or at the age of conversion. But for this analysis a conservative approach is being applied.
New Planting	Hectares	• Assumes 3,000 hectares in 2015. • Then a gradual Increase in new planting of 30,000 hectares per year by 2030	• Assumes 3,000 hectares in 2015. • Then a gradual Increase in new planting of 15,000 hectares per year by 2030	• Assume a low carbon price and little incentive for new planting. • With 5,000 hectares of new planting (mostly based on government planting schemes) per year to 2030	New planting projections are based on a combination of consultation with industry, historical trends and economic modelling. The midpoint new planting projections assume a gradual increase from around 3,000 hectares in 2015 to around 15,000 hectares by 2030. However, new planting projections are particularly difficult to quantify as there are numerous factors that influence both investors and commercial forestry objectives. The gradual increase of new planting was considered based on nursery production constraints and the likelihood of the low carbon price not changing significantly in the near future. Includes carbon losses from grassland due to the establishment of forestland
FLU	Percent	75% 'avoided deforestation' from 2016 onwards by pre-1990 planted forest owners uptake of the NZ ETS offsetting rule	50% 'avoided deforestation' from 2016 onwards by pre-1990 planted forest owners uptake of the NZ ETS offsetting rule	0%	Percent take-up of FLU base on Deforestation Intentions Surveys. Applied to pre-1990 planted forest deforestation.

Post-1989 Harvest	Age	New forest harvest emissions would be factored into the FMRL once the forest is deemed no longer to be a "new" activity but covered under BAU			The FMRL would need to be annually corrected for the inclusion of new forest area into the FMRL
Post-1989 replanting	Year	Assumes replanting takes place within 1 year. Removals from replanting will be covered under the FMRL			Typically replanting occurs within 1-3 year timeframe
ARDC	Mt CO2	Excluded	Excluded	Excluded	CP1 only. In the first commitment period of the Kyoto Protocol, the Afforestation-Reforestation Debit-Credit (ARDC) rule meant that New Zealand did not have to account for more emissions than credits received for post-1989 forests. At Durban it was decided that the ARDC rule would not be continued into the second commitment period.
Yield tables and emissions factors	Mt CO2	LUCAS – 2015 NIR submission			Use the same emission factors and yield table are the latest submission.
Pre-1990 planted forest emissions and removals	Mt CO2	Provided under contract by Scion			Pre-1990 planted forest projections, harvest rates, volumes and all emissions and removals provided by Scion for input into MPI model
Natural disturbance		Assumes no natural disturbance above NZ defined base-line			
Non carbon	Non CO2 emissions	Excluded from projections given these are insignificant emissions			

Projections: New Zealand's projected emissions liabilities from the Hybrid approach (crediting new forests up to average [redacted] under Emissions Scenarios (Mt CO2)

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Note: Excludes projections of any FMRL given LUCAS are proposing a technical correction of the 2011 CP2 FMRL for the 2016 NIR submission.

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Projections: New Zealand's projected emissions liabilities from the Hybrid approach (crediting new forests up to average [redacted] under Emissions Scenarios (Mt CO2)

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Note: Negatives are removals, positives are emissions

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Year	[redacted]			[redacted]		
	High emissions	Midpoint	Low emissions	High emissions	Midpoint	Low emissions
1990	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
1991	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
1992	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
1993	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
1994	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
1995	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
1996	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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1997	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
1998	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
1999	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2000	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2001	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2002	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2003	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2004	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2005	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2006	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2007	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2008	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2009	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2010	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2011	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2012	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2013	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2014	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2015	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2016	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2017	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2018	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2019	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2020	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2021	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2023	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2024	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2025	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2026	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2027	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2028	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2029	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2030	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2031	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2032	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2033	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2034	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2035	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2036	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2037	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2038	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2039	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2040	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2041	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2042	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2043	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2044	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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2045	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2046	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2047	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2048	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2049	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2050	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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(6)

Net-Net: UNFCCC land-based accounting – no special rules – base year 1990

Purpose

1. This document provides a brief outline on how reporting under the UNFCCC for the entire LULUCF sector could be applied for the post-2020 agreement. Provided is a short description on the modelling completed by MPI, the core assumptions, projections and net emissions relative to the 1990 base year.
2. Projections are also provided in an accompanying spreadsheet (named "four forestry options.xls"). Projections are provided within this document starting at the 1990 reporting year and includes legacy effects resulting from the 1962 activity start year.

Description

1. Under this approach, accounting would reflect the net emissions and removals reported in the UNFCCC GHG Inventory, in both the base year and commitment period (a 'net-net' approach).
2. New Zealand's international emissions liability from forestry and land use would be calculated based on **net emissions over a commitment period compared to net emissions in a base** year, where:
    a. Where net emissions = gross emissions + net LULUCF emissions and removals
3. The LULUCF sector is included in the base year, along with all other sectors (i.e. what is reported as "net emissions" under the UNFCCC).
4. Accounting would be based on the 'land-based' reporting categories used in the GHG Inventory, rather than the Kyoto Article 3.3 and 3.4 'activity-based' approach (i.e, it would use 'Land converted to forest' instead of 'Afforestation/reforestation').
5. No special accounting rules for LULUCF would apply, instead the sector would just be treated like all other sectors. Kyoto CP2 forestry rules would not apply.
6. No activity start year would apply (eg, 1990 under Kyoto). This means that the 1990 accounting baseline would include the emissions and removals from land use activities from before 1990.

Modelling

7. Projections are based on supply side modelling, but do included scenarios that take into account economic drivers and uncertainty. Forest growth is modelled using a growth simulation - much the same as the LUCAS CRA system. Projections of harvesting are provided by SCION and take into account the need for a constant supply of timber to the market and the possible change in forest owner harvest intentions due to carbon prices. Projections of carbon stock changes have been developed for forest land and grassland categories only. This is due to the forestland and grassland categories accounting for the majority (around 98%) of net emissions in the sector.
8. The model has been reviewed by Scion who found the model fit for purpose. Results from the MPI model for CPI have also been compared to that produced by the LUCAS CRA for New Zealand's Kyoto protocol achievement under Article 3.3, where net removals were almost identical over the 2008-2012 period.

9. Uncertainty has been included in the projections through the use of scenarios that represent worst (high emissions), most likely (midpoint), and best case (low emissions). The scenarios incorporate assumptions to address uncertainties relating to future rates of afforestation and deforestation, harvesting rates, harvested wood products and also include the effect of other rules such as flexible land use.

10. The harvested wood product (HWP) rule recognises that harvest emissions are not instantaneous but occur overtime depending on the final wood product. HWP is a significant store of carbon and comprised approximately a third of the total net removals from LULUCF in 2013. Given the age class structure of New Zealand's planted forests net removals from the harvested wood products pool are projected to increase in the near future as forests planted in the 1980's and 1990's are harvested for wood production. The three modelled scenarios take into account uncertainty in HWP data and also changes based on future rules negotiations that may impact of how HWP is applied in accounting. The modelling was completed in partnership with the LUCAS – and using the LUCAS HWP model.

Liability coverage:

11. All forestry and land use categories in the GHG Inventory (100% of New Zealand):
    - Forest land
    - Cropland
    - Grassland
    - Wetlands
    - Settlements
    - Other land

Risks and issues

12. Projections include 2015 NIR submission reported emissions and removals for the LULUCF sector. Projections exclude the impact of increasing coverage of NZ LULUCF emissions and removals to include additional categories/pools not currently reported.

13. Removals from the HWP pool comprised a third of total removals in the LULUCF sector in 2013 and is the main driver for future net removals trends. HWP was first reported in the 2013 submission, and as such warrants special attention given its significance. Future improvements are planned to reduce the uncertainty in both current estimates and projections and these will have obvious impacts on future removals from the LULUCF sector in relation to 1990 levels.

Accounting approaches and rules:

Land use/activity	Accounting approach	Key rule assumptions	Activity start year	Baseline
Forest land	Net-net	• HWP assumptions on exported roundwoods • Roll-over at 28 years • Historical effects start from 1962 • No cap on credits • Tier 1 steady state soil carbon default • Managed land proxy • No activity start year • Limited natural disturbance exclusion	None – continuous	1990 net emissions
Cropland				
Grassland				
Wetlands				
Settlements				
Other land				

Modelling results

UNFCCC Net-Net on 1990 Liabilities over 2021-2030 (Mt CO_2) under Emissions Scenarios			
Scenario	**Low Emissions (Best case)**	**Midpoint**	**High Emissions (Worst case)**
	HWP treated as in 2013 NIR	Adjusted HWP to better reflect future harvest and products	Excluding exported roundwoods
1990	[redacted]	-28	[redacted]
2021 - 2030	[redacted]	-213	[redacted]
UNFCCC Net/Net relative to 1990	[redacted]	+71	[redacted]

Note: Negatives are removals, positives are emissions

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Modelling Assumptions

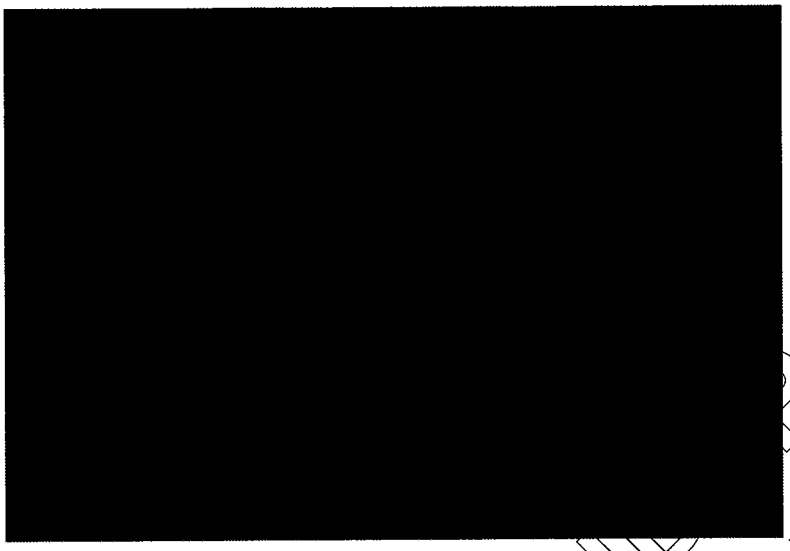
Assumption	Measure	Low emissions	Midpoint	High emissions	Comment
Historical LULUCF 1990 - 2013	Mt CO2	Based on 2015 NIR submission for emissions and removals from 1990 - 2013. 2015 Submission is used for all LULUCF activity data and emission factors.			Latest Submission used for all activity data and emissions factors. However time-series from 1990 – 2013 will not match the 2015 submission due to changes to HWP assumptions impacting on low, midpoint and high emission scenarios.
Projections 2014 – 2050	Mt CO2	Based on MPI model and data sourced under contracts			
Carbon price	$	$25+ +/NZU and other favourable conditions	$12.5 - $25 /NZU and other favourable conditions	$0 – $12.5	Forest owners behaviour is not solely driven by carbon price, rather is a combination of factors, such as: • Wood product returns • Differing rates of return between forestry and other land uses • Nursery capacity • Forest/land owners future intentions • Future international and domestic carbon accounting rules • Land availability, health and safety issues related to topography • Government planting schemes and current private sector interest in participating in forestry schemes administered by the government. • Forest owner's carbon price predictions.
Base Year	Year	1990	1990	1990	1990 reporting year and includes legacy effects resulting from the 1962 activity start year
Pre-1990 and post-1989 HWP	Decay curve	• As per 2015 NIR submission model and datasets. • All exported raw material are included Issues • Has old harvest rate and volumes for out years. • Inconsistent with other projection on wood supply.	• UNFCCC production approach is applied • Includes inherited HWP emissions since 1962. I.e. Harvested wood products that were produced since 1962 remain in the HWP pool and are decayed through time. This decay results in an emission through the time-series as HWPs are assumed to be discarded from use. • HWPs from deforestation are excluded and treated as an instant emission. • Actual roundwood removal and export roundwood data are used up until 2013. • MPI projected roundwood removals are used from 2015. • Domestic use of roundwood is held constant at 2013 levels from 2014 to 2050. The remaining roundwood over-	As per midpoint scenario but: • No exported roundwoods are included. Reality is a likely X percentage will be able to be accounted for. So pessimistic.	Three LULUCF scenarios were developed in partnership with LUCAS, using the LUCAS HWP model. These three LULUCF scenarios take into account the uncertainty in future wood exports, domestic harvest levels, and domestic product mix. MPI research is anyway to determine the final wood products from NZ roundwood exports. How HWP is projected under the UNFCCC and the rules/methods used to determining future removals and emissions from HWP is an area for future research and improvement. The three scenarios encompass uncertainty and provide a measure of 'what if' this happened. In the knowledge that we are attempting to predict a multitude of inter changing variables, future improvements in research, reporting requirements and improvement, and what will actually happen domestically over 2021 – 2030.

			and above that used domestically is assumed to be exported from 2014 to 2050. • Actual MPI data is used for the domestic production of sawnwood, panels and paper from 1990 until 2013. From 2014 to 2050 domestic production of sawnwood and panels is held flat at 2013 levels. This is justified by analysis of the time series production data showing a generally flat or declining trend since the early 2000s (a sharp decline in 2008 is GFC driven). • Paper products domestic consumption is held constant from 2013 levels due to declining paper use worldwide and a recent reduction in production capacity. Half-lives (domestic and export): • Solid wood products 30 years • Paper products 2 years Conversion factors (domestic and export): • Solid wood products 0.21 t C/m3 • Wood based panels 0.294 t C/m3 • Paper products 0.450 t C/m3		
Natural forest deforestation	Hectares	25% less than midpoint per year	Rolling average of last 5 years	25% more than midpoint per year	Low and high scenarios are based on assessed variance in natural forest deforestation since 2008 to determine confidence limits in low and high estimates. Calculations include gains from the establishment of grassland from deforestation events. Emissions from natural forest deforestation are assumed to be instant.
Post-1989 deforestation	Hectares	700 ha per year from 2014 onwards	1,200 ha per year from 2014 onwards	1,400 ha per year from 2014 onwards	Pre-1990 planted forest and post-1989 forest deforestation projections from 2014 to 2020 are based on a combination of the 2011 – 2014 annual Deforestation Intentions Survey's conducted by Canterbury University. The 2011 survey is used for the Midpoint scenario which was undertaken when carbon prices were in the range of $17 - $14, and offsetting was an economically viable option. Respondents indicated that around half (50%) of all pre-1990 planted forest deforestation would be 'avoided' due to the offsetting provision in the NZ ETS. The 2014 survey is used for the high emissions scenario. The survey was undertaken when carbon prices were $4/NZU and offsetting was not economically viable, or a restriction for forest owners in converting pre-1990 planted forest to other land uses. The low emissions scenario assumes a reduction in deforestation due to the higher liability
Pre-1990 deforestation	Hectares	2,800 ha per year from 2014 onwards	4,900 ha per year from 2014 onwards	5,500 ha per year from 2014 onwards	

					forest owners would face. In this scenario offsetting of pre-1990 planted forest is economically viable, with around 75% taking up the offsetting provision. Even with high carbon prices deforestation is still likely to occur at some level as forest owner's decisions to change land use are not solely driven by carbon prices. Calculations Include gains from the establishment of grassland from deforestation events. Emissions from planted forest deforestation are assumed to be instant.
Pre-1990 Planted forest deforestation	Age	28	28	28	Based on historical LUCAS data and typical conversion age coinciding with harvest. Emission are assumed to be instant.
Post-1989 Planted forest deforestation	Age	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards varies from 28-32	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards varies from 28-30	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards is 28	From 2014 – 2017 based on average age of post-1989 forest. Deforestation ages vary due to forest owner's response reflecting carbon price and ETS impacts. Calculations Include gains from the establishment of grassland from deforestation events. Emission are assumed to be instant
New Planting	Hectares	• Assumes 3,000 hectares in 2015. • Then a gradual Increase in new planting of 30,000 hectares per year by 2030	• Assumes 3,000 hectares in 2015. • Then a gradual Increase in new planting of 15,000 hectares per year by 2030	• Assume a low carbon price and little incentive for new planting. • With 5,000 hectares of new planting (mostly based on government planting schemes) per year to 2030	New planting projections are based on a combination of consultation with industry, historical trends and economic modelling. The midpoint new planting projections assume a gradual increase from around 3,000 hectares in 2015 to around 15,000 hectares by 2030. However, new planting projections are particularly difficult to quantify as there are numerous factors that influence both investors and commercial forestry objectives. The gradual increase of new planting was considered based on nursery production constraints and the likelihood of the low carbon price not changing significantly in the near future. Includes carbon losses from grassland due to the establishment of forestland
FLU	Percent	Not included as a KP rule			FLU is not included in LULUCF net-net accounting as it is a KP special rule provision
Post-1989 Harvest	Target Age	32	30	28	Harvest rates provided by Scion under a non-declining total harvest yield provision. Same assumptions on AGB transferred to DW on point of harvest and DW decay as 2015 NIR submission. Rotation ages could become more variable as a result of the NZ ETS. Post-1989 forest land owners will consider not only log prices, but also the carbon balance in the forest (whether it is better to continue to accrue units or meet liabilities) and the price of carbon, which will be a significant new factor that comes into the felling decision. Rotation lengths could increase with increasing carbon prices, but the planted forest will eventually be harvested as the primary revenue source is from timber and forest owners are likely to have forward harvesting and timber supply contracts.

					With lower carbon prices, there is little liability to post-1989 forest owners to harvest, and harvest is assumed to occur in a normal rotation of 28 years. With a higher carbon price of around $25, the rotation could be delayed while forest owners maximise the returns from carbon, with associated less incentive to harvest. The projections take these variations in carbon price into account through the three scenarios.
Post-1989 replanting	Year	Assumes replanting takes place within 1 year			Typically replanting occurs within 1-3 year timeframe
ARDC	Mt CO2	Excluded as a KP rule during CP1			
Yield tables and emissions factors	Mt CO2	LUCAS – 2015 NIR submission			Use the same emission factors and yield table are the latest submission.
Pre-1990 planted forest emissions and removals	Mt CO2	Provided under contract by Scion			Pre-1990 planted forest projections, harvest rates, volumes and all emissions and removals provided by Scion for input into MPI model
Natural disturbance		Excluded			
Non carbon	Non CO2 emissions	Included biomass burning/wildfires			Included for completeness even though insignificant
Natural forest		6 Mt CO2 per year for all scenarios			Based on research1 completed in early 2015, New Zealand's pre-1990 natural regenerating forests are predicted to continue to sequester carbon well into the future. The projections assume that the regenerating component of the pre-1990 natural forest estate will continue to sequester on average around 6 million tonnes carbon dioxide per year, whilst the tall forest component is assumed to be steady state overall.

Projections: New Zealand's Projected Net Forestry & Land Use Emissions under the UNFCCC under Emissions Scenarios



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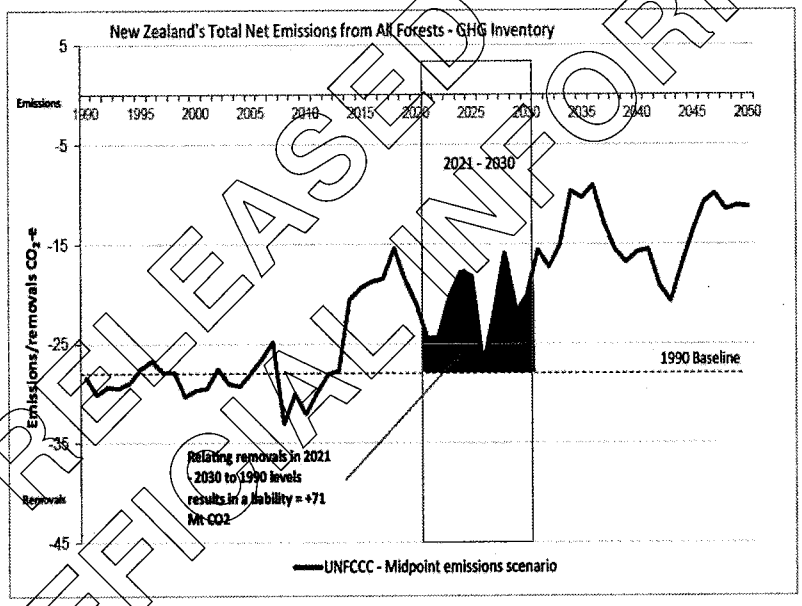
Projection: Midpoint Scenario, LULUCF emissions and removals over 2021 – 2030) relative to 1990 levels (base year)



Note1: Negatives are removals, positives are emissions

Note2: Time-series from 1990 – 2013 will not match the 2015 submission due to changes to HWP assumptions impacting on low, midpoint and high emission scenarios.

Year	LULUCF with 1990 base year (Mt CO2)		
	High emissions	Midpoint	Low emissions
1990	[redacted]	-28.39	[redacted]
1991	[redacted]	-30.13	[redacted]
1992	[redacted]	-29.36	[redacted]
1993	[redacted]	-29.48	[redacted]
1994	[redacted]	-28.93	[redacted]

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1995	[redacted]	-27.53	[redacted]
1996	[redacted]	-26.74	[redacted]
1997	[redacted]	-27.91	[redacted]
1998	[redacted]	-27.92	[redacted]
1999	[redacted]	-30.33	[redacted]
2000	[redacted]	-29.72	[redacted]
2001	[redacted]	-29.51	[redacted]
2002	[redacted]	-27.59	[redacted]
2003	[redacted]	-29.05	[redacted]
2004	[redacted]	-29.31	[redacted]
2005	[redacted]	-27.98	[redacted]
2006	[redacted]	-26.60	[redacted]
2007	[redacted]	-24.87	[redacted]
2008	[redacted]	-33.06	[redacted]
2009	[redacted]	-30.09	[redacted]
2010	[redacted]	-32.10	[redacted]
2011	[redacted]	-29.97	[redacted]
2012	[redacted]	-28.14	[redacted]
2013	[redacted]	-27.77	[redacted]
2014	[redacted]	-20.59	[redacted]
2015	[redacted]	-19.41	[redacted]
2016	[redacted]	-18.81	[redacted]
2017	[redacted]	-18.52	[redacted]
2018	[redacted]	-15.48	[redacted]
2019	[redacted]	-18.65	[redacted]
2020	[redacted]	-21.02	[redacted]
2021	[redacted]	-24.48	[redacted]
2022	[redacted]	-24.38	[redacted]
2023	[redacted]	-20.36	[redacted]
2024	[redacted]	-17.88	[redacted]
2025	[redacted]	-18.53	[redacted]
2026	[redacted]	-27.48	[redacted]
2027	[redacted]	-22.04	[redacted]
2028	[redacted]	-18.96	[redacted]
2029	[redacted]	-21.90	[redacted]
2030	[redacted]	-20.28	[redacted]
2031	[redacted]	-15.64	[redacted]
2032	[redacted]	-17.34	[redacted]
2033	[redacted]	-15.18	[redacted]
2034	[redacted]	-9.73	[redacted]
2035	[redacted]	-10.37	[redacted]
2036	[redacted]	-9.13	[redacted]
2037	[redacted]	-12.95	[redacted]
2038	[redacted]	-15.62	[redacted]
2039	[redacted]	-16.89	[redacted]
2040	[redacted]	-15.86	[redacted]
2041	[redacted]	-15.59	[redacted]
2042	[redacted]	-19.24	[redacted]
2043	[redacted]	-20.78	[redacted]
2044	[redacted]	-17.28	[redacted]

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2045	[redacted]	-13.79	[redacted]
2046	[redacted]	-10.87	[redacted]
2047	[redacted]	-9.97	[redacted]
2048	[redacted]	-11.58	[redacted]
2049	[redacted]	-11.19	[redacted]
2050	[redacted]	-11.29	[redacted]

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(7)

Gross-net: UNFCCC land-based accounting – no special rules – no base year

Purpose

1. This document provides a brief outline on projections under the UNFCCC. Provided is a short description on the modelling completed by MPI, the core assumptions, projections and net emissions.
2. Projections are also provided in an accompanying spreadsheet (named "four forestry options.xls"). Projections are provided within this document starting at the 1990 reporting year and includes legacy effects resulting from the 1962 activity start year.

Description

1. This option treats total net removals from LULUCF as an offset against the emissions liabilities from the rest of the economy.
2. New Zealand's international emissions liability would comprise net emissions (all sectors) over a commitment period compared to gross emissions (excluding LULUCF) in a base year, where:
    - Gross emissions = emissions from all sectors, excluding LULUCF
    - Net emissions = emissions from all sectors, including LULUCF
3. The LULUCF sector is excluded from the base year accounting baseline (i.e. it only includes what is reported as 'gross' emissions under the UNFCCC.

Modelling

1. Projections are based on supply side modelling, but do included scenarios that take into account economic drivers and uncertainty. Forest growth is modelled using a growth simulation - much the same as the LUCAS CRA system. Projections of harvesting are provided by SCION and take into account the need for a constant supply of timber to the market and the possible change in forest owner behaviour due to variable carbon prices. Projections of carbon stock changes have been developed for forest land and grassland categories only. This is due to the forestland and grassland categories accounting for the majority (around 98%) of net emissions in the sector.
2. The model has been reviewed by Scion who found the model fit for purpose. Results from the MPI model for CPI have also been compared to that produced by the LUCAS CRA for New Zealand's Kyoto protocol achievement under Article 3.3, where net removals were almost identical over the 2008-2012 period.
3. Uncertainty has been included in the projections through the use of scenarios that represent worst (high emissions), most likely (midpoint), and best case (low emissions). The scenarios incorporate assumptions to address uncertainties relating to future rates of afforestation and deforestation, harvesting rates, harvested wood products and also include the effect of other rules such as flexible land use.
4. The harvested wood product (HWP) rule recognises that harvest emissions are not instantaneous but occur overtime depending on the final wood product. HWP is a significant store of carbon and comprised approximately a third of the total net removals from LULUCF in 2013. Given the age class structure of New Zealand's planted forests net removals from the harvested wood products pool are projected to increase in the near future as forests planted in the 1980's and 1990's are harvested for wood production. The three modelled scenarios take into account uncertainty in HWP data and also changes based on future rules

negotiations that may impact of how HWP is applied in accounting. The modelling was completed in partnership with the LUCAS – and using the LUCAS HWP model.

Liability coverage:

5. All forestry and land use categories in the GHG Inventory (100% of New Zealand):
    - Forest land
    - Cropland
    - Grassland
    - Wetlands
    - Settlements
    - Other land

Risks and issues

6. Projections include 2015 NIR submission reported emissions and removals for the LULUCF sector. Projections exclude the impact of increasing coverage of NZ LULUCF emissions and removals to include additional categories not currently reported.
7. Removals from the HWP pool comprised a third of total removals in the LULUCF sector in 2013 and is the main driver for future net removals trends. HWP was first reported in the 2013 submission, and as such warrants special attention given its significance. Future improvements are planned to reduce the uncertainty in both current estimates and projections and these will have obvious impacts on future removals from the LULUCF sector in relation to 1990 levels.

Accounting approaches and rules:

- No base year or activity start year would apply to LULUCF (eg, 1990 under Kyoto). This means that the 1990 accounting baseline would include the emissions and removals from land use activities from before 1990. It would also would bring the carbon stored in historically harvested wood products (harvested and produced prior to 1990) into accounting.
- No special accounting rules for LULUCF would apply, instead the sector would just be treated like all other sectors. Kyoto CP2 forestry rules would not apply.
- This option would be based on the GHG Inventory's land-based categories (rather than Kyoto's activity-based approach). These land-based categories include historical effects (referred to as 'backcasting'), with the result that accounting liabilities would bring the carbon stored in historically harvested wood products (harvested and produced prior to 1990) into accounting.
- This option would imply expanding accounting coverage to include other, non-forest land uses (such as grasslands or croplands) and potentially to all land use (100% of New Zealand. This would bring agricultural soils into accounting.
- A number of specific LULUCF reporting methodologies would apply, as specified under the 2006 IPCCC Guidelines. These include:
    - The 'managed land' proxy, intended to exclude non-anthropogenic emissions and removals (New Zealand classes all of our land as managed)
    - Interpolation/averaging approaches to factor out natural variations
    - Reporting of anthropogenic carbon stock changes, rather than carbon stocks

- A focus on land-use change, and differentiation of 'land converted' from 'land remaining' categories, to help focus reporting on anthropogenic emissions and removals from land-use change.

Land use/activity	Accounting approach	Key rule assumptions	Activity start year	Baseline
Forest land	Gross-net	• HWP assumptions on exported roundwoods • Roll-over at 28 years • Historical effects start from 1962 • No cap on credits • Tier 1 steady state soil carbon default • Managed land proxy • No activity start year • Limited natural disturbance exclusion	NA	0
Cropland				
Grassland				
Wetlands				
Settlements				
Other land				

Modelling results

UNFCCC Gross-net accounting over 2021-2030 (Mt CO_2) under Emissions Scenarios			
Scenario	**Low Emissions (Best case)** HWP treated as in 2013 NIR	**Midpoint** Adjusted HWP to better reflect future harvest and products	**High Emissions (Worst case)** Excluding exported roundwoods
1990	0	0	0
2021 – 2030	[redacted]	-213	[redacted]
Gross-net	[redacted]	-213	[redacted]

Note: Negatives are removals, positives are emissions

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Modelling Assumptions

Assumption	Measure	Low emissions	Midpoint	High emissions	Comment
Historical LULUCF 1990 - 2013	Mt CO2	Based on 2015 NIR submission for emissions and removals from 1990 - 2013. 2015 Submission is used for all LULUCF activity data and emission factors.			Latest Submission used for all activity data and emissions factors. However time-series from 1990 – 2013 will not match the 2015 submission due to changes to HWP assumptions impacting on low, midpoint and high emission scenarios.
Projections 2014 – 2050	Mt CO2	Based on MPI model and data sourced under contracts			
Carbon price	$	$25+ +/NZU and other favourable conditions	$12.5 - $25 /NZU and other favourable conditions	$0 – $12.5	Forest owners behaviour is not solely driven by carbon price, rather is a combination of factors, such as: • Wood product returns • Differing rates of return between forestry and other land uses • Nursery capacity • Forest/land owners future intentions • Future international and domestic carbon accounting rules • Land availability, health and safety issues related to topography • Government planting schemes and current private sector interest in participating in forestry schemes administered by the government. • Forest owner's carbon price predictions.
Base Year	Year	Achievement during a commitment period is not compared to a base year. Rather all LULUCF emissions and removals are summed during the commitment period.			1990 reporting year and includes legacy effects resulting from the 1962 activity start year
Pre-1990 and post-1989 HWP	Decay curve	• As per 2015 NIR submission model and datasets. • All exported raw material are included Issues • Has old harvest rate and volumes for out years • Inconsistent with other projection on wood supply	• UNFCCC production approach is applied • Includes inherited HWP emissions since 1962. I.e. Harvested wood products that were produced since 1962 remain in the HWP pool and are decayed through time. This decay results in an emission through the time-series as HWPs are assumed to be discarded from use. • HWPs from deforestation are excluded and treated as an instant emission. • Actual roundwood removal and export roundwood data are used up until 2013. • MPI projected roundwood removals are used from 2015. Domestic use of roundwood is held constant at 2013 levels from 2014 to 2050. The remaining roundwood over-and-above that used domestically is assumed to be exported from 2014 to 2050.	As per midpoint scenario but: • No exported roundwoods are included. Reality being a likely X percentage will be able to be accounted for. So pessimistic.	Three LULUCF scenarios were developed in partnership with LUCAS, using the LUCAS HWP model. These three LULUCF scenarios take into account the uncertainty in future wood exports, domestic harvest levels, and domestic product mix. MPI research is anyway to determine the final wood products from NZ roundwood exports. How HWP is projected under the UNFCCC and the rules/methods used to determining future removals and emissions from HWP is definitely an area for future research and improvement, and MPI acknowledge this. However, the three scenarios provided attempt to encompass this uncertainty and provide us with a measure of 'what if' this happen. In the knowledge that we are attempting to predict a multitude of inter changing variables, future improvements in research, reporting requirements and improvement, and what will actually happen domestically over 2021 – 2030.

			• Actual MPI data is used for the domestic production of sawn wood, panels and paper from 1990 until 2013. From 2014 to 2050 domestic production of sawnwood and panels is held flat at 2013 levels. This is justified by analysis of the time series production data showing a generally flat or declining trend since the early 2000s (a sharp decline in 2008 is GFC driven) • Paper products domestic consumption is held constant from 2013 levels due to declining paper use worldwide and a recent reduction in production capacity. Half-lives (domestic and export): • Solid wood products 30 years • Paper products 2 years Conversion factors (domestic and export): • Solid wood products 0.21 t C/m3 • Wood based panels 0.294 t C/m3 • Paper products 0.450 t C/m3		
Natural forest deforestation	Hectares	25% less than midpoint per year	Rolling average of last 5 years	25% more than midpoint per year	Low and high scenarios are based on assessed variance in natural forest deforestation since 2008 to determine confidence limits in low and high estimates. Calculations include gains from the establishment of grassland from deforestation events. Emissions from natural forest deforestation are assumed to be instant.
Post-1989 deforestation	Hectares	700 ha per year from 2014 onwards	1,200 ha per year from 2014 onwards	1,400 ha per year from 2014 onwards	Pre-1990 planted forest and post-1989 forest deforestation projections from 2014 to 2020 are based on a combination of the 2011 – 2014 annual Deforestation Intentions Survey's conducted by Canterbury University. The 2011 survey is used for the Midpoint scenario which was undertaken when carbon prices were in the range of $17 - $14, and offsetting was an economically viable option. Respondents indicated that around half (50%) of all pre-1990 planted forest deforestation would be 'avoided' due to the offsetting provision in the NZ ETS. The 2014 survey is used for the high emissions scenario. The survey was undertaken when carbon prices were $4/NZU and offsetting was not economically viable, or a restriction for forest owners in converting pre-1990 planted forest to other land uses. The low emissions scenario assumes a reduction in deforestation due to the higher liability forest owners would face. In this scenario offsetting of pre-1990 planted forest is economically viable, with around 75% taking up the offsetting provision. Even with high carbon prices deforestation is still likely to occur at some level as forest owner's decisions to change land use are not solely driven by carbon prices.
Pre-1990 deforestation	Hectares	2,800 ha per year from 2014 onwards	4,900 ha per year from 2014 onwards	5,500 ha per year from 2014 onwards	

					Calculations Include gains from the establishment of grassland from deforestation events. Emissions from planted forest deforestation are assumed to be instant.
Pre-1990 Planted forest deforestation	Age	28	28	28	Based on historical LUCAS data and typical conversion age coinciding with harvest. Emission are assumed to be instant.
Post-1989 Planted forest deforestation	Age	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards varies from 28-32	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards varies from 28-30	• 2013 – 2017 average post-1989 forest age and historical deforestation ages from LUCAS • 2018 onwards is 28	From 2014 – 2017 based on average age of post-1989 forest. Deforestation ages vary due to forest owner's response reflecting carbon price and ETS impacts. Calculations Include gains from the establishment of grassland from deforestation events. Emission are assumed to be instant
New Planting	Hectares	• Assumes 3,000 hectares in 2015. • Then a gradual Increase in new planting of 30,000 hectares per year by 2030	• Assumes 3,000 hectares in 2015. • Then a gradual Increase in new planting of 15,000 hectares per year by 2030	• Assume a low carbon price and little incentive for new planting. • With 5,000 hectares of new planting (mostly based on government planting schemes) per year to 2030	New planting projections are based on a combination of consultation with industry, historical trends and economic modelling. The midpoint new planting projections assume a gradual increase from around 3,000 hectares in 2015 to around 15,000 hectares by 2030. However, new planting projections are particularly difficult to quantify as there are numerous factors that influence both investors and commercial forestry objectives. The gradual increase of new planting was considered based on nursery production constraints and the likelihood of the low carbon price not changing significantly in the near future. Includes carbon losses from grassland due to the establishment of forestland
FLU	Percent	Not included as a KP rule			FLU is not included in LULUCF net-net accounting as it is a KP special rule provision
Post-1989 Harvest	Target Age	32	30	28	Harvest rates provided by Scion under a non-declining total harvest yield provision. Same assumptions on AGB transferred to DW on point of harvest and DW decay as 2015 NIR submission. Rotation ages could become more variable as a result of the NZ ETS. Post-1989 forest land owners will consider not only log prices, but also the carbon balance in the forest (whether it is better to continue to accrue units or meet liabilities) and the price of carbon, which will be a significant new factor that comes into the felling decision. Rotation lengths could increase with increasing carbon prices, but the planted forest will eventually be harvested as the primary revenue source is from timber and forest owners are likely to have forward harvesting and timber supply contracts. With lower carbon prices, there is little liability to post-1989 forest owners to harvest, and harvest is assumed to occur in a normal rotation of 28 years. With a higher carbon price of around $25, the rotation could be delayed while forest

				owners maximise the returns from carbon, with associated less incentive to harvest. The projections take these variations in carbon price into account through the three scenarios.
Post-1989 replanting	Year	Assumes replanting takes place within 1 year		Typically replanting occurs within 1-3 year timeframe
ARDC	Mt CO2	Excluded		
Yield tables and emissions factors	Mt CO2	LUCAS – 2015 NIR submission		Use the same emission factors and yield table are the latest submission.
Pre-1990 planted forest emissions and removals	Mt CO2	Provided under contract by Scion		Pre-1990 planted forest projections, harvest rates, volumes and all emissions and removals provided by Scion for input into MPI model
Natural disturbance		Excluded		
Non carbon	Non CO2 emissions	Included biomass burning/wildfires		Included for completeness even though insignificant
Natural forest	Mt CO2	6 Mt CO2 per year for all scenarios		Based on research1 completed in early 2015, New Zealand's pre-1990 natural regenerating forests are predicted to continue to sequester carbon well into the future. The projections assume that the regenerating component of the pre-1990 natural forest estate will continue to sequester on average around 6 million tonnes carbon dioxide per year, whilst the tall forest component is assumed to be steady state overall.

Projections: New Zealand's Projected Net Forestry & Land Use Emissions under the UNFCCC under Emissions Scenarios

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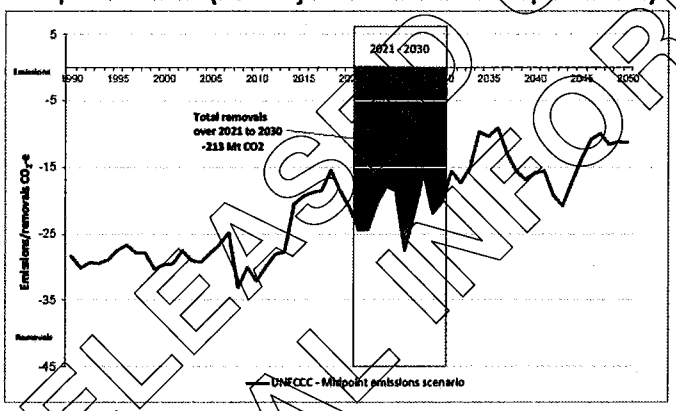
Projection: New Zealand's Projected Net Forestry & Land Use Emissions under the UNFCCC Full Carbon Accounting - Midpoint Scenario (HWP adjusted – Assumes no cap on credits)



Note1: Negatives are removals, positives are emissions

Note2: Time-series from 1990 – 2013 will not match the 2015 submission due to changes to HWP assumptions impacting on low, midpoint and high emission scenarios.

Year	LULUCF (Mt CO2)		
	High emissions	Midpoint	Low emission
1990	[redacted]	-28.39	[redacted]
1991		-30.13	
1992		-29.36	
1993		-29.48	
1994		-28.93	
1995		-27.53	
1996		-26.74	
1997		-27.91	
1998		-27.92	
1999		-30.33	
2000		-29.72	

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2001	[redacted]	-29.51	[redacted]
2002		-27.59	
2003		-29.05	
2004		-29.31	
2005		-27.98	
2006		-26.60	
2007		-24.87	
2008		-33.06	
2009		-30.09	
2010		-32.10	
2011		-29.97	
2012		-28.14	
2013		-27.77	
2014		-20.59	
2015		-19.41	
2016		-18.81	
2017		-18.52	
2018		-15.48	
2019		-18.65	
2020		-21.02	
2021		-24.48	
2022		-24.38	
2023		-20.36	
2024		-17.88	
2025		-18.53	
2026		-27.48	
2027		-22.04	
2028		-15.96	
2029		-21.90	
2030		-20.28	
2031		-15.64	
2032		-17.34	
2033		-15.18	
2034		-9.73	
2035		-10.37	
2036		-9.13	
2037		-12.95	
2038		-15.62	
2039		-16.89	
2040		-15.86	
2041		-15.59	
2042		-19.24	
2043		-20.78	
2044		-17.28	
2045		-13.79	
2046		-10.87	
2047		-9.97	
2048		-11.58	
2049		-11.19	
2050		-11.29	

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Post-2020 Projections Cost Summary - emissions/removals relative to 1990 levels

NOTE: Costing completed just for forestry and against 1990 levels as MPI doesn't have the current Gross emissions being used for target costing

Accounting Scenario	Accounting Approach	Activity Start	Rule variations 1	Rule variations 2	Emissions Scenario		
					Best Case - High C price	Mid Emissions - Mid C price	Worst Case - Low C price
Deforestation only	Total net change over 2021 - 2030	1990	Without FLU		[redacted]		
	Total net change over 2021 - 2030	1990	With FLU				
	Total net change over 2021 - 2030 relative to 1990	1990	Without FLU				
	Total net change over 2021 - 2030 relative to 1990	1990	With FLU				
[redacted]	Total net change over 2021 - 2030 - **Status Quo**	1990	CP2 rules (incl FLU and HWP)				
	Total net change over 2021 - 2030 - **CP2 + ARDC**	1990	CP2 rules (incl FLU and HWP)	+ ARDC			
	Total net change over 2021 - 2030 - **New base year**	2005	CP2 rules (incl FLU and HWP)	+ new base year			
	Value of KP Rules:						
	Total net change over 2021 - 2030	1990	BAU RL	No HWP, FLU or ARDC			
	Total net change over 2021 - 2030	1990	BAU RL	Just FLU			
	Total net change over 2021 - 2030	1990	BAU RL	Just HWP			
	Total net change over 2021 - 2030 - **CP1 rules**	1990	BAU RL	Just ARDC			
[redacted]							
Simple BAU Reference Level	Total net change over 2021 - 2030 relative to BAU reference level	1990	All land included in BAU RL		0/-	0	0/+
Hybrid Approach (Credit/debit land in transition to steady state only, then transfer to BAU RL)	Total net change over 2021 - 2030	1990	All LUC (AR & D)	[redacted]			
	Total net change over 2021 - 2030	1990	All LUC (AR & D)				
	[redacted]						
Hybrid Approach and non harvested indigenous forests	Total net change over 2021 - 2030	1990	All LUC (AR & D) and Non harvested indigenous forest				

S9(2)(j)

S9(2)(j)

Positive (+) is an emission of CO_2 to the atmosphere

Negative (-) is a removal of CO_2 from the atmosphere

'Total net change over 2021-2030' = **Gross-net** under Kyoto terminology
'Total net change over 2021 - 2030 relative to 1990' = **Net-net** under Kyoto terminology

[redacted]

S9(2)(j)

Summary Table - Post-2020 Forestry Treatment - Estimates of Liabilities relative to 1990

Draft as at 10 Sept 2014

NOTE: Costing completed just for forestry and against 1990 levels as MPI doesn't have the current Gross emissions being used for target costing

Commitment Period	Kyoto Protocol CP2 - Status Quo (1)			Hybrid Approach (2)			Value of Hybrid Approach		
	Low Emissions ($Mt CO_2$)	Midpoint ($Mt CO_2$)	High Emissions ($Mt CO_2$)	Low Emissions ($Mt CO_2$)	Midpoint ($Mt CO_2$)	High Emissions ($Mt CO_2$)	Low Emissions ($Mt CO_2$)	Midpoint ($Mt CO_2$)	High Emissions ($Mt CO_2$)
2021 -2025									
2026 -2030									
Annual mean									
Total 2021-2030									

S9(2)(j)

Notes

Negative numbers represent carbon sequestration on 'removals', for which NZ would presumably earn credits.

All emissions estimates are draft, approximate and subject to revision, as inventory and projections data are updated.

1) Assumes current CP2 Kyoto rules apply, which provide credits for net afforestation/reforestation (minus deforestation), and largely factor out any emissions or removals

2) Hybrid approach. Assumes credits for net afforestation/reforestation until steady state only, then transfers this land to under a BAU reference level, where harvest

Estimated Costs of Mid-Point Estimates of Post-2020 Forestry Emissions & Removals

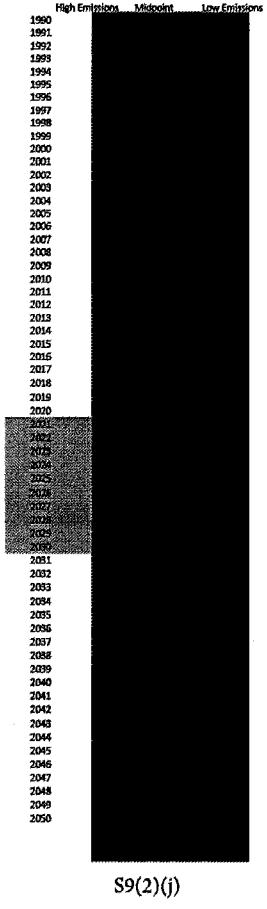
Commitment Period	Kyoto Protocol CP2 - Status Quo (1)			Hybrid Approach (2)			Value of Hybrid Approach		
	Midpoint ($Mt CO_2$)	$25 t/$CO_2$	$110 t/$CO_2$	Midpoint ($Mt CO_2$)	$25 t/$CO_2$	$110 t/$CO_2$	Midpoint ($Mt CO2)	$25 t/$CO_2$	$110 t/$CO_2$
2021 -2025									
2026 -2030									
Annual mean									
Total 2021-2030									

S9(2)(j)

***Cost to NZ** ***Benefit for NZ** ***Benefit for NZ**

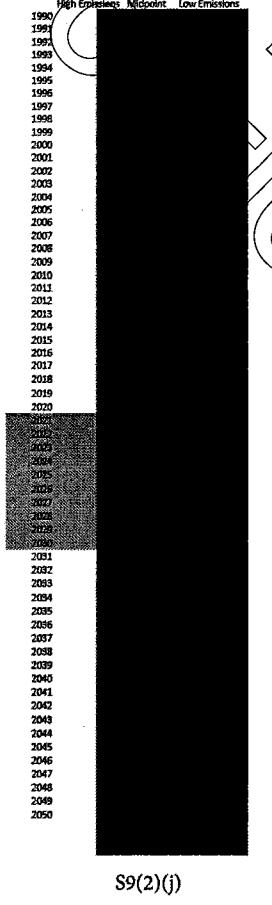
Projections: Hybrid Approach (Mt CO2)

Base = 1990
Time to reach average carbon stock = 20 years
High Emissions Midpoint Low Emissions



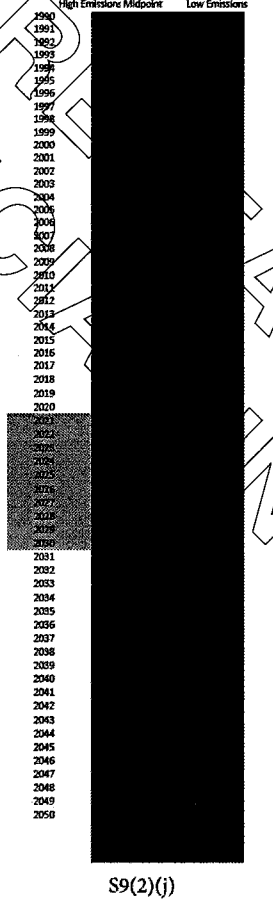
S9(2)(j)

Base = 1990
Time to reach average carbon stock = 28 years
High Emissions Midpoint Low Emissions



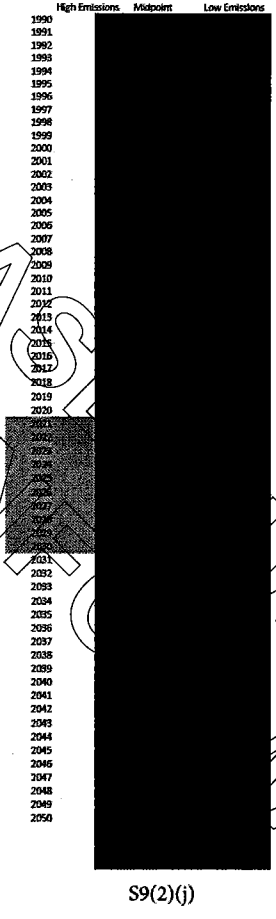
S9(2)(j)

Base = 2005
Time to reach average carbon stock = 20 years
High Emissions Midpoint Low Emissions



S9(2)(j)

Base = 2005
Time to reach average carbon stock = 28 years
High Emissions Midpoint Low Emissions



S9(2)(j)

S9(2)(j)

New Zealand's projected emissions liabilities from 'Land in transition' approach [redacted] under Emissions Scenarios
1990 base year

S9(2)(j)

New Zealand's projected emissions liabilities from 'Land in transition' approach [redacted] under Emissions Scenarios
1990 base year

S9(2)(j)

Kyoto Protocol Article 3.3 Projections (Mt CO2)

Note: Time-series from 1990 – 2013 will not match the 2015 submission given modelling assumptions impacting on low, midpoint and high emission scenarios

	Base Year = 1990			Base Year = 2005		
	Status Quo with FLU and HWP			Status Quo with FLU and HWP		
Year	High emissions	Mid point	Low emissions	High emissions	Mid point	Low emissions
1990	0.51	0.51	0.51	1990		
1991	0.47	0.47	0.47	1991		
1992	0.22	0.22	0.22	1992		
1993	-0.08	-0.08	-0.08	1993		
1994	-0.71	-0.71	-0.71	1994		
1995	-1.43	-1.43	-1.43	1995		
1996	-2.71	-2.71	-2.71	1996		
1997	-4.29	-4.29	-4.29	1997		
1998	-6.23	-6.23	-6.23	1998		
1999	-8.33	-8.33	-8.33	1999		
2000	-10.30	-10.30	-10.30	2000		
2001	-11.99	-11.99	-11.99	2001		
2002	-13.10	-13.10	-13.10	2002		
2003	-13.60	-13.60	-13.60	2003		
2004	-14.30	-14.30	-14.30	2004		
2005	-3.35	-3.35	-3.35	2005		
2006	-1.03	-1.03	-1.03	2006		
2007	3.81	3.81	3.81	2007		
2008	-14.24	-14.24	-14.24	2008		
2009	-12.34	-12.34	-12.34	2009		
2010	-14.37	-14.37	-14.37	2010		
2011	-15.45	-15.45	-15.45	2011		
2012	-15.15	-15.15	-15.15	2012		
2013	-14.11	-16.55	-17.76	2013		
2014	-14.30	-17.13	-18.92	2014		
2015	-13.92	-16.74	-18.52	2015		
2016	-13.37	-16.20	-17.99	2016		
2017	-13.17	-16.01	-17.83	2017		
2018	-7.20	-10.76	-12.61	2018		
2019	-6.79	-9.77	-12.24	2019		
2020	-6.27	-9.27	-11.40	2020		
[redacted]				[redacted]		
2031				2031		
2032				2032		
2033				2033		
2034				2034		
2035				2035		
2036				2036		
2037				2037		
2038				2038		
2039				2039		
2040				2040		
2041				2041		
2042				2042		
2043				2043		
2044				2044		

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S9(2)(j)

New Zealand's Projected Net Forestry & Land Use Emissions under Kyoto CP2 rules

S9(2)(j)

[redacted]

New Zealand's Projected Net Forestry & Land Use Emissions under Kyoto CP2 rules - 2005 base year

[redacted]

S9(2)(j)

2045
2046
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[redacted]

S9(2)(j)

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2050

[redacted]

S9(2)(j)

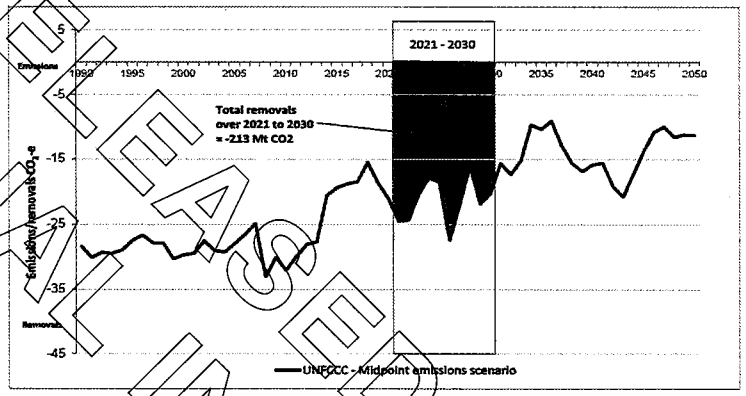
LULUCF/UNFCCC Projections (Mt CO2)

Note: Time-series from 1990 – 2013 will not match the 2015 submission or the 2BR projections due to changes to HWP assumptions impacting on low, midpoint and high emission scenarios.

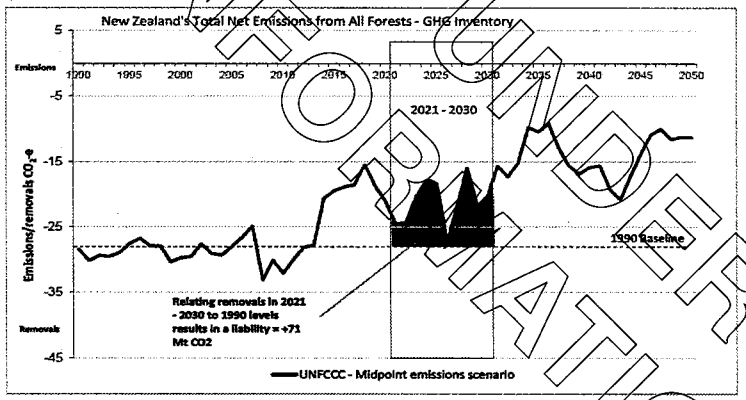
LULUCF emissions and removals

Year	High emissions	Mid point	Low emissions
1990	S9(2)(j)	-28.39	S9(2)(j)
1991		-30.13	
1992		-29.36	
1993		-29.48	
1994		-28.93	
1995		-27.53	
1996		-26.74	
1997		-27.91	
1998		-27.92	
1999		-30.33	
2000		-29.72	
2001		-29.51	
2002		-27.59	
2003		-29.05	
2004		-29.31	
2005		-27.98	
2006		-26.60	
2007		-24.87	
2008		-33.06	
2009		-30.09	
2010		-32.10	
2011		-29.97	
2012		-28.14	
2013		-27.77	
2014		-20.59	
2015		-19.41	
2016		-18.81	
2017		-18.52	
2018		-15.48	
2019		-18.65	
2020		-21.02	
2021		-24.48	
2022		-24.38	
2023		-20.36	
2024		-17.88	
2025		-18.53	
2026		-27.48	
2027		-22.04	
2028		-15.96	
2029		-21.90	
2030		-20.28	
2031		-15.64	
2032		-17.34	
2033		-15.18	
2034		-9.73	
2035		-10.37	
2036		-9.13	
2037		-12.95	
2038		-15.62	
2039		-16.89	
2040		-15.86	
2041		-15.59	
2042		-19.24	
2043		-20.78	
2044		-17.28	
2045		-13.79	
2046		-10.87	
2047		-9.97	

LULUCF Gross-net - New Zealand's Projected Net Forestry & Land Use Emissions under the UNFCCC Full Carbon Accounting - Midpoint Scenario (HWP adjusted – Assumes no cap on credits)



LULUCF net-net - New Zealand's Projected Net Forestry & Land Use Emissions under the UNFCCC Full Carbon Accounting - Midpoint Scenario (HWP adjusted – Assumes no cap on credits)



2048
2049
2050

[redacted]

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Impact Assessment by Activity (Mt CO2)

Impact of activity by accounting option over 2021 - 2030 (midpoint scenario)

Activity	KP CP2		LULUCF
Planted forest	[redacted]	[redacted]	[redacted]
Deforestation without FLU			
Deforestation with FLU			N/A
Natural forest	0	0	[redacted]
Total with FLU	[redacted]		N/A
Total without FLU			-213

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Variance and impact of activities by scenario over 2021 - 2030

Activity	Low emissions	Midpoint	High emissions
Just new planting projections over 2014 - 2030	[redacted]	[redacted]	[redacted]
Just Deforestation without FLU			
Just Deforestation with FLU			
LULUCF HWP			

S9(2)(j)

(9)

[redacted] s9(2)(a)

From: [redacted] s9(2)(a)
Sent: Tuesday, 10 November 2015 2:12 p.m.
To: [redacted] s9(2)(a)
Cc:
Subject: CP2 KP Net Position.xlsx
Attachments: CP2 KP Net Position.xlsx

Hi [redacted] s9(2)(a)

See CP2 KP net position by low, midpoint and high net emissions scenario

Cheers

[redacted] s9(2)(a)

(19)

Article 3 3 Projections - Mt CO2
1990 - 2050 based on MPI model

	Low Emissions	Midpoint	High emissions
1990	0.5	0.5	0.5
1991	0.5	0.5	0.5
1992	0.3	0.3	0.3
1993	0.0	0.0	0.0
1994	-0.6	-0.6	-0.6
1995	-1.3	-1.3	-1.3
1996	-2.7	-2.7	-2.7
1997	-4.5	-4.5	-4.5
1998	-6.7	-6.7	-6.7
1999	-9.1	-9.1	-9.1
2000	-11.3	-11.3	-11.3
2001	-13.1	-13.1	-13.1
2002	-14.3	-14.3	-14.3
2003	-14.7	-14.7	-14.7
2004	-15.5	-15.5	-15.5
2005	-4.1	-4.1	-4.1
2006	-1.7	-1.7	-1.7
2007	3.9	3.9	3.9
2008	-13.6	-13.6	-13.6
2009	-10.2	-10.2	-10.2
2010	-11.7	-11.7	-11.7
2011	-13.2	-13.2	-13.2
2012	-12.4	-12.4	-12.4
2013	-12.7	-12.7	-12.7
2014	-15.9	-13.8	-13.1
2015	-16.5	-13.7	-12.3
2016	-18.9	-15.7	-11.5
2017	-19.3	-15.8	-11.3
2018	-19.6	-12.6	-3.9
2019	-20.6	-12.7	-4.4
2020	-20.7	-13.0	-4.5
2021			
2022			
2023			
2024			
2025			
2026			
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[redacted]

S9(2)(j)

Summary - Mt CO2

	Low Emissions	Midpoint	High emissions
2013 - 2020	-144.4	-110.0	-73.7
2021-2030	[redacted]	[redacted]	[redacted]

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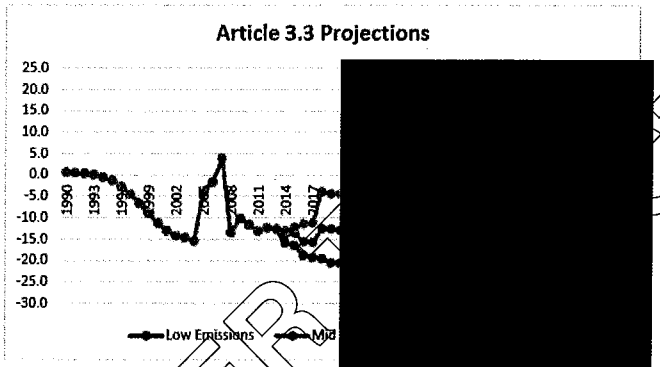

[redacted]

S9(2)(j)

(11)

[redacted] s9(2)(a)

From: [redacted] s9(2)(a)
Sent: Thursday, 12 November 2015 12:35 p.m.
To: [redacted] s9(2)(a)
Cc:
Subject: revised post-2020 projections.xlsx
Attachments: revised post-2020 projections.xlsx

Hi [redacted] s9(2)(a)

Please see attached revised projections for the KP and also averaging given the issue found recently

Cheers

[redacted] s9(2)(a)

Article 3.3 Projections - Mt CO2
1990 - 2050 based on MPI model

	Low Emissions	Midpoint	High emissions	Land in transition [redacted] S9(2)(j) Low Emissions	Midpoint	High emissions	Land in transition [redacted] S9(2)(j) Low Emissions	Midpoint	High emissions
1990	[redacted]								
1991									
1992									
1993									
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S9(2)(j)

[redacted]

(13)

Priority – High

Security Level – Restricted

Distribution
Minister
Minister's Advisor
Minister's Office

Ministry for Primary Industries
Manatū Ahu Matua

13 November 2015

Document Number: **B15-145**

New Zealand's Preferred Approach to International Climate Change Accounting of Forestry Emissions in 2021-2030

Purpose:

This briefing seeks agreement to New Zealand's preferred approach to accounting for forestry emissions and removals against our 2021-2030 climate change target, and to announce our preferred approach before this December's climate change negotiations in Paris.

Minister	Action Required:	Minister's Deadline
Minister of Finance **Minister for Climate Change Issues** **Associate Minister for Primary Industries**	**Note** and **agree** to the recommendations of this brief.	Prior to the commencement of the UNFCCC negotiations on 30th November 2015
CC Associate Minister for Climate Change Issues **Minister for Primary Industries**		

Contact for telephone discussion

	Name	Position	Work	After Hours
Responsible Manager	Chris Carson	Director International Policy	04 894 0639	[redacted]
	Peter Ettema	Manager International Environment	04 894 2680	[redacted]

S9(2)(a)

Key Messages

Why announce a preferred approach to post-2020 forestry accounting before Paris?

1. New Zealand's 2021-2030 climate change target (INDC: the Intended Nationally Determined Contribution) is provisional pending confirmation that we can use our preferred approach to accounting for forestry emissions and removals against the target.[1] By making New Zealand's target provisional, we have reserved the right to make a technical adjustment to the target if negotiations on the new agreement prevent us from using our preferred approach to post-2020 forestry accounting. The purpose of any technical adjustment would be to ensure the cost of New Zealand's target is no higher than it would have been if we had been able to use our preferred approach to forestry accounting.

2. Providing further information about New Zealand's preferred approach to post-2020 forestry accounting before December's United Nations Framework Convention on Climate Change (UNFCCC) negotiations in Paris would enhance our chances of both securing our preferred approach, and being able to effectively exercise our right to adjust the target if we do not. A proposed Addendum to New Zealand's INDC setting out assumptions and methodologies for accounting for forestry and other land use is provided in Appendix 1.

3. Securing our preferred approach to forestry, or the right to adjust our target if we don't, will help manage the costs of New Zealand's 2021-2030 target. Continuing our current approach to forestry after 2020 will [redacted] S9(2)(j) contained in advice to Cabinet [CAB (15) 331; EGI (15) 135 refers].[3] [redacted]

4. Announcing New Zealand's preferred approach before Paris will also allow us to address criticisms from some other Parties in the negotiations and civil society that New Zealand is not being transparent about the approach it intends to take to forestry after 2020.

[1] Our target is more generally provisional on New Zealand being able to use its preferred approach to land sector accounting, [redacted] S9(2)(j) [, and having access to carbon markets.

[2] Real Gross National Disposable Income. RGNDI is a measure of national economic performance, calculated from Gross Domestic Product (GDP) and financial flows in and out of the country.

[3] The advice was based on economic modelling that estimated the total economic costs of New Zealand's 2021-2030 target to be $37 billion (2012 prices) or 1.25% RGNDI. Forestry emissions and removals were not factored in to the cost estimates because they could have increased or decreased the costs depending on the forestry accounting rules applied. Economic costs are from CGE modelling undertaken by Infometrics to simulate the effect of a global carbon price rising to $50 in 2030 on economic growth and emissions. The model captures both the direct and secondary economic effects of domestic emissions reductions and international purchasing.

5. The downside of announcing New Zealand's preferred approach to post-2020 forestry accounting before Paris is that other countries are still determining their own approaches and may identify different approaches [redacted] S9(2)(j) [redacted]. In officials' view, however, announcing New Zealand's preferred approach before Paris would not prevent us from adopting a different approach in the future if the weight of negotiations or further domestic analysis highlights a better option. [redacted] [redacted] S9(f)(iv)

What should New Zealand's preferred approach be?

6. If Ministers agree to announce New Zealand preferred approach now, officials recommend an approach that is:
   a. based on the principles of the forestry accounting rules that New Zealand has previously negotiated under the Kyoto Protocol and currently uses to account for forestry emissions and removals; but
   b. adapted to account more appropriately for New Zealand's domestic circumstances, particularly our fast-growing and cyclically-harvested plantation forest.

7. Officials are calling this approach "Modified Kyoto" and are recommending it as New Zealand's preferred approach at this time because its implications are relatively well understood compared with other options, it offers some cost savings, and presents manageable risks. As noted above, announcing Modified Kyoto as New Zealand's preferred approach now does not prevent us from adopting a different approach later if circumstances permit. Officials will continue to assess the implications of different approaches and provide further advice to Ministers prior to New Zealand ratifying any new agreement.

Implications of Modified Kyoto

8. Under a conservative scenario, Modified Kyoto would [redacted] S9(2)(j) [redacted] of RGNDI over the period, relative to the cost if we continued our current Kyoto Protocol accounting approach after 2020. [redacted] S9(2)(j)

9. Advice to Cabinet on the cost of New Zealand's 2021-2030 target already assumed that New Zealand would change its forestry accounting approach [redacted] S9(2)(j)

[4] Costing figures presented in this briefing have been updated since the previous rescinded version of this briefing based on an issue identified with the projection of emissions and removals of harvested post-1989 forests. The Ministry for the Environment have not had an opportunity to undertake a peer review of the updated projections for forestry in light of changes to the underlying modelling. Officials will continue to update the modelling as new information comes to hand and look for areas of on-going improvements.

10. Adopting Modified Kyoto means we will not receive any credits after 2030 from forests replanted on their second or subsequent rotations. Over the long-term, Modified Kyoto reduces uncertainty about New Zealand's forest liabilities by "smoothing-out" the harvesting cycle of New Zealand's plantation forests.

11. Modified Kyoto is likely to support New Zealand's credibility in the UNFCCC negotiations because it is consistent with our current and past negotiating position, and because it is an adaptation of our current Kyoto Protocol approach. [redacted] S9(2)(j) S9(f)(iv)

12. [redacted] Officials will continue to consider the implications, and the upcoming review of the NZ ETS provides an opportunity to test some of the issues with forestry stakeholders. S9(2)(g)(i) S9(f)(iv) S9(2)(k)

Recommendations

13. MPI recommend that Ministers:

a. **Note** that Cabinet has delegated authority to relevant portfolio Ministers to:
   i. consider New Zealand's preferred approach to accounting for forestry emissions;
   ii. approve an addendum to our INDC; and
   iii. to communicate the addendum to the UNFCCC [Cab Min (15) 0199 refers];

Noted

b. **Note** officials' view that it is in New Zealand's interests to specify before December's climate change negotiations in Paris our preferred approach to accounting for forestry emissions and removals against our 2021-2030 target;

Noted

c. **Note** that specifying New Zealand's preferred approach now does not prevent us from adopting a different approach if subsequent negotiations or domestic analysis highlight a better option; [redacted] S9(f)(iv)

Noted

d. **Agree** to specify that New Zealand's preferred approach to post-2020 forestry accounting will be:
   i. based on the principles of the forestry accounting rules agreed under the Kyoto Protocol and currently used by New Zealand to account for forestry emissions and removals; but
   ii. adapted to account more appropriately for New Zealand's domestic circumstances, particularly our fast-growing and cyclically-harvested plantation forest;

Agreed / Not Agreed

e. **Note** that in this briefing this approach is referred to as "Modified Kyoto";

Noted

f. **Note** that using Modified Kyoto to account for forestry emissions and removals against New Zealand's 2021-2030 target would:
   i. [redacted] S9(2)(j)
   ii. [redacted] of RGNDI over the period, relative to continuing our current Kyoto Protocol approach after 2020; S9(2)(j)
   iii. make it unlikely that New Zealand would receive any credit after 2030 from harvested forests as they are replanted and re-grow; and
   iv. reduce the uncertainty about New Zealand's long-term emissions liability from forestry;

Noted

g. **Note** that Cabinet has previously authorised the Minister for Climate Change Issues to communicate, prior to the Paris meeting, supplementary information to the UNFCCC on New Zealand's proposed approach to forestry accounting [Cab Min (15) 23/10 refers];

Noted

h. **Agree** to provide information about New Zealand's preferred approach, in the terms set out in the draft addendum to the INDC annexed to this brief or similar, allowing for any necessary technical amendments, prior to the commencement of the UNFCCC negotiations on 30 November 2015;

Agreed / Not Agreed

i. **Note** that officials will provide you with further advice on the [redacted] S9(2)(j) S9(f)(iv) S9(2)(k)

ii. releasing further information, including on the rationale, advantages, methodology and projections, about the Modified Kyoto approach

Noted

j. **Agree** to request officials to do further work to assess the costs and benefits of Modified Kyoto, GHG reporting, and other post-2020 forestry accounting approaches, and to provide you with advice on any possible changes to our preferred approach;

Agreed / Not Agreed

k. **Note** these decisions will inform New Zealand's approach to aspects of the land sector negotiations within the UNFCCC.

Noted

Deborah Roche
Deputy Director General
Policy and Trade
for Director-General

Hon Bill English
Minister of Finance
/ / 2015

Hon Tim Groser
Minister for Climate Change Issues
/ / 2015

Hon Jo Goodhew
Associate Minister for Primary Industries
/ / 2015

Background

14. Modelling of New Zealand's 2021-2030 target indicated the total economic cost of meeting the target would be 1.25% of RGNDI or $37 billion (2012 prices) over 2021-2030.[5] The modelling did not factor forestry into the costs since it could increase or decrease the costs depending on the accounting approach applied.

15. New Zealand currently accounts for forestry emissions and removals using rules agreed for the Kyoto Protocol's second commitment period (2013-2020). Continuing with this approach after 2020 would [redacted]

S9(2)(j)

International context

16. Parties negotiating the new global climate change agreement are putting forward intended nationally determined contributions (INDCs), including emission reduction targets, before agreeing the rules they will use to measure and report emissions and removals to determine if they are meeting their contributions. While the Paris outcome may include some high level principles to guide future negotiations on rules, it is now clear that any agreement on the detail of post-2020 accounting rules will occur after the Paris meeting.

17. In submitting INDCs, Parties were invited to set out the assumptions they had made about accounting rules. There is an understanding that Parties may need to make adjustments to their INDCs before finalising if any of their assumptions proved incompatible with any rules finally agreed. The purpose of any adjustments would be to ensure that costs are not higher than they would have been if Parties' assumptions had been compatible with any agreed rules.

18. New Zealand's INDC specifies that our 2021-2030 target is provisional on confirmation that any final rule set allows New Zealand to apply our preferred approach to accounting for forestry emissions and removals against our target. The INDC does not define New Zealand's preferred approach.[6] Instead it notes that we may confirm details of the accounting approach prior to ratifying any new agreement. Cabinet has delegated that relevant portfolio Ministers, that is, the Minister of Finance, Minister for Climate Change Issues and Associate Minister for Primary Industries, consider New Zealand's preferred approach to accounting for forestry emissions and a possible addendum to our INDC to communicate these assumptions to the UNFCCC [Cab Min (15) 0199 refers].

[5] See footnote 3 above for further information about the modelling.
[6] The language in the INDC is as follows:

Approach to accounting for the land sector (agriculture, forestry and other land uses)

Application of accounting methodologies that build on existing IPCC guidance where available (including the 2006 IPCC Guidelines and the 2013 IPCC Kyoto Protocol supplement), recognising the specific biophysical characteristics of the land sector and the need to manage multiple objectives, including global food security.

Accounting will be land or activity-based, recognise permanent and additional carbon stock changes, and include provisions to address natural disturbance, permanence, land-use flexibility, legacy and non-anthropogenic effects. Harvested wood products accounting will be on the basis of a production approach.

Why we should decide our preferred approach to post-2020 forestry accounting now?

19. Officials consider it is in New Zealand's interests to announce our preferred approach to post-2020 forestry accounting before Paris. [redacted] S9(2)(j) S9(2)(g)(i) Cabinet authorised the Minister for Climate Change Issues to communicate, prior to the Paris meeting, supplementary information to the UNFCCC on New Zealand's proposed approach to forestry accounting [Cab Min (15) 23/10 refers].

20. At the same time, specifying our preferred approach to post-2020 forestry accounting in our INDC will enhance our chances of securing it. A decision taken after any rules negotiation will almost certainly be constrained by rules locked in at that time.

21. Determining our preferred approach to post-2020 forestry accounting now will also inform New Zealand's negotiation mandate for the Paris meeting. For example, it will help determine what we need from any post-Paris work programme on accounting rules to ensure it is compatible with our preferred approach, and which countries we should work with to achieve this.

22. Announcing New Zealand's preferred approach to post-2020 forestry accounting now will also assist New Zealand to address criticisms from some other Parties in the negotiations and civil society that New Zealand is not being transparent about the approach it intends to take to forestry after 2020.

What we need to communicate: an addendum to New Zealand's INDC

23. If Ministers agree to specify New Zealand's preferred approach to post-2020 forestry accounting now, New Zealand will need to submit an addendum to our INDC. To be effective, the addendum will need to set out the existing rules we intend to apply and any modification of existing rules we intend to make.

24. A draft of this addendum is attached although further technical adjustments are likely prior to submission.

New Zealand's preferred approach

25. Officials identified two main options to choose from if Ministers agreed to specify New Zealand's preferred approach to post-2020 forestry accounting now:[7]

Option 1: Modified Kyoto	Option 1: Modified Kyoto is based on the forestry accounting rules agreed under the Kyoto Protocol and currently used by New Zealand to account for forestry emissions against our emissions targets. This option primarily addresses "new" action. New Zealand would be credited for removals in new forests, and only receive limited credits/debits for emissions and removals in existing, mature forests. We would be penalised for all deforestation, but not for harvest where replanting occurs.
Option 2: GHG Reporting	Option 2: GHG Reporting is based on UNFCCC-approved methods for reporting forestry emissions and removals in national greenhouse gas (GHG) inventories. This option addresses New Zealand's entire forestry estate and land area (i.e. all new and existing forests plus grasslands, croplands and other land uses). We would account for all emissions and removals regardless of where in the forest or land estate they occurred, and for all forestry emissions, whether they were the result of deforestation or harvest.

26. Officials recommend that Ministers announce Option 1: Modified Kyoto as New Zealand's preferred approach to post-2020 forestry accounting at this time S9(2)(j) because its implications are relatively well understood, [redacted], and presents manageable risks. In contrast, any cost saving from Option 2: GHG Reporting is more uncertain at this time and the international and domestic policy risks are currently harder to identify and manage.

Costs

27. Option 1: Modified Kyoto smooths-out the cyclical peaks and troughs of New Zealand's forestry emissions that arise because of the uneven age classes in our plantation forests. Over the long-term, New Zealand would avoid liabilities when forests are in a high harvesting phase, but not receive credits when those forests are subsequently replanted and regrow. Figure 1 illustrates the potential effect of this on New Zealand's liabilities and credits for forestry emissions and removals from 2020 to 2050.

[7] New Zealand will seek to apply provisions to both options that exclude emissions from natural disturbance events, allow for flexible land use, and apply a Harvested Wood Products rule to delay harvest emissions depending on the wood product mix. [redacted] S9(f)(iv)

Figure 1: New Zealand's projected forestry liabilities using Modified Kyoto [redacted] with current Kyoto Protocol rules (midpoint emissions scenario) S9(2)(j) S9(f)(iv)

[redacted]

S9(2)(j) S9(f)(iv)

28. As figure 1 shows, Option 1: Modified Kyoto would [redacted] S9(2)(j) S9(f)(iv)

a. [redacted]

29. Under Option 1: Modified Kyoto, New Zealand would forgo any credit after 2030 from forests replanted on their second and subsequent rotations. By only crediting new forests on their first rotation, up to their long-term average carbon stock, Modified Kyoto smooths-out future fluctuations in forestry emissions caused by harvesting cycles: New Zealand forgoes both future credits above this level as well as any future harvest liabilities. This reduces uncertainty about New Zealand's long-term forestry emissions liability.

[8] [redacted]

S9(2)(j) S9(f)(iv)

30. There is more uncertainty surrounding the costs of Option 2: GHG Reporting. Depending on a number of factors yet to be determined, it could [redacted]

[redacted] S9(2)(j) S9(f)(iv)

31. [redacted] S9(2)(j)

32. [redacted] S9(2)(j) S9(f)(iv) S9(2)(k)

S9(2)(k): "prevent the disclosure or use of official information for improper gain or improper advantage",

33. [redacted]

34. [redacted] S9(f)(iv)

Domestic policy implications

35. [redacted] S9(f)(iv)

36. [redacted]

37. [redacted]

38. [redacted]

39. [redacted]

S9(2)(g)(i)
S9(f)(iv)

40. The upcoming NZ ETS review is an opportunity to discuss possible post-2020 forestry settings with the forestry sector. The draft terms of reference for the review include consideration of longer-term NZ ETS settings, including in response to changes in how we account for forestry emissions internationally after 2020.

Consultation

41. This briefing note has been prepared through a joint MPI, MfE, Treasury and MFAT process.

Appendix one: Draft Addendum on New Zealand's INDC Forestry Assumptions and methodologies

Approach to accounting for forestry and other land use	
Purpose of Addendum	The purpose of this addendum is to enhance the clarity, transparency and understanding of New Zealand's INDC by setting out the assumptions about accounting for anthropogenic greenhouse gas emissions and removals from forestry and other land use underpinning the INDC submitted on 7 July 2015.
Methodologies	New Zealand's accounting for forestry and other land use will be based on a combination of the 2006 IPCC Guidance and the 2013 IPCC Kyoto Protocol Supplement, providing for Kyoto Protocol accounting principles to be applied to the GHG Inventory land-based categories. This approach recognises that accounting methodologies need to focus on anthropogenic effects, accommodate the specific biophysical characteristics of land use, and create efficient incentives for mitigation that can reconcile multiple sustainable land management objectives.
Forestry and other land use approach	New Zealand's forestry and other land use approach assumes accounting will be either land or activity based, and will apply existing IPCC methodologies to distinguish areas subject to direct human-induced change from those under pre-existing management, as follows: a. Forests established after the base year will continue to be accounted for as they would under the Kyoto Protocol, but once they attain their long-term average carbon stock, taking into account all carbon pools and activities, the forest will transfer to the Forest management/Forest remaining forest category, where it will be accounted for under a business-as-usual reference level. New Zealand will continue to account for all deforestation emissions. b. Forests established before the base year will continue to be accounted for under a business-as-usual reference level, as per the Kyoto Protocol, to address the dynamic effects of age structure resulting from activities and practices before the reference year, and the ongoing cycles of forest harvest and regrowth that occur as part of normal, sustainable forest management. c. Accounting provisions to address natural disturbance, land-use flexibility, legacy effects, non-anthropogenic effects and additionality since the base year will also continue to apply, building on existing guidance. Harvested wood products accounting will be based on the production approach. New Zealand's forestry and other land use approach builds on the accounting principles under the Kyoto Protocol to recognise and focus on additional action, and will create incentives for the establishment of new forests, recognise permanent, long-term enhancements of carbon sinks resulting from new management, and take responsibility for deforestation, while accommodating the long-term sustainable cycles in net emissions and removals that arise from sustainable forest management.