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New Zealand deploys creative accounting to allow emissions to rise

Climate Action Tracker policy brief

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Assessment

On 07 July 2015, New Zealand submitted [its provisional Intended Nationally Determined Contribution](#) (INDC). We rate New Zealand's INDC 2030 target — nominally¹ a 30% reduction from 2005 levels, equivalent to 11% below 1990 levels of greenhouse gas (GHG) emissions excluding land-use, land-use change and forestry (LULUCF)² by the year 2030³ to be “inadequate.” The “inadequate” rating indicates that New Zealand's commitment is not in line with any interpretations of a “fair” approach to reach a 2°C pathway: if most other countries followed the New Zealand approach, global warming would exceed 3–4°C.

New Zealand's INDC target to reduce GHG emissions excl. LULUCF by 11% below 1990 by 2030 is likely to result in an increase in GHG emissions excl. LULUCF of up to 11% above 1990 levels by 2030, given the approaches New Zealand is proposing to use to account for Kyoto surplus emission allowances and forestry credits.

New Zealand's proposed 2030 INDC target is not on a direct path towards its 2050 goal, which is, in itself, inadequate. For New Zealand to move onto a direct path towards a “medium” 2050 goal consistent with, for example, the United States' 80% reduction by 2050 goal, would mean NZ would have to adopt around a 30% reduction from 1990 levels by 2030 (about a 45% reduction from 2005 levels).

New Zealand's nominal¹ 5% reduction below 1990 levels by 2020 Pledge also translates into a large allowed increase using preferred accounting rules. If New Zealand were able to apply its preferred accounting rules for Kyoto surplus emission units and the package of forestry crediting measures and use these units to offset its fossil fuel, agriculture, transport and industrial emissions, we calculate that its 5% reduction by 2020 from 1990 levels pledge could allow business as usual emission increases to at least 2020. Under current policies, New Zealand's overall agriculture, energy, waste and industrial GHG emissions could increase without constraint to 32% above 1990 levels.

However New Zealand's preferred accounting rules are likely to generate sufficient credits to permit an increase in GHG emissions excl. LULUCF of 74-94% above 1990 levels by 2020. As this amount of emission allowances lies far above the emissions resulting from current policies, a substantial further surplus of emission allowances is likely for the post 2020 period. New Zealand would like to use these towards its 2030

¹ The term “nominal” is used to describe the stated target for fossil fuel and industrial GHG emissions, and the term “effective” is used to describe the emissions levels that would result after surplus emission units and credits/debits from the forestry sector are accounted for. Where forestry credits (debits) are accounted for, the effective target will be less (greater) than the nominal target.

² ‘GHG emissions excl. LULUCF’ refers to GHG emissions (CO₂, CH₄, N₂O, PFCs, HFCs, SF₆) from the energy, industrial processes, solvent and other product use, agriculture and waste sectors, excluding the land sector and forestry. This term is often used interchangeably with ‘GHG emissions excluding forestry’. These sources and gases are defined in Annex A of the Kyoto Protocol. See page 106 of http://unfccc.int/resource/docs/publications/08_unfccc_kp_ref_manual.pdf

³ Our assessment assumes that the 5% reduction target relates to GHG emissions excl. LULUCF given that New Zealand's 2013 communication to the UNFCCC states that it intends to apply Kyoto Rules in accounting for the target: http://unfccc.int/files/documentation/submissions_from_parties/application/pdf/13-1620.pdf

INDC target. Whether all this is possible is, however, subject to some uncertainty about whether New Zealand could legally apply the rules it intends to rely upon.

New Zealand's climate policy is projected to head in the opposite direction to climate policy frameworks in China, the United States and the European Union. In China, CO₂ emissions are projected to peak around 2025; in the US, emissions are expected to decrease by 14–17% below 1990 levels by 2025; the EU will see a decrease in GHG emissions excl LULUCF of about 30% below 1990 levels by 2025. In all of these countries, unlike New Zealand, emissions reductions are expected across multiple sectors of the economy, and are not confined to the LULUCF sector. There are virtually no policies in place in New Zealand to address the fastest-growing sources of emissions in New Zealand including transport and industrial sources, which comprise over 50% of the growth in emissions in New Zealand since 1990.

Per capita emission trends illustrate how far New Zealand's current policies diverge from widely accepted views of fair burden sharing and equity. Under current policies, New Zealand's per capita GHG emissions excl LULUCF (now at 17.1 tonnes of CO₂e per person) are set to remain stable, rather than decrease, and are set to surpass the United States' per capita emissions excl LULUCF by around 2025. US per capita emissions are at present 20.6 tCO₂e per person and decreasing steadily. This reflects the underlying reality that while the United States is taking action on climate change with a wide range of policies, New Zealand has few policies in place to cut emissions, and has no emissions cap in its domestic Emission Trading System (ETS).

An unusual aspect of New Zealand's INDC is that it is provisional pending “full and final agreement on the accounting rules/guidelines to apply” to the accounting rules for the land sector and access to carbon markets, or “confirmation in Paris that accounting rules agreed post-Paris will not be applied retroactively.”

New Zealand declined to take on a legally binding target for the Kyoto Protocol's second commitment period (2013–2020).⁴ Nevertheless, New Zealand has announced its intention to continue to use certain Kyoto accounting rules that apply to Parties (to the Protocol) with commitments in order to claim credit for carbon stored in trees, soils and vegetation as offsets against its growing agriculture, transport, energy and industrial GHG emissions⁵.

In addition, New Zealand intends to use acquired surplus emissions units (CERs, ERUs and RMUs) from the first Kyoto commitment period toward its 2020 pledge. However, given that New Zealand has not agreed to accept a legally-binding commitment for the second commitment period, the legal basis upon which New Zealand is seeking to rely upon these accounting rules is unclear. The Kyoto Protocol rule set for the second

⁴ Whilst New Zealand remains a Party to the Kyoto Protocol, but did not sign up for the second commitment period 2013–2020 and has also not put forward legally-binding QELRO for that period. See http://unfccc.int/files/documentation/submissions_from_parties/application/pdf/13-1620.pdf

⁵ The CAT assessment findings outlined above are, in line with New Zealand's stated intentions, premised upon it being able to apply in the period to 2020 accounting rules that govern Parties with commitments under the second commitment period of the Kyoto Protocol. Specifically, it is understood that New Zealand is seeking to rely upon accounting rules that relate to the carry over of surplus emissions units from the first commitment period to the second commitment period, the ability to generate LULUCF credits and to purchase, acquire, transfer or use Kyoto emission units from other Kyoto Parties during the second commitment period.

commitment period precludes Parties without second commitment period targets from undertaking many of these actions.⁶

Kyoto Parties with legally binding commitments can use these units toward their Kyoto second commitment period targets under a rule set agreed as part of the Doha Amendment (decision 1/CMP.8); Kyoto Parties without legally binding target commitments⁷ for the second commitment period are not permitted to use these units under the Protocol.

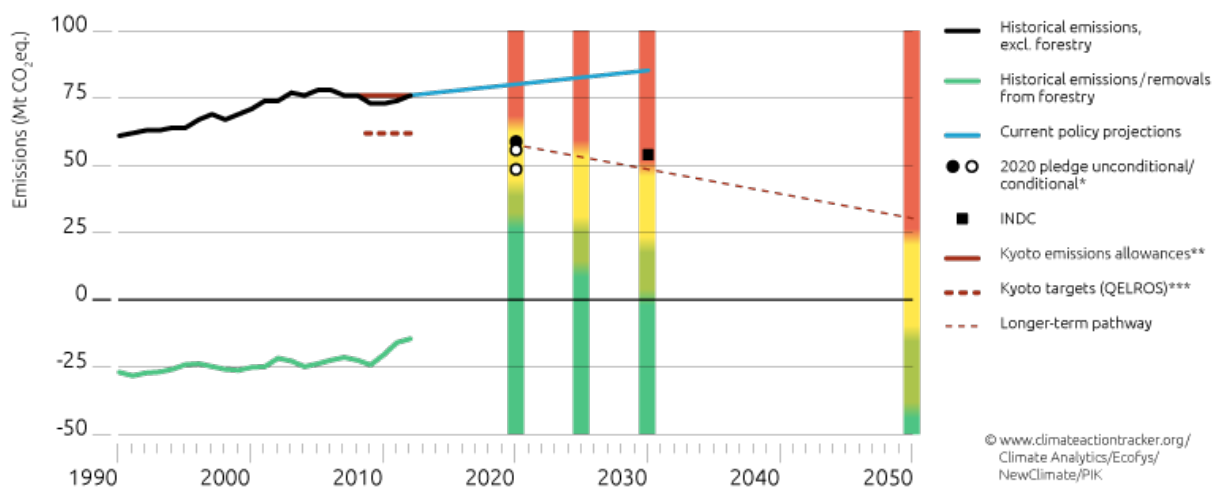


Figure 1 New Zealand Assessment

⁶ See Decision 1/CMP.8, parts IV and VI.

⁷ As set out in Column 3 of amended Annex B to the Protocol.

New Zealand's pledges and post-2020 INDC

1. Kyoto Protocol first commitment period

New Zealand's Kyoto Protocol target for the first commitment period (CP1) (2008–2012) was to return its GHG emissions excl. LULUCF to 1990 levels (QELRO of 100% of 1990 emissions).

Under the Kyoto Protocol accounting rules applicable to New Zealand in the first commitment period, certain land-use change and forestry activities provided credits which were added to allowed GHG emissions excl. LULUCF during the commitment period. In CP1, these activities resulted in extra emission allowances of, on average, 14 MtCO₂e per year for New Zealand (equivalent to about 23% of base year emissions in 1990).

Overall, New Zealand ended CP1 with GHG emissions excl. LULUCF at about 19% above 1990 levels, but will likely remain in compliance with its Kyoto Protocol QELRO due to the operation of Kyoto accounting rules and New Zealand's access to the Protocol's flexible mechanisms⁸. As a consequence of its large volume of LULUCF credits, New Zealand had a substantial surplus of unused emission units at the end of CP1.

As explained below, New Zealand proposes to use these surplus emission allowances from the Kyoto Protocol's first commitment period, which are derived, in part from Kyoto LULUCF credits and acquired emission units from other countries, to meet its 2020 reduction target under the Convention.

Kyoto Protocol	
Member of KP CP1 (2008–2012)	yes
Member of KP CP2 (2013–2020)	no
KP CP1 target (below base year)	0%
KP CP2 target (below base year)	n.a.
Convention	
Unconditional pledge	-5% by 2020
Conditional pledge	-10%/-20% by 2020
Reference for pledge	1990 GHG emissions (excl. LULUCF)
Main conditions	
a) Global agreement sets the world on a pathway to 2 °C, b) all parties making comparable or adequate efforts to New Zealand, c) an effective set of rules for LULUCF and d) full recourse to a broad and efficient international carbon market	
INDC	
Target	-11% by 2030
Reference for pledge	1990 GHG emissions (excl. LULUCF)
Economy wide GHG coverage	
National goals	
Long term goal(s)	-50% by 2050 below 1990 emissions (excl. LULUCF)

⁸ Final Kyoto Protocol first commitment period reports have not been reviewed.

2. 2020 Pledge and Kyoto Second Commitment Period

New Zealand put forward an unconditional pledge in 2013 to reduce GHG emissions excl. LULUCF by 5% below 1990 levels by 2020 under the Convention.⁹ New Zealand's unconditional pledge is complemented by an earlier conditional pledge from August 2009 to reduce emissions by 10–20% below 1990 levels by 2020.¹⁰ The conditional pledge range is linked to a set of conditions, including: adoption of a global agreement that sets the world on a pathway to limit temperature rise to not more than 2°C; developed countries make efforts comparable to those of New Zealand; advanced and major-emitting developing countries take action fully commensurate with their capabilities; there is an effective set of LULUCF rules; and there is recourse to a broad and efficient international carbon market (Government of New Zealand, 2013).

While New Zealand remains a Party to the Kyoto Protocol, it announced in 2012 that it would not participate in the second commitment period (CP2) (2013-2020). In subsequently announcing in 2013 its unconditional 5% by 2020 reduction target, New Zealand provided further details, including that it plans to apply Kyoto Protocol accounting rules governing the second commitment period and that its 5% reduction target will be expressed as a QELRO¹¹ of 96.8%.¹² As New Zealand has not signed up for the Kyoto Protocol second commitment period, and therefore does not have a legally binding QELRO, we refer hereafter to this as an "informal QELRO."

While New Zealand's clarification of the modalities for the accounting it proposes to apply to achieve the 5% by 2020 target is welcome, and the intended application of clear emission reporting rules commendable, there are a number of important issues raised by New Zealand's 2013 communication.

Although New Zealand has explicitly decided not to bring forward a legally binding commitment for the Kyoto Protocol's second commitment period, it has stated that it nevertheless plans to apply Kyoto Protocol accounting rules governing the second commitment period. This raises a number of legal issues, as the Protocol provides certain benefits only to Parties that have emission commitments for the second commitment period set out in column 3 of amended Annex B.¹³ The Kyoto rules New Zealand seeks to take advantage of, despite its lack of a legally-binding commitment under the Protocol for the second commitment period, broadly relate to:

- (i) The carry over of surplus emission units and allowances from the first commitment period;

⁹<http://www.mfat.govt.nz/Foreign-Relations/1-Global-Issues/Environment/2-Climate-Change/index.php>

¹⁰<https://www.climatechange.govt.nz/reducing-our-emissions/targets.html>

¹¹ QELRO = Quantitative emission limitation and reduction objective.

¹² In its 2013 communication to the UNFCCC New Zealand indicated its unconditional target of 5% below 1990 levels by 2020 would be expressed as a Kyoto Protocol budget-based target (QELRO) set at an average of 96.8% of 1990 GHG emissions excluding LULUCF (Kyoto Annex A sources and gases) over the second commitment period (2013–2020). This QELRO corresponds exactly to the 5% below 1990 levels by 2020 target when it is based on straight line from the midpoint of the first commitment period (CP1) QELRO in 2010 to year 2020 (Groser, 2013).

¹³ See Decision 1/CMP.8 and accompanying rule set.

- (ii) The ability to generate LULUCF credits during the second commitment period (2013–2020);
- (iii) The ability to purchase, acquire or sell Kyoto emission units from other Kyoto Parties during the second commitment period; and finally
- (iv) Provisions relating to the carryover of any surplus from the latter period to the post-2020 period.

Because New Zealand has not agreed to accept a legally binding commitment for the Kyoto Protocol's second commitment period, there is a range of other important provisions of the Kyoto Protocol that it is understood New Zealand does not wish to have applied to itself. These include the existing eligibility requirements for emissions trading, the existing compliance system modalities and procedures, and, apparently, the provisions of the Protocol itself that limit the carryover of surplus units to Parties with second commitment period assigned amounts under the Protocol.¹⁴

Under the Climate Convention, there is an agreed framework for monitoring, reporting and verifying progress toward 2020 pledges. However, there are no agreed accounting modalities for 2020 pledges under the Convention that expressly allow Kyoto Parties without Kyoto commitments to apply Kyoto rules under the Convention. Moreover, it should be noted that some of the accounting measures New Zealand proposes to apply to its emissions under the Convention would not be available to it under the Kyoto Protocol, given its status as a country without a second commitment period commitment listed in Annex B to the Protocol.¹⁵ It is not clear whether the new agreement under negotiation for adoption in Paris in December 2015 for the post-2020 period will allow the use of surplus Kyoto units, and even if so, whether New Zealand, not having had a commitment for the second commitment period, would be eligible to do so.

The CAT has estimated likely quantities of the two major sources of "Kyoto" emissions units that New Zealand wishes to use in the period to 2020:

- 1- LULUCF credits for the second commitment period could be on average from **10–17 MtCO₂e a year**, totalling **80–133 MtCO₂e**.
- 2- New Zealand has acquired emissions units under the Kyoto Protocol in the first commitment period and we estimate that it currently has **a total of 136 MtCO₂e** in emission units that it intends to use to meet its 2020 pledge.

When we put together all these units (credits from LULUCF, CERs, RMUs and ERUs), if New Zealand were able to apply its preferred accounting rules, and use these units to offset its fossil fuel and industrial emissions, we calculate that its nominal 5% reduction

¹⁴ Article 3.13 of the Kyoto Protocol provides as follows: "If the emissions of a Party included in Annex I in a commitment period are less than its assigned amount under this Article, this difference shall, on request of that Party, be added to the assigned amount for that Party for subsequent commitment periods." Under the Kyoto Protocol New Zealand does not have a legally binding commitment for the second commitment period set out in Annex B, which is the basis upon which assigned amount is calculated. Therefore, New Zealand will not have an assigned amount for the second commitment period and consequently, under the Kyoto Protocol legal framework, no carryover is possible.

¹⁵ See note above; see also decision 1/CMP.8, parts IV and VI.

by 2020 from 1990 levels pledge could in reality enable an increase in GHG emissions excl. LULUCF of **74-94% above 1990 levels** by 2020. As this exceeds - by a large margin - New Zealand's projected GHG emissions based on its current policies—a **projected increase of about 32% above 1990 levels by 2020—New Zealand would not need to adopt further policy action to meet its stated 5% reduction goal** and it would be left with a further substantial surplus of emission units that it could again seek to carry over to the post-2020 period. However, it should be noted that while this CAT assessment considers the implications of applying Kyoto Protocol second commitment period accounting rules to New Zealand, it is by no means clear that New Zealand's preferences will be permitted in the post-2020 agreement. The figure below graphically shows the results.

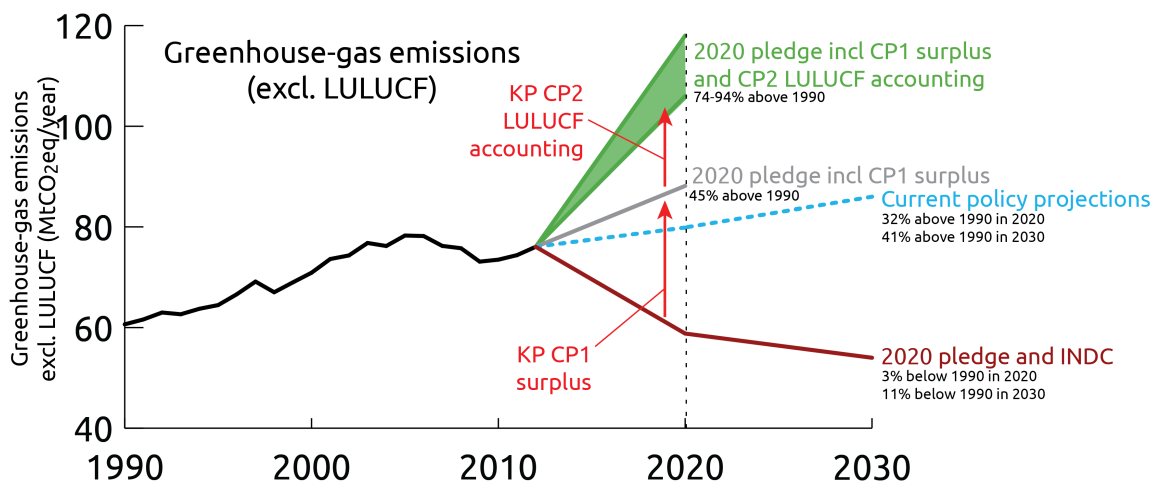


Figure 2: The effect of Kyoto CP1 surplus and CP2 LULUCF accounting credits on allowed emissions on the period to 2020, compared to the 2020 pledge, current policies and the 2030 INDC. The Kyoto CP1 surplus gives sufficient emission allowances to increase emissions to 45% above 1990 levels by 2020 (grey), well above current policies. KP CP2 LULUCF credits further increase these allowances (green). Note that the 5% reduction by 2020 pledge is effectively here 3% reduction to base year emission inventory differences with initial data set used to set this pledge.

3. Post-2020 INDC target

On 7 July 2015, New Zealand announced a 30% nominal reduction by 2030 from 2005 levels of greenhouse gas emissions excl. LULUCF¹⁶. This is stated as equivalent to an 11% reduction by 2030 from 1990 levels, the base year used for New Zealand's 2020 target and commitment. However, as with the 2020 target, the effective reductions may be very different from the nominal reductions, as the following analysis shows.

¹⁶ In the quantitative analysis in this report we have used the global warming potentials (GWPs) of the IPCC's second assessment report. Most INDCs, including New Zealand's, are based on the more up to date GWPs of the fourth assessment report (AR4). Consequence and issues are explained in the Assumptions section at the end of the report.

A recent publication from the Government of New Zealand's contribution to the new international climate change agreement (Government of New Zealand, 2015) makes clear that New Zealand intends to continue applying its preferred pre-2020 accounting rules in the post-2020 period. The government argues that given the significance of the land sector to New Zealand, these rules are particularly important as they can considerably affect the cost of achieving targets.¹⁷ The structure of proposed rules preferred by New Zealand, if permitted for its 2020 pledge, have implications for the effectiveness and real level of emissions related to any INDC target put forward by the New Zealand Government. This section outlines some of the implications and consequences of the accounting system New Zealand proposes to use.

The submitted INDC does not provide full clarity on what accounting rules are to be applied. However, it states that it assumes that any rules agreed between parties will allow for accounting for LULUCF and for the use of international market mechanisms. In fact, New Zealand indicates in its INDC that it will finalise the INDC only "following full and final agreement on the accounting rules/guidelines to apply in those areas, or confirmation in Paris that accounting rules agreed post-Paris will not be applied retroactively."

New Zealand has indicated an intent to use international emission market mechanisms.

For this analysis, we have assumed that New Zealand would seek to continue to apply a Kyoto-type accounting system and also seek to carry over surplus units from the first Kyoto commitment period to the second commitment period, and then from the second commitment period of the Kyoto Protocol to the post-2020 agreement, even though their ability to do so in the new agreement has not been verified.

Under these accounting assumptions we assume that New Zealand "starts" its post-2020 commitment at its 2020 target of reducing emissions to 5% below 1990 levels (excl. credits and debits from LULUCF). Under a Kyoto type accounting system, this would lead to an allocation of "allowed emissions" corresponding to a budget over the 10-year period of its INDC that meets its 11% reduction below 1990 by 2030 target.¹⁸

If the estimated 2013-2020 "surplus" emission units generated by New Zealand's proposed application of the Kyoto Protocol LULUCF rules were allowed to be carried over to the post-2020 period, then **the 11% below 1990 GHG emissions excl. LULUCF reduction target in 2030¹⁹ could actually become a 11% increase above 1990 GHG emissions levels excl. LULUCF** (the lower end of that range would be a reduction of 5%

¹⁷In its consultation document, New Zealand indicates: "When we set our contribution, it is important the target is realistic for future governments to achieve. There are obviously major uncertainties involved in trying to frame any commitment to which a future New Zealand government would be held to account in 2030. Some of these uncertainties relate to: The rules that will apply on forests and land-use change. Given the significance of the land sector to New Zealand, these rules are particularly important to us as they can considerably affect the cost of our target."

<http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/climate-change-consultation-document.pdf>

¹⁸We assume that New Zealand sets an emissions target for a specific year (e.g. 2025), and then applies a budget approach from a specific starting point (for example the unconditional emissions target in 2020), as this is what is has proposed for the period 2013-2020. The emissions budget is the average of the starting point (target or emissions level) and the endpoint (target) multiplied by the number of years covered by the target. For a 2025 INDC, this would be five years, and for a 2030 INDC, this would be 10 years.

¹⁹This is on a direct line between -5% in 2020 and 50% in 2050, but is nonetheless inadequate.

below 1990). This would significantly decrease any action required from New Zealand in the period in its energy and industrial sectors (Figure 2).

However, this is likely to be compensated by projected LULUCF debits. Based on old estimates published by the Government (Government of New Zealand 2009b), the CAT estimates that the debits to be generated in the period 2020–2030 can be as high as 150 MtCO₂e (roughly 2 years of national emissions). Caution is however needed when interpreting these numbers, given their old date and very high uncertainty associated with such estimates.

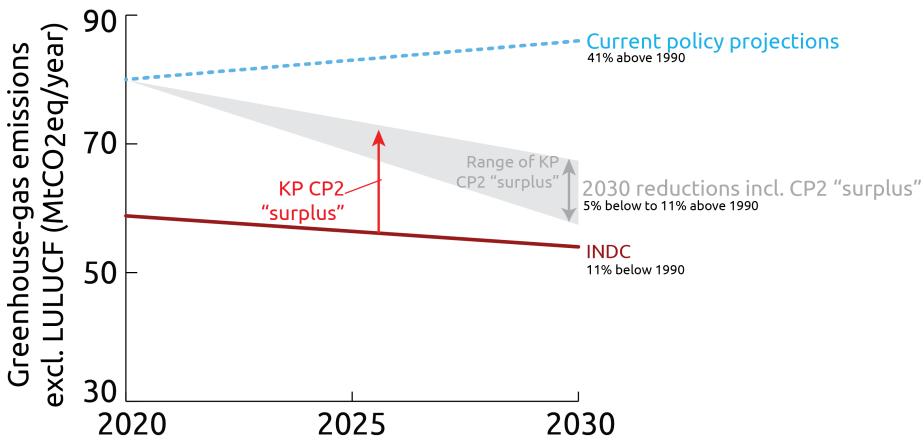


Figure 3: Effects of surplus carryover from Kyoto CP2 on effective INDC target for 2030. The total volume of surplus units is not sufficient to permit current policy emissions to continue however would still result in allowed emissions being up to 11% above 1990 levels.

4. Long term emissions reduction target

In 2011, the New Zealand Government announced a target for a 50% reduction in GHG emissions from 1990 levels by 2050. The Government has stated that “[t]he 2050 target is based on New Zealand’s net GHG emissions and will take into account any removals or emissions arising from afforestation or deforestation since 1990 consistent with the Kyoto Protocol under the United Nations Convention Framework rules on climate change.”²⁰ The INDC text reiterates New Zealand’s intent to meet this target.

As can be seen from Figure 1 above, this target is insufficient. To hold warming below 2°C, the IPCC AR5 found that global GHG emissions need to be reduced to 40–70% below 2010 levels by 2050, which corresponds to 35–55% below 1990 levels. Industrialised countries would need to make substantially larger reductions by 2050 than the global average, otherwise unfair burdens would be placed upon developing countries.

New Zealand’s proposed 2030 INDC target is not on a direct path towards its 2050 goal. The direct pathway between a 5% reduction from 1990 levels in 2020 and a 50%

²⁰ <https://www.climatechange.govt.nz/reducing-our-emissions/targets.html>. It needs to be noted that there is no necessary linkage between the accounting rules under the Kyoto protocol and those of the UNFCCC itself, including in relation to the definitions of afforestation and deforestation.

reduction in 2050 would require in 2030 about a 20% reduction from 1990 levels, or about 37% from 2005 emission levels. However it also needs to be noted that the 50% reduction by 2050 is in itself inadequate for a developed country, and moving towards “medium” consistent with for example the United States 80% reduction by 2050 goal would mean a 30% reduction from 1990 levels by 2030 (about a 45% reduction from 2005 levels).

Fair share

1. *Effort-sharing*

We rate New Zealand’s 2030 INDC target— a 11% reduction from 1990 levels of GHG emissions excl. LULUCF by the year 2020— to be “inadequate.” This means the emissions levels resulting from the 2020 target exceeds the acceptable emissions level for New Zealand in all effort-sharing proposals evaluated by the CAT. For New Zealand, effort-sharing proposals based on capability require less reduction in emissions levels than proposals that focus on equal cumulative/equal per capita emissions. The nominal 2020 5% reduction target would be rated “medium” if no LULUCF credits were used (black dot in Figure 1). However, with the package of forestry crediting measures that New Zealand has indicated it intends to use in accounting for its emissions, the 5% target can lead to the country’s actual overall emissions significantly increasing, meaning that its actual emissions (green range in Figure 2) fall within the “inadequate” category.

For some countries, studies provide “cost as percentage of GDP”, which we include as one of the categories of effort sharing, called “capability/costs”. It usually determines the top end of the range for developed countries. For New Zealand, no data from this category is available in existing studies. Some literature suggests, that abatement costs may be comparably higher in New Zealand than in other developed countries. As a result, the missing category could give New Zealand a higher fair share of emissions and the border between “inadequate” and “medium” could move to the upper end of the range of “capability”. However, this is not possible to confirm without more data.

2. *Per capita emissions*

Comparing per capita emission trends between the United States and New Zealand is instructive. Trends in per capita emissions are a crude, but nevertheless effective, indicator of fair burden sharing and equity in the longer term. New Zealand, historically, has had lower per capita emissions than the United States, due in part to a high proportion of hydroelectricity in its primary energy supply.

With the United States in the process of implementing policies aimed at meeting its 2020 and 2025 targets (with the 2025 target reflected in its INDC), per capita emissions are expected to continue to decline significantly, building upon a trend in reducing per capita emissions that began in about 2005. New Zealand’s nominal 5% reduction target for 2020 the INDC in 2030 indicates a parallel declining trend in per capita emissions until 2020 and a slower decline between 2020-2030. Moreover, while the US policies are projected to lead to real reductions in GHG emissions excl. LULUCF and declining per capita emissions of these gases, New Zealand’s policies are not.

Given the large number of Surplus and LULUCF credits projected to be available to New Zealand, it is more likely that New Zealand’s GHG emissions excl. LULUCF remain stable,

or decline only slightly, according to current policy projections. When combined with the limited number of policies in place in New Zealand targeted specifically at reducing GHG emissions, it is projected that by around 2025, New Zealand's per capita emissions could exceed those of the United States.

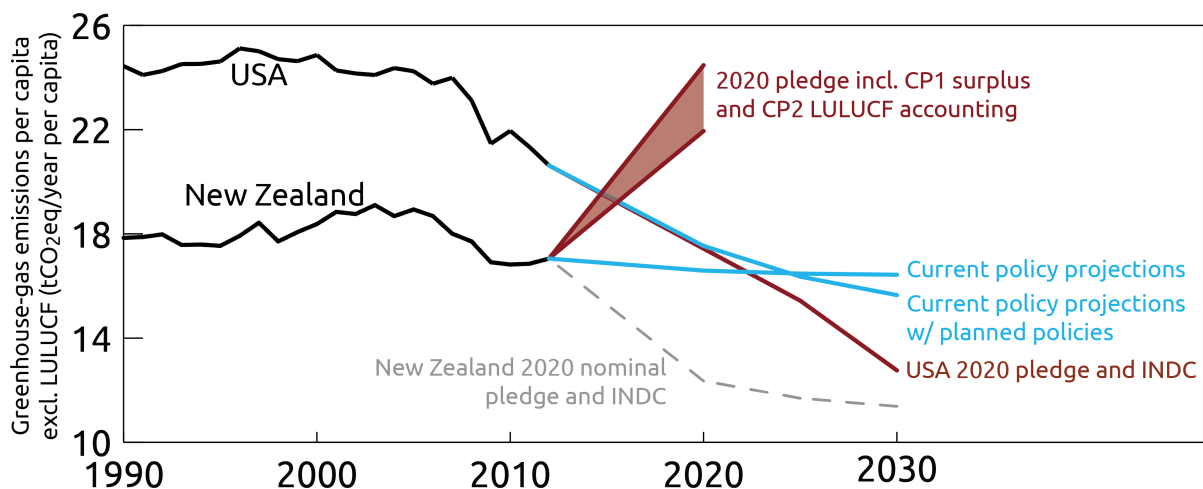


Figure 3: Per capita emissions for the United States and New Zealand for the period 1990 to 2012 (black line). US emissions post-2012 (blue line) are based on current policy estimates by the Climate Action Tracker, and INDC projections, assuming a linear pathway between 2025 and the long-term US goal in 2050. New Zealand current policies are assumed past 2012 (blue line), and the New Zealand “2020 pledge and INDC” are the direct translation into per capita levels of 2020 and 2030 emissions implied by pledge and INDC respectively. The per capita emissions trajectory based on current policy projections for New Zealand reflects the effect of New Zealand’s proposed application of the Kyoto Protocol LULUCF accounting rules and carryover of surplus emissions units. From this figure it can be seen that New Zealand per capita emissions are projected to remain close to present levels through 2020, and continue at this level through 2030. New Zealand per capita emissions appear likely to exceed those of the United States around 2025.

Opening the land-use and forestry and surplus credits black box

Reducing deforestation is important, as is maintaining the sink, or carbon storage capacity, of forests, soils and other ecosystems. However, the contribution of land-use related fluxes of carbon dioxide is small, relative to projected emissions from fossil fuels and industry (WGIII AR5 Chapter 6.3.1.4). To limit warming below 2°C, or 1.5°C, the major focus of mitigation activities need to be on Kyoto Annex A sources (GHG emissions from the energy, industrial processes, solvent and other product use, agriculture, and waste sectors), in particular fossil fuel, agriculture and industrial carbon dioxide emissions.

The implication of LULUCF accounting rules can be very different for different countries. New Zealand has large removals in its LULUCF sector, in the form of growing plantation crop forests – largely exotic pine trees. Because New Zealand is removing large quantities of GHG emissions from the atmosphere, the Kyoto protocol accounting rules allow it to obtain credits that it can use to achieve its GHG targets, although its total sink may be decreasing. This opens up the possibility that New Zealand can use LULUCF sector as a source of cheap credits, effectively masking an increase in its emissions in other sectors.

This problem is not unique to New Zealand. Other countries with large removals in their LULUCF sector, such as Australia and Canada, operating under the same Kyoto Protocol rules, can also accumulate credits from LULUCF activities. What sets New Zealand apart is the sheer volume of New Zealand's LULUCF credits, relative to its emissions footprint, and the implications this has on mitigation efforts in other sectors of New Zealand's economy. How New Zealand came to obtain credits from these and other sources is discussed in the following sections.

Below we explain the origin and consequences of these rules for New Zealand. We calculated New Zealand's LULUCF accounting quantities for the first and second commitment periods for afforestation, reforestation (AR) and deforestation (D) using a gross-net approach (current Kyoto rules for CP1 and CP2) and for forest management (CP2) using emissions relative to a projected reference level (Government of New Zealand, 2009a).

Important background on the Kyoto protocol architecture for setting targets

To understand and place in context the mitigation issues that arise in the case of New Zealand and land use, land use change and forestry it is important to first step through several key principles and accounting approaches. This will then locate the Kyoto protocol accounting "architecture" within a framework that is directly linked to the emission reductions from different sources needed to limit warming below 2°C.

Net emissions comprise "gross" emissions of Kyoto Annex A sources (GHG emissions from the energy, industrial processes, solvent and other product use, agriculture, and waste sectors) minus removals or plus emissions of carbon dioxide from LULUCF activities. Removals refer to the storage of carbon through photosynthetic activity in forests, soils and other vegetation, as well as removal of methane through interactions with soil and other vegetation. Often LULUCF activities are a sink, where removals exceed emissions and in this case net emissions are lower than gross emissions – if deforestation (or other land use changes leading to the release of carbon to the atmosphere) dominates then a country may have overall emissions from the LULUCF sector, in which case net emissions are higher than gross emissions.

It would seem logical that in order to reduce emissions to the extent needed, net emission reductions compared to a base year are what really matters, as this is the real change that the atmosphere sees. And indeed this was what many first thought about when designing the UNFCCC. Parties favouring it (USA, Canada, Australia, New Zealand, Japan, Norway, to name the main ones) attempted to codify this in the operative Article 4.2(a) and (b) of the Convention by using the term "net" to qualify emissions.

Ultimately this failed due to the growing realisation that there were substantial complexities in applying the net approach due a number of factors: uncertainties in estimating "sinks", a high degree of variability, risks that credits are gained for pre-existing sink activities or for natural sink processes, the impermanence of sequestered carbon compared to avoided fossil fuel emissions, verification and monitoring standards required for compliance with legally binding emission obligations and the risk of release of sequestered carbon due to climate change and variability.

These issues became important again with the negotiation of the Kyoto Protocol. The basic emissions accounting architecture of the Protocol sets a target for reducing

“gross” emissions reductions. “Gross” emissions refer to GHG emissions excluding LULUCF, specifically the sources and gases listed in Annex A of the Protocol. The Kyoto targets are set with respect to emissions in 1990 (or in certain cases another base year), which establishes the basic “allowed” gross emissions for that country during the commitment period. A target, or QELRO²¹ of 100 means that the country, absent other provisions of the Protocol, must limit its gross emissions to the same level as in 1990, and a target of 95 means that emissions need to be 5% below 1990 during the commitment period. However, that is where the simplicity ends.

Allowed gross emissions during a commitment period can be increased (or decreased) through crediting of defined LULUCF activities and through the international acquisition or transfer of Kyoto emission units. An acquisition of units, such as emission allowances from another country, or CDM units, adds to the allowed emissions, whereas a transfer reduces them. At the end of a commitment period a country’s total holding of emission allowances are compared to its actual “gross” emissions during the commitment period.

From the point of view of dealing with the main drivers of climate change, carbon dioxide emissions from fossil fuel, agriculture and industry, **it can be seen that the more LULUCF credits are obtained, the less action is needed to reduce CO₂ emissions.** Put simply, the more sinks are counted, the less reductions are required from the fossil fuel, agriculture and industry and other sources of greenhouse gas emissions.

Net-Net, Gross-Net and Gross-gross accounting

To understand some of the elements of the LULUCF provisions of the Kyoto Protocol, and their problems, it is important to further distinguish three different accounting approaches.

Key issues arise in relation to two key questions involved in setting a reduction target relative to emissions in a base year or period: What are the set of emission sources and/or sinks used to define the base year, and what are the set of emissions sources and/or sinks used to define emissions in the commitment period, to compare with the target? Intuitively both of these sources and/or sinks should be the same so that one can compare apples with apples, and not different sets of emissions between the base year and target year.

The term “Gross emissions” refers to Kyoto Annex A emissions (without LULUCF emissions and removals). “Net emissions” are calculated as the sum of Kyoto Annex A emissions and the sum of LULUCF emissions and minus removals. Note that the LULUCF category is the sum of removals and emissions from the LULUCF activities. The LULUCF sector can be either positive (emission) or negative (sink): nearly all Annex I LULUCF sectors are net sinks.

Two broad approaches to accounting - “Gross-Gross” and “Net-Net” compare like with like, between the base year and commitment period, and if applied literally give a good

²¹ QELRO = Quantitative emission limitation and reduction objective. The QELRO is expressed as a percentage in relation a base year, in the example here 1990, and denotes the annual, average level of allowed emissions during a given commitment period

indication of the real difference in emissions that the atmosphere sees between the base year and the commitment period.

“Gross-Gross” accounting is where “gross” emissions are used for both the base year to set the target and to count the emissions during the commitment period to compare to the target, and therefore check for compliance. Targets are set with respect to the base year emissions from sources as defined in Annex A to the Protocol. Intuitively Gross-Gross accounting presents no strange anomalies with respect to what the atmosphere sees from the accounted sources: like is compared with like in terms of target setting and compliance. In other words the accounting system is closed with respect to what the atmosphere sees. Of course, if some categories are not counted then anomalies arise e.g. in relation to international aviation and bunker fuels. If the Kyoto Protocol did not contain Article 3.3, 3.4 or 3.7, or if a country has no qualifying activities under these Articles, then its commitments would be based on Gross-Gross accounting.

“Net-net” accounting means that “net” emissions are used to define the emissions sources used in both the base year and the commitment period. Commitments would be defined relative to the “net” emissions in the base year and “net” emissions in the commitment period would be used for compliance purposes. As with gross-gross accounting like is compared with like, and there is no in principle asymmetry in what is used to set the target versus what is counted as emissions for compliance with an obligation.

The Kyoto Protocol, however, did not adopt the “net-net” approach due to a number of serious problems. Large data uncertainties in estimating sinks and high variability due to factors such as wildfires, droughts or other weather extremes meant that there could be many aspects of the LULUCF emissions that were outside the reasonable control of countries. A country with close to zero or small net emissions in its base year (because its LULUCF sink offsets its fossil fuel source) could find that a small change in either its LULUCF sink or Annex A emissions, would lead to a large difference between its commitment (allowed emissions) and its actual emissions during the commitment period. Where countries take on a legal binding obligation, every percentage point by which actual emissions exceed their target (allowed emissions) could be quite costly.

For this reason many countries judged a net-net approach to be too risky. However, this is the approach proposed by some countries, including the USA, Canada and Norway, for the post 2020 period. In the case of Norway, however it should be noted that an explicit commitment is made in their INDC to ensure that changes in the LULUCF source/sink magnitudes do not affect the reductions in GHG emissions excluding LULUCF.

In addition to these approaches, there was a third approach put forward principally by New Zealand called the “gross-net” approach²². Gross emissions are used to calculate the base year emissions and targets are set with respect to these emissions. Compliance however is based on net emissions during the commitment period. In this case the atmosphere “sees” something completely different than the accounting system, as gross emissions are almost always much higher than the net emissions (gross emissions minus the sink) used for compliance with the target. For most cases, if a country met a

²² <http://unfccc.int/resource/docs/tp/tp0200.pdf>

reduction target set using gross-net accounting, rather than a reduction the atmosphere would have seen a real increase in emissions.

As a consequence of concerns over the environmental integrity of the gross-net approach and also of the effect this could have on the relative level of efforts between countries, the Kyoto Protocol adopted a limited “Gross-Net” approach, where the LUCF activities that could be counted were limited to direct human induced activities since 1990, or capped. Using agreed LULUCF accounting rules, Parties with a commitment under the Kyoto Protocol may add or subtract emissions and removals from LULUCF to their allowed Annex A emissions over the course of a given commitment period. A LULUCF credit adds to a Party’s allowed Annex A emissions and a LULUCF debit reduces a Party’s allowed Annex A emissions.

Credits and debits for different LULUCF activities²³ are accounted for in different ways for different types of land use and in different commitment periods. One example of an accounting rule is the gross-net approach applied to ARD (afforestation/reforestation and deforestation), which applies to all Kyoto Parties for both the first and second commitment periods.

This rule says that Parties are allowed to account for all emissions and removals from these activities over the commitment period and add them to their allowed Annex A emissions. If a Party has removals from Afforestation/Reforestation activities during a commitment period, instead of implementing climate policies to decarbonise their transport or energy sectors, Parties can rely on removals from those activities to meet their target. In the case of forest management activities, or where in the case of cropland and grazing land management a net-net approach is taken.

Forest Management was capped to reflect the desire to limit the accounting of activities that had already occurred or that would have happened anyway. In limiting the “net” LUCF activities that can be counted, the Protocol attempted to reduce the problems that would have arisen from a full “Gross-Net” approach. The success of this is however open to question.

The limited “Gross-Net”, through the ways in which LULUCF activities have been defined and are accounted, has opened up a situation where for some countries there is a very large discrepancy between what the atmosphere “sees” and what the target looks like. At the broadest level, in the case of New Zealand, the target set of 100% of 1990 gross emissions has effectively resulted in an increase of approximately 23% above 1990 gross emissions for the first commitment period. A further indication of this serious anomaly is that net emissions were about 130% above 1990 levels during the first period, indicating that not only did gross emissions increase significantly since 1990, but the sink actually decreased.

²³ LULUCF activities are Afforestation/Reforestation, Deforestation, Forest Management, Cropland management and Grassland management. Wetland management and accounting for Harvested Wood Products have also been introduced for the second commitment period of the Kyoto Protocol.

What does this mean in the case of New Zealand?

Kyoto first Commitment Period (CP1)

New Zealand's initial allowed emissions (assigned amount) for CP1 was 309 MtCO₂e, an average of 61.9 MtCO₂e per year. We find that over the CP1, New Zealand accumulated 71 MtCO₂e of credits, or an average of 14.2 MtCO₂e per year, from LULUCF accounting. This is mainly coming from Afforestation/Reforestation activities largely involving exotic pine forest plantations. Parties to the Kyoto Protocol that have put forward a legally binding QELRO to a Commitment Period are allowed to account for **all emissions and removals** that occur on lands subject to Afforestation/Reforestation (AR) during that Commitment Period since 1990 (gross-net accounting rule). New Zealand benefits from this rule as it has a large AR sink. Along with these LULUCF credits, New Zealand entities²⁴ acquired additional emissions units (CERs, ERUs and RMUs)²⁵ during CP1. As of the end of 2012, New Zealand had acquired net additional units equivalent to 128 MtCO₂e of emissions allowances, or an average of 25.6 MtCO₂e per year during CP1. The added units were mostly (>80%) ERUs acquired from other countries and ~10% were generated through CDM activities.

²⁴ New Zealand government entities and/or New Zealand private sector entities, such that the acquisitions of units were entered into the UNFCCC registry for New Zealand.

²⁵ International Mechanisms and trading

Under the Kyoto Protocol, Parties may also acquire units, or emissions allowances, through trading with other countries or through international mechanisms such as the Clean Development Mechanism or Joint Implementation Activities. Units acquired in this way can also be used to increase the allowed Annex A emissions over the commitment period. The four main types of units are generated from different activities and sources.

AAU	Assigned Amount Unit	Allowance units a Party is assigned according to their commitment
CER	Certified Emission Reduction	Generated from Clean Development Mechanism (CDM) project activity
RMU	Removal Unit	Generated from LULUCF activities, e.g reforestation (see above)
ERU	Emissions Reduction Unit	Generated by joint implementation

Once generated, units may then also be traded. It is therefore possible for one country to purchase an RMU that was generated by another country. As a consequence, if one Party is able to over-achieve its emissions reduction target, any additional emissions units that it has are available for another country to acquire and use to legally meet its emissions reduction commitment. The receiving Party then does not need to reduce its real emissions by as much as the initial reduction target, thereby allowing higher emissions.

International Mechanisms and trading options are in place for good reason; they allow countries to determine what the most cost-effective emissions reductions are and do these. However, if some participating Parties have weak targets (low ambition), surplus units are generated in the system.

Quantitative details

NZ had a first commitment period (CP1) target (QELRO) of 100, base year emissions in 1990 of 61.9 MtCO₂e (GHG emissions excluding LULUCF). At the end of the commitment period its average emissions per year were 74.6 MtCO₂e, significantly above its nominal annual average allowed emission of 61.9 MtCO₂e (100% X 61.9 MtCO₂e [emission in base year 1990]). However, New Zealand acquired an average of 25.6 MtCO₂e emission units per year, and had an average of 14.2 MtCO₂e per year removals of carbon from forestry activities. As a consequence its total holding of allowances for CP1 is an average 101.7 MtCO₂e per year: 61.9 MtCO₂e from the QELRO + 25.6 MtCO₂e from acquired units + 14.2 MtCO₂e from removals or forestry. Thus its annual average total CP1 emission allowances, 101.7 MtCO₂e, exceed its annual average CP1 emissions, 74.6 MtCO₂e, by 27.1 MtCO₂e, per year averaged over the commitment period. This means that the country's total surplus carried forward in emission allowances is 135.5 MtCO₂e (27.1 MtCO₂e, per year multiplied by the number of years (5) in CP1). If permitted, these surplus emission units can be added to the allowed emissions for the subsequent commitment period.

As a consequence, due to the total number of CP1 LULUCF units and the net holdings of acquired CP1 emissions units (after buying and transferring some of these units) it is estimated New Zealand held at the end of CP1 about 508 MtCO₂e in emission allowances, approximately 102 MtCO₂e per year on average. This significantly exceeds New Zealand's actual total emissions during CP1 of about 373 MtCO₂e or approximately 74.6 MtCO₂e per year on average. The average GHG emissions excl. LULUCF emissions during CP1 therefore exceed the 1990 Annex A emissions level by about 23%.²⁶ The situation where emission allowances held exceed actual emissions means that New Zealand has a surplus of approximately 136 MtCO₂e.

Whilst New Zealand has applied the Kyoto protocol accounting rules to obtain this outcome, it is also useful to recall the broader picture as it illustrates one of the key problems with the way in which the Kyoto protocol LULUCF accounting has evolved. This is relevant to a consideration of a situation where New Zealand is selectively applying Kyoto accounting rules for the second commitment period.

During the first commitment period, as outlined above, NZ accumulated about 71 MtCO₂e in credits from specific forest activities. However, over the same period of time, New Zealand's total land surface carbon sink²⁷ of CO₂ was lower than its 1990 level. As a consequence in the Kyoto first commitment period, New Zealand's total land surface stored about 32 MtCO₂e less than it would have had the sink in the Kyoto base year 1990 been maintained. What the atmosphere actually saw in the country was less removals, and therefore, more net emissions, in the commitment period compared to the base

²⁶ The most recent inventory for 1990 is slightly lower than the original estimate used to define the Kyoto 1990 base year emissions and hence the CP 1 allowed emissions. Before each commitment period the base year emissions are fixed and used as the basis for calculating the QELRO.

²⁷ Also called "removals", or the rate of storage of carbon in forests and soils due to forest growth, afforestation, reforestation or management that enhances carbon storage.

year - rather than a large 71MtCO₂e credit the atmosphere saw a debit of around 32 MtCO₂e.

Second Commitment Period 2013-2020 (CP2)

If New Zealand had taken a binding commitment under the Kyoto Protocol for the second commitment period (CP2, 2013–2020), it would have entered CP2 with a large surplus of 136 MtCO₂e, which could be added to the amount of Annex A GHG emissions allowed by its CP2 QELRC. For context, 136 MtCO₂e is around two years worth of New Zealand's total Annex A emissions.

Under the Kyoto Protocol rules, New Zealand would also account for emissions and sinks in the LULUCF sector during CP1. We estimate the likely LULUCF credits that New Zealand could generate in CP2 by applying the rules described above to **projected emissions** from the different LULUCF activities. If calculations are performed using New Zealand's own projections for AR and FM activities (Government of New Zealand 2011a) the country would gain **10 MtCO₂e LULUCF credits per year**. The government projections date from 2009 and are not fully consistent with subsequently reported historical emissions for 2008–2012. We therefore also perform calculations based on our own projections (using historical averages) which result in **17 MtCO₂e credits a year**, which we consider an upper bound to our assessment. Because our estimates are more consistent with historical data, we consider that our estimates—and hence the 17 MtCO₂e credits a year—may be more likely estimates.

Implications for post-2020 Period

As New Zealand's emissions are likely to be much lower than their anticipated high allowance in the 2013–2020 period, New Zealand could have further surplus emissions units. We estimate this could be up to 115–170 MtCO₂e, which is similar to the surplus New Zealand has from CP1. If New Zealand is permitted to use this surplus, the effectiveness a post 2020 target would be reduced.

Why is New Zealand's surplus of credits a problem?

Under currently implemented policies, New Zealand's Annex A GHG emissions from fossil fuels and industrial sources are expected to steadily increase to about **32% above 1990 levels by 2020**. Given the large magnitude of available surplus units and expected additional credits generated from LULUCF activities in CP2, it seems likely that New Zealand can meet its 2020 commitment without implementing any additional policies to reduce Annex A emissions by 2020. New Zealand's nominal 5% reduction in GHG emissions excl. LULUCF from 1990 levels by 2020 can be turned into an effective 30% plus increase through the use emissions trading and LULUCF accounting rules.

While reducing emissions, or increasing sinks, in the LULUCF sector is important, a pathway towards 2°C require decarbonisation of the world energy system. Real, substantial reductions in emissions from all sectors need to be made to set New Zealand on a pathway towards a decarbonised economy. New Zealand's use of LULUCF credits to mask a significant increase in other emissions is inconsistent with a global 2 degrees Celsius goal, and further appears to have removed any signal that could have assisted the increasingly carbon intensive energy system in New Zealand to pursue a low carbon, transformational pathway.

Current policy projections

With current policies in place in New Zealand, total national GHG emissions excl. LULUCF are projected to rise to 80 MtCO₂e by 2020 and 86 MtCO₂e by 2030.²⁸ This represents an increase in emissions from 1990 levels of 32% in 2020 and 42% in 2030. Forestry was projected by the Government in 2009 to change from producing net removals of emissions to becoming a source of emissions by around 2025, as relatively large areas of production forests planted in the 1990s are harvested. A challenge for New Zealand to meet its reduction targets is the growth in GDP, up 67% from 1990 to 2012. During this period, emissions in the energy sector have increased by 25%, mainly due to transport sector growth (58% growth between 1990 and 2012) and fossil fuel electricity generation, while emissions from the agricultural sector grew by 15% (CRF, 2014).

Climate policy developments in New Zealand since 2008 have tended to weaken rather than strengthen policy signals. New Zealand's main instrument to reduce greenhouse gas emissions is an Emissions Trading Scheme (ETS) (Ministry for the Environment, 2014; Government of New Zealand, 2011b). The ETS entered into force in 2008 and has been progressively weakened.²⁹ At present there is no cap on total emissions within New Zealand under the ETS, and it therefore does not regulate total emissions within a given period of time. This implies that there is no restriction on the supply of emissions units and hence there is no price signal constraining the overall level of emissions. The ETS is due to be reviewed later this year.

Forestry was the first sector to enter the ETS (in 2008), followed by liquid fossil fuels, stationary energy and industrial processes in 2010, and waste and synthetic greenhouse gas sectors in 2013. The agriculture sector (with a large share of methane emissions), responsible for around 50% of New Zealand's emissions, has been exempted from the ETS. A recent publication by the Government on New Zealand's contribution to the new climate agreement being negotiated under the Convention (Government of New Zealand, 2015) indicates that there are currently no plans to bring agricultural emissions under the ETS. The Government has stated that it is unlikely that the agricultural sector will be specifically targeted for delivering emission reductions in New Zealand's INDC. The Government's INDC consultation document argues that as no other country has yet put a direct carbon price on farmers, putting a price on agricultural emissions could potentially displace agricultural production in New Zealand with less efficient farming in other countries.³⁰

²⁸ The data used to calculate the current-policy-based trends are taken from the policy scenario from New Zealand's Sixth National Communication (Ministry of Environment, 2014).

²⁹ https://en.wikipedia.org/wiki/New_Zealand_Emissions_Trading_Scheme#Impacts_on_prices

³⁰ See <http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/climate-change-consultation-document.pdf>, Page 10: "New Zealand is a relatively efficient agricultural producer compared to other countries. As no other country has yet put a direct carbon price on farmers, such a price could potentially displace agricultural production in New Zealand with less efficient farming in other countries."

Data sources and assumptions

Pledge

Targets for 2020, 2030 and 2050 were calculated from the most recent national inventory submissions (CRF, 2014).

We note that our projection methods do not take into consideration the effects of forest maturation on LULUCF emissions, and therefore we currently consider our estimate to be an upper bound. New Zealand supports proposals to remove emissions from natural disturbances and to count removals from harvested wood products, which have not been accounted for here. This could lead to higher credits (or lower debits).

Current trends

The current trend projections are based on growth rates from New Zealand's Sixth National Communication (Ministry for the Environment, 2014) applied to the GHG inventory data (CRF, 2014).

In 2012 agriculture accounted for the largest share, about, 47% of New Zealand's emissions. Energy use (excluding transport) GHG emissions accounted for about 24% emissions whereas transport amounted to 19%. The largest sources of emission growth since 1990 in New Zealand are however transport, which accounted for 40% of the increase in emissions, agriculture about 28% and energy (non-transport) emissions 18% followed by industrial emissions at 14%. Whilst New Zealand argues that agricultural emissions are hard to deal with, and there is some merit to this, it's other sources of emissions growth can readily be addressed with appropriate policy frameworks and technologies. There are no policies in place to address the fastest-growing sources of emissions in New Zealand from transport and industrial sources. For the energy system, whilst it is predominantly hydro-and renewables, there is potential for further increasing renewable energy, and improving efficiency on the user end.

Sector	% of 2012 emissions	% of emissions growth since 1990
Transport	19%	40%
Agriculture	47%	28%
Industrial processes	7%	14%
Waste	3%	0%
Energy (excluding transport)	24%	18%
	100%	100%

IPCC AR4 Global Warming Potentials (GWPs)

Until this year, Annex I emissions inventory reporting has used the global warming potentials (GWPs) of the IPCC's second assessment report (SAR). Most INDCs, including New Zealand's, are based on the more up to date GWPs of the fourth assessment report (AR4). Estimates of the GWPs of methane, nitrous oxide, and many fluorinated gases

changed significantly between the two reports that affect the absolute values in accounting and target calculations. Due to the large contribution of emissions from the agriculture sector, a high proportion of New Zealand's emissions are in the form of methane and nitrous oxide. Under AR4 GWPs, CH₄ and N₂O contributed 43% and 13% respectively of New Zealand's total Annex A GHG emissions in 2005.

If New Zealand's INDC 2030 reduction target is calculated against their 2005 emissions using the more up to date (AR4) GWPs it is 58.6 MtCO_{2e}, 3.7 MtCO_{2e} higher than a target calculated using second assessment report GWPs. In all our calculations here we use second assessment report GWPs to ensure comparability with all countries and with earlier assessments. In addition the effort-sharing calculations are based on the older, second assessment report GWPs. The change in GWP's does not affect the percent reduction targets.

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Climate Analytics is a non-profit organization based in Berlin, Germany. It has been established to synthesize climate science and policy research that is relevant for international climate policy negotiations. It aims to provide scientific, policy and analytical support for Small Island States (SIDS) and the least developed country group (LDCs) negotiators, as well as non-governmental organisations and other stakeholders in the 'post-2012' negotiations. Furthermore, it assists in building in-house capacity within SIDS and LDCs. Contact:

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