

Office of the Minister for Climate Change Issues

Chair

Cabinet Economic Growth and Infrastructure Committee

New Zealand's intended contribution to the new global climate change agreement

Proposal

1. This paper seeks agreement to New Zealand's Intended Nationally Determined Contribution (INDC) under the new global climate change agreement.

Executive summary

2. This year countries are tabling contributions (INDCs¹) to a new global climate change agreement for the post-2020 period. All parties, including the major economies and emitters will be participating in the new agreement and New Zealand needs to play its part.
3. Developed countries are expected to show progression on their current targets. All developed countries other than Australia and New Zealand have announced targets under the new agreement. These cover all sectors and gases and represent greater emissions reductions than previous targets.
4. New Zealand currently has a target to reduce emissions to 5% below 1990 levels by 2020 across the whole economy. Our post-2020 target will need to improve on this to show progression.
5. I have considered a 'split target' with reduced coverage of the agricultural sector. This approach has some appeal from a domestic perspective as it takes account of New Zealand's challenges in reducing emissions and offers cost savings.
6. Withheld
[Redacted text]
7. New Zealand needs to set a target which is environmentally credible and reflects our particular circumstances. But we also need to consider the possible costs to our economy which are likely to be higher than for other developed countries.
8. I propose an INDC with an emissions reduction target of 10% below 1990 levels by 2030 across the whole economy. This shows sufficient progression and appropriately balances New Zealand's domestic and international interests.
9. Withheld
[Redacted text]

¹ Intended Nationally Determined Contributions

10. The Government consulted on the INDC in May and June this year and received a strong level of interest from the public, stakeholders and iwi. This paper presents some of the views expressed during consultation and how I have considered them in reaching my recommendation. I have asked officials to prepare a communications plan to announce the target domestically and internationally.

Background

11. Tackling climate change is crucial to avoid economic costs and harm to people and the environment. The Prime Minister's Chief Science Advisor, Professor Sir Peter Gluckman has provided a comment on the current status of science in this area (Appendix 5).
12. This year Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are tabling national 'contributions' to a new post-2020 agreement. These contributions will run to 2025 or 2030. The agreement is due to be concluded at a Ministerial Conference in Paris in December.
13. Securing an effective global response which limits temperature rise to two degrees Celsius is in New Zealand's interests. An international agreement with mitigation commitments by both developed and emerging economies is needed to achieve this. New Zealand will be expected to play its part in the global response.
14. Countries have agreed to submit INDCs to the new agreement well ahead of the Paris meeting. Countries have also agreed that contributions 'should demonstrate progression beyond current undertakings'.
15. New Zealand has a current target of 5% below 1990 levels by 2020 as well as a conditional target pledge of 10% to 20% below 1990 levels by 2020. Under the current target we take responsibility to reduce emissions across the whole economy, or purchase international units to make up the shortfall.
16. New Zealand faces challenges reducing its emissions domestically due to our significant agricultural emissions which have limited reduction opportunities. This means we have relied on credits from storing carbon in forests and international purchasing to meet a large part of targets to date.
17. The new agreement requires all Parties to commit and seems likely to attract greater participation than the Kyoto Protocol. The US has tabled its INDC and China has indicated what it will be tabling. Targets announced to date cover just over 50% of current global emissions. Appendix 2 provides a full list of country contributions to date.
18. On 30 March the Cabinet Strategy Committee gave initial direction on the form and level of New Zealand's post-2020 contribution (STR Min (15) 2/1 refers) and:
 - i. noted the need to balance a number of considerations, including New Zealand's international credibility, costs to the economy, the implications for the agriculture sector, and the nature of signals that would be sent to different sectors of the economy;
 - ii. Withheld

19. Public consultation on New Zealand's post-2020 target took place between 7 May and 3 June. Significant interest was expressed in New Zealand's target, with high attendance at most of the 15 public meetings and hui around the country. Over 16,000 formal submissions were received. I have considered the results of consultation alongside the other objectives for the INDC outlined in this paper.

Comment

Proposal

20. I propose New Zealand tables an INDC (see Appendix 1) which includes:
- A target to reduce New Zealand's emissions across the whole economy to:
 - **10% below 1990 emissions by 2030**
 - for ease of comparability with other countries this would be expressed as **-29% below 2005 by 2030**
 - Statements to the effect that:
 - The target will cover all sectors and gases and will be met by domestic emissions reductions, recognition of emissions and removals by New Zealand forests and the purchase of international carbon units
 - The INDC remains provisional pending finalisation of rules regarding access to international carbon markets and forestry accounting
 - There is a need for the development of commercially viable agricultural mitigation technology in order to deliver emissions reductions in this sector.
21. In developing this proposal I have considered
- the views of the public, iwi and domestic stakeholders
 - New Zealand's international interests, including the progression on our current target and comparability to other countries
 - costs to the economy including the agriculture sector, and
 - signals sent to different sectors of the economy.

Split target option

22. I have also considered an alternate 'split target' form with a different treatment for agricultural emissions. This split-target approach has some appeal from a domestic perspective given its possible cost savings compared to an economy-wide target. It also reduces the risk of a fiscal cost of international purchasing to offset agriculture's emissions over the 2020s². The level of cost-saving depends upon the degree to which agricultural gases are excluded³. I do not recommend this approach.
23. Arguments in support of this split target approach are that carbon dioxide emissions should be the immediate focus and that the world needs to increase food

² Assuming this cost is not put onto the agriculture sector or other emitters via the NZ ETS.

³ A variety of technical potential options exist to reduce the cost arising from agricultural emissions, including excluding specific gases (e.g. methane) or **Withheld**
However these approaches are not well-established under international rules.

production. Agricultural greenhouse gases (nitrous oxide and methane) have a stronger warming effect than carbon dioxide, but also have a shorter lifetime in the atmosphere. The accounting rules we use take into account these differences to factor in the relative 'harmfulness' of the different gases⁴. There are other potential accounting approaches which put less relative weight on methane but New Zealand has not gained traction in previous international negotiations on this issue.

24. New Zealand could build a case for a target to improve the emissions per unit of food produced rather than absolute reductions, supported by a strong narrative on our domestic circumstances and efforts in agricultural research. During consultation, the majority of agricultural sector submitters expressed support for a split target approach and some other submitters noted the importance of focusing on reductions in carbon dioxide.
25. Withheld
26. Withheld
27. Developed countries pledged that they would continue to lead the global effort in order to bring all emerging economies into an agreement that would apply to all. Major developing country economies are waiting to see developed country targets before tabling. Withheld
28. Rules relating to forestry accounting and international carbon markets will not be finalised as part of the primary agreement concluded in Paris. Withheld
29. Withheld
30. Withheld
31. A credible target also helps maintain New Zealand's role as a constructive 'solution finder' in UNFCCC negotiations. This means we can frame discussions and influence others' thinking in the negotiations. For example, making contributions nationally-determined under the new agreement has been key to getting countries to participate and is the result of a New Zealand proposal.
32. There will be greater global focus on our policy positions across the board, including the INDC, during the period of our Security Council membership. The new climate change agreement is the most significant multilateral negotiation now underway. If we don't submit an INDC that represents progression we risk losing our status as a

⁴ For example, under international rules one tonne of methane emissions is accounted for as 25 tonnes 'carbon-dioxide equivalents' and one tonne of nitrous oxide as 298 tonnes 'carbon-dioxide equivalents'.

'responsible global citizen'. Withheld

33. Agricultural emissions reductions will be needed globally in the long-term. Recent progress by New Zealand researchers on agricultural emissions technology is promising but we cannot know if or when it will deliver. A target excluding agriculture makes us less reliant on this technology, but puts more onus on the energy and transport sectors to deliver emissions reductions (although domestic policy decisions can be made independently of the target).
34. Without having confidence in how technology will progress, it is preferable to maintain an economy-wide target. This gives flexibility to use emissions reductions from wherever they cost least. This Withheld and help keep New Zealand at the global forefront of this work.

Comparison with other countries' targets

35. Targets announced by key developed countries are shown in Table 1. These targets represent progression on current undertakings by those countries although they collectively fall short of what's needed to put the world on a pathway to the global two degrees goal.
36. New Zealand and Australia are the only developed countries that have not announced targets. Australia has signalled an intention to table its contribution in July and Withheld Canada (an already tabled target of economy-wide emissions reduction to 30% below 2005 levels by 2030).

Table 1 Targets of some key developed countries

Developed country targets		Versus 1990 levels	Versus 2005 levels	Existing 2020 target
EU	-40% on 1990 by 2030	-40%	-35%	-20% on 1990
US	-26% to -28% on 2005 by 2025	-15%	-26% to -28%	-17% on 2005
Australia ⁵				-5% on 2000
Canada	-30% on 2005 by 2030	+2%	-30%	-17% on 2005
Japan	-26% on 2013 by 2030	-18%	-25%	-3.8% on 2005

37. New Zealand faces challenges in reducing emissions. Our emissions have increased more than those of most other developed countries since 1990 and we lack significant, low-cost opportunities to reduce emissions.
38. Factoring in these challenges means New Zealand could justify making relatively smaller emissions reductions than other developed countries. As a rough indication, a New Zealand target of +10% above 1990 levels would cost about the same as the

⁵ Australia has not yet announced its target. Withheld

EU target. A target costing the same as that of the US would be roughly +5% to -10% on 1990 levels.⁶

39. International and domestic commentators will look at other factors alongside cost when comparing targets, such as countries' historical emissions responsibility and per capita emissions. Comparisons made on this basis suggest a range of more ambitious targets for New Zealand (around 0% to -20% on 1990).

Costs

40. The estimated costs of delivering different targets are shown in Table 2. These are from economic modelling involving three leading New Zealand groups in the field. Appendix 3 provides estimated impacts on business sectors and households as well as caveats and assumptions around the cost estimates and sensitivities to key factors. These estimates exclude potential co-benefits and do not factor in any avoided damages from successfully mitigating climate change.
41. The modelling confirms New Zealand's challenges in reducing emissions⁷. This means that international carbon market access will be critical to control the costs of meeting a target.
42. Costs are hard to estimate with a good degree of certainty and the costs presented here are probably high-end estimates. The cost estimates provided by a second economic modelling group are about half as much⁸. This degree of uncertainty is common in international estimates of the cost of climate policy.
43. It's not yet clear what forestry rule sets will be internationally-acceptable. During consultation, forestry stakeholders highlighted the role of forests in reducing emissions. The rules we use will need to work domestically. I have instructed officials to establish the costs, benefits and feasibility of different rules as the basis for our negotiations following Paris.
44. It is possible that potential forestry rule options Withheld as could faster technological progress.

⁶ These figures are a rough guide only. They exclude the impact of forestry on New Zealand's net emissions, trade effects of carbon pricing and any potential co-benefits of reducing emissions.

⁷ This conclusion is also consistent with separate assessments of New Zealand's emissions reduction opportunities carried out by agencies.

⁸ Appendix 3 covers the differences in model assumptions that may explain this difference in results.

Table 2 Estimated cost of different economy-wide targets.

Target reduction on 1990 by 2030	Target reduction on 2005 by 2030	Annual cost (reduction in RGNDI ⁹ in 2027)
Current RGNDI		\$220bn
Projected 2027 RGNDI (business as usual)		\$299bn
-5%	-25%	\$3.5bn (1.18%)
-10%	-29%	\$3.7bn (1.23%)
-15%	-33%	\$3.9bn (1.32%) ¹⁰
-20%	-37%	\$4.1bn (1.37%)
-40%	-53%	\$5.0bn (1.66%)

Provisionality

45. Withheld
[redacted] I propose including wording in the INDC on 'provisionality' (Appendix 1, page 1).
46. This approach makes clear the INDC is provisional and reserves our right to adjust the target in the event our forestry and carbon markets rules assumptions prove incorrect through subsequent negotiations. Withheld
[redacted]
47. We will need to communicate supplementary information to the UNFCCC, ahead of the Paris meeting, on our assumptions for forestry and other land use accounting, once officials have assessed the best way to do this.
48. Withheld
[redacted]
49. When New Zealand ratifies the agreement we will submit a firm contribution that takes account of the final rule settings.
50. Withheld
[redacted]

Views of the public and domestic stakeholders

51. The Government consulted on the INDC in May and June this year and there was strong interest and sentiment expressed by the many who responded. I have considered the views expressed during consultation in reaching my recommendation. A brief summary of submissions received is included in Appendix 4.
52. Some of the main themes from the consultation were:
 - i. Climate change is seen as an important issue which the Government should address urgently to protect New Zealanders, future generations, and our Pacific neighbours;

⁹ RGNDI is Real Gross National Disposable Income – a measure of the size of the economy based on GDP but which better accounts for the cost of purchasing international units. Although percentage figures are given to two decimal places, they are not necessarily accurate to this degree of precision in absolute terms.

¹⁰ Figure is interpolated between other model results.

- ii. There was a strong call for an ambitious target and leadership from the Government (the most common target suggested by stakeholders was 40% below 1990 levels or a target of zero carbon by 2050);
- iii. Business and other stakeholders want greater involvement and engagement on climate change;
- iv. A large number of stakeholders, including from businesses and the primary sector, highlighted that a target needs to be underpinned by a long-term domestic plan;
- v. There were frequent requests for cross party consensus and an independent commission on climate change;
- vi. There was strong concern that the costs described in the discussion document were overly conservative and excluded possible benefits of acting and the costs of inaction.

Views of the Iwi Leaders Group and other iwi

- 53. Strong interest was expressed by iwi during consultation. The Iwi Leaders Group (ILG) asked for political leadership on climate change. The ILG proposes that any contribution should consider the Treaty of Waitangi.
- 54. They called for an ambitious target (at least 20% below 1990 by 2030) that is in line with EU, USA and China¹¹, allows a smooth transition to a low emissions economy and takes account of our particular domestic circumstances. The ILG consider domestic incentives for behaviour change are also important and stress the opportunities offered by the forestry sector.
- 55. The ILG are also concerned about the particular impacts of climate change and climate policy on Māori and want to work further with government on this, including support for vulnerable communities.
- 56. Other iwi submitters are also greatly concerned about climate change threats for their culture, environment, food sources and taonga and the potentially disproportionate impact on Māori households. An "ambitious target" was commonly suggested to protect vulnerable communities and future generations. They noted the need to transition the agricultural sector and the important contribution of forestry to the target.

Target level

- 57. The extra cost of marginally deeper targets (e.g. -10% vs -5%) is relatively small¹². On the other hand, New Zealand's costs are still at the high-end of those faced by developed countries.
- 58. Strong calls were received for an ambitious target from a large number of submitters during consultation. The response from business and agriculture stakeholders was more mixed. Some business stakeholders suggested an ambitious target; others including Business New Zealand suggested a more

¹¹ China has indicated its INDC will include a target of peaking its carbon dioxide emissions by 2030.

¹² This is firstly because of the substantial growth in New Zealand's emissions since 1990, which means the bulk of effort is to bring emissions back to 1990 levels. In addition, within the modelling setup used, around half the cost is borne regardless of New Zealand's target level. This cost arises from the projected slowdown in economic growth due to a global carbon price (see Appendix 3 for more details).

cautious approach to ensure the target is realistic and achievable and manages costs.

59. Calls for a highly ambitious target need to be balanced against the real economic costs which a target imposes across the population, regardless of their stance on climate change and I believe my recommended target achieves this.

60. Withheld

61. I recommend expressing the target as a reduction relative to 2005 levels. This makes the target more clearly comparable with others (the US and Canada) and

Withheld

Domestic arrangements

62. The NZ ETS is New Zealand's main domestic climate policy tool. I intend to initiate a review of the NZ ETS this year as a first step on work towards delivering the target. This could include setting the direction of travel for the NZ ETS to 2020 and beyond so that it evolves to meet our post-2020 commitments. I am still considering the exact scope, objective, process and timing of the review.
63. Work is continuing on supply management in the NZ ETS, including a possible function to auction New Zealand Units (NZUs). I have asked officials to undertake rigorous testing of the issues and problems to ensure that the Government makes the most appropriate intervention, if any, and to maximise the value of the \$4.1m Budget funding that has been provided for the work. It is important that this work is coordinated with the NZ ETS Review.
64. Delivering the INDC will require a broader examination of New Zealand's strategy to meet its targets. Consultation has revealed strong support for a plan or framework to help guide New Zealand's transition to a low carbon economy and many stakeholders wish to be involved in such work.

Conclusion

65. I have considered a range of options for New Zealand's target. Taking a split-target approach would suit New Zealand's national circumstances and we could attempt to justify it internationally. Withheld
66. If we tabled such a target and these risks came to pass then we could respond by revisiting our target form and level. However it is unlikely this would fully reverse damage to our international reputation. The value of this reputation is a political judgement call.
67. My recommended target represents progression but balances this against the need to manage costs on the New Zealand economy. I consider it sensible to preserve our international reputation and negotiating influence at this critical stage in negotiations.
68. There are substantial uncertainties in the level of cost of any target and there are several factors which could give cost-savings. Nonetheless a future government may consider the costs of delivering the target too high and could choose to revisit

it. **Withheld** Any cost savings would need to be balanced against the resulting reputational damage at that time.

Next steps

69. I propose to announce and then formally table the INDC in July.
70. We may be in a position to update the INDC before Paris with more detail on our proposed forestry rules. This will help reserve our right to amend the target before ratifying if our rule assumptions prove incorrect.
71. I plan to come back to Cabinet in the coming months on the objective, scope and timing of the NZ ETS Review and coordination with NZ ETS supply management work.
72. I intend to continue a dialogue with stakeholders on options for approaches to domestic climate change policy which could provide more structure and certainty.

Financial implications

73. There are no immediate financial implications from the proposals in this paper. Generally accepted accounting practice sets several tests for when an obligation must be recognised in the Crown accounts. In general, an emissions target would be recognised when there is a legally enforceable obligation on the Crown to expend resources to meet the target. Officials do not consider that taking a target under a new international agreement before it enters into force would meet these tests.
74. Whether the tests are met following New Zealand's ratification of the Agreement and its entry into force will depend in part on the content of the Agreement, such as the degree to which the target is binding. It will also depend on the enforceability of the target. If the target was put into domestic legislation, for example, the target may need to be recognised in the Crown accounts if the legislation also created enforceable obligations on the Crown to meet it. Advice on any financial implications of decisions to sign and ratify the new Agreement, or to put the target in legislation, can be provided at the time those decisions are considered.

Consultation

75. The following agencies have been consulted on the contents of this paper: the Ministry of Foreign Affairs and Trade (MFAT), the Treasury, the Ministry for Primary Industries (MPI), the Ministry of Transport (MoT), and the Ministry of Business, Innovation and Employment (MBIE).
76. Full departmental comments are provided in Appendix 6. Summaries of agency positions are provided below.
77. MPI supports the proposition. It also considers it unlikely that progress in agricultural mitigation technology will be sufficient to reduce target costs. **Withheld**
Withheld
Withheld
Withheld
78. Treasury does not support the proposition. Treasury suggests further work is needed to test the key assumptions about impacts on New Zealand's negotiating influence and broader international interests. In particular, there would be value in testing the extent to which New Zealand would lose negotiating influence if we

pursued a different option. Furthermore, many countries in the negotiations have a strong interest in markets and forestry rules so these are likely to form part of the Agreement. The likelihood and cost of any damage to broader foreign policy interests is also unclear. Treasury recommends additional analysis of potential options that could lower the overall costs. Treasury considers that a split target option may be in New Zealand's best interests. This approach can credibly be argued to demonstrate progression from our current target, since carbon dioxide is the main driver of climate change. New Zealand would have flexibility [Withheld] to improve New Zealand's negotiating position should carbon market access not be secured.

79. MFAT strongly supports the proposition. MFAT considers it critical we have influence at this juncture of the negotiations. Tabling a target that did not represent a progression beyond our current -5% undertaking would severely impact our influence. [Withheld]
[Withheld]
[Withheld]
[Withheld] It is important the INDC is "provisional" in relation to land sector and market rules, until New Zealand ratifies the Paris agreement. [Withheld]
[Withheld]
[Withheld] MFAT considers further delay in tabling New Zealand's INDC should be avoided if at all possible.

80. The Department of Prime Minister and Cabinet has been informed of the paper.

Human rights

81. There are no inconsistencies between the proposals in this paper and the Human Rights Act 1993.

Recommendations

82. The Minister for Climate Change Issues recommends that the Committee:
1. note that Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are tabling contributions this year to the 2015 global agreement, comprising greenhouse gas emission reduction targets and supporting actions for the post-2020 period
 2. agree to announce and table the attached draft Intended Nationally Determined Contribution (INDC), including a target to reduce New Zealand's emissions to 10% below 1990 emissions by 2030, expressed as 29% below 2005 levels
 3. note that the recommended target appropriately manages New Zealand's domestic and international interests
 4. note that in reaching this recommendation the Minister for Climate Change Issues has considered the views expressed in public consultation
 5. note that the Minister for Climate Change Issues plans to announce the target in July
 6. note New Zealand will formally table the INDC with the UNFCCC shortly after the announcement

7. note that officials will prepare the final version of the INDC based on the attached draft, revised as necessary to reflect Cabinet's decisions and any minor editorial changes
8. authorise the Minister for Climate Change Issues to approve the final version of the INDC for tabling with the UNFCCC
9. authorise the Minister for Climate Change Issues to communicate, prior to the December Paris ministerial climate conference, supplementary information to the UNFCCC on New Zealand's proposed approach to forestry and other land use accounting
10. note that a communications plan will be prepared for announcing and tabling the INDC
11. note that a consistent theme emerging from consultation is the need for a planned approach to domestic emissions reductions which provides more structure and certainty
12. invite the Minister for Climate Change Issues to return to Cabinet on the objective, scope, and timing of the 2015 Review of the New Zealand Emissions Trading Scheme (NZ ETS) and supply management in the NZ ETS
13. note that the Minister for Climate Change Issues intends to continue a dialogue with stakeholders on options for approaches to domestic climate change policy which could provide more structure and certainty
14. note that the submissions from public consultation, a summary of the public meetings, and this cabinet paper will be proactively released

Hon Tim Groser
Minister for Climate Change Issues

____ / ____ / ____

Note for public release

Appendices 1 and 4 are not included in the version of the paper for public release. Appendix 1 is a draft of New Zealand's Intended Nationally Determined Contribution. Appendix 4 is a draft of the summary of submissions received during consultation. Both of these are superseded by final versions which have been published separately.

Appendix 2 – Comparability analysis

1. Table 1 shows the targets included in INDCs announced so far and an assessment of their progression on current undertakings.

Table 1 Targets announced so far under the new agreement

Country	Target	Emissions coverage	Progression on current target?	
			Target level (versus same base year)	Target form
European Union	40% below 1990 levels by 2030	100%	Greater reductions	Same
United States	26-28% below 2005 levels by 2025	100%	Greater reductions	Same
Australia ¹				
Switzerland	50% below 1990 levels by 2030	100%	Greater reductions	Same
Norway	40% below 1990 levels by 2030	100%	Greater reductions	Same
Canada	30% below 2005 levels by 2030	100%	Greater reductions	Different forestry treatment
Japan	26% below 2013 levels by 2030	100%	Greater reductions	Unclear
Liechtenstein	40% below 1990 levels by 2030	100%	Greater reductions	Same
Russia	25-30% below 1990 levels	100%	Greater reductions	Softening of conditions
China	CO ₂ emissions peak by 2030	>80%	n/a	Intensity to absolute
Morocco	13% below BAU in 2030	99.7%	n/a	First GHG target
Andorra	37% below BAU in 2030	98.5%	n/a	First GHG target
Gabon	50% below BAU in 2025	~99%	n/a	First GHG target
Mexico	22% below BAU in 2030	100%	n/a	Conditional to unconditional

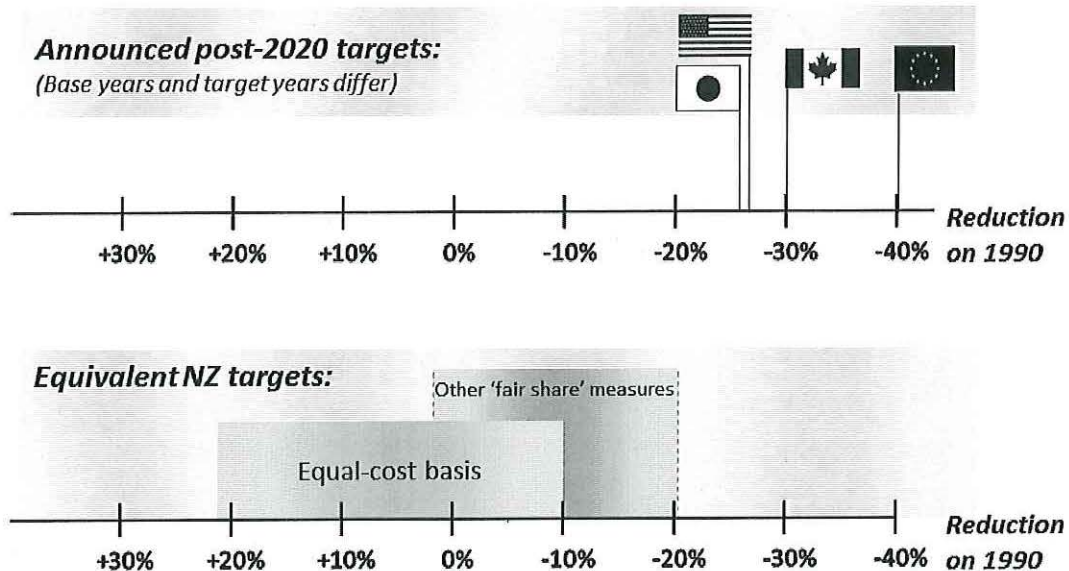
Sources: Ministry for the Environment; modelling by Landcare Research; Climate Action tracker, 2015; World Resources Institute, 2015; United Nations Framework Convention on Climate Change, 2015

2. Because each country has unique national circumstances, their targets cannot be directly compared. There are different ways to compare targets which take account of these country differences. Four methods have been used in the analysis shown in Figure 1:
 - i. 'Equal cost'
 - ii. Equal per capita emissions by 2050
 - iii. 'Historical responsibility' (equal effort based on 1990-2012 emissions)
 - iv. Equal reduction from 'business as usual'

¹ Australia has not yet announced its target. Withheld

- These methods cover the key concepts generally used for comparability analysis in international literature and are some of those likely to be applied by other countries assessing New Zealand's target.

Figure 1 Other countries' targets and New Zealand targets which are 'equivalent' according to different methods.



- The equal cost method suggests that New Zealand targets around +20% above to -10% below 1990 levels would be equivalent to those of key developed countries. The other three fair share measures suggest a range of more ambitious targets on or below 1990 levels.
- New Zealand's costs for a given target are generally higher as a proportion of GDP than for other developed countries. This is primarily because New Zealand's emissions have increased more than most since 1990, and remain on an upward trajectory, in part due to our population growth being at the high-end of OECD countries. In addition, the average cost of emissions reductions is higher for New Zealand.

Appendix 3 – Economic modelling

How costs are estimated

1. Costs are estimated by Computable General Equilibrium models which simulate the effect of a global carbon price rising to \$50 in 2030 on economic growth and emissions. The balance of emissions reductions required for a target is supplied by international purchasing. The models capture both the direct cost and the flow-on economic effects of domestic reductions and international purchasing. The economy continues to grow under all targets examined. The value of the reduction in economic growth represents the cost of the target (Figure 2).
2. Agriculture is not priced in the models but its emissions are accounted for under the economy wide target (but not the split target). Forestry emissions and removals are not factored into these costs as they could increase or reduce the cost depending on the forestry rules applied. There is assumed to be no free allocation, '1 for 2' measure or price cap present in the NZ ETS.

Table 2 Target cost estimates according to two different models. Targets are for 2030.

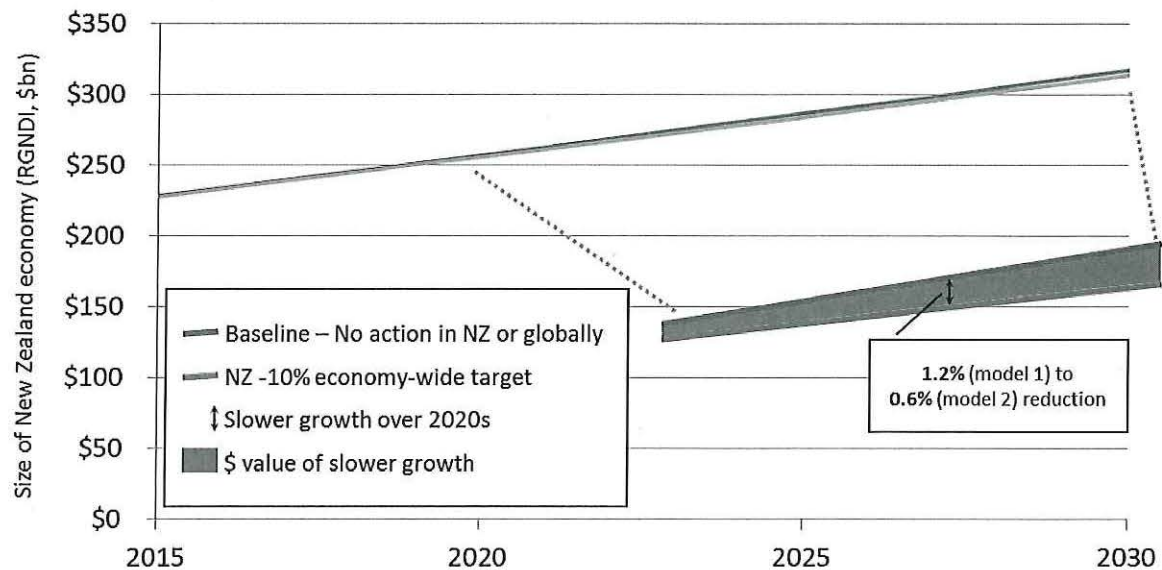
Scenario		Reduction on 1990	Reduction on 2005	Annual cost as reduction in RGNDI	
				Model 1 (Infometrics) (2027)	Model 2 [‡] (Landcare) (2020 average)
Current RGNDI				\$220bn	
Projected 2027 RGNDI (business as usual)				\$299bn	
Economy-wide target		-5%	-25%	\$3.5bn (1.18%)	\$1.7bn (0.56%)
		-10%	-29%	\$3.7bn (1.23%)	\$1.8bn (0.59%)
		-15%	-33%	\$3.9bn [†] (1.32%)	
		-20%	-37%	\$4.1bn (1.37%)	\$1.9bn (0.63%)
		-40%	-53%	\$5.0bn (1.66%)	\$2.2bn (0.74%)
Target for non-Ag emissions		-10%*		\$2.3bn [†] (0.78%)	\$1.2bn [†] (0.40%)
	No carbon markets	-10%		~\$7bn	

*This is equivalent to an economy-wide target of +22% above 1990 levels.

[†]Results for these scenarios have been interpolated from other model runs.

[‡]Model 2 predicts higher baseline economic growth than Model 1. The results presented have been adjusted to show reductions from the same economic baseline.

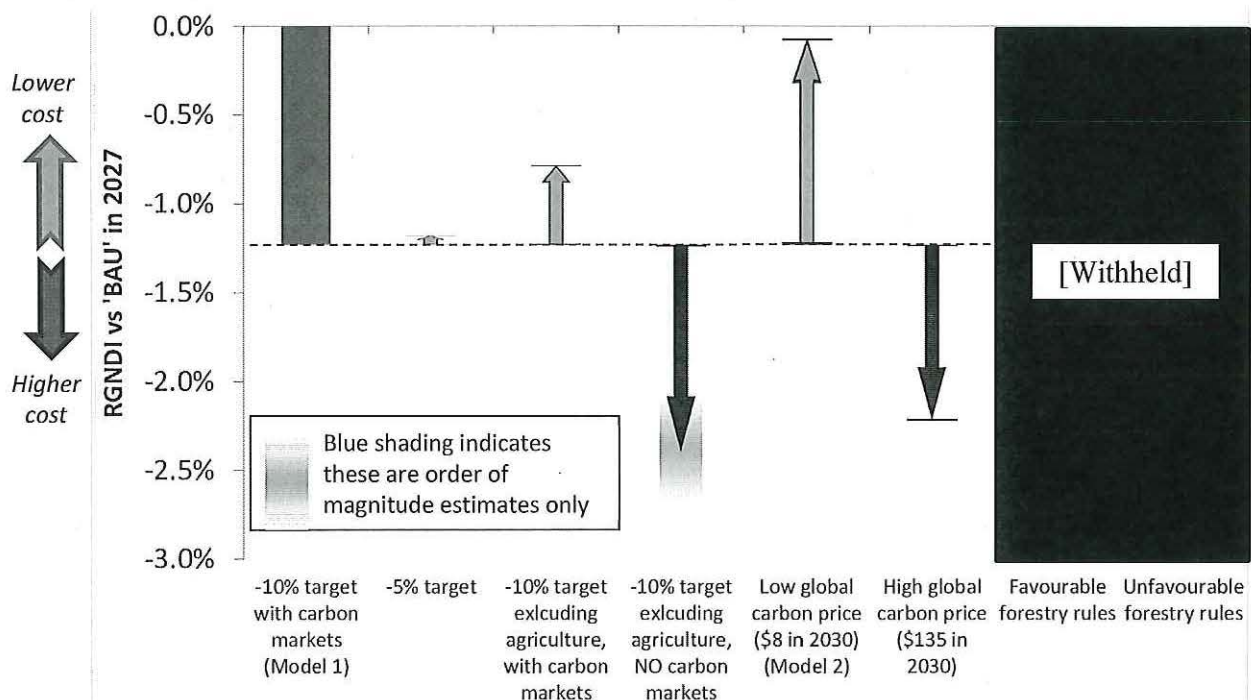
Figure 2 The effect of meeting a target on economic growth and how target costs are calculated (stylized representation)



Different factors affecting costs

- Figure 3 shows that costs are highly sensitive to a number of factors, some of which are highly uncertain (e.g. access to carbon markets, global carbon price and forestry rules).

Figure 3 The impact of different factors on the cost of a -10% on 1990 target



4. A split target which excludes agriculture would be cheaper than an economy-wide target by around 32%-36% (at a \$50 carbon price), assuming access to carbon markets is achieved. This is because it reduces the need to offset a proportion of emissions with international purchasing². There would be additional costs not included here relating to any separate agricultural target (e.g. a commitment to improve the amount of food produced per unit of emissions).
5. Losing access to carbon markets would likely require a domestic carbon price significantly higher than the rest of the world to deliver even a target excluding agriculture (in the approximate range \$300 per tonne). This would mean a severe loss in competitiveness leading to an estimated drop in exports of 5% versus BAU and a substantial increase in target cost (estimated by Model 1 at -2.4% RGNDI versus 0.8% with carbon markets for a -10% target excluding agriculture)³.

Costs for households

6. Estimated costs for households are provided in Table 3. These figures are the impact on annual household consumption in 2027, for an average household, based on a \$50 carbon price⁴.

Table 3 Impact of different targets on households

Target reduction on 1990 by 2030 (Economy-wide)	Reduction in average annual household consumption in 2027
Current household consumption	\$73,000
2027 consumption with no target	\$85,000
-5%	-\$1,269 ⁵
-10%	-\$1320
-15%	-\$1392
-20%	-\$1465 ⁶
-40%	-\$1771

Note for public release
A correction has been made to these figures meaning they differ from those shown in the paper lodged with Cabinet Office. Ministers were provided with these corrected figures prior to Cabinet's decisions on the INDC

² Note that the estimated reduction in costs (36%) is smaller than the agriculture's proportion of emissions (50%). This is because, within the modelling framework used, some economic costs are assumed to be borne regardless of New Zealand's target level. These costs result from the slowing of economic growth when a price is put on carbon (globally and in New Zealand). This effect constitutes 0.4 to 0.5 percentage points (i.e. around half) of the costs presented in this paper for a \$50 carbon price. This is similar to international modelling results of 0.5-1% reduction in global consumption versus BAU presented by the IPCC for a similar price path (IPCC WGIII, Technical report, Figure TS.12, interquartile range for 530-580 ppm CO₂eq scenario).

³ Carbon markets have a similar economic impact in Model 2 (without markets a \$190 domestic carbon price is required to meet a target of +10% above 1990 economy-wide, and exports decline by 2%).

⁴ Assumed ETS settings are that emitters must submit units to the Crown to cover all their emissions. If the Crown receives units in excess of those required for the international target then it is assumed this is recycled to reduce income tax so that there is no net effect on the Crown's fiscal position.

⁵ The -5% figure is provided to greater precision to show the difference to the -10% figure, though the figures are not necessarily accurate to this degree in absolute terms.

⁶ Note that this figure differs from that used in the discussion document (\$1400) as a higher precision model run is now available.

Impacts on business sectors

7. The most heavily-impact business sectors are those with high emissions. Table 4 shows the reduction in output for some of these sectors. This is likely to translate as slower growth rather than a reduction in absolute terms. Distribution of impacts will depend strongly on the ETS settings adopted. The figures presented assume emitters (except agriculture) face a \$50 carbon price on their entire emissions base.

Table 4 Impacts on business sectors

Industry sector	Impact on gross output in 2027 of -10% target, \$50 carbon price
Coal mining	-5.1%
Oil and gas extraction	-2.7%
Other mining and quarrying	-1.7%
Petroleum refining	-3.4%
Industrial chemicals	-1.5%
Electricity generation	-2.8%
Electricity transmission	-1.6%
Sewerage and waste	-2.2%
Air transport	-1.5%

Components excluded from costs

8. The cost estimates exclude the benefits of successful climate change mitigation over the second half of the century which would be expected at higher carbon prices. Although a high international carbon price means higher costs for New Zealand in the 2020s it is also consistent with concerted action by the rest of the world to tackle climate change⁷. A \$135 global carbon price in 2030 corresponds with a likely chance of limiting warming to two degrees⁸.
9. These cost estimates also exclude potential co-benefits or adverse side-effects of climate policy such as impacts on air quality and energy security. These effects are uncertain as they depend on what domestic actions are taken to meet a target and the interaction with non-climate policies. They could materially decrease or increase the net cost of a target but are unlikely to differ with the level of target taken.
10. No radical technology change is included in these costs. Factoring in an optimistic rate of technology improvement (but not radical change) reduces the estimated cost by around 20% (Model 2).

Why do the two models give different results?

11. Model 2 estimates costs at about half the level for Model 1. The results presented in the body of the paper are from Model 1 which is a prudent approach. Analysis suggests that four key differences may contribute to Model 2 giving lower costs:

⁷ Note that such a high international carbon price could in theory arise for other reasons than concerted global action, so it is not prudent to include these avoided climate damage costs in estimates.

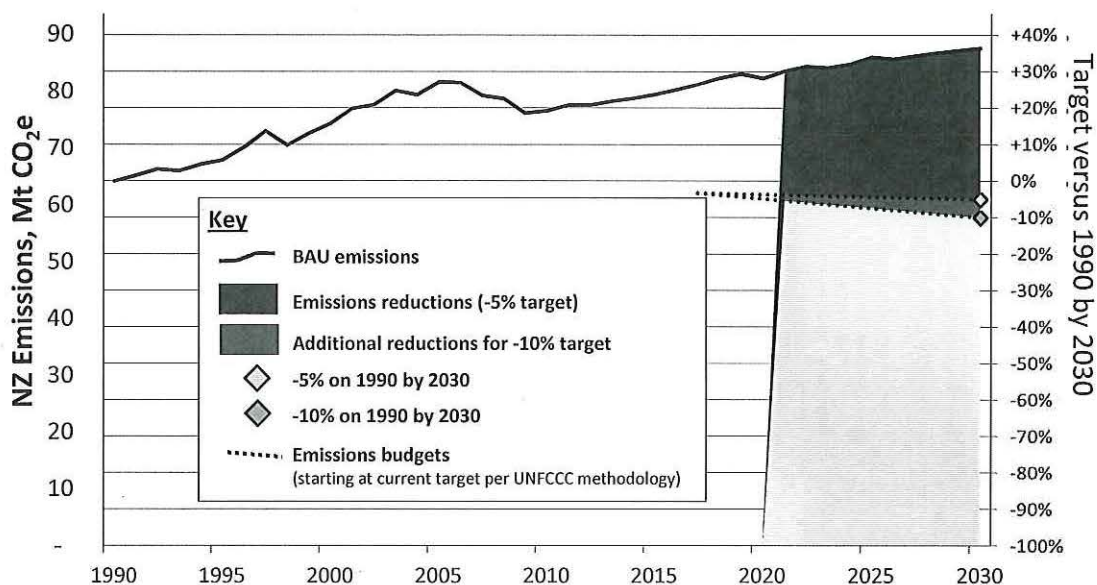
⁸ A \$50 global carbon price in 2030 corresponds with a likely chance of limiting warming to three degrees Celsius.

- i. Model 2 assumes investors have 'perfect foresight' about the rising carbon price and can plan their investments accordingly;
 - ii. Model 2 has a greater amount of 'cheap' emissions reductions available from switching from fossil to renewably-generated electricity (explaining approximately one-third of the model difference);
 - iii. Model 1 predicts a significant drop in capital investment due to the carbon price; Model 2 predicts a smaller drop because investors are willing to accept some reduction in the rate of return on capital instead;
 - iv. Model 2 permits a greater deterioration in New Zealand's current account balance over the commitment period due to the purchase of (i.e. import of) overseas carbon credits.
12. The models give similar order of magnitude results even though they differ significantly in their underlying structure and assumptions. This helps validate the cost estimates are reasonably accurate.

Why is the additional cost for deeper targets relatively small?

13. Firstly, New Zealand's gross emissions will be around 36 per cent above 1990 by 2030 under 'business as usual' projections. This means the bulk of effort required for a given target is to bring emissions back to 1990 levels (Figure 4).
14. Secondly, within the modelling framework used, some economic costs are assumed to be borne regardless of New Zealand's target level. These costs result from the slowing of economic growth when a price is put on carbon (globally and in New Zealand). This effect constitutes 0.4 to 0.5 percentage points (i.e. around half) of the costs presented in this paper for a \$50 carbon price (Model 1). This is similar to international modelling results of 0.5-1% reduction in global consumption versus BAU presented by the IPCC for a similar price path⁹.

Figure 4 An illustration of the additional emissions reductions required for a target of -10% vs -5% on 1990



⁹ IPCC WGIII, Technical report, Figure TS.12, interquartile range for 530-580 ppm CO₂eq scenario.

Appendix 5 – Comment from the Prime Minister’s Chief Science Adviser, Professor Sir Peter Gluckman, on the current state of scientific knowledge on climate change

“I released my report ‘New Zealand’s changing climate and oceans: The impact of human activity and implications for the future, an assessment of the current state of scientific knowledge’ in July 2013. My report provided New Zealand with an update on the current scientific understandings of climate change and the ways in which it is likely to affect New Zealand over coming years and decades. My report stated:

‘An inherent feature of climate change science is its complexity and it must deal with many unknowns. Considerable research into the effects of greenhouse gases has been undertaken globally and, despite inevitable uncertainty, there is a very high scientific consensus regarding the likely magnitude, approximate timing of and the nature of the challenges ahead. It would be highly imprudent to ignore such projected scenarios just because they must be expressed in terms of probabilities rather than certainties. It is important to apply an understanding of uncertainty and of risk and their management to address this challenge and this means using the available and accumulating evidence appropriately. Just because there is an inherent level of uncertainty does not obviate the probability of impactful climate change and the need to be proactive in addressing it through mitigation and adaptive strategies.’

My report is consistent with the IPCC findings, which were subsequently released in 2014. IPCC found that there is increased certainty that anthropogenic greenhouse gas emissions are causing climate change; that we have a fixed budget of allowable remaining emissions; and that limiting climate change will require substantial and sustained reductions of greenhouse gas emissions of the order of 40 to 70% global anthropogenic GHG emissions reductions by 2050 compared to 2010.”

Appendix 6 – Full departmental comments

Ministry for Primary Industries

1. MPI's view is that tabling an INDC **Withheld** is an appropriate way forward at this point. MPI notes, however, that it is unlikely that agricultural technologies will be sufficiently advanced to reduce the cost of the target on the New Zealand economy by the time of ratification of the NDC or even during the commitment period.
2. **Withheld**

Treasury

3. The paper's key argument in favour of the proposed target is that a less stringent target, or one that does not cover all of New Zealand's emissions, would have greater overall costs stemming from:
 - a. a loss of influence in the climate change negotiations **Withheld**
 - b. greater direct economic costs arising from this loss of influence; and
 - c. negative impacts on New Zealand's wider foreign policy interests.
4. Assumptions underlying this judgement are presented in the paper, but the uncertainties about their likelihood and impacts are not. Three key assumptions, with Treasury comment (in italics), are as follows:

1. New Zealand would lose negotiating influence by taking a less stringent target than proposed.

Precedent suggests this is not a given, or that the impact may be temporary. For example, New Zealand declined to take its pre-2020 target under the Kyoto Protocol in 2012. This had some impact at the time, but has not prevented us from pursuing our key negotiating priorities for the post-2020 Agreement since then.

2. Losing negotiating influence jeopardises New Zealand's chances of **Withheld**, which would increase the costs of the target.

Many countries in the negotiations have a strong interest in markets and forestry rules, so these are likely to form part of the Agreement regardless of the target

New Zealand takes. Withheld

3. A less stringent target could damage New Zealand's wider foreign policy interests.

It is unclear how likely this is, what the impact would be, or whether the costs are greater than the costs of meeting the proposed target.

5. Treasury recommends that Ministers seek further advice to test the uncertainties surrounding these assumptions, and in light of this advice, additional analysis of potential options that could lower the overall costs.
6. Based on the balance of risks given the current information available, Treasury considers that a split target may be in New Zealand's best interests. A split target would still cover all of New Zealand's emissions (including from the agricultural sector), but prioritise carbon dioxide reductions in the short-term. The key arguments in favour of a split target are:
 - a. Since carbon dioxide is the main driver of climate change, more stringent targets for carbon dioxide can credibly be argued to demonstrate progression from our current target.
 - b. The costs of achieving a split target would be considerably lower, although there could be greater risk of Withheld
 - c. If this risk materialises in a way that would increase the costs of the split target above those of the proposed target, Ministers would have flexibility Withheld to improve New Zealand's negotiating position.

Ministry of Foreign Affairs and Trade

7. MFAT believes it is critical we have influence at this juncture of the negotiations to maximise the prospects of securing unfettered access to carbon markets and land sector accounting rules that are sufficiently flexible to accommodate our circumstances. These are the key determinants of the cost of any target.
8. Our interests in this aspect of the negotiations are distinct. Withheld
9. Tabling a target that did not represent a progression beyond our current -5% undertaking would severely impact our influence in these negotiations. This was clearly demonstrated when New Zealand declined to take its pre-2020 target under the Kyoto Protocol in 2012, in response to which a decision was taken to exclude us from the Kyoto carbon market.
10. Withheld

Withheld

That we demonstrate full commitment to the success of this negotiation is unquestionably central to countries that are important to us. By contrast, the costs of meeting the target are highly uncertain at this stage. The limitations of the modelled impacts on the New Zealand economy are well established. Withheld

11. To this end, in framing New Zealand's INDC, it is important to provide reassurance that New Zealand intends to take and meet a target that demonstrates progression beyond our current undertaking. It is important the INDC is "provisional" in relation to land sector and market rules, until New Zealand ratifies the Paris agreement. Securing an ability to make technical adjustments to the INDC depends on disclosing rules assumptions in sufficient detail to be able to later demonstrate these are assumptions are invalid - should this be necessary. If New Zealand does not make this disclosure with the initial tabling of the INDC then it will need to do so subsequently, ahead of the INDCs being recognised by the Paris COP (after which we judge it will be too late to introduce assumptions). Withheld

12. MFAT considers further delay in tabling New Zealand's INDC should be avoided if at all possible. New Zealand is very close to being the last developed country to table our INDC. Australia has not yet done so, Withheld International scrutiny (already significant) would increase markedly if we delayed tabling beyond that point.