

Nationally Determined Contribution Options

NDC Objectives

Officials have prepared preliminary advice on options for New Zealand's NDC on the basis of three overarching objectives. These objectives are that the NDC should:

1. Be domestically and internationally credible,
2. Manage costs and broader impacts on New Zealand, and
3. Promote long-term domestic and international emissions reductions and be durable to changing circumstances

Three options for the form of New Zealand's NDC target are presented (A, B and C). Each provides different outcomes against the objectives.

Target form, level and cost

Target form

Three options for target form are presented in this and attached papers. These three options are shown below with a brief description and key messages. Further variations are possible, including 'hybrid' options which combine aspects from these options.

Form A: Carbon budget for whole of economy

Form B: Carbon budget for non-agricultural emissions plus intensity-based approach for agriculture

Form C: Carbon budget for long-lived gases plus stabilisation target for short-lived gases

Cost drivers

Figures presented in this and attached papers are indicative costings from initial economic modelling. These figures are likely to change as they are refined over the next few months through further rounds of modelling. It is assumed that New Zealand chooses the least-cost mix of domestic emissions abatement and international purchasing according to the prevailing international carbon price.

A number of factors drive the cost of delivering New Zealand's NDC. The assumptions made against these factors are listed at the end of this document

The main factors largely under NZ's control are:

- *Target form* – this determines how much of its total greenhouse gas emissions New Zealand takes responsibility for;
- *Target level* – this is the 'headline number' which New Zealand announces (e.g. x% below 1990 by 2030);
- *Base year* – Varying the base year for emissions reductions (e.g. changing from 1990 to 2005);
- *Adding Sub-targets* for specific economic sectors;

Domestic policy settings, including whether agricultural emissions are priced. These settings determine how much domestic mitigation is used to deliver a target are also an important factor for costs. These do not necessarily need to be decided at the time the target is tabled.

Factors over which NZ has less, or no control are:

- *Accounting rules applied* – these determine how emissions are accounted for to calculate our total liability;
- *International carbon price* – this determines the cost of purchasing international offsets;
- *Domestic actions by our trade competitors* – determines the relative competitiveness of New Zealand's exports;

Costs of Options A, B and C

Economic modelling suggests that it is possible to meet a wide range of 2030 emissions reduction targets, while continuing to grow the economy. More ambitious targets mean that the economy grows marginally more slowly than under ‘business as usual’ projections due to investment in domestic abatement measures and purchasing of international offsets. The costs of targets in this paper are presented as a percentage of 2030 GDP.

Table 1 shows the estimated cost of achieving different targets at different international carbon prices. Costs have been estimated for the carbon budget component of each target only. The *agricultural intensity target* under Option B and the *short-lived gas stabilisation target* under Option C are likely to incur additional costs to those shown here associated with domestic actions to deliver the target.

Table 1 – Estimated cost of different targets at different carbon prices

	Estimated Cost as % 2030 GDP ¹ [Costs shown for Carbon budget component only]					
	Option A		Option B		Option C	
Carbon price (in 2030):	\$50	\$150	\$50	\$150	\$50	\$150
5% below 1990 by 2030	0.32%	0.92%	0.16%	0.41%	0.18%	0.49%
20% below 1990 by 2030	0.43%	1.2%	0.20%	0.56%	0.23%	0.65%
40% below 1990 by 2030	0.56%	1.6%	0.27%	0.75%	0.31%	0.87%

For a given headline target number, the costs for Options B and C are lower than Option A. This is because the treatment of some or all agricultural emissions under Forms B and C has the effect of reducing New Zealand’s total liability. This means that more ambitious headline numbers could be tabled for roughly equivalent cost. Table 3 shows some equivalent-cost targets across the three target form options.

Table 2 - Equivalent-cost targets across different target forms

	Equivalent-cost targets [Costs for Carbon budget component only]		
	Option A	Option B	Option C
Target (% change on 1990)	-5%	-60%	-45%

Impact of varying base year

Changing to a more recent base year than 1990 for a target means a given amount of emissions abatement corresponds to a larger headline number. This means that it is possible to construct targets which have approximately equivalent costs and headline numbers across all target forms as shown in Table 2².

Table 3 - Example of impact of changing base year on estimated target cost

	Option A (1990)	Option A (2005)	Option B (1990)	Option C (1990)
Headline	-20%	-20%	-20%	-20%
Base Year	1990	2005	1990	1990
Cost @\$50 (%2030 GDP)	0.4%	0.3%	0.2%	0.3%

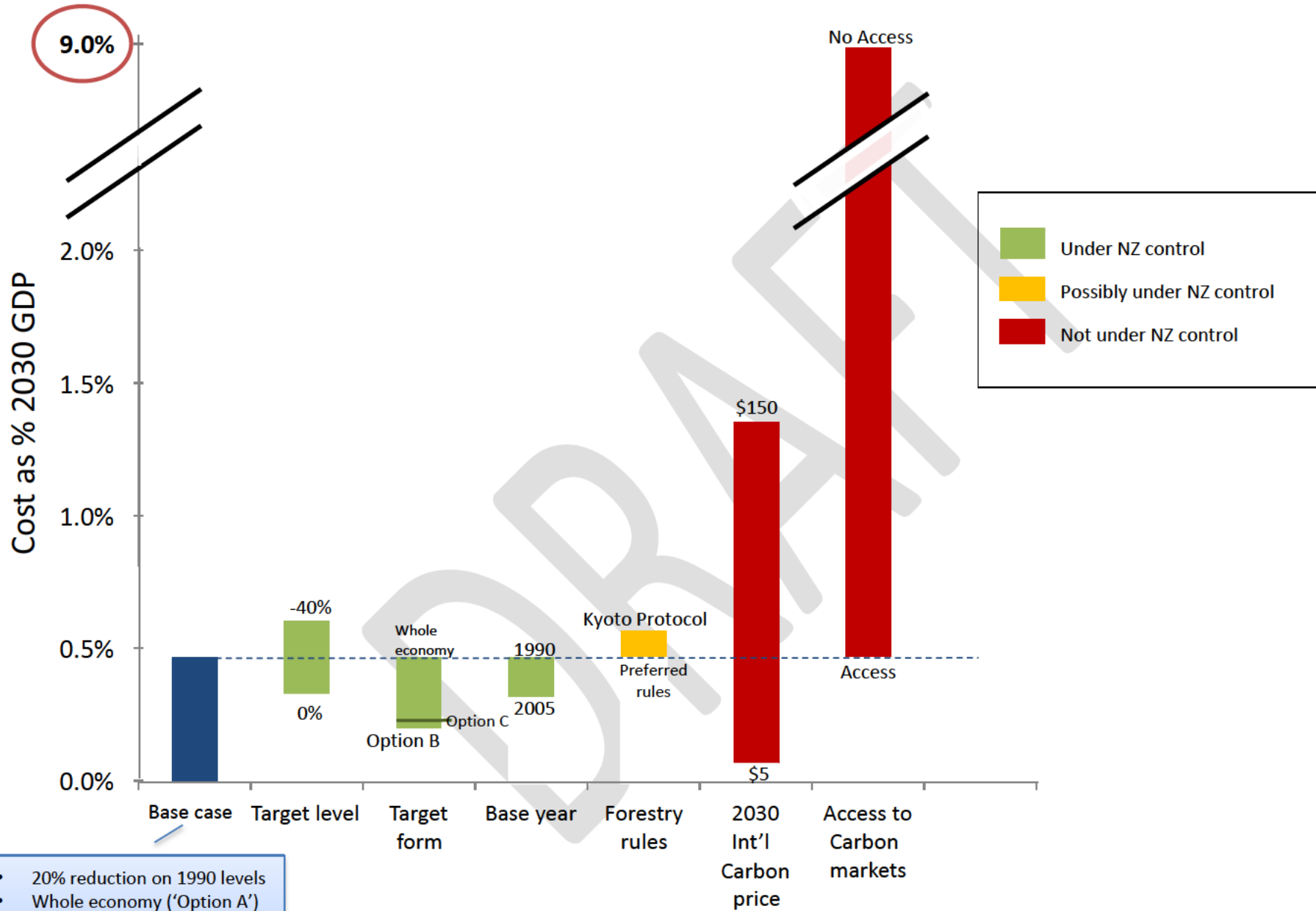
Sensitivity analysis

Figure 2 on the next page shows a sensitivity analysis across some of the multiple factors affecting costs. This demonstrates the relative importance of different factors for the cost of an NDC. Due to the large proportion of international purchasing required to deliver New Zealand’s contribution, market access and the carbon price are by far the most significant factors, although both are outside of NZ’s control.

¹ Costs are given to two significant figures in order to illustrate the relative costs of different target levels. However, this almost certainly overstates the precision with which these numbers can be confidently stated.

² Note relatively small difference between the costs of the targets shown in Table 2 increases at higher carbon prices

Figure 1 - Sensitivity analysis of multiple factors on target cost



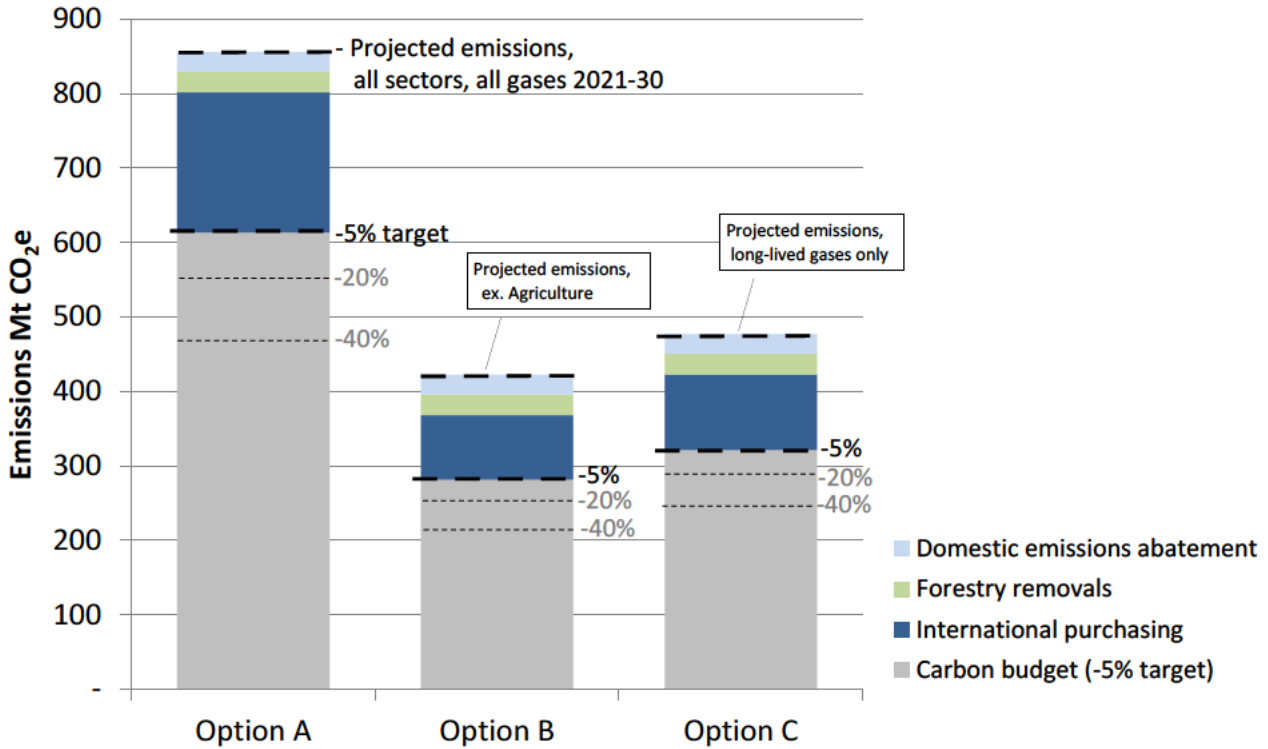
- 20% reduction on 1990 levels
- Whole economy ('Option A')
- Preferred forestry rules
- \$50 carbon price in 2030
- Full market access
- No price on agriculture

Target level

Figure 2 shows the level of emissions abatement required to meet a ‘headline target’ of -5%, -20% or -40% on 1990 levels by 2030 across target forms A, B and C. The split of abatement between domestic emissions abatement, forestry removals and international offset purchasing is also shown.

International purchasing is likely to comprise the majority of emissions reductions as it is likely to be cheaper than most domestic abatement at the \$50 carbon price assumed in these calculations

Figure 2 - Abatement required for different target forms and levels (assuming a \$50 2030 international carbon price)



Sub-targets

Adding ‘sub-targets’ could potentially increase the credibility of any given target by giving more information to the international community about planned to actions to deliver domestic emissions reductions.

In the transport sector, flexibility is an important consideration given the uncertainty about the potential of new technologies and the extent to which emissions per capita are reducing with or without government interventions or new policy measures.

Comparability

Fair share is a subjective assessment, rather than an absolute, measurable quantity. A number of indicators can be used to compare countries’ contributions and are discussed in international literature. Taking any individual metric in isolation will give a very narrow view about the definition of fair share, so it is important to consider a range of indicators. We have had to make assumptions about how countries might act under different hypothetical scenarios in order to compare them with possible New Zealand actions. These figures are indicative only and more comprehensive analysis and advice including more countries and comparison with targets which have been announced can be provided in 2015.

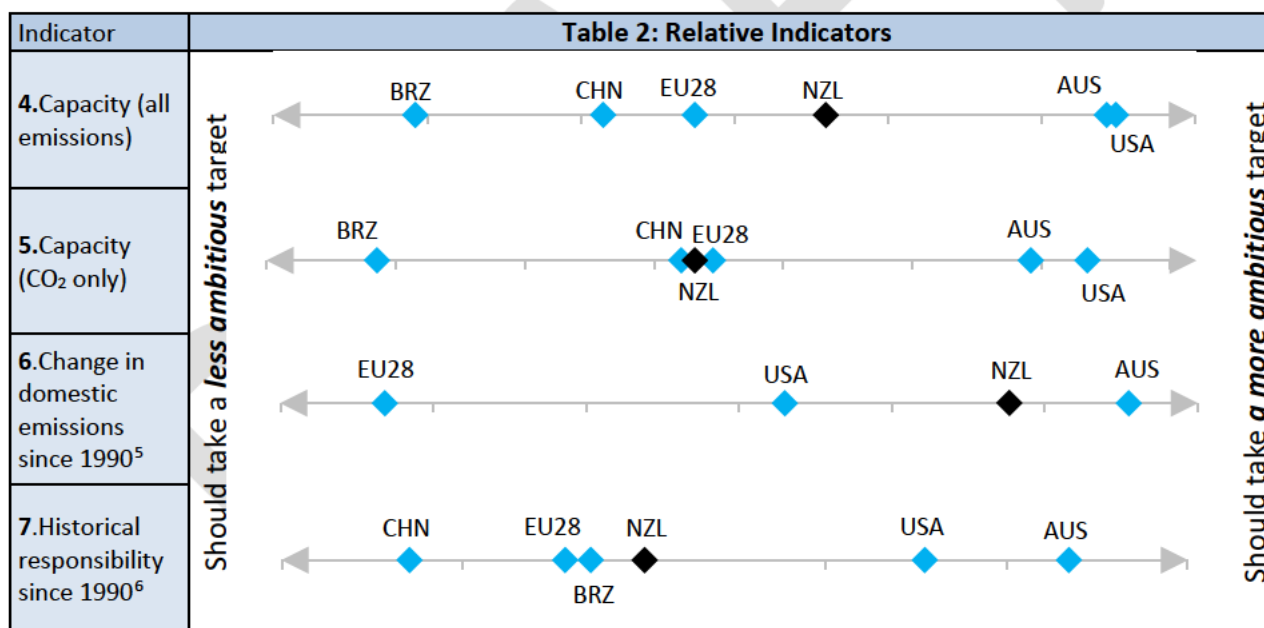
Table 4 shows indicators that generate a proposed climate change target for a particular country. New Zealand’s ‘fair share’ according to an equal cost basis (indicator 1) and on an equal per capita CO₂ basis (indicator 3) would be markedly less than emissions reductions for Europe and the US and about the same as Australia. Emissions reductions according to equal GHG emissions per capita (indicator 2) would be closer between NZ, Australia Europe and the US.

Table 4 - What each country's emissions reduction target would be under quantitative indicators of fair share

Table 1: Prescriptive indicators							
Indicator	Scenarios/assumption	Each country's suggested 2030 target under this indicator (% change against 1990 levels) ^[3]					
		NZL ⁴	AUS	BRZ	CHN	EU28	USA
1. Equal cost (as % of GDP)	Developed countries spend 0.7% GDP	-7%	-1%	N/K	N/K	-36%	-16%
	Developed countries spend 2.0% GDP	-15%	-13%	N/K	N/K	-44%	-27%
2. GHG emissions per capita	Global per capita GHG emissions are equalised by 2050 with a likely chance of limiting warming to 2°C at 2100.	-29%	-29%	+21%	+108%	-49%	-44%
3. Carbon dioxide (CO ₂) per capita	Same as GHG emissions per capita indicator, but for CO ₂ only	-12%	-22%	+133%	+152%	-49%	-44%

Table 5 shows 'relative' indicators. These imply that country X should do *more than* country Y, but cannot be used to specify by how much. According to these indicators, New Zealand should do more than China and Brazil. The results for New Zealand versus Europe and the US are mixed.

Table 5 How countries compare on 'relative' indicators of fair share. Countries further to the right should take stronger targets than those further to the left for any given indicator.



³ Assuming a Form A target is taken

⁴ NZL = New Zealand, AUS = Australia, BRZ = Brazil, CHN = China, EU28 = 28 European Union member states

⁵ Countries which have made more effort to reduce emissions since 1990 have less responsibility (under this indicator alone) to reduce emissions in the future i.e. less effort to date means more effort going forward

⁶ Countries with higher historical emissions to date, under this indicator alone, should take more effort to reduce emissions going forward.

Assumptions

We have made a number of assumptions across all three of the Options:

- That unrestricted access to international carbon markets will be possible. New Zealand chooses the least-cost mix of domestic emissions abatement and international purchasing according to the prevailing international carbon price.
- The international carbon price path to 2030 is impossible to predict as it is highly dependent on developments in global carbon markets and global ambition for climate change action. We have assumed two plausible carbon price scenarios: 1) 'Low' – reaching around \$50 in 2030, 2) 'High' – reaching around \$150 in 2030. The 'High' scenario represents mid-range estimates of a global carbon price consistent with a likely chance of keeping temperature rise with two degrees Celsius⁷.
- That reference level accounting is applied to forestry activity which has the effect of largely removing cyclical harvesting emissions and removals from New Zealand's carbon liability, but provides credits for new afforestation.
- That there is a commitment period of 2021 – 2030 for the target. Future advice could cover a 2021 – 2025 period depending on international developments
- Costings assume that agriculture is not priced in New Zealand or overseas. However, the notion of pricing agriculture is considered in places as part of commentary on the options.

⁷ IPCC Working Group III of the Fifth Assessment Report – AR5 WGIII