Submission

Climate Change Authority
'Caps and Targets Review'

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Summary

Negotiations towards an international agreement to limit global warming are progressing slowly. Many hope that a deal will be concluded in 2015. However such an agreement is neither certain nor is it clear that its targets will be timely or adequate to keep warming below the internationally agreed 'guardrail' of 2 degrees Celsius. As recent events have showed, overseas and in Australia, even 2 degrees Celsius global average warming will deliver powerful and damaging changes to national environments, economies and societies. The damage and losses associated with current levels of warming and recent extreme weather events of increasing intensity and frequency are among the signs that even 2 degrees may be far too high for some countries and some fragile ecosystems.

For warming to be limited to 2 degrees will require a massive international effort, especially from countries such as Australia. To date Australia has taken a 'wait and see' approach by adopting an unconditional mitigation target of -5 percent below a year 2000 baseline by 2020, with politicians and industry advocates arguing that Australia's emissions are globally too insignificant for it to adopt larger cuts.

In response, this submission argues five interrelated points. First, Australia is the world's 12th largest national emitter of greenhouse gases, contributing 1.3 percent of total global emissions (4 percent if its exported emissions are taken into account). It is among the world's highest emitter for per capita emissions and the highest among developed countries. Australia's contribution to global warming is substantial by international comparison. Consequently its responsibility for action is also great.

Second, developed countries like Australia must constrain their emissions while fairly accounting for their historical responsibility for climate change and the economic advantages this has delivered vis-à-vis lesser developed countries. Without equitable burden sharing, developing countries – particularly major emerging emitters such as China and India, upon which successful global mitigation in part depends - will not participate enthusiastically in, or will continue to stall, the development of an effective and timely international agreement. The United States has predicated its contribution to a global deal on this participation. Australia is well-placed to help break this gridlock by adopting targets that are feasible, fair and effective.

Third, Australia's effort must be principally guided by climate science in its aim to combat global warming. Australia's national targets should, first and foremost, represent its fair contribution to the global effort necessary to hold warming to below 2 degrees Celsius and the possibility of achieving the safer target of 1.5 degrees. Climate scientists agree that global emissions must peak within a few years and the major effort in global emissions reduction must occur within this current critical decade. They warn that existing national pledges to cut emissions by 2020 are insufficient to this task, leaving an 'ambition gap' which must be bridged before then. The science shows that there is no time for further delay - the mitigation effort of all major emitters must now increase substantially.

A science-based national approach to helping bridge the 'Ambition Gap' and reducing emissions in a way that contributes to restraining warming to 2 Celsius or less, requires Australia to cut its emissions by some 35% below 2000 levels by 2050. However this target is merely proportionate and does not reflect differences in responsibility and capability.

Australia is one of the wealthiest economies in the world. Its per capita Gross Domestic Product (GDP) is 12th among nations. It can afford, and has the technological capacity, to achieve rapid and significant emissions abatement. However, if Australia's target to be fair vis-à-vis less developed countries, which means acknowledging Australia's status as a wealthy developed state, then the 2020 target should be no less than -45% below 2000 levels. However even this target would not stop Australia 'exhausting' its remaining carbon budget well before 2020. There appears no viable way for Australia to avoid going into 'carbon deficit' short of buying substantial volumes of carbon permits on the international carbon market, which this submission advocates.

Fourth, there is no convincing logic to arguments for making Australia's national target 'conditional' on international negotiations, given the profound environmental, social and economic costs – including for Australia - of delay, under-achievement and failure. 'Conditionality' in climate negotiations is predicated on the idea that the conditional offer of greater mitigation effort will encourage greater cooperation and induce other parties also to adopt more stringent targets, and that delayed action will cost less in the future. Nothing supports Australia's role in international negotiations achieving either goal.

The Stern Review, for instance, demonstrated that delayed action will increase future mitigation costs. Moreover, adaptation costs and the economic impacts of extreme weather will increase as warming progresses. Furthermore, as international negotiations continue to progress only slowly, it is becoming clear that unilateral, bottom-up initiatives by individual states have become increasingly important in framing the level of 'courage' at the international level. Both these points support an argument for stronger domestic action rather than delay in the hope of leadership from elsewhere.

Last, it is economically and technologically feasible for Australia to make the necessary, deep and effective cuts to its emissions of -45 per cent by 2020. It can do so by deploying domestic emissions reduction measures that encourage greater energy efficiency and by switching to renewable technologies, and by participating in the emerging international carbon market, from which – initially - a significant proportion of its emissions reduction will need to be acquired in the form of carbon credits. Funding for the acquisition of international carbon credits can be raised via several equally viable measures, either individually or in combination. These could include using consolidated revenue, raising a direct levy on the public, using a modest levy on Australian fossil fuel production, and using revenue from the auctioning of permits as part of a national emissions trading scheme.

By contrast, Australia's current 2020 target fails utterly when assessed against the principles by which such a target should be set. It will fail to contribute to keeping warming below 2 Celsius. It is in no way equitable. It fails to reflect Australia's substantial economic and technological capacities to do more.

Recommendations

Recommendation 1
Australia's climate targets should:

1. *Be consistent with efforts to limit global average warming to less than 2 Celsius above preindustrial levels;*
2. *Reflect the best available climate science with regard to the pace of mitigation;*
3. *Be equitable with respect to international burden sharing of mitigation effort, taking into account Australia's historical emissions profile ('polluter pays' principle), its national economic wealth and capacity derived from fossil fuel exploitation ('beneficiary pays' principle'), and the equal right of individuals to the global atmospheric commons ('per capita emissions rights' principle);*
   and
4. *Be technologically feasible.*

Recommendation 2
That the CCA use a science-based 'carbon budget' approach as the basis for determining Australia's 2020 climate target and its associated mitigation trajectory.

Recommendation 3
That the CCA accept the figure of 500 billion tonnes of CO_2 as the best available estimate of the planet's remaining global carbon budget as a contribution to its national budget estimations.

Recommendation 4
That the CCA accept the UNEP's 2012 estimate of approximately 14 Gt CO_2-e for the ambition gap between current pledged global mitigation effort and the emissions needed to offer a likely chance of remaining below both 2C and also 1.5C, when determining Australia's 2020 target and national responsibilities.

Recommendation 5
That the CCA employ the Greenhouse Development Rights (GDRs) Framework developed by Baer et al. (2008) in framing Australia's 2020 target and national responsibilities.

Recommendation 6
Based solely on its current emissions contribution, if Australia is to participate meaningfully to an international effort to keep warming below 2 Celsius, its science-based target cannot be less than -35% below 2000 levels. However this approach does not take issues of international equity into account.

If Australia's efforts are to reflect its wealth, historical contribution and capacity, and also make provision for uncertainty, its emissions should be no less than -45% below 2000 levels. However the -45% target will exceed Australia's carbon budget by some 1.7 billion tonnes by 2020.

A target that respects Australia's carbon budget appears beyond its reach in the short term. It would need to either reduce emissions by 20 percent each year between 2014 and 2018, or adopt a lesser target by 2020 supported by a major program for acquisition of additional carbon permits to cover the carbon deficit this lesser target generates over that time…and for some time thereafter.

*With these points in mind**, this submission recommends a 2020 emissions reduction target of no less than -45 percent from a 2000 baseline**, plus a substantial program for acquiring credits from overseas carbon markets to reduce Australia's carbon budget deficit.*

Recommendation 7
Australia should adopt its 2020 mitigation target with a view to meeting no more than half target through the acquisition of accredited carbon units from overseas carbon markets.

Introduction

Australia's Climate Change Authority is currently conducting its *Caps and Targets Review*, through which it will recommend future emissions reduction targets for Australia and also recommend on associated limits, or 'caps', for Australia's carbon pricing mechanism.

Specifically, the Authority will recommend a 2020 emissions reduction target; recommend a national carbon budget and indicative national emissions trajectory which may extend beyond 2020; and discuss how Australia might meet its trajectory, budget, target and caps, including how different sectors contribute, and the role of international emissions trading.

This submission responds to the Climate Change Authority's (CCA) *Caps and Targets Issues Paper - April 2013* and seeks to contribute to the CCA's task in recommending on Australia's future targets.

The Review plans to address four issues (p1), namely:

- the science-related aspects of global emissions budgets, pointing to the overall level of emissions reductions required to limit warming to 2 degrees;
- approaches to sharing global emissions budgets among nations;
- recommend a 2020 emissions reduction target, and caps for the first five trading years of the carbon pricing mechanism, as further steps towards Australia meeting its longer term goals; and
- consider how Australia might meet its trajectory, budget, target and caps, including how different sectors contribute to emissions reductions, and the role of international emissions trading.

This submission addresses these concerns. It does not propose to revisit arguments about the veracity of climate science or about the need for urgent action, which it accepts as having been established by separate research (Christoff 2013a *in* press; IPCC 2007; Schellnhuber 2012).

The submission accepts as given, as does the CCA, certain broad policy ambitions – such as Australia's endorsement of the aim of keeping global average warming below 2 Celsius – the 2 degrees global 'guardrail'.

In December, 2009, countries were encouraged to submit pledges for reducing greenhouse gas emissions for the year 2020 as part of the Copenhagen Accord. Subsequently, 42 industrialized countries and 44 developing countries submitted pledges.

At the Conference of the Parties to the UN Framework Convention on Climate Change, held in Cancún one year later, parties formally recognised country pledges and also recognized "*that deep cuts in global greenhouse gas emissions are required ...so as to hold the increase in global average temperature below 2°C above pre-industrial levels... [as well as] the need to consider... strengthening the*

long-term global goal on the basis of the best available scientific knowledge, including in relation to a global average temperature rise of 1.5°C" (UNFCCC 2010).

As a party to this international recognition, Australia's targets should be determined, and its actions judged, accordingly.

The CCA Issues Paper states that, 'the Authority accepts the view that it is in Australia's interests to support global emissions reductions to limit global average warming to 2 degrees Celsius or less. Additional starting points are Australia's long-term target to reduce emissions to 80 per cent below 2000 levels by 2050, and the policy action of Australian governments at all levels to reduce emissions. The 2050 target and policy measures (which include the carbon price) are among the 'givens' for this Review' (p vii).

The submission suggests that the overarching aim of having Australia contribute fairly to keeping global warming below 2 Celsius is incompatible with the current 80 per cent below 2000 levels target for 2050 and the mitigation trajectory which that 2050 target would suggest is required by 2020.

The submission proceeds as follows. It first considers broad principles for target setting. It then discusses the global carbon budget and the 'ambition gap' that stands between present pledges and the chance of keeping average global warming to below the 'guardrail' of 2 degrees Celsius. The submission then turns to aspects of Australia's current approach to the 2020 target and concludes by proposing a 2020 target and a short-term national carbon budget.

1. Principles for determining emissions targets

The Issues Paper notes that, as an independent statutory body, the Authority's work is guided by the principles set out in the *Clean Energy Act 2011* and the *Climate Change Authority Act 2011 (Cwth)*. According to the latter Act, in performing its functions, the Authority must have regard to the following principles:

'S.12
(a) the principle that any measures to respond to climate change should:
(i) be economically efficient; and
(ii) be environmentally effective; and
(iii) be equitable; and
(iv) be in the public interest; and
(v) take account of the impact on households, business, workers and communities; and
(vi) support the development of an effective global response to climate change; and
(vii) be consistent with Australia's foreign policy and trade objectives;

(b) such other principles (if any) as the Authority considers relevant.' (CoA 2011, 7)

This submission notes that the principles presented in the *Climate Change Authority Act* are not prioritized. Nevertheless, given the overarching aim of the Act, they must be interpreted in a way that ensures the Act's environmental intent is not undermined by other considerations.

Moreover, the principles in S.12 (a) require greater precision if they are to assist in the task of target setting. Principles of 'economic effectiveness', 'impacts on households etc', and 'consistency with Australia's foreign policy and trade objectives' are subsidiary to the principles of environmental effectiveness, and equity, upon which they ultimately depend.

This submission proposes that the guiding principles for target selection should be hierarchical and interrelated. In other words, Australia's climate targets should:

1. Be consistent with efforts to limit global average warming to less than 2 Celsius above preindustrial levels
2. Reflect the best available climate science with regard to the pace of mitigation
3. Be equitable with respect to international burden sharing of mitigation effort, taking into account Australia's historical emissions profile ('polluter pays' principle), its national economic wealth and capacity ('beneficiary pays' principle'), and the equal right of individuals to the global atmospheric commons ('per capita emissions rights' principle) and
4. Be technologically feasible.

These four principles do not contradict those articulated in the *Climate Change Authority Act* but offer greater clarity through their ordering.

Article 3.1 of the United Nations Framework Convention on Climate Change (UNFCCC) enshrines the need for Parties to protect the climate system 'on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities'. The clause reflects a longstanding but inconclusive debate about how a fair mitigation burden for individual nations might be determined, and interrelated concerns about equity, responsibility and capacity. What it should mean in practice remains uncertain. Political and academic debates over responsibility have focused on national contributions to the accumulated atmospheric store of greenhouse gases since the start of the Industrial Revolution. In part they revolve around the conscious versus unconscious historical use of the global atmospheric commons. Some developed states have argued that the lack of understanding of climate science before the latter part of the 20th Century limits national responsibility for the impacts of climate change and for economic redistribution to assist in mitigation and adaptation funding.

By contrast, developing states have emphasized that this history has resulted in the infringement of their sovereign right to develop to a similar standard of economic wealth by using the atmospheric commons, and that states bear a responsibility for the climate damage they have wrought unintentionally. This has sometimes been called the climate version of the 'polluter pays' principle, although it has also categorized in terms of the 'beneficiary pays' principle on the basis of the benefits derived from unintentionally contributing to climate change (see below). A separate argument about responsibility applies to national actions since 1990, the date when the first IPCC report was published, providing an incontrovertible baseline for scientific and political acknowledgement of climate change as an international issue.

Equity has been a second major strand in this debate. Arguments about 'climate debt' are tied to debates over the economic wealth and capacity which have accrued to developed states pursuing a path now largely closed to 'late' developing states – namely that of seemingly limitless fossil fuel-based industrialization. Developed states are seen to have enriched themselves through their disproportionate use of the global atmospheric commons and to have contributed overwhelmingly to global warming impacts that disproportionately afflict poorer communities and poorer states. Calls for the redistribution of this wealth, and assertions about the additional responsibilities of developed nations to take the first steps in mitigation, are based on what is sometimes called the 'beneficiary pays' principle. This principle is reflected in the architecture of the UNFCCC and Kyoto Protocol, with their grouping of Parties based on development status – for instance, using the Annex 1 and non-Annex 1 lists.

Claims about the uneven benefits and costs of climate change are usually also founded on the egalitarian view that individuals – and, derivatively, their sovereign states - have equal rights to a share of the atmosphere. The former can

be termed the 'per capita emissions rights' principle. According to this view, the historical benefits of fossil fuel-based economic development are inequitably distributed because clusters of individuals have 'appropriated' more than their fair share of the global emissions space. Many developing states support the idea that, at minimum, future access to remaining emissions 'space' should be equally shared on a per capita basis, using a 'contraction and convergence' model that would allow them to increase or stabilize their emissions while major developed country emitters make considerable reductions, all converging at an equal per capita emissions level at some future point.

These considerations have, in combination, led to a variety of arguments, claims, and formulae for how mitigation and adaptation effort and costs should best be apportioned to reflect equity, historical responsibility, development and capacity, and nominating how the remaining limited quota of atmospheric emissions should be shared (see Baer et al, 2008; Gardiner 2010; Heywood 2007; Hohne *et al*. 2003). Depending on where the 'baseline' for historical responsibility, or the future point of convergence, is established, developed states owe more or less to developing states under a global budget model. Depending on whether and how carbon rights are accorded to individuals or states, more or less of that fossil-fueled development is 'owed' by and to specific states.

This submission accepts the use of the contract and convergence model - also supported by the Garnaut Report (2008) - as the most equitable means of dividing up the remaining atmospheric commons.

It does not propose a new way to determine Australia's economic responsibility for mitigation and adaptation assistance based on its historical responsibility for climate change. Rather, it also draws on the model proposed by Baer *et al.* (2008) as it calculates and compares Australia's carbon budget and possible targets under each of these models. While the submission compares results from several approaches that embody the notion of individual carbon rights aggregated to the national level, despite underlying differences between these approaches, their results nevertheless converge on a target Australia should adopt if its effort are to be both science-based and fair.

Recommendation 1

Australia's climate targets should:

1. *Be consistent with efforts to limit global average warming to less than 2 Celsius above preindustrial levels;*
2. *Reflect the best available climate science with regard to the pace of mitigation;*
3. *Be equitable with respect to international burden sharing of mitigation effort, taking into account Australia's historical emissions profile ('polluter pays' principle), its national economic wealth ('beneficiary pays' principle') and capacity, and the equal right of individuals to the global atmospheric commons ('per capita emissions rights' principle);*

and

4. *Be technologically feasible.*

2. The Global Carbon Budget

In recent times, climate scientists have attempted to go beyond merely nominating a global temperature guardrail or a global target concentration of atmospheric greenhouse gases – such as 450 parts per million of CO_2 - beyond which the risk of dangerous anthropogenic interference with the climate system seems to become intolerably high. Instead, they have offered a more policy-useful estimation of the physical amount of greenhouse gases that might released into the atmosphere before dangerous climate change occurs. This amount has been termed the global carbon budget.

For instance, in 2009, the German Advisory Council on Global Change (WGBU) argued that, 'It is estimated that the 'budgetary limit' for a reasonable chance of staying below 2 Celsius will be reached when approximately 1 trillion tonnes of CO_2 have been added to the amount already in the atmosphere at the start of the 21st century.' Further, the WGBU argues that 'the budget of CO_2 emissions still available worldwide could be derived from the 2°C 'guard rail'. By the middle of the 21st century a maximum of approximately 750 Gt CO_2 (billion metric tons) may be released into the Earth's atmosphere if the guard rail is to be adhered to with a probability of 67%. If we raise the probability to 75%, the cumulative emissions within this period would even have to remain below 600 Gt CO_2' (WGBU 2009, 2).

More recently, Olivier *et al* note that – by 2012 - human activities had already added some 420 ± 50 billion tonnes of CO_2 to the atmosphere since 2000 (Olivier *et al*, 2012, 18). By various estimates, annual anthropogenic global greenhouse emissions have been approximately 49 Gt over the past few years (Hohne et al. 2012, 10). In all, some 150Gt of greenhouse emissions are likely to have been released by human activity since the WGBU report, reducing its estimate of the available global carbon budget to around or less than 500 Gt CO_2.

In other words, we have used almost half of our budget in 13 years. Conservatively, by the end of 2013, at most another 500 billion tonnes of CO_2 can be added if we are to have only a 75 percent chance of staying below the 2 degrees limit and avoiding "dangerous climate change", and much less for a safer target of 1.5 degrees.

Recommendation 2
That the CCA use a science-based 'carbon budget' approach as the basis for determining Australia's 2020 climate target and its associated mitigation trajectory.

Recommendation 3
That the CCA accept the figure of 500 billion tonnes of CO_2 as the best available estimate of the planet's remaining global carbon budget as a contribution to its national budget estimations.

3. The 'ambition gap'

As noted, at Copenhagen and subsequently at Cancun, the international community agreed to hold global warming to below 2 degrees Celsius. Developed nations and major industrializing countries – including Australia - then pledged voluntary national mitigation targets for 2020 (UNFCCC 2011, 2012). However these pledges fall well short of what is required to hold to that '2 degrees guardrail', much less a safer target of 1.5 degrees.

Climate scientists have determined that the collective mitigation effort embodied in those pledges would still lead to global average warming of around four degrees and catastrophic climate change. This deficit in international effort is now commonly called the 'ambition gap'.

The 'ambition gap' can be given some quantitative precision by estimating a global carbon budget that defines the maximum additional amount of emissions that still may accumulate in the Earth's atmosphere if we are to have a chance of staying below 2 degrees Celsius.

Since 2009 a range of estimates has been published seeking to describe that ambition gap. Over that period, estimates of the gap have increased in size in response to the continuing growth in annual emissions. The most recent credible estimate is published in the UNEP 2012 Emissions Gap report. This suggests that for a "likely" (greater than 66%) chance of meeting the 2°C target, emissions have to peak before 2020, and return emission levels in ***2020*** to about 44 Gt CO_2-e (range: 41-47 Gt CO_2-e) (Höhne et al. 2012, 2).

The emission scenarios assessed in that report and consistent with a "likely" chance of meeting the 2°C target require global emissions in ***2030*** of approximately 37 Gt CO_2-e (range: 33-44 Gt CO_2-e).

Annual global emissions are estimated most likely to be approximately 58 GtCO_2-e by 2020 (range of 57-60 Gt CO_2-e) given current mitigation pledges. These estimates were derived from seven modelling groups that analysed a selection of national emission reduction proposals (Höhne et al. 2012, 10). Therefore the ambition gap under a scenario in which states pursue unconditional pledges but with lenient rules, would be about 13 Gt CO_2-e in 2020 (range 10-16 Gt CO_2-e) (Höhne et al. 2012, 3). For "Conditional pledges, strict rules" – which seems highly unlikely to be achieved by 2020 - the gap would be about 8 Gt CO_2-e (range: 4-11 Gt CO_2-e).

However the UNEP *Emissions Gap 2012* report comments that 'There is increasing uncertainty that conditions currently attached to the high end of country pledges will be met and in addition there is some doubt that governments may agree to stringent international accounting rules for pledges. It is therefore more probable than not that the gap in 2020 will be at the high end of the 8 to 13 GtCO_2-e range' (Höhne et al. 2012, 3).

Scenarios consistent with a "medium" chance of meeting the **1.5°C** limit have average emission levels in 2020 of around 43 Gt CO2-e (Höhne et al. 2012, 3). The UNEP 2012 report estimated the gap between annual emissions in 2020 most likely given current mitigation pledges and the emissions level consistent with a "likely" (greater than 66%) chance of staying within the 2°C target, to be 14 $GtCO_2$-e (Höhne et al. 2012, 30).

As Raupach et al. (2011) comment, there are numerous critiques of these global temperature guardrails, including that the 2 Celsius global guardrail is too general to account for significant regional differences in environmental sensitivity – and so, for instance, would leave low-lying coastal regions and island states submerged, and fire- and drought-prone countries ecologically devastated, over time.

Both the 'global carbon budget' and the 'ambition gap' approach to estimating quantitative limits to greenhouse emissions can be utilized in estimating national carbon budgets, to provide a means for scoping appropriate national mitigation effort.

This submission considers both approaches. It supports the 'option' of a conservative mitigation path which leaves both the 2 Celsius and 1.5 Celsius global target options open.

Recommendation 4
That the CCA accept the UNEP's 2012 estimate of approximately 14 Gt CO_2-e for the ambition gap between current pledged global mitigation effort and the emissions needed to offer a likely chance of remaining below both 2C and also 1.5C, when determining Australia's 2020 target and national responsibilities.

4. Calculating national carbon budgets

As the CCA Issue Paper notes, there is a variety of ways in which a national carbon budget can be calculated. These range from the use of a simple proportionate calculus through to versions which include considerations of social and economic factors such as national and per capita wealth, development needs, and climate-related factors such as mitigation capacity and climate vulnerability/adaptation needs.

The political reality of international mitigation negotiations is such effort [sentence is ungrammatical but I'm not sure how to fix it…] scientific understandings about the limits to future emissions must be

This submission considers three approaches in order to offer a guide and frame for a potential Australian national 2020 target:

- ***Total budget approach*** *- National allocation of global carbon budget (using equal per capita emissions rights/contraction and convergence approach)*
- ***Ambition gap budget approach*** *- National allocation of Ambition Gap based on current emissions (proportional national emissions, or 'grandfathering')*
- ***Development approach*** *- National allocation of global budget adjusted to account for national wealth and development status (Beneficiary/polluter pays - capacity and responsibility approach)*

4.1. National allocation of global carbon budget based on population

A national carbon budget and associated target can be developed by building on the concept of pre capita emissions rights first proposed by Meyer (2000) when he articulated the 'contraction and convergence' approach to moving all national emissions to an per capita-based, ecologically bounded footing over time.

Accordingly, the available global carbon budget of approximately 500 Gt CO_2-e is divided by the global number of human inhabitants. National carbon budgets are then determined by taking into account national population levels. As the WGBU puts it, 'The global CO_2 budget is distributed among the world's population on an equal per-capita basis so that *national CO_2 budgets* can be calculated for all countries, and adopted on a legally binding basis. These budgets provide an orientation for countries on how swiftly and substantially their CO_2 emissions need to be reduced' (WGBU 2009, 3).

This approach in part depends on the baseline used for assessing population – which can be set contemporaneously (say, at 2013) or based on projections (for instance, for 2050, when global population is commonly estimated to peak).

The global average per capita carbon allocation based on best-current **(2010)** global population data is 500 GtCO_2-e divided by approximately 7 billion, or ***71.4 tonnes*** per capita.

Table 1: Carbon budgets of the world's 20 major emitters

Country	*Current (2010) annual emissions* [1] *(Mt)*	*Populat. 2010*[2] *(mill'n)*	*Per capita emissions (tonnes, 2010)*	*National carbon budget (Mt) (2010 popl'n x per capita 71.4)*	*Emission years left (2010 per capita emission rates X 2010 pop)*	*Projected population 2050*[3] *(million)*	*National carbon budget (Mt) (2050 popl'n x per capita 55.6)*	*Emiss'n years left (2010 per capita emiss'n rates x 2050 pop)*
China	11,181.8	1,338.3	**8.4**	95,554.6	**9.5**	1,273.0	70,781.8	**7.4**
United States	6,714.9	309.4	**21.7**	22,087.5	**3.8**	398.0	20,459.6	**3.0**
India	2,691.7	1,224.6	**2.2**	87,437.5	**35.9**	1,684.2	93,641.4	**28.0**
Indonesia	1,945.6	239.9	**8.1**	17,126.7	**8.5**	289.5	16,093.5	**6.6**
Brazil	1,620.7	194.9	**8.3**	13,919. 1	**9.4**	218.7	12,157.2	**7.3**
Russia	1,555.2	141.8	**11.0**	10,121.0	**6.5**	124.3	6,910.0	**5.1**
Japan	1,378.7	127.5	**10.8**	9,100.0	**7.7**	105.7	5,875.9	**6.0**
Germany	979.4	81.8	**12.0**	5,838.9	**6.1**	72.0	4,002.8	**4.8**
Canada	728.2	34.1	**21.3**	2,436.6	**3.2**	43.6	2,424.9	**2.5**
Mexico	660.8	113.4	**5.8**	8,098.4	**12.5**	142.3	7,909.3	**9.7**
Sth Korea	646.8	48.9	**13.2**	3,489.7	**5.9**	46.4	2,580.5	**4.6**
Australia	628.9	22.3	**28.2**	1,592.2	**2.7**	30.9	1,720.8	**2.1**
UK	619.5	62.2	**9.9**	4,443.4	**7.5**	71.5	3,974.5	**5.9**
France	538.0	65.1	**8.3**	4,646.4	**9.4**	73.4	4,081.8	**7.3**
Iran	528.0	74.0	**7.1**	5,2179.1	**10.3**	84.3	4,689.5	**8.0**
Saudi Arabia	495.4	27.5	**18.0**	1,959.8	**4.4**	43.2	2,399.7	**3.4**
Italy	490.6	60.5	**8.1**	4,318.5	**9.7**	58.8	3,268.1	**7.6**
Poland	450.0	38.2	**11.8**	2,726.3	**7.6**	34.5	1,915.3	**5.9**
South Africa	421.9	50.0	**8.4**	3,569.4	**7.8**	56.4	3,136.7	**6.1**
Spain	354.0	46.0	**7.7**	3,289.5	**10.1**	51.5	2,860.7	**7.8**

[1] EU EDGAR (2010 GHG with LULUCF) At:
http://edgar.jrc.ec.europa.eu/overview.php?v=GHGts1990-2010

[2] Data derived from World Bank HNP stats. At:
http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTHEALTHNUTRITIONANDPOPULATION/EXTDATASTATISTICSHNP/EXTHNPSTATS/0,,contentMDK:21737699~menuPK:3385623~pagePK:64168445~piPK:64168309~theSitePK:3237118~isCURL:Y,00.html

[3] Data derived from World Bank HNP stats, as per footnote 1.

Given the inertial nature of demographic trends, which are generally resistant to rapid alteration, it is important to also consider these budgets against realistic future population levels. The global average per capita allocation, based on projected **2050** global population data is 500 $GtCO_2$-e divided by approximately 9 billion (close to the UN's median projection), or ***55.6 tonnes*** per capita.

Both approaches – using 2010 and 2050 population estimates - are used here to calculate national carbon budgets (**Table 1**).

This approach underlines the urgency of rapid emissions reduction if we are to have a chance of keeping warming to below 2 Celsius or the safer level of 1.5 C. When the global per capita carbon budget is adjusted to account for population growth to 2050, all of the 20 highest emitting states - other than India - *exhaust their carbon budget within a decade*, and 12 states do so within seven years, if they continue to emit at current rates and yet wish to keep global average warming below 2 degrees. Only India, with some 28 years at current emission rates, has a 'carbon emissions reserve' sufficient for it to undertake a gradual transition to a post-carbon economy.

It is important to note that while this per capita approach is equitable insofar as it divides the atmospheric commons equally between present and future humans, it is profoundly inequitable insofar as it 'grandfathers' or excuses the historical benefits and potential damages that have accrued or will arise from emissions before the present moment. It fails to recognize the unevenness of global economic development, based on unequal access to and uneven historical use of fossil fuels by nations. In effect, it leaves the 'scraps' on the emissions table to be divided equally among those who have benefited most from the earlier carbon feast, and those who have missed out – with carbon trading being used to effect a major wealth transfer from North to South.

It also assumes that all - including the very poorest states (those with per capita emissions below the current or projected global per capita average) - should undertake proportionate additional mitigation regardless of their development status, whether they are wealthy, highly developed industrialised national or poor, least developed states. As the WGBU (2009) recognizes, taking these factors into account requires developed countries to 'sacrifice' their future emissions in order to create additional emissions space for developing nations - depending on whether trading is allowed, and what rules apply.

However the option for developed countries of deferring domestic mitigation effort by buying carbon credits from low-emitting least developed countries (LDCs) is limited, as the LDCs are responsible for only some 30 percent or less of global emissions and so have limited carbon to trade.

Despite these important qualifications, 'unadjusted' – i.e. proportionate but inequitable - national carbon budgets calculated using 2010 and projected 2050 populations do provide a sound basis for indicating the minimum or 'first cut' rate and volume of emissions mitigation needed if major emitting countries are

to contribute fairly to reducing their emissions while staying within the global budget limit.

4.2 Ambition gap (emissions-based) approach

As noted, the "ambition gap" between the likely current pledges and the aggregate emissions required to keep global average warming below 2 Celsius, with a chance to also keep it below 1.5 Celsius, is 14 Gt. The ambition gap provides an alternative, perhaps easier way, to consider national emissions responsibilities in the short term.

There are several ways in which the task of bridging gap could be distributed between states. The simplest is for nations to accept further emissions reductions proportionate to their current contribution to global emissions, adding these to their current Cancún emissions reduction pledges (**Table 2).**

As with the global budget approach, this is merely mathematically proportionate but nevertheless provides an indicative guide to required effort. This approach is inequitable for the reasons given for 4.1 (including that it requires all nations to participate), and additionally so because it "accepts" the significant differences in underlying mitigation effort by developed nations, varying from Germany's and Norway's pledges to reduce emissions to -30% and -40% below 1990 levels by 2020, respectively, to Australia's -5% below 2000 levels.

4.3 Development approach

As noted earlier, the principles of burden sharing and 'common but differentiated responsibility', enshrined in the UNFCCC, remain poorly defined in practice. Developing nations have argued strongly that their right to develop has been infringed by the 'theft' of their portion of global greenhouse emissions space by developed countries grown wealthy through this misappropriation. Separately, the point is often made that poor countries, often disproportionately the victims of global warming, do not have the economic capacity to pursue mitigation to the same degree as wealthy nations.

Nevertheless, despite two decades of debate, no commonly accepted formula for fair allocation of mitigation effort has emerged. Without movement in this direction, the global mitigation effort will remain inadequate to its goal as developing countries - especially major emitters such as China and India - are highly unlikely to adopt significant emissions reductions in the short term.

Assessments of national wealth and national capacity based on GDP or GNP are flawed, as these measures include unproductive, socially destructive and ecologically unsustainable activity. Nor are they good measures of development status as aggregated or per capita GDP data do not capture the (mal)distribution of income and wealth, and important aspects of development, such as access to education, employment, health and housing. Nevertheless, transnational comparisons of per capita income or GDP do offer a broad indication of disparities in national economic capacity, including of capacity developed

Table 2: Bridging the Ambition Gap: 20 major emitters' contribution

Country	*Current (2010) annual emissions CO2-e (Mt)* [4]	*Percent of global emissions* [5]	*Proportionate additional mitigation burden to bridge Ambition Gap (Mt/per annum)*
China	*11,181.8*	*22.3*	*2,901*
United States	*6,714.9*	*13.4*	*1,742*
India	*2,691.7*	*5.4*	*698*
Indonesia	*1,945.6*	*3.9*	*505*
Brazil	*1,620.7*	*3.2*	*421*
Russian Federation	*1,555.2*	*3.1*	*404*
Japan	*1,378.7*	*2.8*	*358*
Germany	*979.4*	*2.0*	*254*
Canada	*728.2*	*1.5*	*189*
Mexico	*660.8*	*1.3*	*171*
South Korea	*646.8*	*1.3*	*168*
Australia	*628.9*	*1.3*	*163*
United Kingdom	*619.5*	*1.2*	*161*
France	*538.0*	*1.1*	*140*
Iran	*528.0*	*1.1*	*137*
Saudi Arabia	*495.4*	*1.0*	*129*
Italy	*490.6*	*1.0*	*127*
Poland	*450.0*	*0.9*	*117*
South Africa	*421.9*	*0.8*	*109*
Spain	*354.0*	*0.7*	*92*
TOTAL		***70***	***8986***

through the exploitation of fossil fuels in the historical processes of economic industrialization and material investment. For these reasons, adjustment of national allocations of the global carbon budget, and of ambition gap allocations, to reflect disparities in development is supported.

Baer *at al.* argue that 'some 70 percent of the global population is responsible for only 15 percent of all cumulative emissions and have little capacity to invest in solving [the climate problem]' (16). They develop a Responsibility Capability Index (RCI) which defines aggregate national capacity comparatively according to national income. They also set the 'development threshold' at $USD 7500 annual per capita GDP (PPP)(for 2010), below which nations would have no responsibility for mitigation and the need for development is assumed and above which, developing, developed and highly developed nations would fairly share

[4] EU EDGAR (2010 GHG with LULUCF) At: http://edgar.jrc.ec.europa.eu/overview.php?v=GHGts1990-2010

[5] Based on EU EDGAR, as above.

the burden of mitigation to create 'space' for poorer countries. Baer *et al*'s RCI index for 2010 and projected for 2020 (Baer *et al.* 2008, 93-98) is used here to suggest, indicatively, the implications for the top 20 emitting states' additional mitigation effort (**Table 3**). It is notable that Australia is 12th on their table. It appears as 12th on the World Bank's (2005-2011) per capita GDP (PPP) international rankings, 10th for the IMF's 2010 ranking, and 13th for the CIA's listing. Clearly Australia is a country of considerable economic capacity, wealth and general standard of living by this measure (Wiki 2013).

Baer *et al.* continue to base their work on production-based rather than consumption-based emissions accounting. An approach that also takes into account the flows of traded or 'embodied' carbon and the displaced responsibilities of high-consuming and fossil-fuel exporting states, would increase the responsibility of high-consuming, commodity importing states or blocs (such as the United States, the European Union, and Australia) and high fossil fuel exporting states (such as Australia, Norway and Saudi Arabia). It would lower targets for export-oriented, low-consuming manufacturing states such as China (Christoff, 2013b; Grasso and Roberts 2013). Eventually, these two approaches need to be united – something which has proved beyond the capacity of this submission in the time available.

It would be, of course, naïve to expect that, merely by outlining more equitable targets, deeply entrenched cultural and political opposition to their adoption will evaporate. It is highly unlikely that either the United States or China will adopt commitments as substantial as those indicated in Table 3. But it is certain that they will not do so without the pressure of example.

It is more likely that progress towards such outcomes will occur if other high-emitting countries with substantial economic capacities – such as Australia - adopt equity-based targets that are well within their means, thereby supporting the normative arguments for action towards such an international effort. It is this normative 'logic' – along with a good measure of national self-interest in seizing the first mover advantage in the low carbon energy revolution - that has driven Norway, Germany, and the United Kingdom to adopt the tough 2020 targets they are now pursuing.

Several coherent and plausible formulae have been developed to help define an equitable burden sharing approach to mitigation. One is used here to provide an indication of the implications of more equitable approaches to determination of national targets.

Table 3: Bridging the Ambition Gap: 20 major emitters' contribution adjusted for development and capacity responsibilities

Country	*Current (2010) annual emissions [6] (Mt)*	*Percent of global emissions [7]*	*Proportionate additional mitigation to bridge Ambition Gap (Mt/p.a)*	*Percent of bridging effort, based on RCI (2010) [8]*	*Equity -adjusted mitigation to bridge Ambition Gap (2010) (% of AG) (Mt/p.a)*	*Percent of bridging effort, based on RCI (2020) [9]*	*Equity -adjusted mitigation to bridge Ambition Gap (2020) (% of AG) (Mt/p.a)*
China	*11,181.8*	*22.3*	*2,901*	*5.5*	*715*	*10.36*	*1,347*
United States	*6,714.9*	*13.4*	*1,742*	*33.05*	*4,297*	*29.11*	*3,784*
India	*2,691.7*	*5.4*	*698*	*0.48*	*65*	*1.18*	*153*
Indonesia	*1,945.6*	*3.9*	*505*	*0.21*	*22*	*0.45*	*59*
Brazil	*1,620.7*	*3.2*	*421*	*1.7*	*221*	*1.73*	*225*
Russian Federation	*1,555.2*	*3.1*	*404*	*3.84*	*501*	*4.31*	*560*
Japan	*1,378.7*	*2.8*	*358*	*7.77*	*1,010*	*6.61*	*859*
Germany	*979.4*	*2.0*	*254*	*5.47*	*711*	*4.71*	*612*
Canada	*728.2*	*1.5*	*189*	*2.93*	*381*	*2.67*	*347*
Mexico	*660.8*	*1.3*	*171*	*1.58*	*205*	*1.54*	*200*
South Korea	*646.8*	*1.3*	*168*	*2.01*	*261*	*1.94*	*252*
Australia	*628.9*	*1.3*	***163***	*1.71*	***222.3***	*1.54*	***200***
UK	*619.5*	*1.2*	*161*	*3.73*	*485*	*3.21*	*417*
France	*538.0*	*1.1*	*140*	*3.25*	*423*	*2.80*	*364*
Iran	*528.0*	*1.1*	*137*	*0.88*	*114*	*1.13*	*147*
Saudi Arabia	*495.4*	*1.0*	*129*	*1.38*	*179*	*1.53*	*199*
Italy	*490.6*	*1.0*	*127*	*3.08*	*400*	*2.70*	*351*
Poland	*450.0*	*0.9*	*117*	*1.06*	*137*	*1.16*	*151*
South Africa	*421.9*	*0.8*	*109*	*0.97*	*126*	*1.07*	*139*
Spain	*354.0*	*0.7*	*92*	*2.08*	*270*	*1.86*	*242*
TOTAL		***70***	*8986*	***83***	*10746*	***82***	*10,609*

The Greenhouse Development Rights (GDRs) Framework was developed by Baer et al. (2008), who write that 'the GDRs framework codifies the right to development as a "development threshold" – a level of welfare below which people are not expected to share the costs of the climate transition'... indeed,

Recommendation 5

That the CCA use the Greenhouse Development Rights (GDRs) Framework developed by Baer et al. (2008) in framing Australia's 2020 target and national responsibilities.

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[6], [7] EU EDGAR (2010 GHG with LULUCF) At: http://edgar.jrc.ec.europa.eu/overview.php?v=GHGts1990-2010

[8], [9] Baer et al. (2008, 93-98) Appendix (RCI rankings).

5. Australia's fair share

In 2012, Australia emitted some 552 million tonnes (Mt) of CO_2-e (DCCEE, 2012). It ranks 12th among the planet's 195-plus nations for its domestic greenhouse gas emissions (EDGAR 2013). It is 14th largest global contributor based on its domestic CO_2 emissions alone (Olivier et al. 2012, 12). Most importantly, its per capita emissions are among the world's highest (Olivier et al. 2012, 29; UNPD 2010).

Further, when emissions from Australian coal exports are added to its domestic greenhouse emissions, Australia is the source of nearly 4 percent of total global emissions. In all, Australia is a major national emitter, a very significant contributor to global warming, and should shoulder part of the additional reduction burden associated with bridging the 'ambition gap' and preserving the 2 Celsius guardrail. What then, is Australia's fair share of this mitigation effort?

Against conditionality

In 2009 Australia adopted an unconditional short-term emissions target - to cut national greenhouse emissions by 5 percent below 2000 levels by 2020. The government also accepted the recommendation of the Garnaut Review, in 2008, that Australia adopt two additional, conditional 2020 targets, of -15% and -25%.

Australia has pledged to increase its commitment to -15% if there is a global agreement under which major developing economies commit to substantially restrain emissions and advanced economies take on comparable commitments. Australia will further increase its commitment to -25% if the world agrees to an ambitious global deal consistent with stabilizing atmospheric concentrations of greenhouse gases at 450 ppm CO2-e (DCCEE undated). It can be credibly argued that the conditions for the -15% by 2020 target have been met.

'Conditionality' in climate negotiations is predicated on the idea that the conditional offer of greater mitigation effort will encourage greater cooperation and induce other parties also to adopt more stringent targets, and that delayed action will cost less in the future.

This submission suggests there is no convincing logic to arguments for making Australia's national target 'conditional' on international negotiations, given the profound environmental, social and economic costs – including for Australia - of delay, under-achievement and failure. A 'conditional' approach should not be used in setting a revised 2020 target for Australia.

The 2008 Garnaut Report correctly argues that 'Australia's approach to targets and trajectories must be linked to comprehensive global agreement on emissions reductions, for four reasons. First, international agreement is urgent and essential. Second, agreement is possible if Australia and some other countries attach sufficient importance to it. Third, a comprehensive global agreement is the only way to remove completely the dreadful political economy risks, to Australia

and to the global trading system, of payments to trade-exposed, emissions intensive industries. Fourth, international agreement lowers the cost of Australian mitigation and so allows us to be more ambitious about reduction in emissions' (Garnaut 2008, 277-278). It then rightly emphasizes that that 'if we are not prepared to pay our fair share in the cost [of effective mitigation], then we cannot expect other countries to do so' (Garnaut 2008, 278).

Garnaut then suggests that 'committing to interim targets for Australia that are unrealistically or disproportionately ambitious in the absence of an international framework (that recognizes abatement and makes available opportunities for trade in emissions entitlements), is likely to be costly and difficult to achieve…. A vacuous commitment that denies economic reality would be as damaging to international negotiations as an unrealistically low offer that denies scientific urgency' (Garnaut 2008, 278).

These strong points do not, however, support an argument for conditionality, which is based on several assumptions.

'Conditionality' is in part based on a flawed economic rationale, that Australia's costs of delayed abatement will be cheaper if accompanied by an international effort. This rationale is underpinned by assuming the costs of climate change should be confined to the costs of mitigation measures alone.

The contrasting and more convincing view is offered by the Stern Report, which recognizes that the social and ecological costs of climate change – including both adaptation and remediation costs, the costs of widespread damages associated with warming, and the value of productivity foregone - will continue to mount if mitigation is delayed. By this broader calculus, early mitigation will always cost less than delayed mitigation given the value of these other 'externalities', especially once warming of 2, 3 and 4 degrees or more occurs.

The alternative path, of delay, has to assume that a future in which less effort, and less cost (in terms of the aggregate costs of mitigation, adaptation, and climate-related losses), are possible. Neither are plausible expectations.

The second, related argument refers to the state of international climate negotiations and the assertion that other Parties will respond to the inducements Australia offers. At and since COP 15 at Copenhagen, the setting of national targets has depended more on the bottom-up nomination of effort by individual Parties than a top-down negotiation based on commonly agreed formulae. While COP 18 at Doha agreed to a process intended to lead to a binding agreement by 2015, there is little guarantee that such an agreement will include robust and effective targets before or even by 2020. There has ben no sign – despite 'conditional' offers being made by a number of Parties, that these have had any effect on negotiations, and particularly on the negotiating stance of the two major actors, the United States and China.

Waiting for an international agreement –in the hope that it will reduce costs for Australia – does nothing to galvanise such an agreement. By contrast, early

substantial effort may, in a 'bottom-up world', have a leadership effect and therefore help to induce international agreement, while potentially minimizing real future costs when international action does eventuate.

Australia's carbon budget

Earlier, this submission recommended that Australia's climate targets should:

1. Be consistent with efforts to limit global average warming to less than 2 Celsius above preindustrial levels;
2. Reflect the best available climate science with regard to the pace of mitigation;
3. Be equitable with respect to international burden sharing of mitigation effort, taking into account Australia's historical emissions profile ('polluter pays' principle), its national economic wealth and capacity ('beneficiary pays' principle'), and the equal right of individuals to the global atmospheric commons ('per capita emissions rights' principle); and
4. Be technologically feasible.

Taking these principles into account, three different approaches to science- and equity-based mitigation targets were employed in Section 4. Their implications for Australia are summarized in **Table 4**, along with a target that would respect Australia's available carbon budget.

Table 4: Australia's possible 2020 targets

Australia	***2020 target (% below 2000 baseline)***	***2020 target (Mt below 2000 baseline* of 556.5Mt CO2-e[9]**	***2020 target (Mt below 2012 emission,* est. 552 Mt CO2-e[10]**	***Average reduction required each year (Mt) (2014-2020) from* 552 Mt CO2-e[11]**	***Percent reduction required each year (2014-2020)***	***Approximate total carbon deficit by 2020 (Mt)***
Available National carbon budget (GCB) 2 degrees scenario, 2050 popln (Table 1)						***1,721***
Current -5% target (unconditional)	***-5%***	*(528.7) -27.8*	*-23.2*	***-3.3***	*-0.6*	***-2600***
Proposed proportionate target covering Ambition Gap ***(Table 2)***	***-35%***	*-194.4*	*-189.9*	***-27.1***	*-4.9*	***-1940***
Proposed development adjusted AG target (2010 index) ***(Table 3)***	***-45%***	*-250.4*	*-245.9*	***-35.1***	*-6.4*	***-1710***
Proposed development adjusted AG target (2020 index) ***(Table 3)***	***-41%***	*-228.2*	*-223.7*	***-32.0***	*-5.8*	***-1800***
Target that respects available national carbon budget	***-100% by 2018***			***-115***	***-20***	***0***

[9] DCCEE. Australian emissions 2000 (UNFCCC inventory)
[10] DCCEE (2012)
[11] DCCEE (2012)

5.1 Total national carbon budget

Based on a per capita allocation of the remaining global carbon budget and Australia's projected 2050 population, Australia's *total* remaining emissions budget is some 1.72 billion tonnes. At current emissions rates, Australia will exhaust its total remaining carbon budget in slightly over three years.

Australia has the least adjustment time of any high-emitting nation, with only two to three years[12] of emissions at current rates remaining in its budget.

It is destined to consume much more of the global emissions budget than is its fair share unless it reduces its emissions by much more than the current target of -5% below 2000 levels by 2020. Reducing Australia's emissions steadily to that target would see it emit some 4.3 billion tonnes of GHGs by 2020, or 2.6 times its total available national carbon budget – leaving Australia with a 'carbon debt' of some 2.6 billion tonnes (**Table 4**).

Moreover, if Australia wants to gradually reduce its emissions to 5 percent below 2000 levels by 2020 and then to 80 percent below that 2000 level by 2050, it would emit something in the vicinity of 14.2 billion tonnes of emissions over that time – or around 8 times its national carbon budget. Nations collectively exceeding the carbon budget by this rate would make a +2 Celsius World, or even a +4 Celsius World, impossible to achieve.

Only by reducing domestic emissions by 20 percent of its assumed 2013 emissions[13] (552Mt) *each year* between 2013 and 2018, could Australia stay within its carbon budget, which would run out in 2018. Or if Australia intends to constrain its greenhouse emissions to its proportionate national carbon budget but also wants to continue to emit until approximately 2033, it has to cut its emissions to around 86 Mt per annum immediately (around 15 percent of current emissions).

That Australia will run a substantial carbon deficit seems unavoidable. It will need to buy a very significant volume of carbon credits from overseas carbon markets to 'compensate' for the 'debt' caused by its likely level of domestic emissions.

5.2 Ambition gap approach

If the top 20 major emitting nations were to reduce their emissions to bridge the ambition gap by a volume that was merely proportionate with their contribution to global emissions, Australia would accept an additional 1.3 per cent of the 'outstanding' 13 billion tonnes. This would increase Australia's unconditional

[12] Some 2.1 years based on the 2050 population estimate and national emission at 2010 levels, and 3.1 years based on the 2050 population estimate and national emission at estimated 2012 levels.

[13] For the purposes of this submission, 2013 and 2014 emissions are assumed to be identical to the estimated emissions for 2012 (552 Mt CO2-equiv).

2020 target by 163 million tonnes per annum, from 27.6Mt per annum to 190.6 Mt below 2000 levels by 2020. This increases Australia's present unconditional target of -5 percent of year 2000 emissions by some -29.5 per cent, to approximately -35 per cent below 2000 levels by 2020.

5.3 Development adjusted targets

Australia's comparative wealth, capacity and economic advantage - derived in part from its historical use of fossil fuels – need to be taken into account in determining a short term target that reflects the requirements of Article 3.1 of the UNFCCC and better enables Australia to participate in the international climate framework on the basis of equity and in accordance with its common but differentiated responsibilities and respective capabilities.

Australia ranks very highly on international indices of national and per capita development, wealth and GDP. These considerations are taken into account in the index (derived from Baer *et al*. 2008) and used in ***Table 4***. Depending on whether 2010 or 2020 are used as 'baseline' dates for development, Australia's 2020 target increases to either -45% or -41%, respectively.

There is no single 'correct' target that can be derived from a commonly agreed approach. Rather, as has been suggested, there are a variety of approaches to achieving a scientifically appropriate, ethically robust target. Moreover, it is impossible to be conclusive about the effort that an individual state should adopt given the nature of this global collective action problem.

Nevertheless, the approaches used above show the lower limits for Australia's 2020 target if it is to be equitable and scientifically responsible. Based solely on current emissions contribution, if Australia is to participate meaningfully and successfully to an international effort to keep warming below 2 Celsius, its science-based target cannot be less than -35% below 2000 levels. If its efforts are to reflect its wealth, historical contribution and capacity, and also make provision for uncertainty, its emissions should be no less than -45%.

By contrast, Australia's current unconditional 2020 target of -5% fails utterly when assessed against the principles by which such a target should be set. It will fail to contribute to keeping warming below 2 Celsius. It is in no way equitable. It fails to reflect Australia's substantial economic and technological capacities to do more.

Meeting steep targets, achieving rapid decarbonization

Finally, this submission turns briefly to the issues of technological and economic feasibility. A range of reports (e.g. CWA 2011) have shown that, with a modest carbon price of $25, investment in energy efficiency measures and in new low-carbon and no-carbon technologies will lead to emissions reductions of up to 25% by 2020. Additional measures, such as a stronger national Renewable Energy Target (currently 20% of stationary energy by 2020), would reinforce this trajectory.

Table 5: Buying into Australia's 2020 target

Australia	***2020 target (% below 2000 baseline)***	***Estimated total Mt cut from 2013 emission level,* (est. 552 Mt CO2-e)**	***Buying half of target @$6.5/t $million/ per annum averaged 2014 to 2020***	***Buying half of target @$10/t $million/ per annum averaged 2014 to 2020***	***Buying half of target @$20/t $billion/ per annum averaged 2014 to 2020***
Proposed proportionate target covering Ambition Gap ***(Table 2)***	***-35%***	*-760*	***353***	***543***	***1.1***
Proposed development adjusted AG target (2010 index) ***(Table 3)***	***-45%***	*-985*	***456***	***704***	***1.4***
Proposed development adjusted AG target (2020 index) ***(Table 3)***	***-41%***	*-907*	***421***	***648***	***1.3***

However, in the absence of a major government-driven program supporting replacement of domestic carbon-fuelled energy production with renewable energy sources, it is unlikely that a mitigation target of -45% could be achieved - based on domestic effort alone - in the brief time remaining before the end of 2020. Therefore it is important also to consider supplementary measures that would make achievement of that target possible, while encouraging the development of a domestic trajectory of rapid decarbonization.

This submission accepts that up to half the proposed target might need to be met through the acquisition of certified carbon credits from overseas markets. The price of carbon in the European emissions trading scheme has plunged in recent years and at time of writing was around AUD$6.5/tonne. A proportion of Australia's emissions burden could – in the short term – be covered through the acquisition of certified carbon credits on the international market.

If half the total 45% emissions reduction sought by 2020 were bought, this could cost between approximately $460 million and $700 million per annum (averaged annual cost) by 2020, depending on the market - here estimated to be between $AUD6.50 and AUD20(***Table 5***). This approach is not seen a longer term solution to Australia's mitigation challenge.

The acquisition of international carbon credits could be funded in several ways. These could include, either individually or in combination, using consolidated revenue, raising a direct levy on the public, using a modest levy on Australian fossil fuel production, and from the revenue raised by auctioning of permits as part of a national emissions trading scheme.

In the absence of a domestic carbon price, a levy of $1 per tonne of CO2-e could be placed on all coal produced by Australia for domestic use and export. This approach would, in the short term, contribute $1.17 billion (2.6 x approx. 451.6 tonnes coal[14]) to the cost of buying international permits. This would constitute a levy of some 2 percent on the expected production value of $53 264 billion in that year. A lower levy could be used if gas production was also included or if revenue was sought from other sources.

If a domestic emissions trading scheme is established – as has been strongly endorsed by both the Howard Coalition government and Rudd and Gillard Labor governments – revenue could in part be drawn from the auction of domestic permits.

Finally the submission suggests – but will not argue - that the depth and rate of emissions reduction required of Australia by 2020, indicates that the 80 per cent below 2000 levels target for 2050 would be incompatible with the aim of having Australia contribute fairly to keeping global warming below 2 Celsius.

Recommendation 6
Based solely on its current emissions contribution, if Australia is to participate meaningfully to an international effort to keep warming below 2 Celsius, its science-based target cannot be less than -35% below 2000 levels. However this approach does not take issues of international equity into account.

If Australia's efforts are to reflect its wealth, historical contribution and capacity, and also make provision for uncertainty, its emissions should be no less than -45% below 2000 levels. However the -45% target will exceed Australia's carbon budget by some 1.7 billion tonnes by 2020.

A target that respects Australia's carbon budget appears beyond its reach in the short term. It would need to either reduce emissions by 20 percent each year between 2014 and 2018, or adopt a lesser target by 2020 supported by a major program for acquisition of additional carbon permits to cover the carbon deficit this lesser target generates over that time…and for some time thereafter.

With these points in mind, this submission recommends a 2020 emissions reduction target of no less than -45 percent from a 2000 baseline, plus a substantial program for acquiring credits from overseas carbon markets to reduce Australia's carbon budget deficit.

Recommendation 7
Australia should adopt its 2020 mitigation target with a view to meeting a significant portion of that target through the acquisition of accredited carbon units from overseas carbon markets.

[14] Projected production, 2013-2014 (DTE undated).

Conclusion

This submission has argued that Australia's present, unconditional 2020 target of -5% below 2000 emissions levels is unjustifiably low. The current target fails to contribute sufficiently to the goal of holding average global warming to 2 Celsius or less, and is also profoundly inequitable. (The same holds for Australia's current conditional targets of -10% and -25%.)

To have a reasonable chance of holding global warming below 2 Celsius, the international community must first bridge the 'ambition gap' between existing national abatement pledges for 2020 and the collective mitigation effort necessary to contribute to that goal and, second, also restrain total international emissions to the global carbon budget of around 500 Gt.

This submission argues that, for Australia to contribute meaningfully to that international effort, it should adopt a 2020 abatement target of no less than -45 percent from a 2000 emissions baseline. This target fairly reflects Australia's national wealth and capacities in the context of broader scientific argument for increased international mitigation effort.

However Australia will only contribute effectively to keeping global emissions below the 2 Celsius threshold if its total emissions do not exceed its remaining national carbon budget (derived from the global carbon budget).

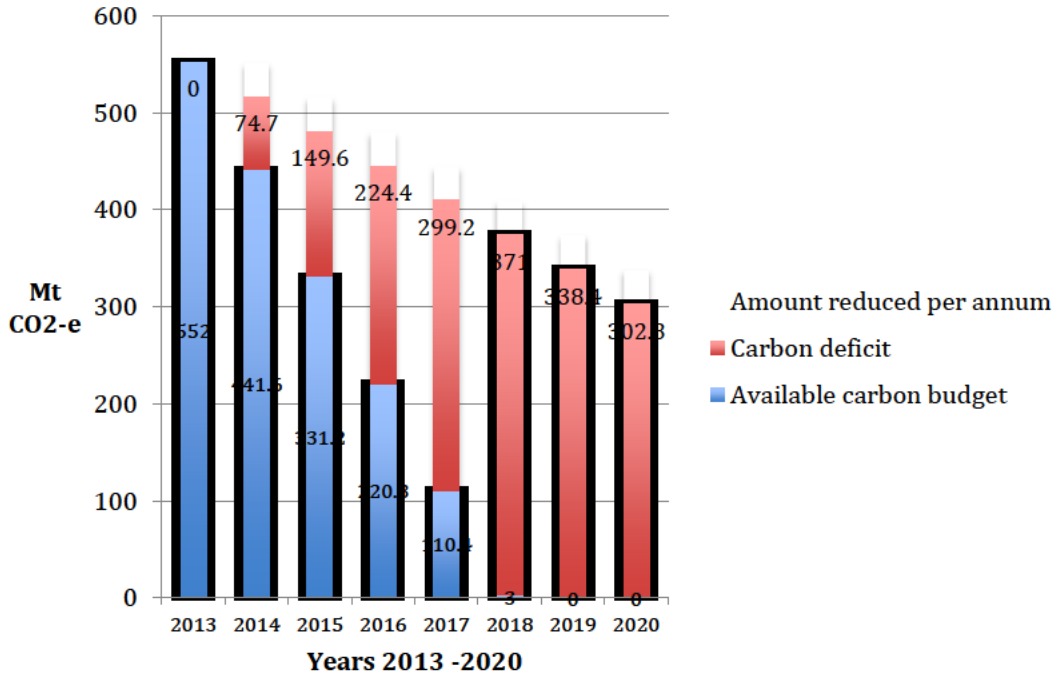
Australia's national carbon budget will be exhausted in approximately three years given current (estimated 2012) emission rates. Only by cutting its national emissions by around 20 percent of total emissions each year could Australia to stay within this budget. Such a rate of reduction is clearly not feasible given the carbon-intensity of Australia's economy. Nevertheless, any discussion of an effective and equitable 2020 target must consider this larger issue.

The recommended mitigation target of -45%, with equal annual reductions beginning in 2014, would see Australia overshoot its carbon budget by some 1.7 billion tonnes (**Figure 1)**

This submission proposes that the resulting 'carbon deficit' be offset through the acquisition of carbon credits in a program separate from any acquisitions necessary to ensure the -45% target is achieved. This program of 'budget-balancing' acquisition would need to continue while Australia continues to emit greenhouse gases in excess of its carbon budget.

The submission recommends that Australia's annual caps through to 2020 be set to effect an evenly graduated reduction of emissions. In reality, one would expect mitigation performance to be uneven, with less achieved in earlier years and acceleration towards the final years. However mitigation performance is unpredictable, dependent on a wide variety of social, political and economic factors. A slow start assumes a faster finish. The acquisition of credits could be used to 'smooth' the result.

Figure 1: Australia:2013-2020 emissions trajectory (-45% 2020 target) and carbon budget (blue)/carbon deficit (red)



A change of national government is likely later this year. An incoming Coalition government will seek to end the fixed price on carbon and dismantle recent institutional and legislative innovations that support national climate policy. Federal funding for mitigation is likely to be reduced and those funds that remain will most likely be diverted to 'on-the-ground' incentive programs. A Coalition government may also seek to hasten the introduction of an internationally linked emissions trading scheme in order to resolve some of the tensions in its present stance and to maintain progress in mitigation.

This submission's recommended 2020 target of (at minimum) -45% is much harder to achieve if Australia has a carbon price of less than $25. The main argument for linking an Australian ETS to the international market in the next few years is a political one, to do with apparent dissonances in carbon prices and least cost mitigation. However early linkage, as proposed by Labor, would greatly lower the Australian price and undermine its effectiveness as a driver for change – as would enabling high levels of access to international credits. Australia needs to employ its own measures and pricing to reduce down its exceptionally high emissions levels.

The task of reducing emissions will also be made much harder if recently established climate policy institutions and associated funding are weakened,

and/or if the Renewable Energy Target is weakened or abandoned. For instance, the RET would need to be increased to at least 50% and additional effort would be required to increase energy efficiency. Carbon credits from overseas sources would be required. Australia also will only achieve its mitigation goals by ending the predicted expansion of its export gas and coal sectors.

None of these considerations undermine the logic of adopting an interim target that best reflects Australia's longterm social, economic and ecological interests.

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