TO CLIMATE CHANGE AUTHORITY
Attn; Ms Shayleen Thompson, Executive Director
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This complements my earlier submissions:

- ID 62 of 11 Mar 2016 to your *Second Draft Report Special Review* of Australia's Climate Policy Options, and
- ID 43 of 31 May 203, to *Targets and Progress Review 2014 – Issues Paper*

Some key points for Australia's emissions targets and ETS

I would be pleased and grateful if the Authority can consider the points I submit at this late stage to complement my earlier submission of 11 Mar 2016, ID 62. Points in this current submission on Australia's emissions targets are also supported by my submission of 31 May 2013, ID 43. I note that deferral of the publication date of your report until after the election may allow more time for consideration.

Note: There are some key and critical points raised in my submission for the Authority's consideration though I would have liked more time to improve its construction and presentation. Please bear with that.

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Introduction

The governments *Guide to Regulation* is endorsed and required by the Council of Australian Governments for implementing regulation. Accordingly, my comments here use the key *Questions of a Regulation Impact Statement* as a framework to address the Minister's, the Honourable Greg Hunt's, request to the Authority on 10 December 2014 to "assess whether Australia should have an Emission Trading Scheme in the future . . .". The seven questions are summarised in footnote[1].

[1] Answering the RIS Questions; see https://cuttingredtape.gov.au/handbook/answering-ris-questions
1. What is the problem you are trying to solve?
2. Why is government action needed?
3. What policy options are you considering?
4. What is the likely net benefit of each option?

My comments to some of these are interspersed in the submission.

RIS Q1 What is the problem you are trying to solve?

Global requirement – what reductions are needed, how long have we got?

The Paris agreement has set a maximum temperature rise of 2°C but preferably aiming for a maximum of 1.5°C.

Climate modelling provides a good relationship between global, cumulative anthropogenic carbon emissions and the subsequent temperature rise. We can use these with our current rate of emissions to see how long before we reach the budget above which we risk exceeding an unacceptable (ie, dangerous) temperature rise.

In 2014, the Fifth Assessment Report of the IPCC and the Synthesis Report update, May 2016[2]. give the total global cumulative emissions since 2011 that are consistent with a global average temperature rise of less than 2°C above pre-industrial levels at a likely (>66 per cent) probability as approximately 1,000 Gt CO2. This value can be converted to a measure in CO2e using the ratio of CO2e/CO2 reported in the US EPA's *Global Greenhouse Gas Emissions* [3]. By measurement this is 1.31 in 2010 (there was not a great change with time). The global budget for 2°C then becomes 1310 Gt CO2e.

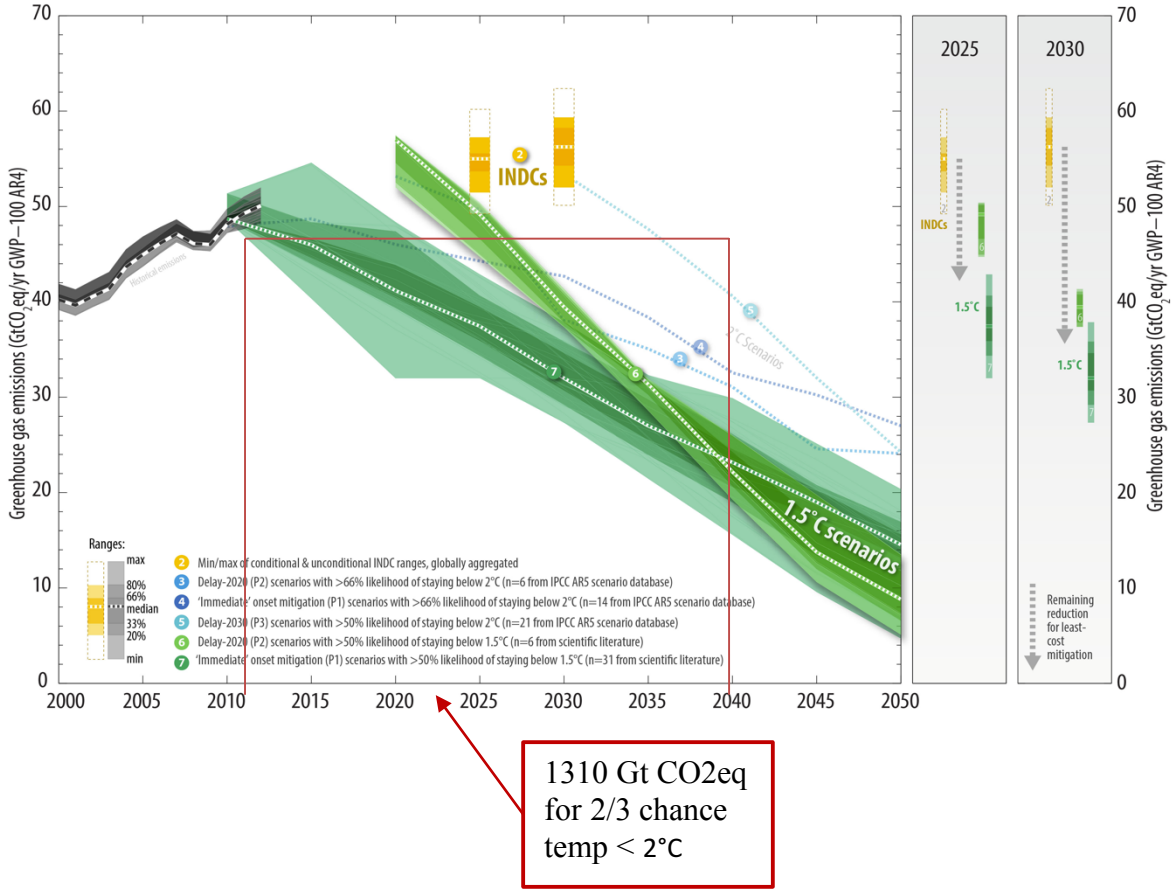
With a 'long-term' budget of around 1310 Gt CO2e at current and constant annual emissions of around 45 Gt CO2e/year (2011) **we have less than 29 years (1310/45) to reach zero global GHG emissions ie, no more global emissions after 2040** (2011 + 29 years).

5. Who will you consult about these options and how will you consult them?
6. What is the best option from those you have considered?
7. How will you implement and evaluate your chosen option?

[2] *Aggregate effect of the intended nationally determined contributions: an update*, UN FCCC/CP/2016/2 at; http://unfccc.int/resource/docs/2016/cop22/eng/02.pdf

[3] US EPA's *Global Greenhouse Gas Emissions* at; https://www3.epa.gov/climatechange/science/indicators/ghg/global-ghg-emissions.html

This is shown by the red rectangle drawn on **Fig 9** from the UNFCC Synthesis report update, May 2016.



1310 Gt CO2eq for 2/3 chance temp < 2°C

With global emissions still increasing, this hypothetical timeframe is a stark signal of the enormous challenge. We need strong and immediate reductions. And to limit the temperature increase to 1.5°C is even more problematic.

No one could pretend that current INDCs, shown by the two yellow/orange bars in Fig 9, are sufficient to achieve the goal to avoid dangerous climate. We must do more. It is commendable that a majority of countries signed up to the Paris Agreement. However, each country's INDC is not legally binding.

RIS Q2: Why is government action needed?

ANS: Since Australia signed the UNFCC Convention at Rio in 1992 it has been clear that a unified international response needs to be developed to climate change. The Commonwealth Government has this responsibility.

Prof Michael Raupach spoke to the Global Carbon Budgets Expert Roundtable at the Climate Change Authority in Melbourne on 1 March 2013[4] and observed presciently;

> **"The problem of sharing global quotas between nations is the biggest climate-mitigation problem of all"**

At Paris (COP 21, Dec 2015), a majority of countries agreed to the Paris Agreement, and submitted

[4] *The relationship between different emission trajectories and 2100 CO2-eq stabilisation targets* See: http://climatechangeauthority.gov.au/files/files/Professor%2BMike%2BRaupach%2Bpresentation%2B1%2BMarch%2B2013.pdf

their Intended Nationally Determined Contributions (INDCs). Australia's INDC is to reduce emissions to 26 to 28 per cent below 2005 levels by 2030.

The Authority's draft report of Nov 2015 says, *"In the Special Review, the Authority is focusing on how Australia should meet its emissions reduction commitments."*. **I consider that the Authority should revisit Australia's INDC in order to submit a significantly more ambitious abatement target.** Given the obvious need for stronger abatement, the sooner we engage with that, the lower will be the overall costs. Economists have promoted this point for decades, yet we are reluctant to face the need for much stronger reduction targets now. It's like having a painful tooth; the longer you delay going to the dentist, the worse the outcome will be.

I consider that the Authority should revisit Australia's INDC in order to submit a significantly more ambitious abatement target

RIS Q3: What policy options are you considering?

Answer:

The CCA's November options paper canvasses a number of options some of which I comment on here.

Per capita emissions – international considerations

The BASIC countries (Brazil, South Africa, India and China) have long argued for equal per capita emissions globally. *Equitable access to sustainable development* is a detailed review (Dec 2011) by BASIC authors, Harald Winkler et al, of how emissions might be shared[5]

They suggest that the global Carbon budget is shared in an equal per capita distribution of cumulative emissions entitlements (permits), *inclusive of emissions in the past from some specified initial year*. . . ". An emissions trading scheme would enable all countries to reduce emissions to the agreed, acceptable (less dangerous) budget maximum. The market price of a permit would be strongly affected by the technological developments that enable low, or zero emissions. In its initial years, prices of tens of dollars per tonne CO2 could be expected, if the permits are issued at a rate to cover some decades. While there are many possible variables, the dominant effect would be a large flow of wealth from high-per-capita carbon countries to low-carbon countries.

Contraction and Convergence[6] is a scheme that would allow the high-carbon countries to move to a global, equal per capita allocation over time, the 'convergence' period. Concurrently, the annual issue of permits would 'contract' so the aggregate over time met the acceptable maximum (less dangerous) carbon budget limit.

Carbon pricing – ETS v carbon tax

Contraction and Convergence, one form of **ETS**, was said to be promoted at Copenhagen (COP 15, Dec 2009) *with a convergence date of 2050!* The low-carbon countries naturally rejected this because they would get little from sale of permits in the initial decades. As the Garnaut Review[7] says, *"The convergence date is the main equity lever in such a scheme."*

[5] *Equitable access to sustainable development,* Dec 2011 at; http://gdrights.org/wp-content/uploads/2011/12/EASD-final.pdf

[6] See Climate Consent at; http://www.climateconsent.org/pages/videosummary.html and www.gci.org

[7] The Garnaut Climate Change Review, 2008 at; http://www.garnautreview.org.au/2008-review.html, page 203

The schemes above are formulaic and ensure the carbon budget is not exceeded – surely the key objective of the UNFCCC? Garnaut also says, *"the per capita approach has the virtue of simplicity. Equal per capita emissions is a natural focal point, and contestable computations based on economic variables do not need to enter the allocation formula."* Of course there are significant issues of monitoring, verifying and enforcing agreed provisions. As less than 25 countries account for about 80% of global emissions, it is not essential that many small countries participate.

The Authority's report of November 2015 considers various forms of pricing carbon in section 3.1. Pricing carbon emissions at the source is clearly the simplest, cheapest, and least contestable in most instances[8]. This was done under the previous Clean Energy Act with a coverage of around 60% of Australia's total GHG emissions and wider coverage was readily achievable if desired. Reporting under the National Greenhouse and Energy Reporting Scheme is still active and proved to be a suitable vehicle for monitoring, verifying and enforcing emissions management. I would add that there are many facilities reporting to NGERS that did not have to pay the carbon price (tax) because they were outside the scope for obligation. For efficiency, this unnecessary reporting should be eliminated. Reporting should be only for entities that were obliged to pay under the Clean Energy Act, ie primary emitters.

An example of a global ETS, with an instantaneous 'convergence date', viz, equal per capita permit allocation from the start is shown in my earlier indicative estimates at Appendix A, *"Value of trade in emissions permits 2011; per capita emissions."*. These illustrate (using $25/t CO2) the often large costs to high-carbon countries (surprisingly, 1.1% of GDP for China) and huge benefits to some low-carbon countries (6.9% of GDP to India). While an immediate allocation of equal per capita permits would face considerable opposition in some quarters – and strong support in others – the tempered move over time under contraction and convergence should be acceptable – particularly as it achieves the climate objective to limit emissions to acceptable levels and it still provides large incomes without contestable computations – like how much should each country pay to the Green Climate Fund?

Carbon taxes in each country is another way of coercing carbon abatement. Agreements may be needed between countries to ensure each did its share of abatement. Means of ensuring equity in this arrangement seem less apparent than allocations of equal per capita emission entitlements. Border Adjustment Measures would probably be used to level the playing field amongst countries with different, or no, taxes.

The quantitative ETS approach was considered at the time of the Kyoto Protocol. Quantitative emissions targets were legally adopted by over 30 developed countries with high per capita emissions (Annex B). It was expected that the Annex B countries would establish a workable ETS and that low-carbon countries (Annex A) would participate in the second stage of Kyoto – post 2012 – joining the ETS and having excess emissions quotas (permits) to sell to high-carbon countries. This did not eventuate – the EU's ETS was poorly designed with excess permits issued - so the equitable and formulaic methods now seem neglected. Political reticence from some major emitters seems a likely cause of dismissing the ETS model at present.

Economist note that an ETS is an economically efficient means to reduce emissions. Everyone has a choice as to what they will pay for their emission. The Polluter Pays principle is satisfied.

[8] Eg, emissions from ruminants could be hard to assess accurately though some form of algorithm might be developed using key animal characteristics

Emissions tend to be reduced where it is least costly to do so. This enables the overall cost of abatement to be minimised.

Baseline and credit ETSs . . .

are discussed in the Authority's options paper. Given that these suffer from the problem of additionality, viz, the imputed baseline is never exact, it is foolish to consider this option for any emission that can be measured directly. It suffers from many weaknesses widely discussed elsewhere. Our Prime Minister said to the House, 8 Feb 2010 – see link[9]:

> "if . . . the Government pays the firm to reduce its emissions intensity, . . ., there is firstly going to be a substantial and contentious debate about what the correct baseline is, then whether it will be actually be reduced."

It seems Gilbertian that our current Direct Action policy pays taxpayer funded subsidies based on questionable carbon reduction estimates.

Of course this method is reasonable for instances where direct pricing of an emission is not applicable, eg, CO2 sequestration under the Clean Farming Initiative and of course UNFCCC measures like JI and CDM, which are justifiably considered weak because of their inherent lack of veracity.

Further comment on RIS Q3 What policy options are you considering?

Prof Ross Garnaut provided a comprehensive review of climate change policies in his 2008 Review[10] in which he analysed and discussed a wide range of policy options. He supported Contraction and Convergence which he said was the best framework to calibrating fair shares across countries. In his later Review 2011 he elaborates on the modified Contraction and Convergence policy.

The Authority's current Special Review of Australia's climate policy does not refer at all to Garnaut's two Reviews nor does it appear to mention the Shergold Report, the Carbon Pollution Reduction Scheme or the Clean Energy Futures reports, each developed by most senior policy and economic experts. They contain a wealth of careful and objective analyses. Perhaps these omissions were dictated politically? - and if so, this seems _ _ _ _ _! It appears unprofessional and weird. This kind of limited analysis seems a poor basis for future decisions when so much has already been carefully considered.

The Authority asks for a response to its Questions

1. The Authority proposes assessing policies primarily on their cost effectiveness, environmental effectiveness and equity. Are these principles appropriate? Are there any other principles that should be applied, and if so, why?
   ANS: They seem effective as they stand, however they do not seem sufficient for the scale of the problem. They seem to have little relevance or reference to the international aspect or the urgency required to reduce emissions. Australia is in the invidious situation of having such a high per capita emissions intensity. This is likely to haunt us well into the future as lower carbon countries insist that Australia reduce to a level close to the global average.
2. What lessons can be learned from Australia and overseas on the effectiveness of mandatory carbon pricing, and its interaction with other climate policies?
   ANS: The EU scheme is poorly designed because it has issued far too many permits. In contrast the proposed Carbon Pollution Reduction Scheme and the Clean Energy Futures policy did have realistic limits on the emissions permits which would be issued. Each of these policies had coverage of Australia's total GHG in emissions of around 75% and 60% respectively. And they had a long time frame, at least 10 years, of the future emissions

[9] Turnbull's speech to the House, 8 Feb 2010 at http://www.smh.com.au/action/printArticle?id=1102600
[10] The Garnaut Climate Change Review, 2008 at; http://www.garnautreview.org.au/2008-review.html

permits that would be issued. This enables a secondary market in the permits to provide long-term carbon price signals. This of course is highly desirable for planning future capital investments – whether in the public or private sector. This is a major advantage of having carbon markets with future vintages of permits.

3. How does mandatory carbon pricing perform against the principles of cost effectiveness, environmental effectiveness and equity? Which type of pricing scheme is likely to be more effective, and why?
   ANS: This, and many other questions here, are best answered by looking at the details in the reports I mention, which inexplicably haven't been used in this report, viz, Shergold, Garnaut, the CPRS and the Clean Energy Futures policy papers. The Wilcox-McKibben model is another detailed measure.
4. What lessons can be learned from Australia and overseas on the effectiveness of voluntary carbon pricing, and its interaction with other climate policies?
   ANS: Let's cut to the chase – all later questions are effectively covered by the following.

Occam's razor, the law of parsimony

The simplicity, rigour and low cost of implementation, mandate that carbon pricing is the primary and preferable tool to use. There are two options, an emissions trading scheme or a carbon tax.

A key difference between them is that the **ETS** can guarantee the carbon emissions that occur, within the limits of its coverage. But the carbon prices, for different vintages, are uncertain and dependent on the market in them.

A **carbon tax** can guarantee the current and future carbon prices – specified by government – but it is uncertain what emissions will occur. This probably means the future carbon prices have to be modified in light of the resultant emissions under the specified price.

Experts may argue about the merits of one system or another but I tend to prefer the ETS because it naturally enables global emissions trading. And I agree with Garnaut that some form of contraction and convergence is desirable on an equity basis and it needs an ETS to work.

In conclusion I consider Australia should have an ETS as soon as possible and should try to work internationally to promote Contraction and Convergence, which can enable a global ETS and least cost abatement globally.

The urgency and challenge is too great to be distracted with ad hoc, band-aid policies and procrastinate further.

All other policy instruments become secondary to a well implemented ETS. Most of our current ad hoc policies were instituted as political expedients to appear to be taking action rather than take the best policy of pricing carbon emissions. In most instances the cost of abatement under the alternative policies will be higher. I recall estimated costs of some $100s per tonne of CO2 abatement for one scheme – obviously much higher than the $25/t we had for 2 years, 2012 – 2014, under the operating Clean Energy Act. Note that the this tax didn't send the economy to the dogs and we didn't have $100 roasts but it did effectively and efficiently reduce our emissions.

APPENDIX A

Value of trade in emissions permits 2011; per capita emissions

Income from sale or cost to buy emissions permits expressed as a percentage of each country's GDP at carbon price of $25/t CO_2. Other key assumptions – below table.

Income and costs of permit trade in first year of contraction of 5.8% of world emissions;**

Country ↓	**Emissions % of world total** [CDIAC CO_2]	**Income from sale of excess permits @** $25/t CO_2	**Cost to buy permits @** $25/t CO_2	**Emissions per capita** CO_2 ,CDIAC
Units→	*%*	*% of GDP*	*% of GDP*	*t/person*
China	24.6%		1.10%	6.2
United States	16.4%		0.30%	17.6
India	6.2%	6.9%		1.7
Russia	5.0%		0.90%	11.8
Japan	3.4%		0.16%	8.9
Germany	2.3%		0.18%	9.3
Iran	1.7%		1.11%	7.6
South Korea	1.7%		0.44%	11.5
Canada	1.5%		0.26%	14.9
Saudi Arabia	1.5%		0.86%	18.2
United Kingdom	1.5%		0.17%	7.9
Indonesia	1.4%	2.9%		2.0
Mexico	1.4%	0.4%		4.1
South Africa	1.3%		0.98%	8.9
Brazil	1.3%	0.7%		2.2
Italy	1.2%		0.16%	6.7
Australia	1.1%		0.23%	16.0
France	1.1%		0.11%	5.5
Poland	0.9%		0.52%	8.1
Pakistan	0.5%	11.5%		1.0
World Sales revenue = Purchase cost	76.0%	$million 171,573	$million 171,573	4.89

Key assumptions in model sums;

- The aggregate world CO_2 'covered' emissions [Note 1] (and entitlements) are 5.8% less in 2011 than the 2010 base data available. The basis for a 5.8% yr on yr contraction rate is needed to meet the Meinshausen global budget of 1000 Gt CO_2 from 2000 to 2050 - explained in Note 2.
- 2010 is the base year as I could only find complete data for 2010 when sums were done early 2012 – and felt when $ values are being estimated best to have as few debatable variables as possible. I could have used extrapolated data for 2015-16 which are the starting years for the Sydney Bridge model.
- Equal per capita *emissions entitlements* start in 2011 (this is immediate convergence, under contraction and convergence, and would be resisted by the North).
- In 2011, low-carbon countries (the South) are assumed to maintain the same emissions as in 2010 (for simplicity). The low-carbon countries sell all their 2011 *entitlements* above their 2011 emissions, as assumed by the model.
- High-carbon countries (the North) buy all the available 'excess' entitlements from the South.
- With these assumptions, I take the North's total carbon emissions as is its per capita *entitlement allowances* [equal to the 2010 world average, reduced by a 5.8%/year contraction] plus purchases of *excess permits* from the South. The North's 2011 emissions allowances (entitlements + purchases) are calculated to total 6.6% less

than its 2010 emissions, hence each high-carbon country reduces uniformly to meet this restraint. At this point the carbon price of \$25/t CO_2, assumed in the sums, could be tested!

Notes

1 Covered emissions

Sydney Bridge model [18Apr2012] page 14 shows different measures of CO_2. CDIAC CO_2 data is the most basic and reliably measured – and likely basis for entitlements in early years. Total CO_2 equivalent is greater by around 50%, but the extra greenhouse gas emissions (further CO_2 plus other GHGs) are more expensive and less reliable to measure – so fuller coverage comes later.

2 Annual rate of contraction of CO_2 emissions?

1. Assume a total **global budget of 1000 Gt CO_2 from 2000 to 2050** (Meinshausen et al, 2009)
2. the 'Sydney Bridge' model has global emission reductions starting from end of 2015 baseline with first emission contraction in 2016. I need to determine the target CO_2 budget from 2016 through 2050 and the initial emissions rate in base year 2015 – to estimate the annual decrease in emissions over this period.
3. CDIAC data for "Record High 2010 ... " see html copy [HW file], gives an estimated aggregate emission from 2000 to 2015 of 464 Gt CO_2. Hence **aggregate emissions** available to emit from 2016 (starting year for proposed framework), is 1000 - 460 [round] = **540 Gt CO_2**.
4. CDIAC extrapolation gives **2015 annual emissions** = 10.0 Gt C/y = **36.7 Gt CO_2/y**. This is the starting point for reductions through to 2050.
5. **Starting with 36.6 Gt CO_2 emissions in 2015 and limiting aggregate emissions to 1000 Gt CO_2 requires a constant 5.8% year on year rate of contraction.** This was found numerically [spreadsheet] and is negligently different from the algebraically determined exponential rate. [The year on year method seems more amenable managerially to measurement and verification].

**** Nb: These are unverified, preliminary results for illustrative purposes. They are based on some real data and hypothetical but possible conditions.**

Harley Wright, 2012 *'striving to avoid dangerous climate change'*
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