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NOTE ON AUSTRALIAN EMISSIONS REDUCTION TARGETS

This note summarises the approach that led to the 2008 Garnaut Climate Change Review's recommendations on 2020 emissions reduction targets and draws on that analysis in discussing targets for the period after 2020.

Comprehensive modelling of the costs and benefits of climate change mitigation is an immensely complex task. It takes good people with a lot of resources a long time. My original climate change review had those people and resources. The 2008 Review was supported by every State and Territory Government as well as by the Federal Government, and had the active support of the then Federal Opposition. There were opportunities for public participation in draft proposals, including town hall meetings in all mainland capitals that attracted many thousands of participants. Tens of thousands of pages of working papers were made available on the web for interested parties, and are accessed today by many students. The modelling in the Review was extended and updated by the Treasury in its estimates of the cost of emissions reductions in Australia, and by the Climate Change Authority in its preparation of last year's review of targets and progress.

My 2008 Review contained the one systematic examination in Australia of the benefits as well as the costs of climate change mitigation. It analysed Australia's fair share in a global mitigation effort, and sought by analysis to define the amount of global mitigation effort with Australia doing its fair share in a global effort that would maximize the excess of benefits over costs of climate change mitigation.

The Review noted that there were several kinds of costs of climate change and therefore benefits of avoiding it:

- Benefits of mitigation (avoided costs of climate change) of a conventionally economic kind, reflected in changes in the value of market exchange, assuming that climate outcomes corresponded to the median of the probability distribution of possible outcomes. The modelling was confined to conventional and measureable economic effects through to the end of the twenty first century. (For example, these effects included avoidance of lower prices for commodities as other countries' economic performance was damaged by climate change; avoidance of reduced tourism sales in North Queensland as a result of destruction of the Great Barrier Reef; avoidance of greater hospital

costs of larger numbers of patients from distress and illness associated with increased summer temperatures; or negatively, failure to achieve higher grain yields as a result of carbon enrichment of the atmosphere in areas with sufficient soil moisture to take advantage of it).

- Benefits of insurance against climate outcomes that were worse than the median of expectations, given the normal risk aversion of human society in the face of transformational change. (There is asymmetry between the valuation of losses from unexpectedly bad outcomes and the valuation of benefits from unexpectedly good outcomes).
- Benefits of climate change mitigation that were not sensibly quantifiable because they were not manifested in changes in the value of goods and services exchanged through markets (eg the value that Australians place on length of life for themselves and people they know; the natural heritage of diverse species and other natural phenomena; the welfare of people outside Australia; the continuity of social life amongst communities whose economic foundations would be undermined by unmitigated climate change).
- All benefits of mitigation beyond 2100 (noting that unmitigated or weakly mitigated climate change has its most disruptive effect on society and economy after 2100).

The modelling for the 2008 Review took systematic account of the fact that benefits came after costs of mitigation. This required application of discount rates. Three different discount rates were applied depending on the purpose for which they were used. I am confident that the discount rates applied were not too low, and so did not lean in the direction of favouring excessive mitigation, and am happy to provide additional documentation on this point should it be requested.

The quantitative analysis of the Review indicated that consideration of the first set of benefits of mitigation alone—the measurable, conventionally economic effects covered by the general equilibrium modelling—justified Australia doing its fair share in a global effort to hold global emissions concentrations to 450ppm of carbon dioxide equivalent (corresponding to a reasonable chance of holding human-induced temperature increases to two degrees). The second, third and fourth sets of benefits, in my view substantially larger than the first, could be considered a bonus from Australia participating in effective global mitigation to hold likely temperature increase to two degrees.

The calculation of Australia's "fair share" was based on an assessment that the only basis for allocating the global mitigation effort amongst countries was for emissions entitlements to converge towards equal per capita levels at or before the middle of the century. In responses to the 2008 Review, this was generally thought by analysts and commentators in developing countries to be excessively generous to developed countries, and especially to developed countries like Australia with exceptionally high per capita emissions at present, which would absorb a disproportionately high proportion of the world's remaining "emissions budget" prior to convergence on equal per capita emissions. It therefore represents the least onerous on Australia of the practically possible bases for assessing "fair shares".

Note that equal per capita entitlements to emit is not the same as equal per capita emissions. Specialisation in export of emissions-intensive goods (eg China in manufactures or Australia in fossil fuels) would lead to higher per capita emissions, which could be offset by purchase of emissions entitlements of other countries, with

the purchase of entitlements being reflected in higher international prices of the goods under discussion. Note that this outcome via trade in emissions entitlements is possible whether Australia and its trading partners meet their emissions reduction targets through carbon pricing or regulatory means.

The 2008 Review's recommendations were the source of Australia's current emissions reduction targets for 2020. The recommended targets were nested within a perspective on targets into the long term future. We can get quite a lot of guidance on the costs and benefits of climate change mitigation approaches today by looking systematically at what has changed since 2008.

The Review recommended that Australia commit itself unconditionally—that is, even if the rest of the world were doing nothing—by five percent on 2000 levels by 2020, and by larger reductions up to 25 percent depending on what the rest of the world is doing. Beyond 2020, the Review explained that Australia's fair share in an effective global mitigation effort would require the reduction of emissions by about 90 percent, or about 95 percent per person, by 2050 if the whole international community were seeking a reasonable chance of containing the increase in human-induced warming within two degrees Celsius.

The modelling revealed modest costs for Australia doing its fair share in a global effort to hold the increase in greenhouse gas emissions to levels that gave a reasonable chance of avoiding human-induced temperature increases above two degrees Celsius. The gross cost—without taking benefits into account—was estimated to be about an average of one tenth of a percentage point per annum off Gross National Income growth until mid-century.

The largest single source of gross costs to Australia of participation in a global effort to hold human-induced climate change to two degrees derived from the effects of other countries' actions on demand for our fossil fuels. This is a cost from other countries' action—whatever we ourselves do on climate policy. Hopes that other countries would not take action to reduce the costs of climate change has contributed to the misjudgements that caused overinvestment in Australian resources production capacity over the past four years. Failure to recognize the seriousness of other countries' commitments to reduce emissions, most importantly China and the United States, has imposed large costs on the Australian economy. The total of these unnecessary costs may already exceed what would have been the cost to the middle of the century of timely implementation of Australia's share of a global mitigation effort directed at holding temperature increase to two degrees.

The 2020 recommendations with some modification in detail attracted Opposition support, became Government policy, and were communicated to the United Nations as Australia's formal commitments to the international community at the Cancun Conference of the Parties of the United Nations Framework Convention on Climate Change. The presence of conditional as well as unconditional targets commitments was recognized by the current Government when in Opposition prior to the 2013 Federal election.

The commitment—a domestic political commitment and a formal undertaking to the United Nations—is to reduce emissions by five percent by 2020 even if the rest of the world is doing nothing; by 15 percent if other developed countries are taking comparable action and developing countries are reducing emissions significantly below

business as usual; and by 25 percent if the international community is working within an agreement that brings reasonable prospects of holding temperature increases to 2 degrees.

The 2008 recommendations and the 2020 targets established in 2008 identified conditional as well as unconditional elements because at that time it was not clear that the international community would commit itself to a major mitigation effort. In 2007, the United States President had said that he expected United States emissions to continue to rise to a peak in 2025. In 2009 at Cancun, the United States committed itself to reducing emissions by 17% by 2020 on 2005 levels. At the time when the work leading to the 2008 Review was being completed, the Chinese Government had made no formal commitment to constrain emissions below business as usual. At Cancun in 2009, the Chinese Government committed to reducing the emissions intensity of economic activity by 40-45 percent by 2020 on 2005 levels. In 2008, there was no international agreement on an objective for constraining human-induced climate change. In 2009 at Cancun, the international community through the United Nations Framework Convention on Climate Change, following an agreement within the Prime Ministerial Meeting G20 of large countries which had met for the first time in December 2008, agreed on an objective of holding the temperature increase to two degrees above pre-industrial levels.

The actions of other countries since 2008 have triggered the application of the conditional target.

Australian law designates the Climate Change Authority (CCA) as the body that provides the Australian Parliament with advice on targets on a continuing basis. The Climate Change Authority advises that the target that corresponds to Australian international commitments in the light of what other countries are doing is to reduce emissions by 15 percent with an additional four percentage points from application of four percentage points carried over from Australia's over-performance against its 2008-2012 Kyoto commitments, for a total of 19 percent. The CCA has recently recommended reductions of 30 percent from 2000 levels by 2025 and 40-50 percent by 2030.

My own assessment is that emissions reduction of 15 percent by 2020 is required by the action of other countries within the conditional commitments that Australia has made to the international community. My own view is that we would be wise to hold the four percent credit from over-performance 2008-12 against the possibility of underperformance at some future time.

The CCA showed that the extra cost of moving from the unconditional minus five percent to the conditional 19 percent is low if we choose the lowest cost means of reducing emissions—0.02 percentage points from the annual rate of Australian economic growth.

Apart from the breach of domestic political and international commitments, we will create economic problems for the future if we do too little to reduce emissions to 2020. The longer term targets that represent our fair share of the global effort are not diminished by weak early efforts. Accelerating emissions reductions after 2020 to catch up on slow early action would increase the costs of adjustment for Australians in future. In addition, slow early action by Australia and other countries to the need for convergence toward near-zero emissions at an earlier date than would otherwise be

the case, and would lead to earlier exhaustion of the “carbon budget” that is consistent with holding temperature increases to two degrees, and therefore to an acceleration of later emissions reductions that would increase the costs of adjustment.

Two considerations would seem to be especially important in setting targets for 2025 and 2030:

- To allow for gradual adjustment over time, so as to avoid shifting an unmanageable adjustment burden onto Australians in later years.
- To keep more or less in line with comparable countries—in our case, with other developed countries.

A linearly steady adjustment from minus 15 percent in 2020 to minus 90 percent in 2050 would suggest targets of minus 27.5 percent on 2000 levels in 2025, and minus 40 percent in 2030. This should be considered the minimum adjustment consistent with avoiding pushing costs excessively from current to future generations.

The costs and difficulties of reducing emissions by the same number of tonnes per annum would be likely to increase as the lower hanging fruit is harvested. An even adjustment burden over time would probably argue for targets that embodied steady percentage reductions in emissions rather than steady quantities of reductions in emissions. This approach would point to stronger emissions reduction targets over the next one and one and a half decades—by over 40 percent in 2025 and over 50 percent in 2030.

The least ambitious targets consistent with steady and gradual adjustment and avoidance of pushing excessive burdens onto future Australians are minus 27.5 percent by 2025 and 40 percent by 2030 on 2000 levels—targets which are close to those proposed by the CCA for 2025, and at the bottom end of the range proposed by the CCA for 2030. To be more confident of not pushing excessive costs of adjustments onto Australians living in future, we would adopt targets of minus 40 percent in 2015 and minus 50 percent in 2030.

Targets of minus 27.5 percent by 2025 and minus 40 percent by 2030 are broadly consistent with what is being proposed by other developed countries. Depending on the starting dates we choose, we could make these targets look a bit less or a bit more ambitious than the United States and other developed countries. It is not desirable to manipulate our starting date to suit the political convenience of particular moments. I recommend retention of a 2000 base, and the adoption of a target of at least minus 15 percent by 2020, minus 27.5 percent by 2025 and minus 40 percent by 2030.

It would be legitimate to meet part of this commitment by purchase of emissions entitlements from other developed countries under agreed arrangements, or purchase of CDM credits from developing countries. We would not serve the interests of Australians in future by avoiding early domestic adjustment through excessive reliance on purchase of entitlements from other countries, as international prices of abatement are likely to be much higher in the 2020s than in they are at present.

It is sometimes argued that continued uncertainty about the impact of climate change makes a case for a slow start in mitigation action. This is a false argument. Greater uncertainty around the same average outcomes and the asymmetry of reactions to positive and negative deviations away from average outcomes makes the case for

stronger early action as insurance against unexpectedly severe impacts. The uncertainty around scientific assessments of likely impacts has diminished since 2008.

What would be the cost of reaching these targets? As shown above, the 2008 Garnaut Climate Change Review and the 2014 Climate Change Authority report on targets demonstrated that costs are modest, so long as we use economically efficient policies to achieve reductions in emissions.

Several developments have reduced the incremental costs from now on of reducing Australian emissions within a global mitigation effort to well below what was estimated in the 2008 Review.

- First, the effects of other countries' efforts to reduce emissions on the prices of Australia's coal exports has occurred earlier than anticipated in the 2008 modelling. A substantial part of this dimension of the costs of mitigation has already been incurred.
- Second, the costs of low-emissions technologies have been falling substantially more rapidly than assumed in the 2008 modelling.
- Third, the cost of capital has fallen substantially to the lowest levels in the history of modern economic development. It happens that the low-emissions energy technologies have much higher ratios of capital to operating costs than the fossil-fuel-based technologies, so that lower capital costs systematically lower the costs of shifting from high-emissions to low-emissions energy technologies.
- Fourth, there has been a powerful tendency in all countries led by the developed countries and China to use much less energy per unit of economic activity since about 2009. Over this period the absolute level of electricity consumption has fallen in all developed countries including Australia, despite reasonably strong population increase and growth in economic output in some of them, including Australia. This tendency has strong roots in technological development induced by growing awareness of and policies to take into account environmental constraints on growth and is likely to continue. It is a source of continuing falls in the costs of reducing emissions.
- Fifth, developments in agreed international rules for measuring land management emissions and scientific developments in measurement and assessment of the potential of these sources of emissions reductions in Australia has raised the prospects of turning part of the considerable potential that the 2008 Review identified for reducing land-management-based emissions in Australia into internationally acceptable contributions to our targets. (It is important in this area to continue to recognize the potential, to work conscientiously on converting potential into real reductions in emissions, and to avoid counting land-based emissions reductions until it has been demonstrated that such inclusion meets the requirements of the international rules).
- Sixth, Australia is going through a period of relatively high unemployment that was not anticipated in 2008, and can be expected to remain in that state for at least several years. The presence of unemployment lowers the economic cost of early investment in industrial transformation.

In sum:

It is recommended that the Targets be minus 15 percent (holding credits for over-performance 2008-12 in reserve for future use in any periods of under-performance) in 2020, at least minus 27.5 percent for 2025 and at least minus 40 percent for 2030. These embody close to the lowest rates of reduction in emissions that are consistent with avoiding placing unreasonable burdens on future Australians; are broadly in line with the targets of comparable countries; and can be met at low cost so long as they are implemented through economically efficient policies. It is recommended that consideration be given to larger early reductions to avoid placing excessive adjustment burdens on future Australians.

Yours sincerely,

Ross Garnaut