

Submission to Caps and Targets Review Issues Paper

Summary

This submission will argue that Australia's 2050 target of an 80% emissions reduction be brought forward to 2020. More broadly, it also deconstructs Australia's present approach to climate policy, which I see as avoidant, and advocates an activist one. My arguments and recommendations, and how they contrast with the Australian government's present beliefs and policies, are summarized in the following table:

Existing assumption/policy	My counterargument/recommendation
Climate policies designed mostly as advocated by industry lobby groups	Because of the need for fossil fuel phaseout, the fossil fuel industry cannot be trusted to participate in the design of climate policies.
Climate change is one among many competing priorities.	Climate change is the largest and most urgent threat facing humanity today. Climate change mitigation must override all other objectives where they are perceived to conflict.
Australia's interest in climate policy is the competitiveness of its fossil fuels.	Australia's true interest is to prevent dangerous climate change.
Climate policies should remain largely unchanged to give investors certainty.	Investment certainty is unachievable because of the sabotaging influence of vested interests. Instead, climate policies and targets should be strengthened to send a strong investment signal.
Emissions caps to be locked in through to 2019-20. Unclear whether carbon permits are associated with property rights. Voluntary actions to be counted five years after they occur, if ever.	Emissions targets must be implemented in a way that does not limit ambition. Otherwise, a bad decision will be difficult if not impossible to correct before 2020.
Banking and borrowing of permits allowed	Banking and borrowing is unwise.
Stabilizing atmospheric CO ₂ at 450 ppm should limit global warming to <2°C and prevent dangerous climate change, based on IPCC AR4.	IPCC has systematically understated the problem. Unpredictable feedbacks could amplify projected warming. At nearly 400 ppm, atmospheric CO ₂ is already too high to avoid tipping points for dangerous climate change. A safe level is somewhere below 350 ppm (~1°C). The Arctic melt implies even 350 ppm is dangerous.
Emissions targets and caps are assumed to determine the level of action achieved.	The Review's scope must be expanded to include policies, because they determine whether targets are meaningful. It is urgent to get both right.

Existing policies will work reasonably well without being changed.	Australia's ETS contains time-bombs which would cause domestic emissions to rise, not fall. These must be fixed now.
Market mechanisms are preferable to regulatory ones.	A mix of markets and regulations are needed; indeed the carbon price already has elements of both. More regulatory elements are needed to ensure the market aspect delivers an effective outcome.
The value of a floating carbon price does not matter because the target will be met.	A higher carbon price is better than a lower one, because a stronger price signal is more likely to drive behavior change. A weak emissions cap, or flawed policy design, would cause the carbon price to crash.
Ceiling price; no floor price	The floor price should be reinstated to help prevent the carbon price from crashing. The ceiling price should be removed because it limits the penalty for pollution.
ETS to be linked to EU ETS and various international offset mechanisms	International linking and offsets displace domestic decarbonization, allow flawed schemes to contaminate each other, will cause the carbon price to crash, shift the burden to other countries, and may not represent real emissions cuts. Australia must meet its targets domestically.
The most important measure of a climate policy is cost of abatement, so the ideal climate policy is a carbon market with as few restrictions as possible to ensure emissions cuts occur where they are cheapest.	Australia's ETS treats non-equivalent types of emissions and abatement as equivalent, and is unlikely to deem the most important places to cut emissions as the cheapest. It is most important and urgent to phase out fossil fuel CO ₂ emissions, the largest and longest-lived cause of global warming. The ETS could be compartmentalized by sector and/or greenhouse gas.
Transition to ETS scheduled for July 2015, based on caps set in May 2014	If it is deemed politically impossible to set strong caps and fix the ETS by May 2014, the government should extend the fixed carbon price to avert the time-bombs.
\$13b/year in fossil fuel subsidies including \$4b/year in free carbon permits	Fossil fuel subsidies and free carbon permits outweigh the carbon price signal, and must be removed.

The carbon price is the central measure. Most other policies are redundant.	Success should not hinge on any single policy. Australia must support its carbon price with other new and existing policies, including renewable energy subsidies, feed-in tariffs, a ban on new fossil-fuelled electricity generators, a plan to close coal power plants, and a greenhouse trigger for environmental approvals.
2020 target range of 5-25% below 2000; 2050 target 80% below 2000	CCA's mandate puts no limit on the ambition of the targets it can recommend.
The objective of domestic climate policy is to implement the government's 2020 and 2050 targets.	Distant targets ignore the urgency and are easily undermined. It is more important to begin, in a single electoral term, systemic decarbonization of the economy.
Unconditional 2020 target 5% below 2000	The present target is meaninglessly weak. Australia must set emissions caps that rapidly reduce toward zero.
Australia's only responsibility is to cut its domestic emissions.	In a world where national emissions targets do not add up to a safe global target, Australia shares responsibility for emissions resulting from its fossil fuel exports.
Surplus permits carried over from Kyoto first commitment period	Surplus permits should be voluntarily cancelled so they do not dilute future targets
No sense of urgency	Returning CO ₂ to <350 ppm requires cutting global fossil fuel emissions by 6%/year beginning in 2013 (or even faster if the world delays), to near-zero as soon as possible, and eventually less than zero.
Foresees a future for the fossil fuel industry	Fossil fuels must be phased out globally, leaving most reserves in the ground.
Australia can rely on UNFCCC talks to solve global warming.	UNFCCC talks have delayed global participation until at least 2020, and present voluntary pledges put the Earth on course for an unimaginably catastrophic >4°C global warming by 2100.
15% and 25% 2020 targets conditional on international action	The existence and specifics of Australia's conditions are unfair, undiplomatic, and counterproductive. Unconditional unilateral ambition is required to break the international deadlock. Australia is obligated to lead the world.
Australia can only be a small part of the global solution.	As the world's largest coal exporter, Australia can make a global difference.

Facilitate expansion of fossil fuel exports	Demand for Australia's planned fossil fuel export growth depends on an emissions scenario leading to $>4^{\circ}\text{C}$ global warming. Australia must stop expanding and start phasing out its fossil fuel exports.
Australia's negotiating strategy in UNFCCC talks will help reach a global solution to limit global warming to $<2^{\circ}\text{C}$.	Australia's position is counterproductive. Instead Australia must adopt unconditional ambitious Kyoto targets, stop advocating loopholes, and stop prioritizing a post-2020 agreement.
Targets allocated by Garnaut's modified contraction-and-convergence method	Garnaut's approach unjustly favors Australia in multiple ways, so a fairer method should be used. Australia should not refuse to do more than what it calculates to be its "fair share".
Emissions cuts must be made at the lowest possible cost.	Many policy measures intended to reduce costs actually reduce effectiveness. Policies that mitigate enormous costs from climate change are preferable to policies that are cheap and ineffective.
Emissions cuts are generally costly.	The costs of mitigation are greatly exaggerated, short-term, and mainly paid by polluting companies. The costs of climate change are mostly not modeled by Garnaut, and are likely far higher than \$23/tonne. Cost-benefit analysis effectively discounts the lives of future generations.
Fossil fuels are essential to Australia's economy.	The contribution of fossil fuels to the economy is overblown. Continuing to rely on fossil fuels would damage Australia's future competitiveness.
An ETS is inherently superior to a fixed carbon price.	Shifting to a floating carbon price would not be an improvement if it causes the Australian emissions reduction rate to slow, or the carbon price to fall.
New information on global warming potentials not to be applied until 2017-18	Improved information should be applied immediately.
Australia's emissions have barely increased since 1990.	Australia's emissions excluding LULUCF rose 32% between 1990 and 2011.
Gas is a transition fuel.	Investment in gas would lock in fossil fuel infrastructure for decades.
CCS will save the fossil fuel industry.	CCS is unlikely to be deployed on a global scale for decades.

1. Introduction

I am a student and blogger with no vested interests or affiliations. I write a blog about climate change politics (www.precariousclimate.com). I have also written for www.skepticalscience.com and www.shapingtomorrowsworld.org/. My interest in emissions caps relates to their effectiveness in addressing climate change.

I am very supportive of the Climate Change Authority (CCA). As a respected independent body, CCA has an opportunity to be a strong advocate for climate action, and challenge the assumptions that Australian governments have made about climate policy to date. The Caps and Targets Review should be treated as part of a vitally important global effort to avert climate catastrophe.

The Australian government's present climate policies, emissions targets, and underlying beliefs about Australia's role in mitigating climate change (largely based on the approach of former advisor Ross Garnaut) are deeply flawed. This submission will deconstruct the existing paradigm and advocate a more activist, realistic, and pragmatic one (similar to that outlined by Beyond Zero Emissions¹).

This submission is informed throughout by an understanding of the extreme urgency of rapid emissions cuts, a sense of urgency that seems to be lacking in the Australian government's response to date. The extent of climate impacts decades, centuries and millennia from now will be determined by policy decisions taken in the near future. The Australian government's own Climate Commission has identified the 2010s as the "critical decade" for avoiding dangerous climate change.² This will be explained in detail in sections 2.1, 3.1.1 and 3.2.1.

Because of the need for fossil fuel phaseout (which will be explained in section 3.2.1), the fossil fuel industry cannot be trusted to participate in the design of climate policies. Misleading, self-serving arguments will be made to CCA by the fossil fuel lobby and the broader business lobby. While it could be argued these organizations have a right to lobby in their self-interest, their interests should not be put ahead of the public interest. They have known for many decades about climate change and the risk it poses to fossil fuel investments, and they should now face the consequences of the investment choices they have made without special treatment by governments. Past experience (eg. with carbon price compensation) shows that when the fossil fuel lobby secures concessions from government, however arbitrary, they become entitlements that are difficult to remove.³

The sections in this submission mostly correspond to sections in the Issues Paper, except for my Summary, Conclusion, and other added headings and subheadings shown in italic.

1.1 The Review task

I note the Issues Paper (p. vii) invites feedback not only on specific issues but also its proposed approach, as well as any issues it may have overlooked, and I do so in this

submission. I think the scope of the Review is too narrow. Throughout this submission I will cover broader issues I think are relevant to caps and targets, and suggest CCA broaden the scope of the Review to include them.

Anthropogenic global warming is the largest and most urgent threat facing humanity today. It is therefore incongruous that governments have tended to treat climate change as one of many competing priorities. If climate change is not adequately addressed, the resulting impacts will almost certainly outweigh all other attempts to make Australia and the world a richer and/or more equitable society. Because of this, and despite CCA's legislated principles, the goal of climate change mitigation must override policy certainty, cost-effectiveness, efficiency, equity, foreign policy, trade, and other objectives where they are perceived to conflict. CCA's focus in all its reviews must be strengthening climate policies to accelerate the transition to a zero-carbon economy, not preserving them for the sake of policy certainty or weakening them to reduce alleged short-term costs.

1.2 Approach to the Review

Australian governments to date, including the present government, have tended to design climate policy to promote Australia's national interest, understand the national interest mostly as short-term economic competitiveness, and equate fossil fuel mining and export interests with its short-term economic competitiveness. Given the scale of the climate change threat, and the Issues Paper's acknowledgement (p. 3) that Australia's true national interest is to prevent dangerous climate change, climate policy must not be subordinated to this mistaken goal.

1.2.1 Australia's emissions reduction goals

One of the four considerations which the Issues Paper proposes that the Review focus on in determining its recommendations is "the extent and nature of international action to reduce greenhouse gas emissions" (p. 5). This should not be a consideration at all, or at least should not continue to be seen as a condition for raising ambition, for reasons I will explain in section 3.2.2. Instead, the legislative requirement for CCA to have regard to "global action to reduce emissions" should be interpreted in the ways I will outline in section 3.2.2.

The Issues Paper notes that the Review's legislative mandate allows it to have regard to "such other matters (if any) as the Authority considers relevant". In this submission I propose adding a new consideration, "the need to accelerate decarbonization", which will be discussed in section 3.2.5 of this submission.

1.2.2 Australia's progress

See section 5 for my views on how CCA should approach reviewing Australia's progress.

1.2.3 Uncertainty and risk

Question: “how targets, trajectories, budgets and caps might be framed to help reduce uncertainty, and assist in managing risks in Australia’s transition to a low-emissions economy”

Investor certainty

In the RET Review, the CCA and the government argued⁴ that climate policies must largely remain unchanged so companies can be sure about where to invest. Yet as CCA CEO Anthea Harris recently remarked, “Anything is possible in climate change policy.”⁵ The reality is that certainty in climate policy is unachievable for the foreseeable future, because of the constant sabotaging influence of powerful vested interests whose business model is threatened. Despite the saying that death and taxes are the only certainties, not even taxes are certain in climate policy. Within this context, there is little point in trying to minimize investor uncertainty. There is also little point in designing a policy whose effects are intended to play out over decades, a topic I will return to in section 3.1.1.

The investment certainty argument also assumes that existing policies are perfect, or at least close enough to perfect that they can work reasonably well without being changed. In the real world, Australia’s climate policies are far from perfect, and it would be a terrible mistake to preserve those imperfections. There is no point in giving investors certainty of an undesirable outcome.

Instead of attempting to fight inevitable uncertainty, policymakers should embrace it as an opportunity to drive rapid change. Climate policies should be designed not for the unrealistic mirage of policy certainty, but the more pragmatic aim of policy strength: to send the strongest possible signal to penalize fossil fuel use and incentivize investment in zero-carbon technologies. To this end, CCA should not shy away from recommending the government adopt deeper targets and stronger policies. The reason for the existence of a Climate Change Authority with regularly scheduled reviews is to provide regular opportunities to strengthen Australia’s climate policies and thus accelerate decarbonization over time.⁶ If CCA continues to take the light touch approach it took in its Renewable Energy Target Review, it risks making itself irrelevant.

Responding to changing information

The Issues Paper (p. 6) discusses the risk that CCA could make bad judgments and the need to respond to changing information, then claims that the present policy of locking in emissions caps through to 2019-20 helps to manage this. In fact, it does the opposite. If CCA makes the mistake of recommending an emissions trajectory that is not sufficiently ambitious, then the lock-in will make it difficult, if not impossible, to correct until the end of the critical decade. It is unclear whether it would be constitutionally possible to later reduce the number of emissions permits to strengthen the target; any attempt to do so might be legally challenged as an acquisition of property. This has two implications.

Firstly, CCA must be very careful not to make such a mistake. In dealing with uncertain information, it should err on the side of avoiding dangerous climate change. The best way to manage risk is to take strong action now and *then* reassess whether it was necessary. This is particularly pertinent given the inherent difficulties with modeling the costs of climate change explained in section 3.2.4.

Secondly, CCA must recommend that emissions targets and caps be enforced in a way that does not preclude raising ambition. CCA would no doubt seek legal advice on how best to do this, but here are some ideas. An emissions trajectory could be planned years in advance, but binding caps set only one year at a time, as recommended by the annual Caps and Targets Review. The Clean Energy Act could be amended to clarify that carbon permits are not associated with property rights, to ensure emissions caps can be tightened after they have been set.

To encourage voluntary actions, there must be a clear mechanism to tighten the emissions cap to account for verifiable voluntary emissions cuts, including emissions cuts from other federal, state, and local policies (ie. making those policies additional to the emissions cap). To prevent inertia, verified emissions cuts should be subtracted from the cap in the following year, instead of five years after they occur as is current policy. Also, recalled permits should be cancelled instead of being reissued. Any possibility of overachieving or oversupply of permits should be welcomed as an opportunity to tighten the next year's emissions cap.

Banking and borrowing

Current rules allow liable companies to bank present carbon permits to use in the future, and borrow future permits to use in the present. This is unwise as it creates uncertainty in Australia's emissions trajectory, and could result in a surplus of permits.

International linking and price ceiling

The Issues Paper claims (p. 6) that Australia's plans for international linking and a carbon price ceiling limit the risk of large mitigation costs. What these policies actually do is limit domestic emissions cuts, and they should be abandoned, as I will explain further in section 2.2.2. Limiting the cost of mitigation should not be seen as an argument for these policies, for reasons I will explain in section 3.2.4.

2. Context and Scope

2.1 Climate science

I am pleased to see the Issues Paper (pp. 7-9) acknowledges the general scientific context of climate change, and that it is in Australia's national interest to limit global warming to 2°C. However, I would like to call to the Review's attention a few points which mean greater urgency.

The latest climate science shows scientists have systematically underestimated the impacts of global warming (possibly because they have overcorrected in response to accusations of alarmism).⁷ The Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC AR4) dramatically understates the problem, and AR5 can be expected to do the same because of the conservative nature and inertia of the IPCC process.

The Review should not assume that stabilizing atmospheric CO₂ at 450 ppm would limit global warming to <2°C. There is a high risk that current estimates of climate sensitivity are underestimates, as long-term feedbacks could become significant much sooner than expected.⁸

Furthermore, 2°C is itself a very dangerous level of warming. Many climatologists argue the present atmospheric CO₂ concentration of ~400 ppm⁹ (which means there is further warming to come due to inertia¹⁰) is already too high to avoid tipping points for dangerous climate change. Fortunately, reducing atmospheric CO₂ from its present level should prevent some of the warming in the pipeline. The safe level has been estimated as somewhere below 350 ppm, associated with ~1°C global warming above preindustrial.¹¹

There is mounting evidence that even the present global temperature (0.8°C above preindustrial¹²) is dangerously high:

- Arctic sea ice is already melting faster in the real world than in the projections that will be included in AR5.¹³ Based on the trend in sea ice volume¹⁴ and one regional model¹⁵, the Arctic in September could be completely sea-ice-free within a few years. By reversing the surface reflectivity of the northern polar region, the Arctic melt threatens to set off a chain reaction of tipping points, including collapse of the Greenland ice sheet and large-scale release of carbon from melting permafrost.¹⁶
- The Greenland ice sheet is shrinking at an unprecedented and accelerating rate¹⁷, and recent modeling suggests the tipping point for total collapse could be a global temperature of around 1.6°C above preindustrial. The lower end of the range of possibilities is only 0.8°C, equal to today's global temperature.¹⁸
- Permafrost is already starting to release carbon and could eventually emit at the same rate as deforestation, a finding which will not be included in AR5.¹⁹
- The last time the global temperature was ~1°C above preindustrial (in the Eemian interglacial age 125,000 years ago), the poles were several degrees warmer²⁰, there was no summer sea ice in the Arctic²¹, and sea level was 6-9 meters higher²²²³ (meaning at least partial melting of the Greenland and/or West Antarctic ice sheets).

The above findings imply we are already entering a period of dangerous climate change and there is very little time to avoid large feedbacks that could send climate change spiraling out of control.

CCA should note the objective of the United Nations Framework Convention on Climate Change (UNFCCC) is to cut emissions fast enough to avoid “dangerous anthropogenic interference with the climate system”²⁴, which would mean reducing CO₂ to <350 ppm. Also, the global temperature target specified in the Cancun Agreements is not 2°C but <2°C, and many countries advocate <1.5°C.²⁵

It would be extremely reckless to be complacent about the world’s present path to >4°C, as human civilization is unlikely to be able to adapt to anything like that level of global warming.²⁶ It is impossible to predict the exact social impacts of climate change, but it is not difficult to imagine unprecedented migrations of hundreds of millions of people, resource wars, and even a collapse of global civilization.

Some argue it is already too late to avert dangerous climate change. Even if that turns out to be correct, we must act now to limit the damage by decarbonizing the global economy as fast as possible.

2.2 Australia’s action on climate change

2.2.1 Australia’s emissions

See section 5 for discussion of Australia’s progress to date.

2.2.2 Policies and measures

The Issues Paper says (p. 11): “The Authority does not intend to examine the merits of the carbon pricing mechanism, nor its detailed design, in this Review.” Yet as the Issues Paper acknowledges in the very next paragraph, “policy settings have a major influence on the impacts of different goals”. Targets alone do not determine the amount and quality of action achieved. Targets and policies are two sides of the same coin; they cannot be considered separately as each determines whether the other is effective. Decisions about policy design affect how targets are met. Perhaps the most important example is international linkage, which will determine whether Australia’s targets are met in Australia. If the Review proceeds to confine its purview to targets alone, it will merely be recommending a set of numbers without regard for what those numbers really mean.

Australia’s emissions trading scheme (ETS) has built-in flaws which need to be fixed to ensure emissions caps are meaningful. The most important of those flaws are time-bombs set to go off when the carbon price becomes an ETS, scheduled for 2015. The main time-bombs are the lock-in of emissions caps (whose effects are described in section 1.2.3), international linking and offsets, and trading of non-equivalent types of emissions. The time-bombs must be fixed before they go off.

If the time-bombs are not fixed, they will actively prevent emissions cuts, stopping the present emissions reduction in its tracks and allowing emissions to rise instead. Treasury projections show present policies will not drive a phaseout of fossil-fuelled electricity generation in Australia, nor even an absolute reduction in domestic emissions, for many decades. According to the latest government projections, Australia’s domestic emissions

would actually *increase* 11% by 2020.²⁷ Fossil fuels would still provide ~60% of Australia's electricity in 2030.²⁸ These outcomes are completely unacceptable.

CCA should either expand the scope of this review to include policies and measures where relevant, or bring forward the carbon pricing mechanism review (currently scheduled for 2016) to coincide with the Caps and Targets Review. Both scientific and legal reasons make it urgent to get climate policy design right. It will be far too late to fix the design of the policy in 2016: caps will have been locked in until 2019-20, the flexible price period will have begun, large numbers of dubious emissions permits will have been purchased, and several years' worth of emissions will have accumulated in the atmosphere. Therefore it is imperative that the major flaws be fixed as a result of this Review.

Given the Australian government has chosen to proceed with a carbon price that will become an ETS, it is essential that the Australian ETS does not fail like its international counterparts have. Below I discuss how some of the flaws in the ETS could be fixed. I also propose the alternative option of extending the fixed carbon price if the flaws cannot be fixed.

Many other sections in this submission will refer back to this one, demonstrating how very relevant these issues are to the Review.

Markets versus regulations?

It is often argued that climate policy requires a choice between market mechanisms and regulatory ones and that the former are inherently preferable, but this is a false dichotomy. A mix of markets and regulations are needed; indeed the carbon price already has both market-based and regulatory aspects. More regulatory elements are needed to ensure the market aspect delivers an effective outcome. It would be unwise to leave too many greenhouse gas decisions to markets, because a market failure is driving the problem in the first place. On that basis, a climate policy is more likely to be effective the more limited its market aspects and the more restrictive its regulatory aspects. If markets are badly designed by governments then they will make the wrong investment decisions.

The need for a high carbon price

It is often assumed that the value of a floating carbon price does not matter because the carbon market will meet the set target anyway. This is wrong because meeting an arbitrary target is less important than beginning systemic decarbonization of the economy, as will be further explained in section 3.1.1. A higher carbon price is superior to a lower one, because a stronger price signal is more likely to drive behavior change. A weak emissions cap, and/or flawed policy (eg. international offsets), would cause the carbon price to crash to levels like present international carbon prices, undermining the penalty for carbon pollution and incentive to invest in zero-carbon technology and energy efficiency.

Carbon price floor and ceiling

Australia's ETS is presently planned to have a ceiling price, but a proposed floor price has been cancelled. The floor price should be reinstated (preferably at a higher level than the original \$15/tonne) to help prevent the carbon price from crashing. The ceiling price should be removed because it limits the penalty for pollution.

International emissions trading

Under present policy, polluting companies will be allowed to meet Australia's emissions caps with effectively unlimited international offsets, both from other cap-and-trade schemes like the EU ETS, and from baseline-and-credit schemes without emissions caps like the Kyoto Protocol Clean Development Mechanism (CDM).

International linking and offsets raise huge concerns for Australian climate policy:

- International offsets may not represent real emissions cuts, especially those from baseline-and-credit schemes which depend on highly fallible estimates of additionality. For example, currently the most common type of Certified Emissions Reduction (CER) comes from Asian companies who produce gratuitous pollution so they can be paid to stop.²⁹ This criticism is based not on an irrational distrust of foreigners, but on a realistic skepticism about the difficulties of carbon accounting in developing countries with no absolute emissions caps, less regulation, and in some cases a less accountable government. (Linking to a scheme with an absolute emissions cap like the EU ETS is comparatively credible but still has the other problems outlined below.)
- International permits would displace (and thereby hinder) domestic decarbonization. This is a problem because all countries need to phase out fossil fuel emissions as quickly as possible, and this requires real structural change in the Australian economy.
- International linking allows distinct emissions trading schemes to contaminate each other with their flaws. For example, the EU ETS has already achieved its 2020 emissions target eight years ahead of schedule³⁰, thus no longer provides any incentive to cut emissions, and so far Poland has vetoed all attempts to fix the scheme.³¹ Difficulties may also arise from linking schemes with different accounting rules.
- Australia's carbon price would be largely determined by policy decisions made in other countries. Based on present rock-bottom carbon prices in the EU ETS and other international carbon markets, Australia would be flooded by cheap imported permits and the Australian carbon price would plummet, potentially to nearly zero. Treasury recently revised its forecast for the Australian carbon price in 2015 downward from \$29/tonne to \$12.10/tonne.³² Such a low carbon price would undermine any incentive for investors to decarbonize (especially considering that a proposed carbon floor price that could have acted as a brake has been

cancelled). Even if international prices eventually recover, much damage will already have been done, as Australian polluters are allowed to buy international permits now at the current price and use them later.

- International offsets are unfair because they shift the burden of cutting emissions from Australia to other countries, which are often poorer and less carbon-intensive. Australia has an obligation to lead the world (as will be explained in section 3.2.3). Although it is important for Australia to finance climate action in developing countries, it should be supplementary to domestic action, not as an offset for domestic emissions.
- The Australian public and other countries expect Australia to cut its own emissions.

The existing 50% “limit” on international offsets is virtually meaningless because it allows companies to pollute up to twice the level of the Australian emissions cap.³³ In other words, Australia will have effectively no mandatory absolute domestic emissions reduction unless its target is deeper than 50% below present levels. It is also unclear whether the 50% limit will apply to importation of European permits. Even the more recently added 12.5% limit on Certified Emissions Reductions (CERs), a step in the right direction, still allows companies to emit in excess of the cap by a significant amount.

Australia should follow the lead of South Korea and California, who will allow zero international permits in their emissions trading schemes.³⁴ The Australian government should not proceed with its intention to link to the EU ETS, Kyoto Protocol offset mechanisms, or any other international emissions trading or offset scheme. Australia must meet its targets domestically.

Trading of non-equivalent types of emissions and abatement

Even without international offsets, there are reasons for concern about the effectiveness of emissions trading generally. The rationale for Australia’s ETS is that the most important measure of a climate policy is its cost-effectiveness in dollars per tonne of CO₂e abated per year, so the ideal climate policy is a carbon market with as few restrictions as possible to (in theory) ensure emissions cuts occur where they are cheapest. My concern about that logic is that the carbon market is unlikely to deem the most important places to cut emissions as the cheapest, considering the cost is paid by polluters. If it does not, it will instead prevent the most urgently needed transition, away from fossil fuels. This is especially a concern considering the free permits handed out to large polluters, which in at least some cases are making them more profitable.^{35 36 37}

There are several ways in which relatively expensive emissions cuts can be more significant than the cheaper abatement favored by a carbon market. Firstly, although Australia’s ETS treats all tonnes of CO₂e as equivalent, their effects on the climate system are not equivalent, as discussed in section 3.2.1. Secondly, although every tonne of abatement looks identical on paper, in the real world different actions contribute very

differently to long-term systemic decarbonization of the economy. The latter is affected by factors such as whether the action locks in or prevents lock-in of fossil fuel infrastructure, whether it changes relative technology prices, whether the emissions reductions are permanent, and whether the emissions reductions will continue beyond the start year. By choosing apparently least-cost short-term abatement, the carbon market may fail to account for these matters.

To better address these issues, the ETS could be compartmentalized by sector and/or greenhouse gas to ensure action on all fronts. Instead of a single catch-all commodity called “carbon” that equates many different things, there could be several commodities (eg. “fossil carbon”, “land carbon”, “chlorofluorocarbon”, etc), each with its own separate emissions budget, targets, and market. Companies would be allowed to exchange apples for apples, but not apples for oranges. Greatest priority (deepest target, highest floor price) should be given to cutting the commodity with the most important role in climate change: fossil fuel CO₂ emissions. This compartmentalized emissions trading would allow each type of emissions to be reduced at the lowest *credible* cost.

At the very least, the Carbon Farming Initiative should be redesigned into a separate cap-and-trade scheme, instead of an offset scheme connected to the ETS.

The alternative of continuing the fixed price

If it is deemed politically impossible to, by May 2014 (when emissions caps are scheduled to be locked in), set ambitious emissions targets and fix the fatal policy flaws outlined above and elsewhere in this submission (particularly international offsets), then I propose a simple alternative. The government could indefinitely extend the fixed price period, averting the time-bombs that would lock in failure.

A fixed carbon price is in one way superior to an ETS. The specific flaws in Australia’s ETS which I have criticized above are illustrative of a general problem with emissions trading schemes: an ETS that is anything less than perfect can actively prevent climate action, because it leaves so many decisions to the market. A perfect policy is difficult to achieve due to the power of vested interests, as discussed in section 1.2.3. The collapse of overseas carbon markets is a clear warning of the pitfalls of emissions trading schemes. Emissions trading is a risky policy pathway for Australia to continue along. In contrast, a fixed carbon price does not need to be perfect because it places no limit on emissions cuts, cannot crash due to recession or bad policy design, cannot be compromised by external offsets, and can easily complement other policies like renewable energy subsidies.

If the choice is made to continue the fixed price, it should proceed to increase much faster than a few percent per year, to strengthen the signal to investors, and because \$25.40/tonne is likely far less than the true external cost of CO₂ emissions.³⁸

Fossil fuel subsidies

Currently annual carbon price revenue (\$8 billion³⁹, which could fall dramatically after the shift to emissions trading⁴⁰) and annual renewable energy subsidies (approximately \$300 million rising to \$2 billion next financial year) are outweighed by the counteracting incentive-to-pollute provided by annual fossil fuel subsidies (\$13 billion, including \$4 billion in polluter compensation for the carbon price⁴¹). The net effect is to make polluting industries more profitable. These fossil fuel subsidies should be removed.

The carbon price compensation arrangements include the Jobs and Competitiveness Program, handing out \$3 billion per year in free carbon permits to industries defined as “emissions-intensive trade-exposed” (EITE). The highest-polluting EITEs get 94.5% of their permits for free, diluting the carbon price to \$1.27/tonne for those companies. Note the 94.5% number actually refers to 94.5% of the industry average, so any company with emissions below its industry’s average could be overcompensated for its emissions. Low international carbon prices increase the chances of EITE companies being overcompensated.⁴² The rate at which the percentage of free permits reduces is so meaningless that the total number of free permits could actually rise over time. These absurd levels of compensation are guaranteed in law until at least 2017, with the government required to give three years’ notice of any changes.

The other main plank of the compensation is a \$1-billion-per-year Energy Security Fund for coal-fired electricity generators, also mostly in the form of free permits. The only condition for a generator to receive compensation is that it continues to operate, effectively an incentive to stay open for years. This fund has actually made the generators more profitable than if there had been no carbon price, contributing to the failure of another fund intended to pay for the closure of 2,000 MW of coal-fired generation.⁴³ If the Energy Security Fund continues, windfall profits to generators will reach \$2-5 billion by 2016.⁴⁴ Again, the lower the international carbon price, the higher those windfall profits will be.

The justifications for all these free carbon permits are unconvincing. The Jobs and Competitiveness Program is not actually protecting Australian jobs and competitiveness, because competitiveness in the future will depend on phasing out fossil fuels, as will be explained in section 3.2.4. The Energy Security Fund has been proven unnecessary by the decline in Australian electricity demand.

CCA should recommend that Australia immediately announce it will terminate the Jobs and Competitiveness Program from 2018. The Energy Security Fund and other fossil fuel subsidies should be immediately cut.

Energy policy

The Australian government’s Energy White Paper⁴⁵ plans to facilitate the expansion of fossil fuel mining and export industries, extraction of Australia’s enormous known fossil fuel reserves, and exploration for new reserves. The Energy White Paper must be

replaced by a new energy policy which will leave most fossil fuel reserves in the ground, and phase out fossil fuel burning as quickly as possible. Such an energy policy is further discussed in section 3.2.2.

Complementary policies

The carbon price should not be expected to do all the work, but instead be complemented by other new and existing policies. A single measure is highly vulnerable to repeal, failure, low ambition, or erosion over time (and as demonstrated above, there are many ways in which emissions trading schemes can go wrong). Australia needs a range of climate policies operating alongside each other, so success in cutting emissions does not depend on the survival and effectiveness of any single policy.

Complementary policies are not redundant: they are a way of ensuring emissions cuts occur where it is most important instead of merely where it is cheapest (and ensuring they occur domestically, if international offsets continue to be allowed). Also, some of the required structural economic changes (eg. infrastructure) may not be driven by a price signal alone.

CCA should recommend the government continue to introduce new measures to assist in meeting emissions targets, for both covered and uncovered emissions. The complementary measures which already exist, including the Renewable Energy Target (RET), Clean Energy Finance Corporation (CEFC), and Australian Renewable Energy Agency (ARENA), are far from sufficient in scale. The carbon price should not be used as an excuse to scrap other existing climate policies or preclude new ones, and the government should consider reinstating policies it has already scrapped.

More government funding is needed to support deployment of existing zero-carbon technologies and zero-carbon infrastructure. Though R&D is also important, the emphasis should be on deployment of existing technologies as there is no time to wait for the invention of new technologies such as carbon capture and storage (CCS). New wind power is now cheaper per megawatt-hour than new coal- or gas-fired electricity generation, but renewable energy still needs subsidies to compete with existing generators.⁴⁶ Renewable energy subsidies are justified, especially considering the fossil fuel industry is profitable today thanks to enormous past and present subsidies and other supportive policies. New renewable energy subsidies could be funded by cutting fossil fuel subsidies, cutting carbon price compensation, and/or abandoning the unnecessary goal of a budget surplus. The biggest threat facing humanity is worth spending money on.

The RET should be increased to reach 100% as soon as possible. Funding for CEFC should be increased, and should be solely directed to zero-carbon technologies. A federal feed-in tariff should be introduced for each renewable energy technology. Most of the EU's renewable energy has been delivered by feed-in tariffs.⁴⁷

There is a risk⁴⁸ (albeit diminishing due to the falling prices of renewables) that a too-low carbon price, instead of deploying renewables as is urgently needed, could drive

investment in gas-fired electricity generation, locking in fossil fuel infrastructure with a lifetime of decades. CCA should recommend the government ban new fossil-fuelled electricity generators to guard against this risk.

The hole left by the failure of contracts-for-closure should be replaced with a new plan to close coal-fired power plants and replace them with renewable energy.

A greenhouse trigger should be added to the Environmental Protection and Biodiversity Conservation Act, and the federal government's approval powers under the Act should not be delegated to the states.

Climate change mitigation should be one of the National Electricity Market objectives.

2.2.3 Emissions reduction targets

I am pleased to see the Issues Paper (p. 14) views Australia's present UNFCCC and Kyoto Protocol targets as minimums, is not constrained by the government's stated conditions, and does not rule out targets deeper than 25% below 2000 by 2020. The 80%-below-2000-by-2050 target should similarly be treated as a minimum. I note CCA's legislative mandate puts no limit on the ambition of the targets it can recommend, and allows it to account for any matter it considers relevant (Issues Paper, p. 5). In section 3, I will explain why Australia's current conditions for raising ambition are utterly inappropriate, and argue that an unconditional target more stringent than any in the current target range is in the interests of limiting global warming to <2°C and therefore in Australia's national interest.

3. Australia's emissions reduction goals

3.1 Defining targets, trajectories, and budgets

3.1.1 Timeframes

Question: “the extent to which specific recommendations for emissions reduction goals beyond 2020 should be made, and the merits of different approaches (for example, a long term national budget or a long term indicative national trajectory)”

It is a mistake for climate policy to focus on distant targets for 2050, 2030, 2025, or indeed even 2020. The long-term nature of climate change impacts makes it urgent to cut emissions rapidly in the short term. The 2010s is the critical decade.

Further emphasizing the need for decisive, rapid, and transformative action is that however well climate policies are designed today, there is a high danger they will be sabotaged by vested interests tomorrow, as discussed in section 1.2.3. Today's 2020 and 2050 targets could easily be undermined long before they are reached, through present governments delaying the heavy lifting and/or future governments reversing the policies of present ones. Consider Australia's failure to meet the Hawke government's emissions reduction target of 20% below 1988 by 2005.⁴⁹

The Government's present target of a 5% emissions reduction below 2000 by 2020 is arbitrary and meaninglessly weak given the urgency of rapid global emissions cuts, yet it is encouraging politicians to focus on finding the cheapest way to comply with it. The 2050 target of an 80% emissions reduction below 2000 has far too long a timeframe. Australia and the world should reach zero emissions well before 2050.

The objective of climate policy should not be merely implementing a distant arbitrary target. It is more important to begin the systemic economic changes needed to decarbonize. To use a football analogy, Australia should not put all its efforts into winning the pre-season final, instead of training for the more meaningful grand final.

CCA should recommend Australia adopt an emissions reduction trajectory fast enough to shift the political focus from a 2020 target to slashing emissions in a single electoral term, to accelerate the pace of decarbonization and so the incumbent government can be held accountable for its targets. Emissions caps should decrease each year, and reach zero as soon as possible.

3.1.2 Accounting

Question: “whether Australia’s emissions reduction goals should be aligned with its commitments under the Kyoto Protocol, or instead address a wider range of emissions and activities (for example, emissions from international shipping and aviation)”

Sphere of influence

Australia's present climate policies (like those of other countries) focus on constraining only emissions that occur within its borders. CCA should instead look beyond Australia's domestic emissions to its larger “sphere of influence”, including emissions from the consumption of its exports and emissions from the production of its imports. Australia has a responsibility to address each of these sources of emissions. Beyond Zero Emissions has argued a sphere-of-influence view of national responsibility makes more sense than domestic-only accounting, in a world where national emissions targets do not add up to a safe global target.⁵⁰

From an ethical and practical point of view, global trade means countries have overlapping spheres of influence. Many of the world's largest proposed fossil fuel projects involve carbon being mined in one country and burned in another.⁵¹ To target the problem at its source, much more attention must be given to constraining the extraction and trade of fossil fuels.

The largest and fastest-growing source of emissions in Australia's sphere of influence is fossil fuel exports. Already the majority of Australia's fossil fuels are exported, and Australia is the world's largest coal exporter. Worse, planned exponential growth of fossil fuel exports will dwarf any domestic emissions cuts. Proposed Australian coal export projects collectively have been identified as the second largest proposed expansion of fossil fuel CO₂ emissions after Chinese coal mining.⁵² Demand for such growth in

exports depends on an emissions scenario where the world takes no further climate action beyond present UNFCCC pledges, leading to $>4^{\circ}\text{C}$ global warming, despite Australia claiming to support the globally agreed objective of limiting warming to $<2^{\circ}\text{C}$.⁵³

CCA should research, or commission research on, the extent of Australia's current and projected exported and imported emissions, and make recommendations on how they could be addressed, with particular regard to phasing out fossil fuel exports (which will be further discussed in section 3.2.2).

The large size of Australia's sphere of influence also further increases Australia's obligation to slash domestic emissions.

International offsets

While the accounting must include international trade in *products*, it must exclude international trade in *permits* (ie. the opposite of the government's present thinking in both cases). This is because the important thing is what Australia is responsible for, and offsetting emissions is not taking responsibility for them, because of the problems explained in section 2.2.2.

Surplus permits

Question: “how Australia’s carry over of emission units from the first commitment period of the Kyoto Protocol might best be used”

These surplus permits should be voluntarily cancelled so they do not dilute future targets.

Miscellaneous accounting issues

There is evidence to suggest gas-fired electricity generation may actually be worse than coal-fired generation on a 20-year timescale after taking into account fugitive emissions of methane from unconventional gas extraction.⁵⁴ Full measurement and accounting of these emissions must be mandated.

Emissions are counted on a facility-by-facility basis rather than company-by-company. I am concerned companies could avoid paying the carbon price by setting up a large number of small facilities each with small emissions.

3.2 Key considerations

3.2.1 Global emissions budgets

Question: “the global emissions budget of most relevance to Australia’s emissions reduction goals”

For the reasons explained in section 2.1, Australia should aim to help reduce CO₂ to <350 ppm within this century. That goal corresponds to a global fossil fuel emissions budget of just 136 Gt C (500 Gt CO₂) for 2012-2050, followed later this century by a global reforestation program to remove 100 Gt C (367 Gt CO₂) from the atmosphere.⁵⁵

Because the effect of emissions is cumulative, it makes most sense from a climate point of view to cut global emissions steeply at first and then level off, as opposed to the gradual turnaround shown in the Issues Paper's Figure 6. This means cutting global fossil fuel emissions by 6%/year beginning in 2013. If the world delays until 2020, the required emissions reduction rate would become 15%/year; a rate of 6%/year beginning in 2020 would result in CO₂ remaining above 350 ppm until 2300.⁵⁶ At some point the required cuts become so steep they are impossible.

There is very little time to shift away from business-as-usual. CO₂ is now rising by ~2 ppm/year⁵⁷ and emissions are still accelerating: annual global fossil fuel CO₂ emissions have risen by 58% since 1990 and rose 2.6% in 2012.⁵⁸

The key implication of the global emissions budget, regardless of which precise budget is chosen, is the urgent need for each country to cut fossil fuel emissions to zero or near-zero as soon as possible (and eventually less than zero), which entails a global phaseout of fossil fuels. Because of the long lifetime of CO₂ in the atmosphere, before attempting to reduce its concentration, humanity must first stop emitting.⁵⁹ The vast majority of the Earth's known fossil fuel reserves must be left in the ground to achieve an 80% probability of limiting global warming to <2°C.⁶⁰ This is a point that seems not to be understood by the Australian government, judging from comments such as Julia Gillard's "the coal industry has a great future in this country"⁶¹, or Greg Combet's "the Government is extremely committed to ensuring that we've got a vibrant coal industry in the future".⁶²

The need for a fossil-fuel-CO₂-only budget

The Issues Paper (p. 18) points out that "gases behave differently in the atmosphere and contribute to long-term temperature change in different ways". In particular, greenhouse gases other than CO₂ are more powerful at trapping heat, but do not linger in the atmosphere for as long. While it is very important to cut emissions of non-CO₂ gases to prevent rapid near-term warming, this also should not be considered a substitute for phasing out fossil fuel CO₂ emissions to limit long-term warming. Therefore CCA should use a separate budget for each gas.

Just as not all tonnes of CO₂e are equivalent, not even all sources of CO₂ are equivalent. CO₂ emissions from fossil fuels and CO₂ emissions from land use play a different role in the carbon cycle. On human timescales carbon easily moves between the atmosphere, ocean, and land. It is only over geological timescales that these "surface reservoirs" exchange carbon with deeper, larger reservoirs. The most important thing humans are doing is mining and burning fossil carbon that has been buried for millions of years, thus emitting carbon at a pace many orders of magnitude greater than the rate of the processes which remove carbon from surface reservoirs. While storing more carbon in the land is a necessary part of climate action, it is far from sufficient and not nearly as urgent as eliminating fossil fuel emissions. A proportion of the fossil carbon will stay aboveground for millennia, and the land is a climate feedback so cannot store carbon permanently.

Finally, from a practical perspective, land carbon is harder to measure. For these reasons, CCA should also distinguish fossil carbon from land carbon.

Although all emissions are important, it is of most importance and urgency to phase out fossil fuel CO₂ emissions because they are the largest and longest-lived cause of anthropogenic global warming. If the world fails to phase out fossil fuels in a reasonable timeframe, all other efforts to mitigate climate change will matter little. Thus CCA's central focus should be on the budget for fossil fuel CO₂ emissions.

Because of these issues, it seems misguided for Australia's ETS to treat all greenhouse gases as the same. This could be addressed by compartmentalizing the ETS as explained in section 2.2.2.

3.2.2 International action

Although the international context is indeed relevant in many ways to Australian climate policy, raising Australian ambition should not be conditional on international action, for reasons I will explain below. Of the three dimensions listed by the Issues Paper (p. 18), only the third (the ability of Australia to influence other countries) should be a deciding factor, and it alone may be enough to fulfill CCA's legislative requirements. Nevertheless, given the approach proposed by the Issues Paper, this submission will comment on each dimension of international action and its true implications.

Industry assistance/compensation intended to protect competitiveness of exports should be removed regardless of the state of international action, because Australia's should be considered at least partly responsible for exported emissions (as argued in section 3.1.2), and because carbon-intensive assets will be detrimental to future competitiveness (as argued in section 3.2.4).

Assessing global action to reduce greenhouse gas emissions

Almost all evidence indicates global climate action is not happening at anywhere near the required scale and speed.

Australia cannot rely on UNFCCC negotiations to solve global warming, because those talks have delayed a possible global climate agreement until 2020 at the earliest⁶³ (and even then it is far from certain to be a globally binding regime⁶⁴), relying almost entirely on voluntary pledges for the entirety of the critical decade. As noted in the Issues Paper (p. 8), present pledges (assuming they are successfully implemented, which is not happening⁶⁵) put the Earth on course for an unimaginably catastrophic >4°C global warming by 2100 (plus potentially large feedbacks and post-2100 warming).⁶⁶ The “ambition gap” between these pledges and a 2°C pathway (which as explained in section 2.1, is far from a safe target) is growing instead of shrinking.

The abysmal state of global action is a reason for Australia to dramatically increase its ambition unilaterally and unconditionally, because leadership is required to break the

international deadlock and generate momentum for global action on the necessary scale. It is in no way a reason for Australia to cling stubbornly to its useless 5% target.

Question: “the extent to which the Government’s existing 2020 target conditions have been met”

It does not matter whether the existing conditions have been met, because both the very existence and the specific details of the conditions are unreasonable (and therefore unlikely to ever be fully met).

If a given target is justified, then Australia should adopt that target regardless of international action. It is unfair, undiplomatic, and counterproductive for Australia to make any of its actions conditional on the actions of other countries, particularly developing countries. The UNFCCC principle of “common but differentiated responsibilities”⁶⁷ obligates Australia, as a developed high per-capita emitter, to show leadership.

Ross Garnaut argued that Australia’s conditional targets would incentivize other countries to raise their ambition.⁶⁸ It is time for the Australian government to realize that strategy has failed, as those targets have now been on the table for nearly four years and there has been no significant movement from other countries. This should not be surprising: developing countries are unlikely to ever be impressed by conditional emissions targets from one of the world’s richest and highest per-capita emitters, especially considering the target range is a mere 5-25% below 2000 by 2020, the conditions are so demanding, and Australia has been flouting its responsibility to lead for two decades (damaging its international reputation⁶⁹). If the Australian government thinks its conditional targets will persuade anybody, it is kidding itself.

Conditional targets are not an effective way of driving global ambition. If anything, they are making global ambition less likely, by antagonizing countries who rightly expect Australia to act responsibly. Furthermore, Australia’s politicians have tended to forget conditional targets as they focus on implementing the unconditional 5% target. All this renders conditional targets as no more than an excuse for Australia to avoid taking meaningful action.

Specific problems with Australia’s conditions include:

- There is no need for Australia to wait for global ambition to become “clear” before increasing its ambition beyond 5% below 2000 by 2020. It is already clear the level of global ambition is a small fraction of what is required, and leadership is needed to kickstart the process.
- It is unreasonable for Australia to demand “clarity on… access to markets” (ie. international offsets) before raising its ambition beyond 5%, because Australia increasing its target will mean little if it will be met with offsets (as argued in section 2.2.2).

- It is counterproductive for Australia to make its 15%-below-2000-by-2020 target conditional on a global agreement to stabilize at 510-540 ppm CO₂e, because such an agreement is nowhere in sight and will not be brought any closer by Australia refusing to cut its emissions by 15%.
- It is unfair, undiplomatic, and counterproductive for Australia to make its 15%-below-2000-by-2020 target conditional on other developed countries accepting targets deeper than 15% and relative to the stricter baseline of 1990.
- It is unfair, undiplomatic, and counterproductive for a rich country like Australia to demand actions from poor countries before cutting its emissions 15% by 2020.
- It is unreasonable for Australia to demand “deeper and broader carbon markets” before cutting its emissions 15% by 2020, because Australia increasing its target will mean little if it will be met with offsets.
- Australia’s demand for “progress towards inclusion of forests” suggests an intention to meet a 15% target with international offsets in forests, which are no substitute for cutting fossil fuel CO₂ emissions in Australia.
- It is counterproductive for Australia to make its 25%-below-2000-by-2020 target conditional on a global agreement to stabilize at <450 ppm CO₂e, because such an agreement is nowhere in sight and will not be brought any closer by Australia refusing to cut its emissions by 25%.
- It is unfair, undiplomatic, and counterproductive for Australia to make its 25%-below-2000-by-2020 target conditional on other developed countries accepting targets deeper than 25% and relative to the stricter baseline of 1990.
- It is unfair, undiplomatic, and counterproductive for a rich country like Australia to demand actions from poor countries before cutting its emissions 25% by 2020.
- It is unreasonable for Australia to demand “access to the full range of international abatement opportunities through a broad and functioning international market in carbon credits” before cutting its emissions 25% by 2020, because Australia increasing its target will mean little if it will be met with offsets.
- Australia’s demand for “inclusion of forests... and the land sector” suggests an intention to meet a 25% target with international offsets in forests, which are no substitute for cutting fossil fuel CO₂ emissions in Australia.
- Even the present maximum target of 25% by 2020 is indefensibly weak, as will become clear in section 3.2.3.
- If a global agreement is reached or implemented after 2020, it will by then be much more difficult, if not impossible, to achieve the goal of stabilization at 450

ppm CO₂e which the Australian government claims its conditional targets are trying to bring about, let alone reducing CO₂ to 350 ppm.

Comparing targets across countries

Question: “the countries (for example, other developed countries with a similar standard of living, other major emitting economies or trade competitors) Australia should compare itself with in determining its appropriate emissions reduction goals, and the appropriate comparative metrics for this purpose”

Australia should not look to comparable countries for guidance on what it should do, because other countries are generally not living up to their own responsibilities. Australia should be a leader, not a follower. If there is any group of countries from which Australia should take its lead, it is the small island states, because they are taking the fastest action despite having least responsibility⁷⁰ and this should shame countries like Australia into ambitious action.

Non-absolute emissions reduction measures (eg. emissions intensity) may be used for comparison but should be treated with caution because they can be very misleading. Emissions intensity tends to fall over time even when absolute emissions grow.

Contrary to what some argue⁷¹, Australia is not already leading the world with its \$23/tonne carbon price. One reason for the low carbon price in the EU ETS is that many European countries have other climate policies (carbon floor prices, feed-in tariffs to support renewables, energy efficiency policies, transport policies, etc) which are taking the load off the ETS. Another reason is the EU ETS is badly designed (eg. its 2020 target requires no emissions cuts from present levels⁷²), which is no reason for Australia to follow their example.

How Australian action can influence others

Question: “assessing whether – and to what extent – Australia’s actions might influence other countries”

Global impacts of Australia’s domestic actions

Anecdotally, Australians generally believe Australia can only be a small part of the global solution to climate change. Yet section 3.1.2 showed Australia’s contribution to climate change is larger than it acknowledges. A corollary is that Australia has the power to play a larger part in the global solution than it acknowledges.

Australia should aim to use every lever at its disposal to cut emissions within its sphere of influence to zero or near-zero in as short a timeframe as possible. In addition to ambitious domestic targets, this means Australia must stop expanding and start phasing out its fossil fuel exports. As Australia is the world’s largest coal exporter, this would make a global difference.

Australia should declare a moratorium on new fossil fuel mining and export projects, and begin phasing out existing ones. Australia could then launch international negotiations on a global fossil fuel phaseout. These actions would put fossil fuel phaseout on the global agenda. Beyond Zero Emissions has outlined how Australia could go about doing this.⁷³

Australia phasing out its fossil fuels would help to create a new international norm of leaving fossil fuels in the ground, where emissions are only acceptable in the context of a rapid transition to a zero-carbon economy.⁷⁴

Another way Australian action can make a global difference is by helping to change the relative prices of energy technologies globally (ie. making renewables cheaper and fossil fuels more expensive). Renewable energy technologies are already becoming cheaper, but need further investment to bring down their costs faster. This will help accelerate their deployment of renewable energy everywhere. Meanwhile, a phaseout of Australian fossil fuel exports would reduce global supply and thereby increase their prices. Other countries would not be able to immediately scale up supply to replace Australia.⁷⁵

Australia's negotiating strategy

The position taken by the Australian government in UNFCCC negotiations has been largely counterproductive, including: its membership of the Umbrella Group of delay countries; its prioritization of a post-2020 agreement over raising ambition as is urgently required; its insistence on a meaninglessly weak 2020 target for Australia; its unreasonable conditions for Australia to increase its target; its refusal to countenance even conditional targets deeper than 25% below 2000 by 2020; its pursuit of dubious accounting rules for LULUCF (land use, land use change, and forestry) in both Kyoto commitment periods⁷⁶; its intended reliance on international offset mechanisms; and its failure to provide finance for developing countries.

Instead, Australia should take a leading role in climate talks. Conditional targets should not be seen as a way of influencing global action, as explained above. Australia should adopt an unconditional ambitious target, both domestically and in the Kyoto Protocol. It should forgo international offsets and other loopholes. It should acknowledge the “Australia clause” was an error committed by a previous government, propose an amendment to the Kyoto Protocol to correct it, and stop using it in its national emissions accounting. Australia should lobby other countries to raise their ambition. It should consider the promised post-2020 agreement as a distant last priority unless the implementation date is brought forward, because it is extremely misguided to focus on the mirage of a possible future agreement to be implemented after the critical decade is over. Australia is also obligated to provide funding and technology for climate change mitigation and adaptation in developing countries.

3.2.3 Sharing global emissions budgets

Principles and approaches

Question: “the merits of different principles and approaches to determining Australia’s fair and defensible share of the relevant global emissions budget”

Principles

Each of the four principles outlined on p. 26 places a high obligation on Australia to lead the world.

Australia has high capacity to act, as will be argued in section 3.2.4.

Australia has high responsibility for climate change. Its greenhouse gas emissions are the 15th largest in the world and the highest per capita in the OECD. Its cumulative historical emissions are the 14th highest in the world.⁷⁷ Its emissions excluding LULUCF have risen 32% since 1990 (ie. during a period when harm was foreseeable).⁷⁸ Its responsibility increases further when its exports and imports are taken into account (as discussed in section 3.1.2).

Australia has high per capita emissions, and thus should make large emissions cuts for the sake of equality.

Australia has comparatively little need to develop, as a developed country which has emerged well from the global financial crisis, and thus should act faster than the global average, to allow the poorest people access to sustainable development.

Given that Australia has a greater responsibility to act than the global average, and given the 6%/year global emissions reduction rate mentioned in section 3.2.1, presumably Australia is obligated to cut its emissions faster than 6%/year.

Approaches

The Garnaut Review’s modified contraction and convergence approach⁷⁹ (on which the Australian government based its present targets) should be discarded by the Review because of the following flaws:

- Garnaut began with a global emissions budget aimed at 450 ppm CO₂e or higher, whereas the world should be aiming to reduce CO₂ to <350 ppm (as discussed in section 3.2.1).
- Convergence towards equal per capita emissions, accounting for projected population change, unfairly rewards Australia for policies promoting high per-capita emissions and rapid population growth, which if anything justify a *more* stringent target for Australia than for other countries.
- Setting the convergence date as late as 2050, with a linear trajectory, allows Australia and other developed countries to maintain high per capita emissions for

decades, ignoring the urgency of rapid emissions cuts and flouting the principle of common but differentiated responsibilities.

- Calculating targets relative to the first commitment period of the Kyoto Protocol, instead of relative to 1990, unjustly rewards Australia for having insisted on an emissions increase target for 2008-2012. It further unfairly rewards Australia for meeting its Kyoto target with a non-additional decline in land clearing which occurred between 1990 and 1997, while concurrently increasing fossil fuel emissions by 32%. This is inconsistent with Garnaut's argument that former Soviet Union countries should not be rewarded for the non-additional drop in *their* emissions between 1990 and 1997.⁸⁰
- All the above problems are compounded by making the calculated targets conditional on a global agreement in which targets add up to stabilization of greenhouse gas concentrations at the corresponding level, an unrealistic negotiating strategy which if anything makes global agreement less likely (as argued in section 3.2.2).
- All the above problems are compounded by allowing Australia to meet its targets with international offsets (see section 2.2.2), which makes a mockery of dividing up the work into fair shares in the first place.

The overall effect of Garnaut's misjudgements was to let Australia off the hook with uniquely lenient targets (not to mention conditions and offsets which defeat their purpose). This is neither responsible nor helpful in global negotiations, where it is surely seen as shameless special pleading, especially in the context of Australia's long history of obstructionism at climate talks. Garnaut has openly admitted his chosen approach "protects Australia's position".⁸¹

CCA should choose an approach which avoids the problems listed above. Population growth should not be rewarded. High per-capita emissions should be penalized instead of allowed to continue for decades. Australia's target should be calculated relative to 1990 and exclude LULUCF, so that Australia is not rewarded for the Howard government's refusal to cut fossil fuel emissions.

Of the budget-sharing approaches outlined by the Issues Paper (p. 27), "greenhouse development rights" appears to be the fairest, because it is based directly on responsibility and capacity. In response to the Issues Paper's comment that deep near-term targets for developed countries may be politically infeasible, it would likely be even less politically feasible to place that burden on the world's poorest people.

A final point to be made is that while Australia should cut its emissions by *at least* its fair share as recommended by CCA, this does not necessarily mean Australia should refuse to do any more, for two reasons. Firstly, there is a risk that CCA, like any government advisor, may make judgments that in hindsight prove to be too lenient to Australia, in which case the calculated "fair share" would in fact be unfair. Secondly, Australia cannot

assume that in the real world the global carbon budget will be divided up fairly, with all countries doing their fair share (although obviously that would be ideal). As a country with the responsibility, capacity, and potential will to lead the world, Australia need not rigidly limit its ambition to its fair share and could aim to cut its emissions faster if possible.

3.2.4 Economic and social implications

Question: “the likely impact of Australia’s emissions reduction goals on the carbon price, and economic and social conditions in Australia”

Australia’s emissions reduction opportunities

Australia has vast renewable energy resources. It is possible for Australia to achieve 100% renewable energy by scaling up existing technologies,⁸² a result recently confirmed by the Australian Energy Market Operator (AEMO).⁸³ The price of renewables are falling exponentially as they are deployed, and can be further reduced by scaling up deployment, whereas the price of fossil fuels will ultimately rise as more and more countries price carbon and because they are non-renewable resources. The rapidly falling prices of renewable energy technologies make it now much easier to cut emissions than was believed when the 5%-by-2020 target was set in 2008.

In one sense, having high per capita emissions makes it easier for Australia to cut emissions than other countries, because there is more “low-hanging fruit”.⁸⁴

The policy mix

The Issues Paper says (p. 28): “Some policies will reduce emissions more cost-effectively than others.” CCA must understand that in many cases policy measures intended to reduce costs, such as international linking, actually reduce effectiveness. Economic efficiency is often used as an excuse to undermine the intent of climate policies. Efforts to minimize costs overlook that the cost of climate policies is (or at least is supposed to be) mainly paid by polluting companies. Yet few would argue, for example, that anti-tobacco legislation should be “least-cost” for tobacco companies.

The Australian government should not limit itself to apparently least-cost mechanisms. Maximizing the scale, pace, and effectiveness of climate action is far more important than limiting the costs of action. Effective climate policies that mitigate enormous costs from climate change are preferable to climate policies that are cheap and ineffective.

Whenever a policy is claimed to be cost-effective or otherwise, CCA should ask “cost-effective based on which assumptions, over what time period, and for whom?” A source of emissions cuts which appears cheap can be less credible or less significant than one with a higher upfront cost (as discussed in section 2.2.2). Contribution to the long-term structural change required to decarbonize the economy should be prioritized over short-term low-cost abatement.

The Productivity Commission, which is often referred to on whether climate policies are cost-effective, is not a credible source. It has published an inaccurate estimate of the cost of emissions cuts from solar PV⁸⁵, which it continues to cite⁸⁶ despite it having quietly debunked by the Productivity Commission itself.⁸⁷ Neither analysis accounted for technology price reductions.

For more on the merits of various policy choices, see section 2.2.2.

International trade in emissions units

The Issues Paper notes (p. 29) that in the presence of international linking, Australia's choice of targets and caps would not have a significant impact on the level of domestic action or the domestic carbon price, which would instead depend primarily on the international carbon price. This illustrates why international linking should be abandoned: so that Australia's targets actually make a difference domestically, where Australia can verify, control, and take full responsibility for it. There is little point in CCA recommending a stronger target if that will merely require companies to buy more offsets.

The outlook for international carbon markets is extremely bleak: carbon prices everywhere are crashing.

For more on the problems with international offsets, see section 2.2.2.

The level of the carbon price and impact of actions by other countries

If international linking and offsets are abandoned, as I recommend in section 2.2.2, then the international carbon price would not influence the Australian carbon price. Any impact of divergent carbon prices on Australian competitiveness should not be a major concern, because continuing to rely on high-emitting industries will damage Australia's competitiveness in the long run, as explained below.

Estimating the economic and social impacts

The apparent costs of climate policies are short-term, greatly exaggerated, and mainly paid by polluting companies, while the external costs of CO₂ emissions are greatly underestimated, long-lived, and paid by everyone. Most of the costs of climate change are long-term, unquantifiable, worst-case, and non-market costs, which are not included in cost-benefit analyses of climate action like that of the Garnaut Review.⁸⁸ Also, many cost-benefit analyses use high discount rates to estimate the future costs of climate change, which is questionable both on ethical grounds and because it assumes economic growth can continue indefinitely. The true external cost of CO₂ emissions could be far higher than the current carbon price of \$23/tonne, so high that practically any measures to move to a zero-carbon economy are worth taking.⁸⁹

The contribution of fossil fuels to the Australian economy is overblown. Only 0.3% of Australian jobs are in coal mining. The majority of mining industry profits either go overseas or benefit only a small minority of Australians. The mining boom is driving up

the Australian dollar and thereby destroying other industries. The mining sector did not prevent a recession as is popularly believed, but in fact went into recession itself in 2009.⁹⁰ The relative importance of sectors in the Australian economy has always changed over time. Australia can exit the fossil fuel business and instead export renewable energy technologies to the world.

Claims (eg. by business groups) that climate policies would cause economic losses usually turn out to refer merely to slower economic growth. Even phasing out Australia's coal exports would merely cause Australian GDP to double by 2031 instead of by 2030⁹¹, paling in comparison to the impacts of the several degrees of global warming associated with continuing demand for those exports.

Continuing to rely on fossil fuels would damage Australia's future competitiveness. The fact that most fossil fuels are unburnable implies the global economy contains a "carbon bubble". The valuation of fossil fuel companies is based on the assumption that their reserves will be burned. If humanity wishes to avoid global catastrophe, that bubble must burst. When it does, more than \$20 trillion worth of fossil fuel reserves will become stranded assets and the companies' value will plummet.⁹² Environmentally unsustainable investments are ultimately also economically unsustainable. Those countries least reliant on fossil fuels will be most competitive in the future.

It does not matter that strengthening emissions caps decreases carbon price revenue, because most of the revenue is spent on compensation anyway.

The main contributor to electricity price rises has been gold-plated investment in transmission and distribution, not carbon pricing or other climate policies.⁹³ In contrast, climate change can be expected to cause massive increases to the cost of living, particularly food prices.

Concerns about job losses should be addressed by assisting employees to transition into green jobs, not by handing out free permits to polluting companies.

Concerns about the effects of phasing out fossil fuel exports on developing countries should be addressed by providing those countries with funding and technology for climate change mitigation and adaptation. The effects of continuing to supply the world with fossil fuels will hurt the poorest worst of all. In any case, solar PV is cheaper than fossil fuels in many off-grid regions.⁹⁴

The most important equity issue that CCA must consider is intergenerational. Young people like myself and future generations will suffer the impacts of the greenhouse gases emitted in the present. In this context, cost-benefit analyses tend to be inequitable because the use of discount rates effectively discounts the lives and living standards of future generations.⁹⁵

3.2.5 The need to accelerate decarbonization

There is an urgent need for rapid decarbonization, as explained in section 3.1.1, and for an approach based on strong investment signals as opposed to investment certainty, as argued in section 1.2.3.

Shifting to a floating carbon price would not be an improvement upon the fixed price if it causes the rate of Australian emissions reductions to slow or stop. Therefore, CCA should recommend a rate of emissions reductions faster than, or at least as fast as, the observed emissions reduction rate during the fixed price period. It should also be faster than, or at least as fast as, the projected emissions reduction rate in a scenario where the fixed carbon price continues and is complemented by other climate policies like the Renewable Energy Target (RET) and Clean Energy Finance Corporation (CEFC). This is yet another reason international offsets should not be allowed, to maintain the rate of *domestic* emissions reductions. Unless all three of these criteria are met, it would be better to extend the fixed price as suggested in section 2.2.2.

Similarly, the shift would not be an improvement if it causes the carbon price to fall. This can be avoided by recommending no international offsets and an emissions trajectory that should cause the carbon price to rise rapidly over time.

4. Setting caps

4.1 Relationship with the target, trajectory, and carbon budget

The caps should be consistent with everything I have said about the targets.

Question: “whether emissions caps should follow the path of the national trajectory on a year-by-year basis, or whether there are benefits to following a different path”

The emissions trajectory and caps should decrease each year. If the trajectory is anything other than linear it should begin steeply, as mentioned in section 3.2.1. The caps for covered emissions should follow a steeper path than the overall trajectory.

4.2 Estimating uncovered emissions

4.2.1 Uncertainty in emissions estimates

Question: “whether tighter caps might provide a hedge against the uncertainty inherent in future uncovered emissions levels, or whether caps should be based on the best (central) estimate of uncovered emissions”

Caps should be tighter than targets to account for the possibility of higher-than-projected uncovered emissions.

4.2.2 Policy impacts

On policies to reduce emissions from uncovered sources, see discussion of land carbon in section 2.2.2.

The Issues Paper (p. 33) says CCA is required to account for voluntary action when setting caps. This cannot work if caps are locked in for five years into the future (ie. voluntary actions will only be accounted for years after they occur). See discussion in section 1.2.3.

4.2.3 Coverage

Question: “the extent to which large fuel users are likely to opt-in to the carbon pricing mechanism”

No comment.

Question: “the appropriate treatment of emissions from heavy on-road vehicles”

No comment.

4.2.4 Land sector and the Kyoto Protocol

See discussion of land carbon in section 2.2.2.

4.3 Government purchase of international units

The government should not purchase any international units, for the same reasons that companies should not be allowed to purchase them, as explained in section 2.2.2.

4.4 Changes to accounting rules

The most recent science on global warming potentials should be applied immediately, not from 2017-18. It defies common sense to delay for years the application of improved information. It is not as though the laws of physics will change on 1 July 2017.

5. Progress toward medium and long-term targets

5.1 Defining which medium and long term targets will be used

See section 3.1.1 for discussion of timeframes.

5.2 Measuring Australia’s progress

5.2.1 Progress to date

It is misleading to describe Australia’s emissions as having increased 5% since 1990. When LULUCF is excluded, Australia’s emissions rose 32% between 1990 and 2011.⁹⁶ The latter comparison is more meaningful because of the issues with land carbon explained in section 3.2.1.

Recent data show Australia’s total emissions fell 1% between July and December 2012.⁹⁷ If this rate continues (which may be too optimistic), then Australia is currently cutting its emissions at ~2%/year, which is nowhere near fast enough. Of course, this number refers to domestic emissions only; Australia’s exported emissions are set to rise rapidly.

Question: “examine the drivers of change in Australia’s emissions since 1990, and the relative contributions of government policies, business cycles and long term structural change in the economy”

Reasons Australia failed to cut emissions from 1990 to 2007 include reliance on voluntary measures and grant programs, reliance on non-additional emissions reductions in the land sector, electricity market reform, the Goods and Services Tax (GST) package, the Howard government’s refusal to introduce a carbon price, the Howard government’s refusal to extend the Mandatory Renewable Energy Target (MRET), a focus on CCS R&D programs which have yet to yield any results, and expansionist fossil fuel energy policies.⁹⁸

5.2.2 Future progress

For discussion of policy issues that need to be addressed, see section 2.2.2.

Australia’s domestic transition

CCA’s measure of overall progress should exclude LULUCF, because of the difficulties and controversial nature of accounting in that sector.

For maximum transparency, CCA should consider the implications of various different accounting choices, and report emissions based on as many different accounting choices as possible, especially for controversial areas like LULUCF.

CCA should also measure progress in addressing emissions from exports and imports, as argued in section 3.1.2.

Strategic emissions reductions milestones – building an evaluation framework

Question: “develop an evaluation framework to assess Australia’s future progress and identify strategic milestones for domestic emission reductions, including for the power sector”

Because of the urgency discussed in section 3.1.1, CCA should not focus on decadal milestones toward the existing 2050 target, but instead annual milestones toward a much more stringent 2020 target.

This shorter timeframe makes it infeasible for Australia to rely on either gas as a transition fuel, or CCS as a savior for the fossil fuel industry. A wave of investment in new gas-fired electricity generation would lock in fossil fuel infrastructure with a lifetime of decades.⁹⁹ CCS technology is unlikely to be deployed on a global scale for decades.¹⁰⁰ (Having said that, some form of CCS may be needed later to directly remove CO₂ from the atmosphere.) Fossil fuels will need to be replaced with renewable energy.

The international outlook

Question: “explore the opportunities and risks associated with linkages between the domestic carbon pricing mechanism and international carbon markets over the long term”

International linkage is so risky that Australia should not proceed with it (see discussion in section 2.2.2). It does not, as claimed by the Issues Paper (p. 39), “enable more ambitious action”; it enables less credible action and less ambitious domestic action. Price volatility is better addressed by other means, such as a floor price.

Conclusion

All the above mean Australia’s present climate policies and emissions targets are completely inadequate. CCA must recommend Australian emissions targets and caps that rapidly reduce toward zero to decarbonize the economy as fast as possible, and redesigning policies so as not to impede the transition.

As the Issues Paper says (p. 4), there is no simple formula that determines what targets and caps Australia should adopt; the selection of a number will inevitably be partly arbitrary. However, considering all the issues I have outlined, I propose that the 2050 target of an 80% reduction in domestic emissions be brought forward to 2020.

Australian governments to date have acted as if our future depends on protecting the fossil fuel industry from climate policy. The reality is that our future depends on protecting our climate from the fossil fuel industry.

References

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- ¹ F Green & R Finighan, *Laggard to Leader: How Australia can lead the world to zero carbon prosperity*, Beyond Zero Emissions, 2012, viewed 9 September 2012, http://media.beyondzeroemissions.org/Laggard_Leaderv1.pdf.
- ² Climate Commission, *The Critical Decade: Climate science, risks and responses*, Commonwealth of Australia (Department of Climate Change and Energy Efficiency), 2011, viewed 22 February 2013, http://climatecommission.gov.au/wp-content/uploads/The-Critical-Decade_July-revision_Low-res.pdf
- ³ F Green, ‘Ghosts of politicians past’, *Inside Story*, 3 October 2011, viewed 21 February 2013, <http://inside.org.au/ghosts-of-politicians-past/>
- ⁴ ‘Labor backs RET in current form: Combet’, *Climate Spectator*, 21 March 2013, viewed 29 May 2013, <http://www.businessspectator.com.au/news/2013/3/21/policy-politics/labor-backs-ret-current-form-combet>
- ⁵ G Parkinson, ‘Is Australia ready for a really tight carbon budget?’, *Renew Economy*, 23 April 2013, viewed 29 May 2013, <http://reneweconomy.com.au/2013/is-australia-ready-for-a-really-tight-carbon-budget-77202>
- ⁶ C Milne, ‘Carbon price will cut pollution now, lay foundations for science-based climate action’, Australian Greens, 10 July 2011, viewed 21 February 2013, <http://greensmps.org.au/content/media-releases/carbon-price-will-cut-pollution-now-lay-foundations-science-based-climate-act>
- ⁷ D Nuccitelli, ‘Climate scientists erring on the side of least drama’, *Skeptical Science* (blog), 30 January 2013, viewed 21 February 2013, <http://www.skepticalscience.com/climate-scientists-esld.html>
- ⁸ JE Hansen, M Sato, P Kharecha, D Beerling, R Berner, V Masson-Delmotte M Pagini, M Raymo, DL Royer, & JC Zachos, ‘Target atmospheric CO₂: Where should humanity aim?’, *Open Atmospheric Science Journal*, vol. 2 (2008), pp. 217-231, viewed 21 February 2013, <http://arxiv.org/abs/0804.1126>

-
- ⁹ Earth System Research Laboratory, ‘Up-to-date weekly average CO₂ at Mauna Loa’, *Trends in Atmospheric Carbon Dioxide*, US National Oceanic and Atmospheric Administration, 2013, viewed 29 May 2013, <http://www.esrl.noaa.gov/gmd/ccgg/trends/weekly.html>
- ¹⁰ G Schmidt, ‘Climate change commitment II’, *RealClimate* (blog), 2 June 2010, viewed 22 February 2013, <http://www.realclimate.org/index.php/archives/2010/06/climate-change-commitment-ii/>
- ¹¹ J Hansen, P Kharecha, M Sato, F Ackerman, PJ Hearty, O Hough-Guldberg, S-L Hsu, F Krueger, C Parmesan, S Rahmstorf, J Rockstrom, EJ Rohling, J Sachs, P Smith, K Steffen, LV Susteren, K von Schuckmann, & JC Zachos, ‘Scientific case for avoiding dangerous climate change to protect young people and nature’, *Proceedings of the National Academy of Sciences*, in press, viewed 12 August 2012, <http://arxiv.org/abs/1110.1365>
- ¹² J Hansen, R Ruedy, M Sato, K Lo, ‘Global surface temperature change’, *Rev. Geophys.*, vol. 48 (2010), RG4004, http://pubs.giss.nasa.gov/docs/2010/2010_Hansen_etal.pdf
- ¹³ D Spratt, ‘Arctic sea-ice melt record more than broken, it’s being smashed’, *Climate Code Red* (blog), 25 August 2012, viewed 21 February 2013, <http://www.climatecodered.org/2012/08/arctic-sea-ice-melt-record-more-than.html>
- ¹⁴ S Carana, ‘How British government’s climate forecasting MET Office gets the Arctic wrong’, *Climate Code Red* (blog), 20 September 2012, viewed 21 February 2013, <http://www.climatecodered.org/2012/09/how-british-governments-climate.html>
- ¹⁵ D Spratt, ‘All gone by 2015? Welcome to the Arctic end times’, *Renew Economy*, 30 August 2012, viewed 21 February 2013, <http://reneweconomy.com.au/2012/all-gone-by-2015-welcome-to-the-arctic-end-times-44411>
- ¹⁶ Neven & K McKinney, ‘Why Arctic sea ice shouldn’t leave anyone cold’, *Arctic Sea Ice Blog*, 26 August 2012, viewed 21 February 2013, <http://neven1.typepad.com/blog/2012/08/wasilac.html>
- ¹⁷ M-J Viñas, *Satellites See Unprecedented Greenland Ice Sheet Surface Melt*, NASA, 24 July 2012, viewed 21 February 2013, <http://www.nasa.gov/topics/earth/features/greenland-melt.html>
- ¹⁸ A Robinson, R Calov, & A Ganopolski, ‘Multistability and critical thresholds of the Greenland ice sheet’, *Nature Climate Change*, vol. 2 (2012), pp. 429-432, viewed 21 February 2013, <http://www.sciencemag.org/content/335/6071/956>
- ¹⁹ B Cubby, ‘At the edge of disaster’, *Age*, 28 November 2012, viewed 21 February 2013, <http://www.theage.com.au/national/at-the-edge-of-disaster-20121127-2a5xe.html>
- ²⁰ J Hansen & M Sato, ‘Paleoclimate implications for human-made climate change’, *Climate Change at the Eve of the Second Decade of the Century: Inferences from Paleoclimate and Regional Aspects: Proceedings of Milutin Milankovitch 130th Anniversary Symposium*, 2012, pp. 21-47, viewed 22 February 2013, <http://arxiv.org/abs/1105.0968>
- ²¹ Climate Commission, *Loss of Arctic sea ice indicates global risks from climate change*, 2012, viewed 13 November 2013, <http://climatecommission.gov.au/wp-content/uploads/Climate-Commission-Arctic-sea-ice-summary.pdf>
- ²² RE Kopp, FJ Simons, JX Mitrovica, AC Maloof & R Oppenheimer, ‘Probabilistic assessment of sea level during the last interglacial stage’, *Nature*, vol. 462 (2009), pp. 863-867, viewed 21 February 2013, <http://www.nature.com/nature/journal/v462/n7275/full/nature08686.html>
- ²³ A Dutton & K Lambeck, ‘Ice volume and sea level during the last interglacial’, *Science*, vol. 337 (2012), pp. 216-219, viewed 21 February 2013, <http://www.sciencemag.org/content/337/6091/216.abstract>
- ²⁴ United Nations, *United Nations Framework Convention on Climate Change*, 1992, viewed 9 September 2012, <http://unfccc.int/resource/docs/convkp/conveng.pdf>, p. 4.
- ²⁵ United Nations Framework Convention on Climate Change, ‘The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention’ in *Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010*, United Nations, viewed 12 August 2012, <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>
- ²⁶ Climate Commission, *Avoiding the Unadaptabale: a 4°C world*, Australian Government, 2012, viewed 22 February 2013, <http://climatecommission.gov.au/others/avoiding-unadaptabale-a-4-degree-celsius-world/>
- ²⁷ F Jotzo, ‘Australia’s emissions projections: bleak, but too pessimistic’, *Renew Economy*, 5 November 2012, viewed 29 May 2013, <http://reneweconomy.com.au/2012/australias-emissions-projections-bleak-but-too-pessimistic-16002>

-
- ²⁸ Department of Resources, Energy and Tourism, *Energy White Paper 2012: Australia's energy transformation*, Commonwealth of Australia, 2012, <http://www.ret.gov.au/energy/Documents/ewp/2012/Energy %20White Paper 2012.pdf>, p. 34
- ²⁹ E Rosenthal & AW Lehren, 'Profits on carbon credits drive output of a harmful gas', *New York Times*, 9 August 2012, viewed 21 February 2013, <http://www.nytimes.com/2012/08/09/world/asia/incentive-to-slow-climate-change-drives-output-of-harmful-gases.html>
- ³⁰ F Harvey, 'Doha climate talks: EU weakened over new emissions targets', *Guardian*, 23 November 2012, viewed 21 February 2013, <http://www.guardian.co.uk/environment/2012/nov/23/doha-climate-talks-eu-weakened-emissions>
- ³¹ G Parkinson, 'The triumph of Tony Abbott's carbon alter-ego', *Renew Economy*, 29 August 2012, viewed 21 February 2013, <http://reneweconomy.com.au/2012/the-triumph-of-tony-abbotts-carbon-alter-ego-92270>
- ³² 'Budget 2013: Carbon price forecasts cut, clean energy programs trimmed', *Climate Spectator*, 14 May 2013, viewed 29 May 2013, <http://www.businessspectator.com.au/news/2013/5/14/policy-politics/budget-2013-carbon-price-forecasts-cut-clean-energy-programs-trimmed>
- ³³ T Edis, 'How Labor can improve the carbon pricing scheme', *Climate Spectator*, 13 August 2012, viewed 21 February 2013, <http://www.climatespectator.com.au/commentary/how-labor-can-improve-carbon-pricing-scheme>
- ³⁴ A Morton, 'Australia lags on carbon tax rules', *Age*, 26 July 2012, viewed 21 November 2013, <http://www.theage.com.au/opinion/political-news/australia-lags-on-carbon-tax-rules-20120725-22qz9.html>
- ³⁵ S Cullen, 'Coal-fired stations "\$1b better off under carbon tax"', *ABC News*, 6 September 2012, viewed 21 November 2012, <http://www.abc.net.au/news/2012-09-06/coal-fired-stations-1b-better-off-under-carbon-tax/4246100>
- ³⁶ S Lauder & S Lane, 'Consumers "paying twice" as carbon emitters compensated', *ABC News*, 20 February 2013, viewed 21 February 2013, <http://www.abc.net.au/news/2013-02-20/consumers-paying-twice-as-carbon-emitters-compensated/4529268>
- ³⁷ T Edis, 'How polluters can cream the carbon scheme', *Climate Spectator*, 5 September 2012, viewed 21 February 2013, <http://www.climatespectator.com.au/commentary/how-polluters-can-cream-carbon-scheme>
- ³⁸ F Ackerman & Stanton, E, *Climate Risks and Carbon Prices: Revising the Social Cost of Carbon*, Economics for Equity and Environment, 2011, viewed 14 September 2012, http://www.e3network.org/papers/Climate Risks and Carbon Prices executive-summary full-report_comments.pdf
- ³⁹ 'Carbon price tug of war', Australia Institute, viewed 21 February 2013, <https://www.tai.org.au/node/586>
- ⁴⁰ G Winestock & M Priest, 'EU carbon price a hard act to follow', *Australian Financial Review*, 18 February 2013, viewed 21 February 2013, http://www.afr.com/p/national/eu_carbon_price_hard_act_to_follow_Lt5XbJv3iE9iyKRMit5tUI
- ⁴¹ 'Carbon price tug of war', Australia Institute, viewed 21 February 2013, <https://www.tai.org.au/node/586>
- ⁴² T Edis, 'How polluters can cream the carbon scheme', *Climate Spectator*, 5 September 2012, viewed 21 February 2013, <http://www.climatespectator.com.au/commentary/how-polluters-can-cream-carbon-scheme>
- ⁴³ S Cullen, 'Coal-fired stations "\$1b better off under carbon tax"', *ABC News*, 6 September 2012, viewed 21 November 2012, <http://www.abc.net.au/news/2012-09-06/coal-fired-stations-1b-better-off-under-carbon-tax/4246100>
- ⁴⁴ CME, *Transitional assistance or windfall profits? The financial impact of the carbon price and compensation payments on Victoria's brown coal generators*, Environment Victoria, 2013, viewed 1 April 2013, http://issuu.com/environmentvictoria/docs/transitional_assistance_or_windfall_profits_report
- ⁴⁵ Australian Government Department of Resources, Energy and Tourism, *Energy White Paper 2012: Australia's energy transformation*, 2012, viewed 21 February 2013, <http://www.ret.gov.au/energy/Documents/ewp/2012/Energy %20White Paper 2012.pdf>
- ⁴⁶ G Parkinson, 'Renewables now cheaper than coal and gas in Australia', *Renew Economy*, 7 February 2013, viewed 21 February 2013, <http://reneweconomy.com.au/2013/renewables-now-cheaper-than-coal-and-gas-in-australia-62268>
- ⁴⁷ F Green & R Finigan, *Laggard to Leader: How Australia can lead the world to zero carbon prosperity*, Beyond Zero Emissions, 2012, viewed 9 September 2012, http://media.beyondzeroemissions.org/Laggard_Leaderv1.pdf, p. 60.

-
- ⁴⁸ P Hearps, ‘A carbon price won’t bring zero emissions’, *The Conversation*, 30 March 2011, viewed 21 February 2013, <http://theconversation.edu.au/a-carbon-price-wont-bring-zero-emissions-23>
- ⁴⁹ C Hamilton, *Scorcher: The dirty politics of climate change*, 2007, Black Inc. Agenda, Melbourne, pp. 46-47.
- ⁵⁰ F Green & R Finighan, *Laggard to Leader: How Australia can lead the world to zero carbon prosperity*, Beyond Zero Emissions, 2012, viewed 9 September 2012, http://media.beyondzeroemissions.org/Laggard_Leaderv1.pdf, pp. 16-21.
- ⁵¹ Greenpeace, *Point of No Return: The massive climate threats we must avoid*, 2013, viewed 23 January 2013, <http://www.greenpeace.org/international/Global/international/publications/climate/2013/PointOfNoReturn.pdf>
- ⁵² Greenpeace, *Point of No Return: The massive climate threats we must avoid*, 2013, viewed 23 January 2013, <http://www.greenpeace.org/international/Global/international/publications/climate/2013/PointOfNoReturn.pdf>
- ⁵³ T Edis, ‘Australia’s schizophrenic energy policy’, *Climate Spectator*, 12 November 2012, viewed 21 February 2013, <http://www.climatespectator.com.au/commentary/australia-s-schizophrenic-energy-policy>
- ⁵⁴ RW Howarth, Santoro, R & Ingraffea, A, ‘Methane and the greenhouse-gas footprint of natural gas from shale formations’, *Climate Change*, 2011, viewed 14 September 2012, <http://www.eeb.cornell.edu/howarth/Howarth et al 2011.pdf>
- ⁵⁵ J Hansen, P Kharecha, M Sato, F Ackerman, PJ Hearty, O Hough-Guldberg, S-L Hsu, F Krueger, C Parmesan, S Rahmstorf, J Rockstrom, EJ Rohling, J Sachs, P Smith, K Steffen, LV Susteren, K von Schuckmann, & JC Zachos, ‘Scientific case for avoiding dangerous climate change to protect young people and nature’, *Proceedings of the National Academy of Sciences*, in press, viewed 12 August 2012, <http://arxiv.org/abs/1110.1365v3>
- ⁵⁶ J Hansen, P Kharecha, M Sato, F Ackerman, PJ Hearty, O Hough-Guldberg, S-L Hsu, F Krueger, C Parmesan, S Rahmstorf, J Rockstrom, EJ Rohling, J Sachs, P Smith, K Steffen, LV Susteren, K von Schuckmann, & JC Zachos, ‘Scientific case for avoiding dangerous climate change to protect young people and nature’, *Proceedings of the National Academy of Sciences*, in press, viewed 12 August 2012, <http://arxiv.org/abs/1110.1365v3>
- ⁵⁷ Earth System Research Laboratory, ‘Recent Global CO₂’, *Trends in Atmospheric Carbon Dioxide*, US National Oceanic and Atmospheric Administration, 2013, viewed 21 February 2013, <http://www.esrl.noaa.gov/gmd/ccgg/trends/global.html>
- ⁵⁸ Global Carbon Project, *Global Carbon Budget 2012*, 3 December 2012, viewed 21 February 2013, <http://www.globalcarbonproject.org/carbonbudget/12/files/CarbonBudget2012.pdf>
- ⁵⁹ G Schmidt, ‘Climate change commitment II’, *RealClimate* (blog), 2 June 2010, viewed 22 February 2013, <http://www.realclimate.org/index.php/archives/2010/06/climate-change-commitment-ii/>
- ⁶⁰ Carbon Tracker Initiative, *Unburnable Carbon 2013: Wasted capital and stranded assets*, 2013, viewed 30 May 2013, <http://carbontracker.live.kiln.it/Unburnable-Carbon-2-Web-Version.pdf>
- ⁶¹ M Stevens, G Daley & M Priest, ‘Revealed: Coal under green attack’, *Australian Financial Review*, 6 March 2012, viewed 19 March 2013, http://afr.com/p/national/revealed_coal_under_green_attack_SpwuwDfoOKnrXymBW3N3AM
- ⁶² J Thompson, ‘Carbon tax could be disaster for industry: Rio’, *ABC News*, 7 March 2011, viewed 29 May 2013, <http://www.abc.net.au/news/2011-03-07/carbon-tax-could-be-disaster-for-industry-rio/1969130>
- ⁶³ United Nations Framework Convention on Climate Change, ‘Establishment of an Ad Hoc Working Group on the Durban Platform for Enhanced Action’ in *Report of the Conference of the Parties on its seventeenth session, held in Durban from 28 November to 11 December 2011*, United Nations, viewed 12 August 2012, <http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf>
- ⁶⁴ M Levi, ‘A misplaced climate celebration in Durban’, *Energy, Security, and Climate* (blog), 11 December 2011, viewed 12 August 2012, <http://blogs.cfr.org/levi/2011/12/11/a-misplaced-climate-celebration-in-durban/>
- ⁶⁵ Climate Action Tracker, *Emissions gap looks set to increase if government action doesn’t step up*, Climate Analytics, 2012, viewed 12 August 2012, <http://climateactiontracker.org/news/126/Emissions-gap-looks-set-to-increase-if-government-action-doesnt-step-up.html>

-
- ⁶⁶ *The Climate Scoreboard*, Climate Interactive, 2012, viewed 21 February 2013, <http://climateinteractive.org/scoreboard>
- ⁶⁷ United Nations, *United Nations Framework Convention on Climate Change*, 1992, viewed 9 September 2012, <http://unfccc.int/resource/docs/convkp/conveng.pdf>, p. 1.
- ⁶⁸ R Garnaut, *The Garnaut Review 2011: Australia in the global response to climate change*, Commonwealth of Australia, Cambridge University Press, 2011, p. 167
- ⁶⁹ C Hamilton, *Running From the Storm: The development of climate change policy in Australia*, 2001, UNSW Press, Sydney, pp. 89-92.
- ⁷⁰ J Vidal, 'Small island states in clean energy race', *Guardian*, 11 May 2012, viewed 30 May 2013, <http://www.guardian.co.uk/environment/2012/may/10/small-island-states-clean-energy-race>
- ⁷¹ Australian Industry Group, *The move to an emissions trading scheme needs to happen now*, 7 March 2013, viewed 1 April 2013, http://www.aigroup.com.au/portal/site/aig/template.MAXIMIZE/mediacentre/releases/archive2013/?javax.portlet.tpt=a2a67955d2b1143269a8c802ed91a0a0_ws_MX&javax.portlet.ppr_a2a67955d2b1143269a8c802ed91a0a0=index%3D17%26docName%3DThe%2Bmove%2Bto%2Ban%2Bemissions%2Btrading%2Bscheme%2Bneeds%2Bto%2Bhappen%2Bnow%26folderPath%3D%252FLIVE_CONTENT%252FMedia%2BReleases%252F2013%252FMarch%252F%26viewID%3Dcontent&javax.portlet.begCacheTok=com.vignette.cachetoken&javax.portlet.endCacheTok=com.vignette.cachetoken
- ⁷² F Harvey, 'Doha climate talks: EU weakened over new emissions targets', *Guardian*, 23 November 2012, viewed 21 February 2013, <http://www.guardian.co.uk/environment/2012/nov/23/doha-climate-talks-eu-weakened-emissions>
- ⁷³ F Green & R Finighan, *Laggard to Leader: How Australia can lead the world to zero carbon prosperity*, Beyond Zero Emissions, 2012, viewed 9 September 2012, http://media.beyondzeroemissions.org/Laggard_Leaderv1.pdf, pp. 76-84.
- ⁷⁴ F Green & R Finighan, *Laggard to Leader: How Australia can lead the world to zero carbon prosperity*, Beyond Zero Emissions, 2012, viewed 9 September 2012, http://media.beyondzeroemissions.org/Laggard_Leaderv1.pdf, p. 81.
- ⁷⁵ F Green & R Finighan, *Laggard to Leader: How Australia can lead the world to zero carbon prosperity*, Beyond Zero Emissions, 2012, viewed 9 September 2012, http://media.beyondzeroemissions.org/Laggard_Leaderv1.pdf, pp. 55-56, 80-81.
- ⁷⁶ C Milne, 'Australia must not rort Kyoto protocol rules', Australian Greens, 8 December 2011, viewed 22 February 2013, <http://greensmps.org.au/content/media-releases/australia-must-not-rort-kyoto-protocol-rules>
- ⁷⁷ F Green & R Finighan, *Laggard to Leader: How Australia can lead the world to zero carbon prosperity*, Beyond Zero Emissions, 2012, viewed 9 September 2012, http://media.beyondzeroemissions.org/Laggard_Leaderv1.pdf, pp. 17-19.
- ⁷⁸ Australian Government Department of Climate Change and Energy Efficiency, *National Greenhouse Gas Inventory Trend*, 2012, viewed 28 May 2013, <http://ageis.climatechange.gov.au/NGGITrend.aspx>
- ⁷⁹ R Garnaut, *The Garnaut climate change review*, Cambridge University Press, 2008, viewed 22 February 2013, [http://www.garnautreview.org.au/CA25734E0016A131/WebObj/GarnautClimateChangeReview-FinalReport-30September2008\(Fullversion\)/\\$File/Garnaut_Climate_Change_Review - Final_Report – 30_September_2008_\(Full_version\).pdf](http://www.garnautreview.org.au/CA25734E0016A131/WebObj/GarnautClimateChangeReview-FinalReport-30September2008(Fullversion)/$File/Garnaut_Climate_Change_Review - Final_Report – 30_September_2008_(Full_version).pdf), pp. 205-213, 278-285.
- ⁸⁰ C Hamilton, 'Clive Hamilton essay: Politics trumps science in Garnaut report', *Crikey*, 30 September 2008, viewed 29 May 2013, <http://www.crikey.com.au/2008/09/30/clive-hamilton-essay-politics-trumps-science-in-garnaut-report/>
- ⁸¹ C Hamilton, 'Clive Hamilton essay: Politics trumps science in Garnaut report', *Crikey*, 30 September 2008, viewed 29 May 2013, <http://www.crikey.com.au/2008/09/30/clive-hamilton-essay-politics-trumps-science-in-garnaut-report/>
- ⁸² Beyond Zero Emissions, *Zero Carbon Australia Stationary Energy Plan*, 2010, viewed 9 September 2012, http://media.beyondzeroemissions.org/ZCA2020_Stationary_Energy_Report_v1.pdf
- ⁸³ G Parkinson, '100% renewables for Australia – not so costly after all', *Renew Economy*, 29 April 2013, viewed 30 May 2013, <http://reneweconomy.com.au/2013/100-renewables-for-australia-not-so-costly-after-all-50218>
- ⁸⁴ C Hamilton, *Scorcher: The dirty politics of climate change*, 2007, Black Inc. Agenda, Melbourne, pp. 42-43.

-
- ⁸⁵ Productivity Commission, *Carbon Emission Policies in Key Economies*, Research Report, 2011, viewed 14 September 2012, http://www.pc.gov.au/_data/assets/pdf_file/0003/109830/carbon-prices.pdf
- ⁸⁶ G Parkinson, ‘Why you are paying \$10/hr to run your neighbour’s air-con’, *Renew Economy*, 18 October 2012, viewed 21 February 2013, <http://reneweconomy.com.au/2012/why-you-are-paying-10hr-to-run-your-neighbours-air-con-21376>
- ⁸⁷ Productivity Commission, *Carbon Emission Policies in Key Economies: Responses to Feedback on Certain Estimates for Australia*, Supplement to Research Report, 2011, viewed 14 September 2012, http://www.pc.gov.au/_data/assets/pdf_file/0016/114244/carbon-prices-supplement.pdf
- ⁸⁸ R Garnaut, *The Garnaut climate change review*, Cambridge University Press, 2008, viewed 22 February 2013, [http://www.garnautreview.org.au/CA25734E0016A131/WebObj/GarnautClimateChangeReview-FinalReport-30September2008\(Fullversion\)/\\$File/Garnaut Climate Change Review - Final Report – 30 September 2008 \(Full version\).pdf](http://www.garnautreview.org.au/CA25734E0016A131/WebObj/GarnautClimateChangeReview-FinalReport-30September2008(Fullversion)/$File/Garnaut Climate Change Review - Final Report – 30 September 2008 (Full version).pdf), pp. 249-250.
- ⁸⁹ F Ackerman & Stanton, E, *Climate Risks and Carbon Prices: Revising the Social Cost of Carbon*, Economics for Equity and Environment, 2011, viewed 14 September 2012, http://www.e3network.org/papers/Climate_Risks_and_Carbon_Prices_executive-summary_full-report_comments.pdf
- ⁹⁰ F Green & R Finighan, *Laggard to Leader: How Australia can lead the world to zero carbon prosperity, Beyond Zero Emissions*, 2012, viewed 9 September 2012, http://media.beyondzeroemissions.org/Laggard_Leaderv1.pdf, pp. 82-84.
- ⁹¹ G Pearse, ‘Quarry Vision: Coal, climate change, and the end of the resources boom’, *Quarterly Essay* 33, Schwartz Media Pty Ltd, 2009, pp. 87.
- ⁹² Carbon Tracker Initiative, *Unburnable Carbon 2013: Wasted capital and stranded assets*, 2013, viewed 30 May 2013, <http://carbontracker.live.kiln.it/Unburnable-Carbon-2-Web-Version.pdf>
- ⁹³ J Grimes, ‘The truth about rising power prices’, *Renew Economy*, 20 June 2012, viewed 21 February 2013, <http://reneweconomy.com.au/2012/the-truth-about-rising-power-prices-75112>
- ⁹⁴ F Green & R Finighan, *Laggard to Leader: How Australia can lead the world to zero carbon prosperity, Beyond Zero Emissions*, 2012, viewed 9 September 2012, http://media.beyondzeroemissions.org/Laggard_Leaderv1.pdf, p. 47.
- ⁹⁵ D Roberts, ‘Discount rates: A boring thing you should know about (with otters!)’, *Grist* (blog), 24 September 2012, viewed 21 February 2013, <http://grist.org/article/discount-rates-a-boring-thing-you-should-know-about-with-otters/>
- ⁹⁶ Australian Government Department of Climate Change and Energy Efficiency, *National Greenhouse Gas Inventory Trend*, 2012, viewed 28 May 2013, <http://ageis.climatechange.gov.au/NGGITrend.aspx>
- ⁹⁷ G Parkinson, ‘Mixed Greens: Cheap wind energy rewrites energy rules in Brazil’, *Renew Economy*, 15 April 2013, viewed 29 May 2013, <http://reneweconomy.com.au/2013/mixed-greens-cheap-wind-energy-rewrites-energy-rules-in-brazil-84724>
- ⁹⁸ C Hamilton, *Running from the Storm: The development of climate change policy in Australia*, 2001, UNSW Press, Sydney; C Hamilton, *Scorcher: The dirty politics of climate change*, 2007, Black Inc. Agenda, Melbourne; G Pearse, *High and Dry: John Howard, climate change and the selling of Australia’s future*, 2007, Penguin Group (Australia), Camberwell, Victoria.
- ⁹⁹ J Romm, ‘International Energy Agency Finds “Safe” Gas Fracking Would Destroy A Livable Climate’, *Climate Progress*, weblog, 30 May 2012, viewed 14 September 2012, <http://thinkprogress.org/climate/2012/05/30/491970/international-energy-agency-finds-safe-gas-fracking-would-destroy-a-livable-climate/>
- ¹⁰⁰ M Atkin, ‘Clean coal “unviable for two decades”’, *ABC News*, 17 February 2012, viewed 21 February 2013, <http://www.abc.net.au/news/2012-02-15/clean-coal-unviable-advisor-says/3828946>