

THE GARNAUT CLIMATE CHANGE
REVIEW

SUBMISSION BY THE CLIMATE
INSTITUTE TO THE:

INTERIM REPORT TO THE
COMMONWEALTH, STATE AND
TERRITORY GOVERNMENTS OF
AUSTRALIA

EMISSIONS TRADING SCHEME
DISCUSSION PAPER

APRIL 2008

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Overview of recommendations

Global action

It is in Australia's national interest to ensure global temperatures peak at the lowest possible level. Even a 2°C increase in global temperature above preindustrial levels would see severe impacts in Australia and our region. Accepting warming at or above this level equates to accepting the risk of global and large scale irreversible (and potentially catastrophic) outcomes.

Caution should be used in attempting to define a global carbon budget or a concentration level as the global long-term goal as it may lead to unintended outcomes. These approaches do not necessarily consider the rate of global climate change, which is a key determinant of climate change impacts. Early reductions in emissions are critical.

The Climate Institute believes that:

- Industrialised countries' overall emissions should be around 30 per cent below 1990 levels by 2020* ;
- Developing country emissions should peak and begin to decline rapidly over the same time period;
- Global emissions should be less than 50 per cent below 1990 levels by 2050; and
- Global action to rapidly reduce emissions from land use change and deforestation is also required.

Australia's posture in the lead up to the Copenhagen conference in 2009 should be one that seeks to ensure that the agreement reached does not foreclose achieving these outcomes.

Domestic interim target

Australia should commit unilaterally to peaking national emissions by 2012 and commit to an interim target of around 25 per cent below 1990 levels by 2020. While this commitment is comparatively stronger than the EU's current 20 per cent unilateral target it is Australia's national international interest to be taking a leadership role in global efforts to reduce emissions.

If a strong international agreement can be agreed, Australia should be prepared to accept an emission reduction obligation of stronger than around 25% by 2020.

Through international emissions trading, Australia could supplement domestic efforts with opportunities to reduce emissions at low cost in other countries.

Cross cutting issues

To ensure policy makers are clear about the consequences of short-term policy choices the Review should clearly articulate (both in terms of modelled costs and qualitative

* With a range of 25-40 per cent below 1990 levels by 2020.

assessments) the potential climate impact and intergenerational consequences of failing to stabilise GHG concentrations below 450 ppm[†]. This should include discussion of the risks of exceeding critical climate tipping points.

The Review should be cautious in characterising the costs and benefits mitigation in terms of comparing the costs of action with the cost of inaction. Comparing possible economic costs of climate change to expected mitigation costs is not appropriate when it comes to setting emission targets. Such an assessment cannot deal with difficult ethical issues such as how to value the lives and wellbeing of future generations and people in highly vulnerable communities.

Emissions trading design proposals

Broadly, The Climate Institute is in agreement with most of the Review's proposals regarding the development of an emission trading scheme in Australia. Key areas that require further exploration by the Review include:

- **Australia's emission trajectory:** Trajectory B will undermine Australia's capacity to leverage international action and would reduce the nations standing as a potential leader in climate change negotiations.
- **Annual budgets and lending:** Official lending should be severely limited, if included at all. The Review should explore the use of five year carbon budgets with unlimited hoarding and lending within these five year periods.
- **Governance:** The Review should explore an independent authority that has a broader scope for the review of climate policy than just oversight of emission trading system.
- **Use of permit revenue:** The Review should make recommendations to on what principles and criteria Government would use in determining permit allocation and the use of emission trading revenues. High priority for spending revenue from the emissions trading dividend should be given to supporting vulnerable low income communities, funding further development and deployment of new and existing low emission technologies, and assisting technology transfer, pollution reduction or adaptation initiatives in developing countries.
- **Trade exposed GHG intensive industries:** The introduction of any insulation must be transparent, be linked by to regular reviews of new international policy developments; be conditional on industries demonstrating they are meeting world's best practice standards in greenhouse intensity and technology development; lock in a gradual reduction in protection to promote best practice and adjustment; and be based on the actual "trade-exposed" and "emission intensive" elements of a company's operation.

[†] Unless otherwise stated all ppm concentrations are defined as CO₂ equivalent.

Summary

Dangerous climate change and long-term goals

Central to defining a long-term goal for global action on climate change is what countries view as acceptable climate change impacts. There is an emerging consensus among prominent scientists that a 2°C increase in global temperatures above pre-industrial levels would constitute a threshold above which dangerous, irreversible and potentially catastrophic global impacts may occur.

A number of approaches have been proposed for defining long-term targets for global action on climate change to guide collective global action in both the short and long-term.

Suggestions include:

- setting general climate goals (such as avoiding 2°C above preindustrial levels as suggested by the EU and Norway);
- stabilising greenhouse gas concentrations;
- emission reduction goals (as identified in the Bali Roadmap); and
- carbon budget approaches such as those identified in the Garnaut Review.

To date the Australian Government has not finalised its bargaining position for the negotiations towards Copenhagen in 2009. The Australian position however notes that *“In considering what constitutes dangerous anthropogenic interference with the climate system, Parties should agree on cooperative approaches that minimise the impacts of climate change at the **lowest achievable stabilisation goal.**”* [emphasis added]

Caution should be used in attempting to define a global carbon budget or a concentration level as the global long-term goal as it may lead to unintended outcomes. For example, both these approaches do not necessarily consider the rate of global climate change. The timing of the peak and decline of emission levels will be critical to the climatic impact. The clear advantage of climate impact goals over other global targets is that they more clearly indicate to constituents what governments define as acceptable and unacceptable potential climate change impacts.

It is in Australia’s national interest to ensure global average temperatures peak and then stabilise at the lowest possible levels. It is also important that intergenerational implications of current decision making are fully considered and articulated by the Review. For example, defining an objective of stabilising atmospheric concentrations at 550 ppm suggests that Australia is prepared to accept, on behalf of future generations, up to a 3°C (or greater) increase in global temperature. This risks severe droughts constraining water supplies and farming over large areas of the nation, and the lives and wellbeing of hundreds of millions of people being put at risk globally. This objective would also risk catastrophic outcomes such as the collapse of the Greenland and West Antarctic ice sheets and land based sinks of

greenhouse gases turning into net sources of greenhouse emissions (e.g. if the Amazon collapses). Known adaptive capacity of Australian natural ecosystems, water security and coastal communities could also be exceeded.

From this point of view, the Review should be very cautious how it characterises the costs and benefits mitigation in terms of comparing the costs of action vs the cost of inaction. Comparing possible economic costs of climate change to expected mitigation costs can provide useful information, but this is not appropriate when it comes to setting emission targets as such an assessment cannot deal with difficult ethical issues such as how to value the lives and wellbeing of future generations and people in highly vulnerable communities.

To give a reasonable chance of avoiding a 2°C increase in global temperature, the global mitigation effort needs to ensure greenhouse gas (GHG) concentrations peak well below 500 ppm, and then decline to levels below 400ppm over the coming centuries. This implies industrialised countries overall emissions should be around 30 per cent below 1990 levels by 2020, developing country emission should peak and begin the decline rapidly over the same time period and global emissions should be less than 50 per cent below 1990 levels by 2050. Global action to rapidly reduce emissions from land use change and deforestation are also required.

The post 2012 climate regime

A global solution to climate change will require mitigation and adaptation action – in a fair and equitable way – from all countries. Article 3.1 of the UNFCCC states that such a differentiation should be in accordance with Parties “common but differentiated responsibilities and respective capabilities”. Broadly this suggests differentiation based on the criteria of responsibility, capability and potential to mitigate. This implies:

- Leadership in developed countries must be the backbone of the global regime. These countries are responsible for the majority of historical emissions and have the highest capacity to undertake and support mitigation.
- Developing countries historic responsibility, capacity and mitigation potential varies greatly. Developing countries are not a homogeneous group. This implies the post-2012 climate regime should differentiate between developing country obligations.
- While countries like China and India have very large total emissions their capacity to bear the economic cost of substantial mitigation requirements is comparatively limited. This implies engaging these countries more effectively in the global regime will require substantial levels of capacity building and technology transfer from developed countries.
- Developing countries, however, also have lower cost mitigation potential than developed countries, highlighting the importance of global carbon markets or equivalent arrangements in delivering cost effective abatement.
- Emissions from land use change in countries such as Brazil and Indonesia account for large proportion of these countries total and historic emissions. The near term capacity of these and similar nations to reduce emissions from land use change appears low, and even achieving medium term reductions in emissions would be

likely to require substantial funding and capacity building. Australia's regional neighbours of Papua New Guinea and the Solomon Islands are in a similar situation.

The diplomatic end game in climate talks in Copenhagen will centre on an agreement between the USA and other large developing country emitters such as China and India. For the first time in Bali, developing countries signalled their willingness to take on measurable and verifiable emission obligations. However, building on this spirit will require strategies to build trust and capacity among developing countries.

Unless the USA and other large emitting developed countries commit to substantial domestic action large developing countries will continue to resist strong measures themselves. Australia can play an important role here through signalling a strong domestic emission reduction target and engaging early with the USA (the new USA leadership and domestic political leaders in the Senate and Congress) to ensure a positive US posture in climate talks.

Technology transfer and finance will be another important area of capacity building and trust building with developing countries. It is difficult to imagine developing countries agreeing to emission obligations without firm commitments to overcoming barriers to technology transfer and substantial technology financing in addition to decisive developed country medium term targets. Financing reductions in deforestation will also be central for some countries.

Australia's emission trajectory

The Review proposed four emission trajectories for Australia. A – the Kyoto Target; B – 2020 target based on existing developed countries commitments; C – based on the Government's 60 per cent reduction target by 2050; and D – based on global action to avoid dangerous climate change.

The Climate Institute does not support the need for Trajectory B. As the Review notes the setting of Australia's interim target will have important international ramifications and that it should be calibrated towards leveraging international action consistent with Australia's national interest. As the Review and the Australian Government have noted, Australia's national interest lies in stabilising concentrations of GHG at the lowest possible level.

Australia negotiated a very favourable target in Kyoto. Australia's ratification of the Kyoto Protocol has helped build Australia's standing internationally, however, other progressive countries and those most vulnerable to the impacts of climate change (such as our neighbours in the Pacific) will be looking to Australia to build on this momentum and support strong interim targets for developed countries. Australia signalling an interim target that is weaker than its existing domestic commitment (Trajectory B) will undermine the nation's potential leadership position and strengthen the hand of developed countries that are resisting strong 2020 obligations (e.g. Japan, Canada and the USA).

Australia should commit unilaterally to peaking national emissions by 2012 and commit to an interim target of around 25 per cent below 1990 levels by 2020. While this commitment is

comparatively stronger than the position taken by the EU it is Australia's national international interest to be taking a leadership role in global efforts to reduce emissions.

Economic modelling that suggests that with appropriate policies responses that an interim target of this scale is affordable and manageable.

Criteria that judge national contributions to avoiding dangerous climate change Australia should be taking a leadership role in global efforts to reduce emissions. On a per capita basis, Australia carries a high level of responsibility for the problem, relative to other countries (both developed and developing) has the capacity to pay for and implement mitigation efforts, and has many potential opportunities to reduce GHG emissions at lower cost than other countries. This implies Australia can and should be taking a leadership position in setting its interim target.

Through international emissions trading, Australia could supplement domestic efforts with opportunities to reduce emissions at low cost in other countries.

Decisive early action would make it easier for Australia to pursue other climate policy objectives, such as achieving a global agreement that avoids dangerous climate change impacts and in relation to the treatment of emissions intensive traded goods. It would also build a more flexible domestic policy regime, encourage the development of new industries and technologies, and expand the benefits of participating new markets in low emission technologies and emissions offsets.

If a strong international agreement can be agreed, Australia should be prepared to accept an emission reduction obligation of stronger than around 25 per cent by 2020.

Emission trading design elements

Broadly, The Climate Institute is in agreement with most of the Review's proposals regarding the development of an emission trading scheme in Australia. Key areas that require further exploration by the Review include:

- **Australia's emission trajectory:** Trajectory B will undermine Australia's capacity to leverage international action and would reduce the nations standing as a potential leader in climate change negotiations. (See above)
- **Annual budgets and lending:** Official lending should be severely limited, if included at all. The Review should explore the use of five year carbon budgets with unlimited hoarding and lending within these five year periods.
- **Governance:** The Review should explore an independent authority that has a broader scope than just the emission trading system. To build confidence, transparency and accountability in the Government's overall response to climate change, the independent body could assess the effectiveness of the current targets and adaptive measures, assess progress towards the targets, report on the impact of ongoing mitigation and adaptive policies and measures; and make recommendations on additional (or the phase out of existing complimentary measures) mitigation and adaptation policies. After a public consultation process, the independent body

should report annually to the Parliament and the Government would be required to table a response. Minutes of key meetings and/or reasons for key decisions should be released publically.

- **Use of permit revenue:** The Review should make recommendations to on what principles and criteria Government would use in determining permit allocation and the use of emission trading revenues. Environmental effectiveness, cost-effectiveness, equity and institutional feasibility would be appropriate overriding criteria. Environmental effectiveness criteria should include domestic emission reduction and whether the revenue encourages early action from other large emitters. High priority for revenue from the emissions trading dividend should be given to supporting vulnerable low income communities, funding further development and deployment of new and existing low emission technologies, and assisting technology transfer, pollution reduction or adaptation initiatives in developing countries. Alongside the Government's Renewable Energy Target, additional funding and incentives for low emission technologies can create policy flexibility by avoiding locking in new high emission technologies and ensure all new load is met by clean energy sources.
- **Transitional financial assistance for greenhouse intensive trade exposed industries:** The rationale for, and introduction of, any insulation must be transparent, be linked by to regular reviews of new international policy developments, be conditional on industries demonstrating they are meeting world's best practice standards in greenhouse intensity and technology development, be subject to sunset clauses, lock in a gradual reduction in protection to promote best practice and adjustment, and be based on the actual "trade-exposed" and "emission intensive" elements of a company's operation.

Introduction

The Climate Institute welcomes the opportunity to submit to the Garnaut Review (the Review) process. Established in late 2005, The Climate Institute has a goal of raising public awareness and debate about the dangers to Australia of global warming and to motivate the country to take positive action.

The Climate Institute is a non-partisan, independent research organisation that works with community, business and government to drive innovative and effective climate change solutions. Our vision is for an Australia leading the world in clean energy use and innovation, with clean and low energy solutions a part of everyday life throughout the community, government and business.

The Climate Institute is funded by a donation from the Poola Foundation (Tom Kantor Fund).

This submission focuses on responding to key issues outlined in the Review's Interim (Garnaut, 2008a) and Emissions Trading Design (Garnaut, 2008b) papers. Specifically:

- Dangerous climate change and international collaborative action
- Global emissions reductions architecture and differentiating national obligations
- Australia's emission trajectory and 2020 targets
- Comments on broad emissions trading design elements

The Climate Institute is currently commissioned and undertaking research to other areas relevant to the Review including:

- The impact of emissions trading and complimentary measures on the electricity market.
- Australian mitigation wedges and Australia's mitigation potential.
- The market failures, barriers and co-benefits of energy efficiency, and the technical and market potential of policies and measures to meet a national energy efficiency target.
- The implications of emissions trading for low income communities.

We would welcome the opportunity to present these to the Review at a later date.

Defining the climate end game

Dangerous climate change

Central to defining a long-term goal for global action on climate change is what countries view as acceptable climate change impacts.

The UN's Framework Convention on Climate Change, signed in 1992, commits governments to avoiding "*dangerous*" levels of climate change and to stabilising the climate in a time frame that allows natural systems to adapt, food production not to be threatened and for economic development to proceed in a sustainable manner.[‡] It also commits countries to "... *take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures ...*"[§].

Australia is a signatory and has ratified the climate convention and is legally bound to help achieve these objectives.

The scientific community has been clear for well over a decade that human emissions of greenhouse gases pose a threat to the global climate. Progressive assessments of the Intergovernmental Panel on Climate Change (IPCC) have strengthened these conclusions but since 1990 it has been well established that that greenhouse gas would cause climate warming (Table 1, Houghton, Jenkins, Ephraums (eds), 1990; Houghton, Meira Filho, Callender, et al. (eds), 1995; Houghton, Ding, Griggs, et al. (eds), 2001); Solomon, Qin, Manning, et al., 2007). These reports have been endorsed by progressive Australian Governments. This point is important as some have argued that the seriousness of climate change has just dawned on the scientific community and policy makers.

[‡] UN Framework Convention on Climate Change, Article 2, (1992).

[§] UN Framework Convention on Climate Change, Article 3.3, (1992).

Table 1: Conclusions of IPCC science assessments.

	IPCC First Assessment 1990	IPCC Second Assessment 1995	IPCC Third Assessment 2001	IPCC Forth Assessment 2007
Has the climate changed (recent global warming)	Highly likely (0.3-0.6 since 1880s)	Yes (0.3-0.6 °C since 1880s)	Yes (0.4-0.8 °C since 1880s)	Warming “unequivocal” (0.56-0.92 °C since 1906)
Human influence on recent warming	Unequivocal detection of human influence on climate “not likely for a decade or more.”	“Balance of evidence suggests a discernable human influence on global climate.”	“... most of the warming observed over the last 50 years is attributable to human activities.”	“Most of the observed increase in global average temperatures since the mid-20 th century is very likely due to the observed increase in ... greenhouse gas concentrations”
Projected warming	Warming “certain” in years ahead: 0.2 – 0.5 °C/decade (around 2-5 °C by 2100)	1.0-3.5 °C by 2100	1.4-5.8 °C by 2100	1.4-6.4 °C by 2099
Projected sea level rise	3-10cm/decade (around 30-100cm by 2100)	13-94cm by 2100	9-88cm by 2100	18-59cm by 2100 (excluding rapid changes in ice flow)

There is an emerging consensus among prominent scientists that a 2°C increase in global temperatures above pre-industrial levels would constitute a threshold above which dangerous, irreversible and potentially catastrophic global impacts may occur (Preston, Jones, 2006; Bali Climate Declaration by Scientists, 2007). For example the 2007 Bali Climate Declaration by Scientists, which was endorsed by many of Australia’s leading climate change researchers, concludes:

The prime goal of this new [post-2012] regime must be to limit global warming to no more than 2 °C above the pre-industrial temperature

In the long run, greenhouse gas concentrations need to be stabilised at a level well below 450 ppm (parts per million; measured in CO₂-equivalent concentration).

The Prime Minister has stated (Rudd, 2007):

“... the IPCC found that the level of greenhouse gases in the atmosphere will need to be kept between 445 – 490 parts per million, in order to avoid the most dangerous impacts of climate change.”

More recent assessments indicate global warming well below 2°C may constitute dangerous climate change and that climate tipping points may be approaching much more rapidly than previously anticipated (Pittock, 2006; Hansen, 2007). Current levels of atmospheric concentrations may already threaten (Hansen, Sato, Kharecha, et al., 2008):

- rainfall declines and increased aridity in southern Australia, southern United States, the Mediterranean region and parts of Africa;
- fresh water supplies from glaciers in the Himalayas, Andes and Rocky Mountains that now supply water to hundreds of millions of people;
- accelerating mass losses from Greenland and West Antarctica and the complete loss of Arctic summer sea ice; and
- severe impacts on the world’s coral reefs and knock on impacts to the 500 million people worldwide who rely on them for their food and livelihood.

While scientists can provide assessments of impacts from under a range of scenarios it falls to policy makers to determine whether such impacts are “*acceptable*”. For example, a small increase in global temperature and the consequent increase in sea level and extreme weather events are of major concern to the people and politicians of the low lying Pacific islands. However, other policy makers and people are less concerned by this particular impact. This is exemplified by the comments in 1998 by the former head of Australian Bureau of Resource Economics who suggested that it would be a more cost effective option to allow climate change to continue and pay to move these people to other countries.

Figure 1a and 1b outline global temperature increases to 2100 based on greenhouse gas stabilisation scenarios for 350 ppm, 400 ppm, 450 ppm and 550 ppm by 2100.** This is compared to examples of potential climate change impacts in Australia and globally for various degrees of global warming (Figure 1a). Figure 1b compares global GHG stabilisation to the potential risks that known adaptive capacity of key Australian sectors as identified by the IPCC (Hennessy, Fitzharris, Bates, et al. 2007). In addition to scenarios that use “*best guess*” climate sensitivity,^{††} scenarios that use a climate sensitivity of 6°C are also used.

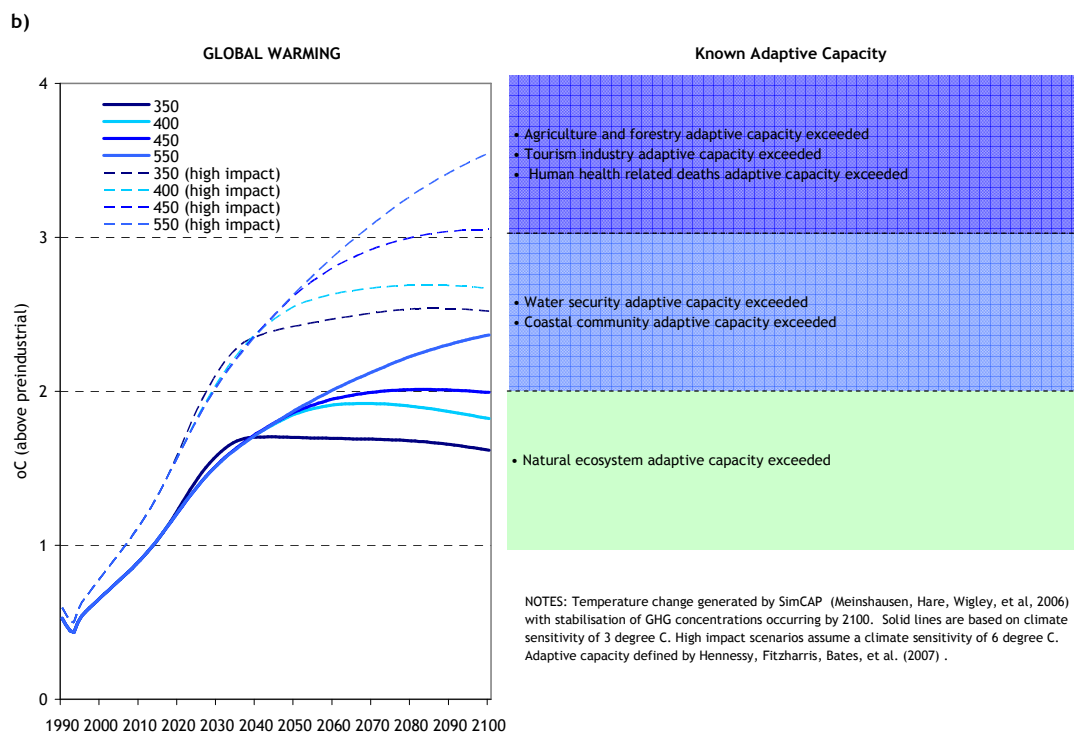
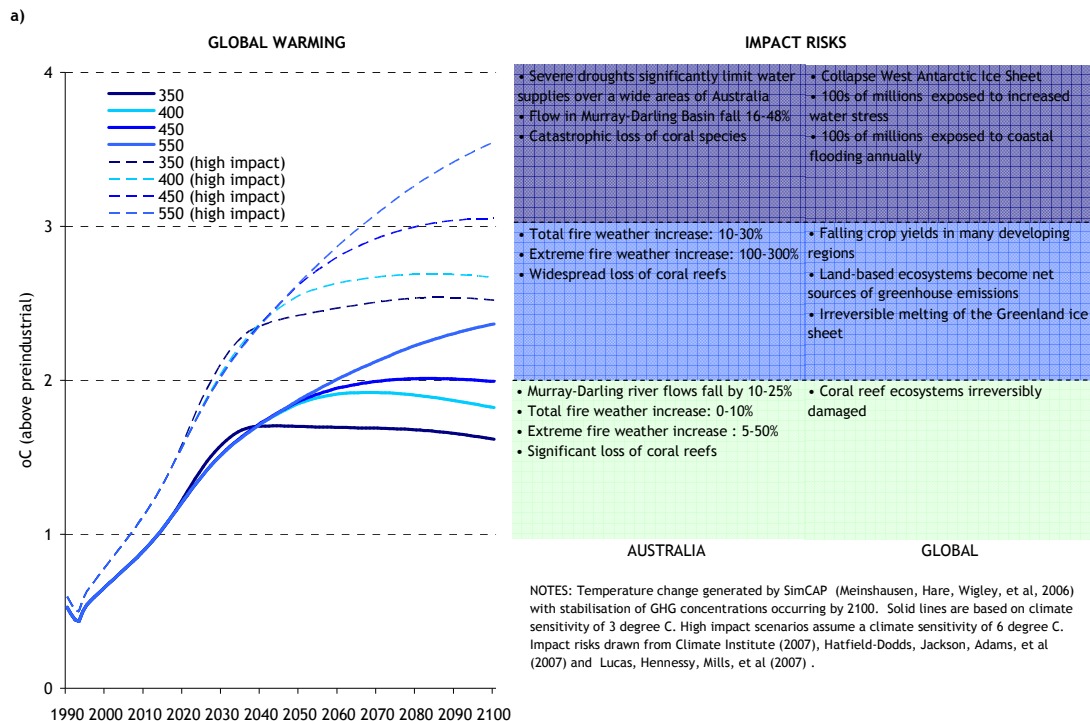
** The SiMCaP model attempts to get as close to the defined target as possible. In both the 400 ppm and 450 ppm scenarios concentrations peak at around 500 ppm before falling towards the desired levels after 2100. In the 350 scenario, concentrations peak at around 475 ppm then fall and stabilise at around 375 ppm in around 2200. Model runs that seek stabilisation at 350 after 2200 are not used in this submission.

^{††} “*Climate sensitivity*” is one of the most uncertain aspects of climate system as it relates to climate policy. It is usefully defined as the total change in global temperature that would result if atmospheric concentrations of CO₂ were doubled in the atmosphere (at equilibrium). The IPCC give a likely range of 2-4.5°C with a “*best guess*” of 3°C.

While such an outcome has a lower probability of occurring than the best guess scenarios, climate sensitivity of this magnitude cannot be ruled out and these scenarios are used to illustrate the potential for low probability/high impact outcomes. This illustrates a number of points relevant to Australia determining its global negotiating position:

- Defining an objective of stabilising atmospheric concentrations at 550 ppm suggests that Australia is prepared to accept the risk that climate change will lead to severe drought constraining water supplies and farming over large areas of the nation, hundreds of millions of lives being put at risk globally, catastrophic outcomes such as the collapse of the Greenland and West Antarctic ice sheets and land based sinks of greenhouse gases turning into net sources of greenhouse emissions (e.g. if the Amazon collapses). Known adaptive capacity of Australian natural ecosystems, water security and coastal communities would also be exceeded. Stabilisation at this level also risks the known adaptive capacity of agriculture, forestry, tourism and health systems.
- Defining an objective of stabilising atmospheric concentrations at 450 ppm suggests that Australia is prepared to accept the known adaptive capacity of Australian natural ecosystems being exceeded. Stabilisation at this level also risks the known adaptive capacity of water security and coastal communities. If the climate system proves more sensitive than currently estimated climate change will lead to severe drought constraining water supplies and farming over large areas of Australia, hundreds of millions of lives being put at risk and globally catastrophic outcomes such as the collapse of the West Antarctic Ice Sheet.
- Defining an objective of stabilising atmospheric concentrations at 400 ppm or below still poses risks particularly to natural systems such as coral reefs. However, stabilisation of GHG concentrations at these levels reduces the risk of irreversible and potentially catastrophic global impacts.

Figure 1: GHG stabilisation, global warming and impact risks



Long-term cooperative action

The Review notes (Garnaut, 2008a, p.27):

The first task is to articulate the areas where broad international agreement will be required if there is to be effective international action.

Broad international agreement will require acceptance of global limits on emissions, sharing of rights to emissions across countries within these limits, and international collaboration to help achieve the national restrictions.

The IPCC conclude that (Gupta, Tirpak, Burger, et al., 2007):

The choice of the long-term ambition level significantly influences the necessary short-term action and, therefore, the design of the international regime.

In Bali, governments agreed to negotiate (UNFCCC, 2007a):

A shared vision for long-term cooperative action, including a long-term global goal for emission reductions, to achieve the ultimate objective of the Convention, in accordance with the provisions and principles of the Convention, in particular the principle of common but differentiated responsibilities and respective capabilities, and taking into account social and economic conditions and other relevant factors;

A number of approaches have been proposed for defining long-term targets for global action on climate change as a guide collective global action in both the short and long-term (Gupta, Tirpak, Burger, et al., 2007). Suggestions include climate goals (such avoiding 2°C above preindustrial levels as suggested by the EU and Norway), goals to stabilisation of GHG concentrations, emission reduction goals (as identified in the Bali Roadmap) and carbon budget approaches such as identified in the Review (Garnaut, 2008a, p.27-30).

Budgets and concentrations

Caution should be used in attempting to define a global carbon budget or a concentration level as the global long-term goal as it may lead to perverse outcomes. For example, both these approaches do not explicitly consider the rate of global climate change.

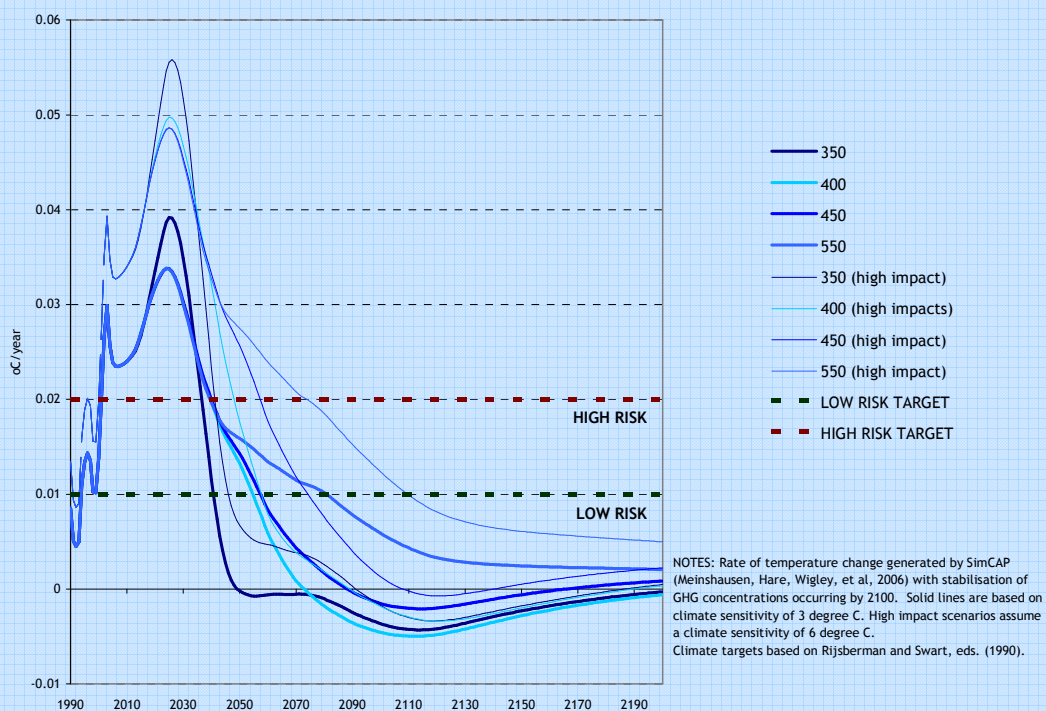
The total magnitude of climate change is not the only determinant of climate change impacts. The rate of climate change is critical to the ability natural and socio economic systems to adapt to changed circumstances. Global assessments have suggested that global warming of more than 0.1°C/decade would exceed the adaptive capacity many ecosystems (Rijsberman, Swart, 1990; Hare, 2003; O'Neill, Oppenheimer, 2004). Preston and Jones (2006), highlight this in the context benefits to Australia that may stem from early reductions in GHG emissions:

Mitigation would reduce not just the magnitude, but also the rate of future climate change, which may give natural ecosystems such as coral reefs greater time to adapt. As a result, coral communities may avoid the loss of at least the more heat-tolerant species, thereby maintaining the function, goods, and services of reef ecosystems.

Box 1: Impact of stabilisation pathway on the rate of global temperature change

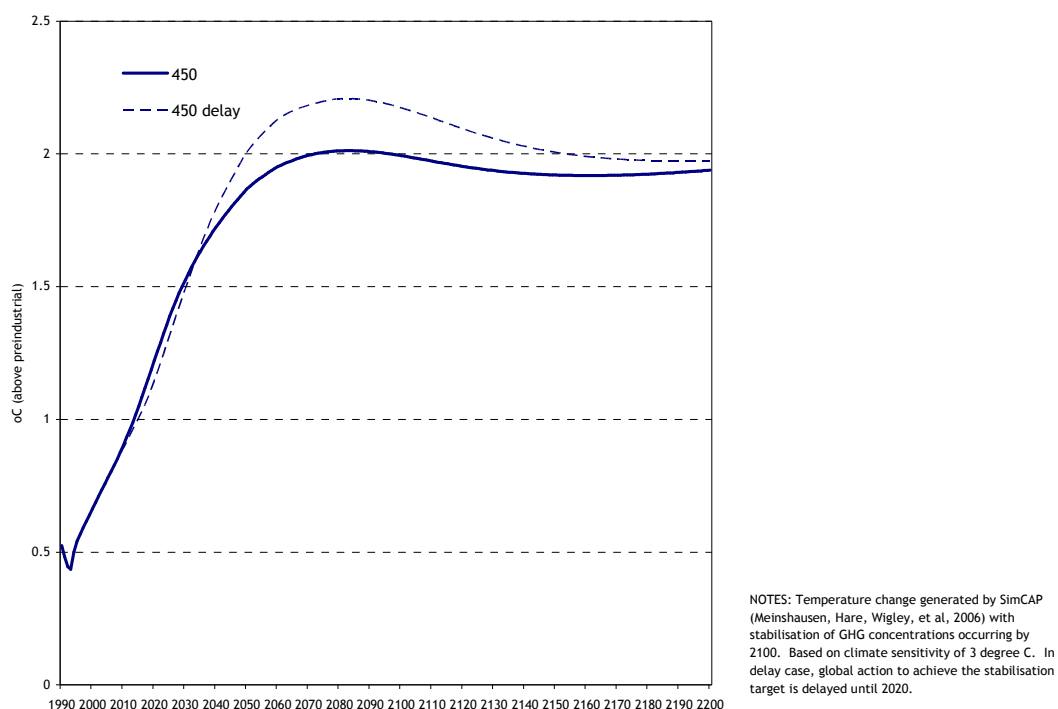
Figure 2 illustrates the impact of different GHG concentration (CO₂e) targets on the rate of global warming over the next 200 years. This is compared to low risk (0.1°C/decade) and high risk (0.2°C/decade) rates of climate change. Due to historical emissions and under all pathways, climate change occurs at a rate that present very high risks to natural systems until around 2030. An emission pathway that aims to stabilise a 350 ppm by 2100 sees global temperatures falling below high and low risk levels between 2030-2050. Pathways consistent with stabilising are between 400-450 ppm see rate of climate change falling to lower risk levels by around the middle of the century and pathways to stabilise at 550 see lower risk changes occurring towards the end of the century. If the climate system is more sensitive (high impact scenarios) then expected achieving lower risk levels of change is delayed by 20-30 years under all pathways except 350 ppm. The spike in the rate of temperature increase in the 350 ppm scenario is due to the rapid reductions sulphate aerosols associated with fossil fuel burning. Aerosols have short-term cooling effect on the climate.

Figure 2: GHG stabilisation and rates of temperature change



Also defining a global budget, without clearly defined short-term emission reduction goals, may risk some countries deferring action. This would increase both the short-term rate of climate change and delay reducing global temperatures to safer levels. To illustrate, Figure 3 illustrates simply the impact of delaying global action to stabilise GHG concentrations at 450 ppm by 2100. Under this scenario global temperatures stay below a 2°C increase in global temperature. However, with ten years of delay global temperatures exceed dangerous levels in around 2050 and stay above them for over a century.

Figure 3: 450 ppm CO₂e global temperature increase (1990-2200): Early vs delayed action



Climate change targets

The EU and others have articulated that global temperatures should not exceed a 2°C above preindustrial levels. Some least developed countries and the Alliance of Small Island States suggest global temperatures should be stabilised well below this level. The clear advantage of climate impact goals over other global targets is that they more clearly indicate to constituents what governments define as acceptable and unacceptable potential climate change impacts.

However, there are a number of difficulties in assigning a particular atmospheric concentration of GHGs to avoiding a particular temperature target. In particular these relate to uncertainties about emissions from other greenhouse gases besides CO₂, the sensitivity of the climate system to increases in greenhouse gases, how current natural sources and sinks will respond to climate change and the potential for large-scale catastrophic impacts. The principle scientific uncertainty is that of climate sensitivity – i.e. how sensitive the climate is to a given level of greenhouse gas concentration. Also defining global goals based on

temperature or other climate change impacts gives business little certainty in investment decisions.

To overcome problems associated with defining emission pathways to avoid a climate change impact the scientific community is using probability assessments to define the risk of overshooting particular global temperature targets with a given concentration of greenhouse gas in the atmosphere (Forest, Stone, Sokolov, et al., 2002; Hare, Meinshausen, 2004; den Elzen, Meinshausen, 2005; Meinshausen, 2006), see Figure 4). For 350-450 ppm scenarios the risk of overshooting a 2°C global temperature target by 2100 to be between 10-50 per cent. For stabilising greenhouse gas concentrations at 550 ppm the risk of overshooting is very high – a 68-99 per cent chance. This is broadly consistent with work by other researchers who have estimated that the chance of overshooting 2°C enters the “unlikely” range at around 475 ppm. They suggest overshooting 2°C would be “very unlikely” below 410 ppm.

Figure 4: Risk of overshooting a 2°C increase in global temperature.

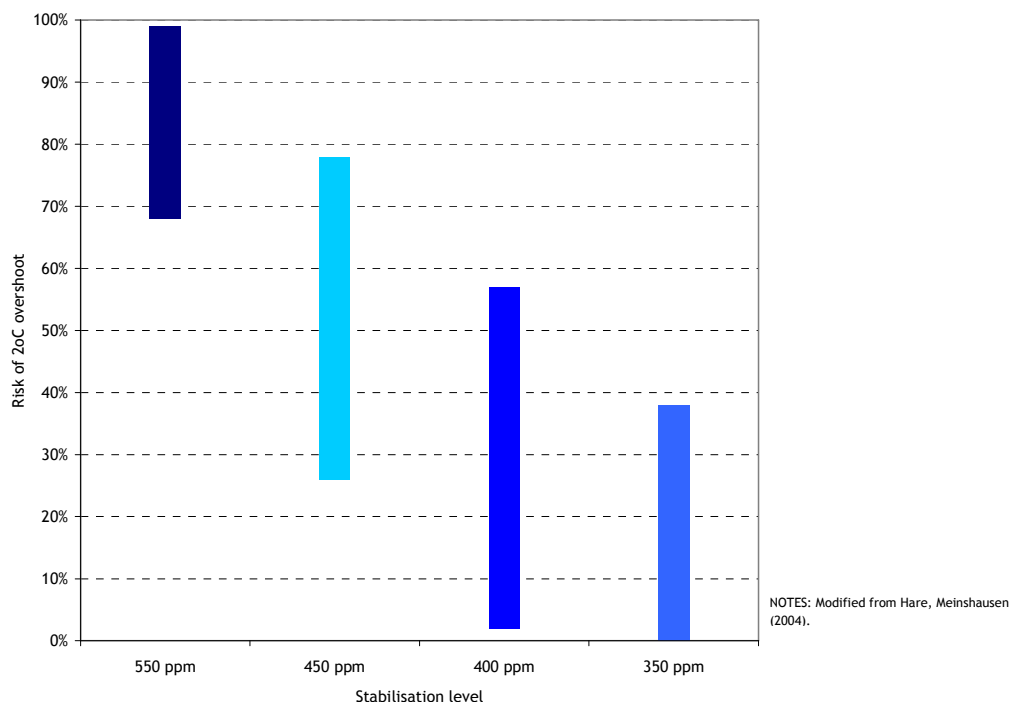
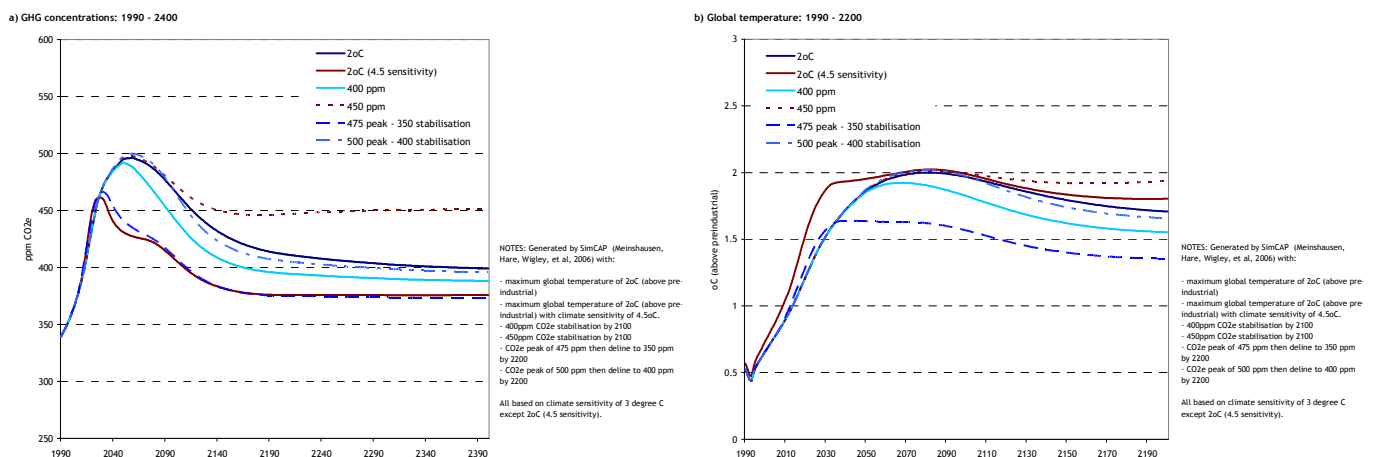


Figure 5 a and b illustrates the global temperature impacts of a number scenarios that attempt to keep global temperatures at around or below a 2°C increase in temperature. The scenarios are:

- **2°C:** Temperature target is set to peak global emissions at 2°C above preindustrial levels using the IPCC best guess climate sensitivity (3°C).
- **2°C (4.5 sensitivity):** Temperature target is set to peak global emissions at 2°C above preindustrial levels using a climate sensitivity of 4.5°C.
- **400 ppm:** Global GHG concentrations are set to stabilise at 400 ppm CO₂e by 2100 (IPCC best guess climate sensitivity 3°C).

- **450 ppm:** Global GHG concentrations are set to stabilise at 450 ppm CO₂e by 2100 (IPCC best guess climate sensitivity 3°C).
- **475 peak – 350 stabilisation:** Global GHG concentrations are set to peak at 475 ppm CO₂e then stabilise at 350 ppm by 2200 (IPCC best guess climate sensitivity 3°C) (a similar approach as used by den Elzen, van Vuuren, 2007).
- **500 peak – 400 stabilisation:** Global GHG concentrations are set to peak at 500 ppm CO₂e then stabilise at 400 ppm by 2200 (IPCC best guess climate sensitivity 3°C) (a similar approach as used by den Elzen, van Vuuren, 2007).

Figure 5: GHG concentrations and global temperature



These scenarios illustrate that:

- Global GHG concentrations need to peak at well below 500 ppm to give a reasonable change of staying below a 2°C in global temperature.
- Post 2100 global concentrations need to continue to decrease to 400 ppm or below to ensure temperature continues to decrease towards preindustrial levels over the current millennium.

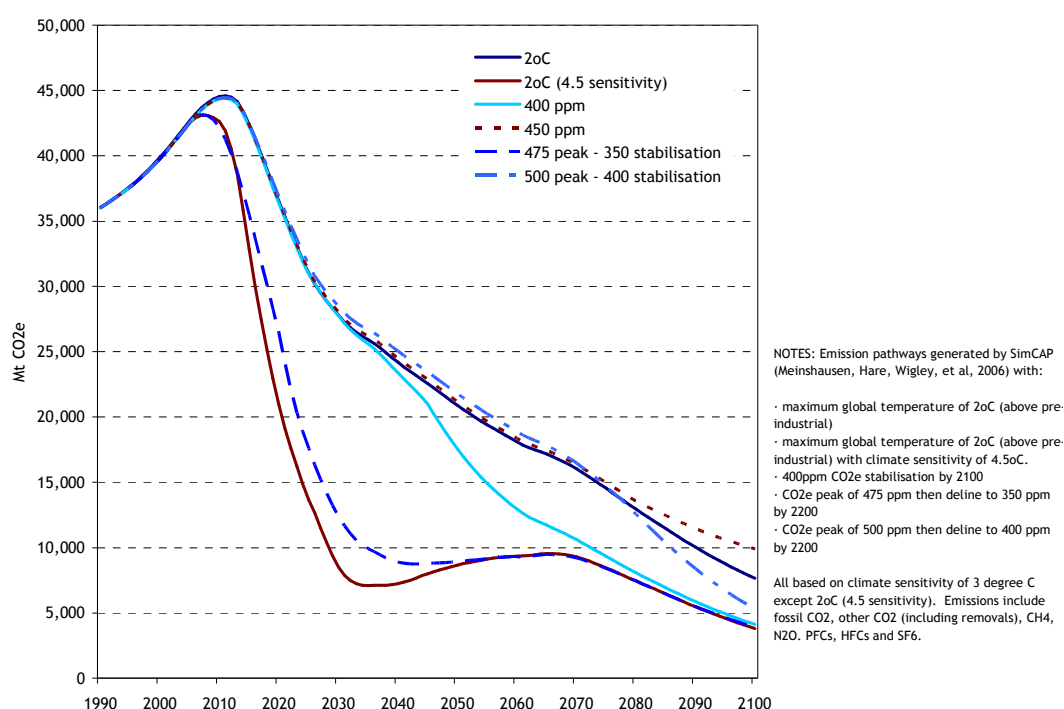
Figures 6, 7a and b, and 8 illustrate global and regional greenhouse emissions (including removals of CO₂) of these scenarios. Key points can be drawn from these scenarios:

- Comparison of scenarios 2°C and 2°C (4.5 sensitivity) illustrates that the global emissions pathway for peaking global temperature at 2°C above preindustrial levels using two different climate sensitivities. This shows that emissions pathways can diverge greatly depending on what climate sensitivity scientists and policy makers define as most likely.
- Post 2100 global GHG concentrations need to continue to decrease to 400 ppm or below to ensure temperature continues to decrease towards preindustrial levels over the current millennium.
- Global emission pathways associated with 400 ppm and 450 ppm are similar until 2030 when they diverge. However, decisive global action would be required to avoid a 2°C in global temperature above preindustrial levels (global emissions must peak

no later than 2015).^{‡‡} Also give the long-life of energy related infrastructure (e.g. power stations, urban infrastructure) policy decisions today should not compromise the ability of emissions to diverge post 2020.

- Industrialised country emissions (Annex 1 - OECD and REF) emissions need to fall to around 30 per cent below 1990 levels by 2020^{§§} and developing country (ASIA and ALM) emissions need to peak and begin to rapidly decline over the same period. By 2050, industrialised country emissions need to be around 85-100 per cent below 1990 levels and developing country emissions need to be (well) below 1990 levels by 2050.
- Early, sustained and effective action is need to halt deforestation, promote afforestation and reforestation and build the reliance of natural sinks of CO₂ is needed if global temperatures are to be kept below 2°C. However, a few key words of caution should be considered when comparing reductions in CO₂ emissions from fossil fuels and land-use related CO₂ net removals. Today's carbon sinks are possibly tomorrow's sources and carbon sinks may not bind the carbon for a very long time. In the long-term, enhancing of carbon sinks is not the equivalent to restricting fossil fuel emissions (see Lashof, Hare, 1999; Kirschbaum, 2003; Harvey, 2004).

Figure 6: Net global emissions associated with avoiding 2°C: 1990-2100



^{‡‡} These results see a later peak and decline that suggested by the review (Garnaut, 2008, p19-20) and this is likely due to different modelling methodologies, and the more explicit representation of non-fossil CO₂ GHG's and other forcing agents in these scenarios.

^{§§} With a range of 25-40 per cent below 1990 levels by 2020 (see UNFCCC, 2007b)

Figure 7: Net regional emissions associated with avoiding 2°C: 1990-2050.

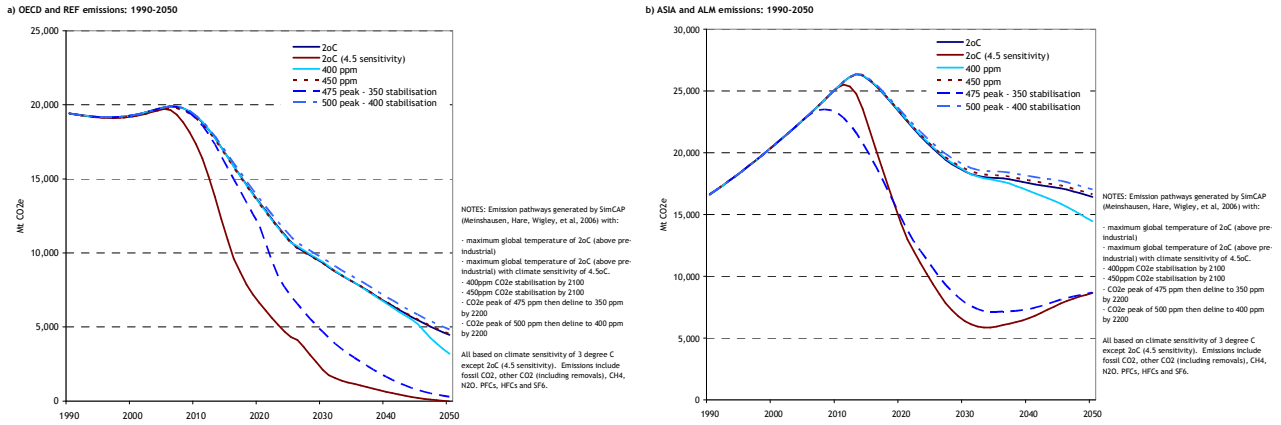
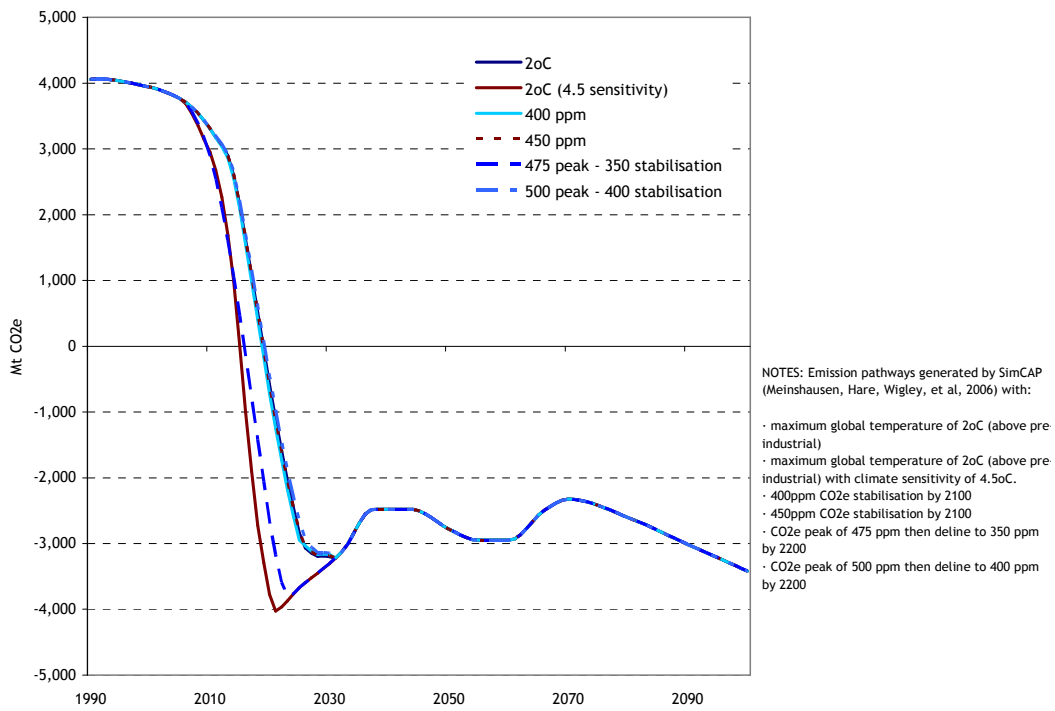


Figure 8: Global non-fossil fuel emissions associated with avoiding 2°C: 1990 - 2100



Box 2: Hedging vs climate risks

Some policy experts have also advocated a “hedging” strategy to deal with uncertainty associated with climate science (Toth, Mwandosya, Carraro, et al., 2001; Schneider, Avar, 2001; Graßl, Kokott, Kulesa, et al., 2003; Yohe, Andronova, Schlesinger, 2004; CSIRO, 2007). That is, ensure that your short-term actions do not rule out the possibility of achieving your long-term objectives.

The Intergovernmental Panel on Climate Change has concluded that (Toth, Mwandosya, Carraro, et al., 2001):

Any concentration ceiling implies a cumulative emissions limit. Thus preserving the option to stay below any arbitrary limit means adopting a hedging strategy ... Since a future political decision on a 450ppmv target cannot be excluded, decisions prior to 2020 must be such that they do not preclude the achievement of such a target.

CSIRO (2007) note that:

... if the objective is to ensure no more than 2°C warming, national emissions trajectories that are consistent with stabilising global GHG concentrations at 400-500 ppmv CO₂e may be necessary. For this reason, near term policy settings should preferably ensure that Australia maintains maximum flexibility for achieving these more stringent targets. Policy that presumes stabilisation targets of 500-550 ppmv (and no lower) as the required reduction in emissions would present risks. This is because if it became clear that stabilising atmospheric GHGs at these levels would lead to warming beyond the target level, further and urgent action would become necessary. This would be more costly and have more dramatic economic and social costs than action taken earlier and might prove ineffective.

Undertaking a hedging strategy is not only consistent with government obligations under the UN’s Framework Convention on Climate Change (Article 3.3), it also makes economic sense. (e.g. Ha-Duong, Grubb, Hourcade, 1997). Uncertainties surrounding the impacts of climate change and the appropriate policy response have enormous implications for this investment. A 550 ppm target may be regarded as tolerable or acceptable today, but new scientific information or the emergence of new climate impacts could lead to a re-evaluation of this target in 15 years time to 450 ppm. This would mean emissions would have to drop very sharply. As the investments in long-term infrastructure would have already taken place this could lead to the premature retirement of capital and stranded assets to meet the new policy regime.

What does Australia view as dangerous climate change?

To date the Australian Government has not defined the climate change end game it hopes to achieve through the negotiations towards Copenhagen in 2009. The Australian position notes that a number of countries are seeking to define an agreement around a 50 per cent reduction in global emissions by 2050 (Government of Australia, 2008) and highlights that:

*... a two degree increase in the global average temperature above 1980-1999 levels^{***} ... could already see widespread global impacts that would alter in severity from region to region. Australia, which has the driest and most variable climate of the inhabited continents, is projected to be among the first regions to suffer from the severe impacts of climate change.*

*In considering what constitutes dangerous anthropogenic interference with the climate system, Parties should agree on cooperative approaches that minimise the impacts of climate change at the **lowest achievable stabilisation goal**. [emphasis added]*

The Review notes that (Garnaut, 2008a, p.19-20):

Achieving stabilisation at 450 ppm CO₂-e target would require dramatic and immediate changes in global emissions. An initial simulation scenario for this stabilisation target carried out for the Review (using CO₂ stabilisation at 420ppm as a proxy for stabilisation of all greenhouse gases at 450 ppm CO₂-e) has global emissions peaking around 2010, falling to 2000 levels by soon after 2020, and then to less than half of 2000 levels by 2050 and less than a quarter by 2100.

*A less ambitious target, **leaving much higher risks of dangerous climate change**, is to restrict greenhouse gas concentrations to 550 ppm CO₂-e. An initial simulation scenario to achieve this stabilisation target has global emissions slowing, peaking by 2030, and then falling back to 2000 levels around the middle of the century. [emphasis added]*

The 450 ppm CO₂-e stabilisation scenario depicted here involves allowing the greenhouse gas concentration to reach around 500ppm CO₂-e before it declines to 450 ppm CO₂-e later (“overshooting”). Keeping the concentration to 450 ppm CO₂-e or less would require a peaking of global emissions in 2010 followed by a very rapid fall. ... Peaking of global emissions in the near future, followed by very rapid falls, is clearly not feasible, given long lead-times and lifetimes of energy sector investments, and the huge momentum of emissions growth especially but not only in developing countries.

^{***} Note a 2°C increase above 1980-1999 levels implies around a 2.5°C increase above preindustrial levels.

Also, (Garnaut, 2008a, p.25):

These glimpses suggest that it is in Australia's interest to seek the strongest feasible global mitigation outcomes – 450 ppm as currently recommended by the science advisers to the UNFCCC and accepted by the European Union.⁺⁺⁺ Failing international agreement on this ambitious target – and its realisation would require strong commitments to demanding targets from all major developing countries from 2013 – preliminary analysis suggests that it would be in Australia's interests to seek international agreement on the most ambitious feasible global mitigation target.
[emphasis added]

... the prospects of achieving [a 400 ppm target] the global mitigation effort that would be necessary to achieve this outcome appear to be remote in early 2008. Changes in ambition would require radical changes in the global approach to mitigation, and also major technological progress in the development of low-emissions technologies. To keep the possibility of eventual attainment of a 400ppm objective (with overshooting) alive, the 450ppm objective could be pursued with a view to tightening emissions targets if at some future time the political and technological conditions for far reaching mitigation had improved.

This implies that the Review appears to focussing on “overshoot” concentration scenarios. Recent assessments suggest that “peaking” profiles that see concentrations peak then continually decline over the coming centuries is a more appropriate policy response given current emissions trajectories and climate risks (den Elzen, van Vuuren, 2007). However, any peaking scenario must ensure concentrations decline rapidly some after the peak ensure climate tipping points and large scale irreversible impacts are not locked into the climate system (Hansen, Sato, Kharecha, et al., 2008).

Feasibility of targets and intergeneration equity

There is no doubt that peaking global emissions in the short-term will be challenging. It will require a fundamental reorientation of global energy systems towards low emission technologies and energy efficiency, the rapid deployment of low emission technologies, the premature closure of some of the world's energy infrastructure, and a global program to reduce emissions from land use change and forestry. However, modelling assessments indicate that stabilising concentrations at 450 ppm is feasible and affordable if the appropriate policy setting and political will exist (IPCC, 2007; OECD, 2008).

The IPCC note that an increasing number of scenarios are assessing the attainability of very low targets of below 450 ppm (Fisher, Nakicenovic, Alfsen, et al., 2007). Achieving such low targets will depend on using a wide range of abatement option and the technology ‘readiness’ of advanced technologies that remove CO₂ from the atmosphere may be critical (e.g. biomass and carbon capture and storage, soil carbon sequestration, see Azar, Lindgren,

⁺⁺⁺ Note the EU have not recommended a 450 ppm target.

Larson, et al., 2006; Van Vuuren, den Elzen, Lucas, et al., 2007; Hansen, Sato, Kharecha, et al., 2008).

It is also critical that intergeneration implications of your short-term decision making are fully considered and articulated by the Review. As the IPCC note (Toth, Mwandosya, Carraro, et al., 2001):

“... most of the people who will be directly affected by the problem [of climate change] have not been born yet, which limits their ability to negotiate.”

One danger in the approach suggested by the Review and the Government by making pre-emptive judgments on what is “feasible” or “achievable” or not is that this is largely a political judgment about what costs we are prepared to accept to avoid impacts in 50 years time, and how much we value the lives and wellbeing of future generations (our children and their children). In this context the review states (Garnaut, 2008a, p.27):

But what is conservative in a context where the possible outcomes include some that most humans today would consider catastrophic? Conservatism may in fact require erring on the side of ambitious mitigation. After all, prudent risk management would suggest that it is worth the sacrifice of a significant amount of current income to avoid a small chance of a catastrophic outcome.

Further delay of mitigation efforts risks the potential foreclosure of reaching certain climate targets and locking in globally catastrophic climate impacts later in the century.

In particular, concern that climate change may “feed on itself, accelerate, and bring big global surprises”⁺⁺⁺ has been discussed since the early 1990s (e.g. Leggett, 1990; IPCC, 2001; US National Research Council, 2002; Schrag, Alley, 2004; IPCC, 2007). More recently they have been described as “tipping points” where the climate can reach a point where rapid changes proceed out of our control (Lenton, Held, Kriegler et al., 2008; Hansen, Sato, Kharecha, et al., 2008). Common examples of the kinds of changes include the collapse of the Gulf Stream, the disintegration of the Earth’s great Ice Sheets in Greenland and Antarctica, rapid changes in the El Niño system and the release of large amounts of greenhouse gases from dying forests or other stores of GHGs. In 2003, the eminent German Advisory Council on Global Change concluded these tipping points or non-linear global events as “a devastating risk to humankind” (Graßl, Kokott, Kulesa, et al., 2003).

From this point of view, the Review should be very cautious how it characterises the costs and benefits mitigation in terms of comparing the costs of action versus the cost of inaction. Commenting on attempts to undertake cost benefit analysis of climate change mitigation Azar and Lindgren (2003) note:

⁺⁺⁺ Eminent oceanographer, Dr George Woodwell, Director of the Woods Hole Research Center in a *Boston Globe Magazine* interview, 22 April 2001.

... CBA [cost benefit analysis] can provide useful information, but CBA is not appropriate when it comes to setting emission targets in the context of global warming. There are too many difficult ethical issues in the climate debate that need to be dealt with explicitly, e.g., discounting and distributional issues. Further, the uncertainty about the impacts is so large that basically any optimal outcome can be justified. ... For that reason, an alternative approach to cost-benefit analysis is required. This could be to use environmental indicators, e.g., temperature change or sea level rise, as guidelines in setting emission targets.

Ultimately, the more we reduce today the less of a burden we create for future generations - and the greater flexibility we give them in responding to the climate change problem. Delay would require future generations and political decision makers facing more stringent emission reductions while confronting the increasing costs of climate change impacts. There is also significant concern that future policy makers would not feel bound by our decision to pass the burden to them and be reluctant to close energy related-capital stock and putting people out of work and instead opt for a higher stabilisation target, further delay and even higher future impacts (Schneider, Avar, 2001).

Implications for Australia's desired end game

In conclusion, to ensure policy makers are clear about the potential climate impact and intergenerational consequences of policy choices (both in terms of modelled costs and qualitative assessments). The Review should also be very clear when it is making a conclusions of statement based on an expert judgement on the political acceptability of certain policy choices. This critical to mature climate change debate in Australia which in the past has focused on (important) issues such as electricity price increases and not focused on the longer term consequences of the decisions we will make in the next few years.

A number of broad implications can be drawn from the above discussion, the position of the Australia Government and the initial conclusions of the Review:

- It is in Australia's national interest to ensure global temperatures peak at the lowest possible level. Even a 2°C increase in global temperature above preindustrial levels would see severe impacts in Australia and our region. Accepting warming at or above this level is accepting the risk of global and large scale irreversible (and potentially catastrophic) outcomes.
- It is in Australia's national interest that the global mitigation effort ensures GHG concentrations peak at well below 500 ppm then decline to levels below 400ppm over the coming centuries. This implies industrialised countries overall emissions should be around 30 per cent below 1990 levels by 2020, developing country emission should peak over the same time period and global emissions should be less than 50 per cent below 1990 levels by 2050. Global action to rapidly reduce emissions from land use change and deforestation are also required.
- Australia's posture in the lead up to the Copenhagen conference in 2009 should be one that seeks to ensure that the agreement reached does not foreclose achieving these outcomes.

Global architecture

It is likely that international agreements and action to reduce emissions will build on existing frameworks, and include the following key elements (Stavins, 2004; Boston (eds), 2007):

- Common but differentiated commitments by developed and developing countries, recognising that effective mitigation will require broad-based global participation.
- Leadership from developed nations which account for around 75 per cent of historical greenhouse emissions and current concentrations, and have the greatest capacity to resource required actions and investments. Developing nations account for a large and growing share of greenhouse gas emissions, and an even larger share of the available low-cost abatement opportunities.
- Clear emissions reductions obligations for developed and developing nations, with some differentiation in obligations between these nations (reflecting different national circumstances and capacity to achieve reductions).
- Market based policy approaches and ‘flexibility mechanisms’ that allow nations to meet their obligations through various forms of emissions trading. Arrangements that allow developed nations to meet their obligations through supporting emissions reductions in developing nations will be central to achieving a cost-effective, politically acceptable, and worthwhile global framework.
- Long term goals or milestones that build the momentum and confidence required for national policy action, and provide the necessary security for public and private investment in low emissions technologies and other activities.

Many proposals have been developed as the shape of global regime post 2012 (see Gupta, Tirpak, Burger, et al., 2007) but the central question is how to differentiate national obligations in a fair, effective and acceptable way.

Differentiation of national obligations

The Review notes (Garnaut, 2008a, p.30):

To be widely accepted, principles to guide the allocation of a global emissions budget across countries will need to be simple, transparent and readily applicable. To be considered fair, they will need to give much weight to equal per capita emissions rights. To be considered practical, they will need to allow long periods for adjustment towards such positions.

Article 3.1 of the UNFCCC states that such a differentiation should be in accordance with Parties “*common but differentiated responsibilities and respective capabilities*”. Broadly this suggest differentiation based on the criteria of responsibility, capability and potential to mitigate (for example see Ott, Winkler, Brouns, et al., 2004).^{§§§} Table 2 outlines possible indicators for each of these areas.

^{§§§} Note that these criteria have been developed in the context of industrialized countries continuing to take the lead in global efforts to reduce emissions and have a particular focus on how to differentiate developing country commitments.

Table 2: Criteria for differentiation of commitments

Criteria	Indicator	Notes
Responsibility – a countries responsibility for the problem	Cumulative per capita emissions (1990 to 2000)	The 1990-2000 period avoids ‘punishing’ countries for historical emissions, since the consequences were less widely known in the past. Since the IPCC’s First Assessment Report in 1990, the implications can, at least, be said to be well-known internationally.
Capability – a countries ability to pay for and implement mitigation efforts	The Human Development Index (HDI) Gross Domestic Product (GDP) per capita	A country’s capability to reduce emissions might be quite different from its level of responsibility, e.g. a country may have great responsibility for contributing GHG emissions, but be too poor to devote resources toward mitigation.
Potential (to mitigate) – a country’s opportunities for reducing GHG emissions	CO ₂ /GDP emissions per capita	High CO ₂ /GDP suggests a high potential to mitigate. The more efficient an economy, the less potential there is for lower cost mitigation. High per capita emissions suggest unsustainable consumption patterns, which should provide potential to mitigate without significant reductions in welfare. National GHG emissions are the sum of emissions from different sectors, therefore, potential is also determined by the ability to increase energy efficiency or reduce carbon intensity in particular sectors (in particular the energy sector).

A global solution to climate change will require mitigation and adaptation action – in a fair and equitable way – from all countries. Figure 9 shows the world’s top 20 emitters in terms of total emission in 2000 (all Kyoto gases and land use change) and 2004 (fossil CO₂ only). It illustrates that around half of the top 20 emitters are developing countries. Also if Indonesia’s and Brazil’s emissions from land use change are excluded, both of these countries have emissions comparable to Australia. Exclusion of land use change emissions would exclude Malaysia and Myanmar from the top 20 list.

Figure 9: Top 20 global emitters

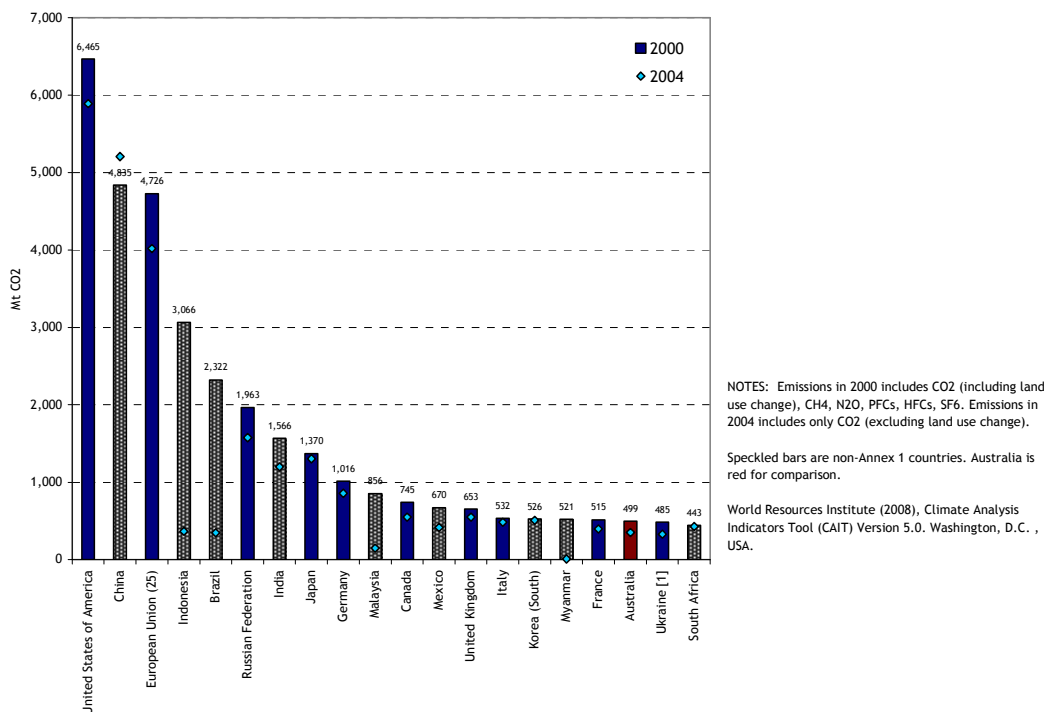


Figure 10a, b, c and d brake down the 20 top emitters based on criteria of Responsibility, Capacity and Potential. This illustrates that based on these indicators that among the top 20 emitters:

- Responsibility:** On a per capita basis, developed countries have higher levels of responsibility and reinforcing the need to take leadership in reducing emissions. This is particularly the case for the USA, Canada and Australia.

Among the developing countries South Korea and South Africa have the highest level of responsibility if land use emissions are excluded. This implies the early introduction of mitigation responsibilities for these countries. If land use emissions are included Brazil, Indonesia, Malaysia and Myanmar might also be included.

- Capacity:** With the exception of the Russian Federation and Ukraine, developed countries also have the highest level of economic and technical capacity to reduce emissions. As recently highlighted by the Australian Government’s submission to the UNFCCC, Annex 1 former Soviet states have GDP per capita indicators similar to the main developing countries (Australian Government, 2008).

South Korea has the highest capacity rating among developing countries (nearly double the GDP of other large developing country emitters). Brazil, Malaysia, Mexico and South Africa have similar capacity while China, Indonesia, India and Myanmar have lower capacity.

- **Potential:** If land use emissions are excluded, developed countries have higher per capita emissions than developing countries. Among developed countries the Russian Federation and Ukraine have the most emission intensive economies. Australia, Canada and the USA also have emission intensive economies compared to Japan and EU countries. The USA, Canada and Australia also have high per capita emissions.

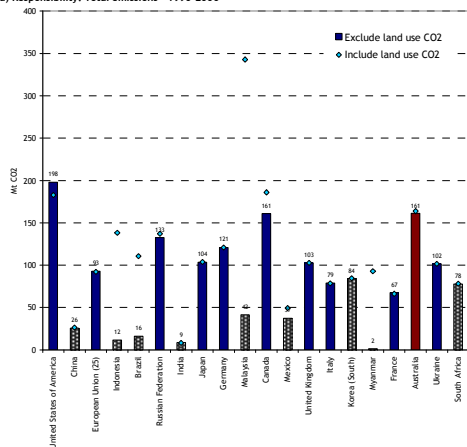
Overall, this suggests that the USA, Australia and Canada have the highest potential to mitigate at lower cost than the EU and Japan.**** The relative high emission intensity of the Russian Federation and Ukraine also suggests lower cost mitigation potential but needs to be balanced by their average per capita emissions which suggest fewer “luxury” emissions than the USA, Australia or Canada.

Broadly, developing countries have more emission intensive economies than developed countries, in particular China and South Africa. This suggests lower cost abatement options are available in these countries and this is consistent with more detailed global mitigation assessments (see Barker, Bashmakov, Alharthi, et al., 2007). Among developing countries South Africa and South Korea have high per capita emissions. Indonesia, Brazil, India and Myanmar have low per capita emissions. However, if land use emissions are included Indonesia, Malaysia, and Myanmar have per capita emissions comparable to or much higher than even developed countries.

**** Note this does not consider the different economic structures of these countries and this is discussed further below.

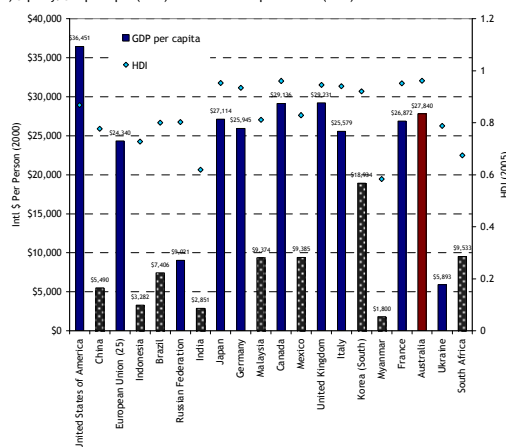
Figure 10: Differentiation among top 20 global emitters – Responsibility, Capacity, and mitigation Potential indicators

a) Responsibility: Total emissions - 1990-2000



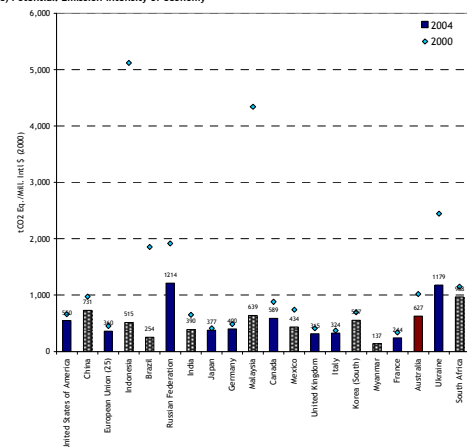
NOTES: Speckled bars are non-Annex 1 countries. Australia is red for comparison.
World Resources Institute (2008), Climate Analysis Indicators Tool (CAIT) Version 5.0. Washington, D.C., USA.

b) Capacity: GDP per capita (2000) and Human Development Index (2005)



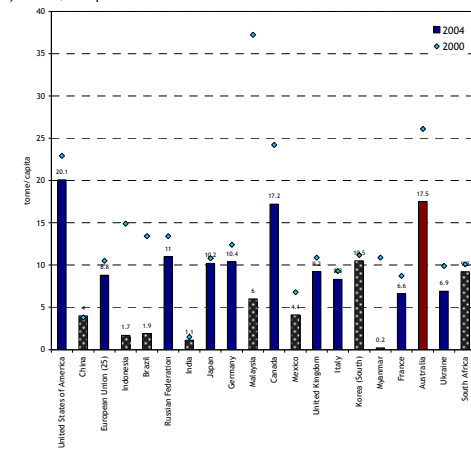
NOTES: Speckled bars are non-Annex 1 countries. Australia is red for comparison.
GDP (capita): World Resources Institute (2008), Climate Analysis Indicators Tool (CAIT) Version 5.0. Washington, D.C., USA. Human Development Index (HDI): UNDP (2008), Human Development Index. <http://hdr.undp.org/en/statistics/data/>

c) Potential: Emission intensity of economy



NOTES: Emissions in 2000 includes CO2 (including land use change), CH4, N2O, PFCs, HFCs, SF6. Emissions in 2004 includes only CO2 (excluding land use change).
Speckled bars are non-Annex 1 countries. Australia is red for comparison.
Myanmar's 2000 point has been removed for scaling purposes. The number is over 8,700 tCO2e.
World Resources Institute (2008), Climate Analysis Indicators Tool (CAIT) Version 5.0. Washington, D.C., USA.

d) Potential: Per capita emissions



NOTES: Emissions in 2000 includes CO2 (including land use change), CH4, N2O, PFCs, HFCs, SF6. Emissions in 2004 includes only CO2 (excluding land use change).
Speckled bars are non-Annex 1 countries. Australia is red for comparison.
World Resources Institute (2008), Climate Analysis Indicators Tool (CAIT) Version 5.0. Washington, D.C., USA.

While these examples do not include an analysis of all UNFCCC countries (see den Elzen, 2005) it does illustrate a number of points including:

- Developed country leadership must be the backbone of the global regime. They are most responsible and have the highest capacity to mitigate. ⁺⁺⁺⁺

⁺⁺⁺⁺ Some suggest that the scale of the gains from effective collective action to address climate change implies that developed countries would, as a group, benefit from effective action on climate change even if they bear the entire incremental cost of emissions reductions for several decades beyond 2012. (Hatfield-Dodds, 2007b) Under such an approach it would be possible to bring major developing nations into an agreement on the basis of 'purchasing' effective abatement, which is most effective at the sector or national level (rather than the project level that is the currently focus of CDM).

- While developing countries count for around half of the top 20 emitters, there historic responsibility, capacity and mitigation potential varies greatly. Developing countries are not a homogeneous group. This implies the post-2012 climate regime will have to differentiate between developing country obligations. Based on these indicators, there appears a clear rationale for developing countries such as South Korea to take on binding emission reduction obligations to cap than reduce their emissions sooner rather than later. Recent press reports suggest that the new South Korean government is examining capping the countries emissions at 2005 levels by 2012 are very encouraging in this regard.^{****}
- While countries like China and India have very large total emissions, their capacity to mitigate is comparatively limited. This implies engaging these countries more effectively in the global regime will require significantly levels of capacity building and technology transfer from developed countries.
- Broadly developing countries also have low cost higher mitigation potential than developed countries highlighting the importance of global carbon markets in delivering cost effective abatement.
- Emissions from land use change in Brazil, Indonesia, Malaysia and Myanmar account for a large proportion of these countries total and historic emissions. However, these countries have limited governance capacity to ensure long term reduction of emissions. Australia's regional neighbours of Papua New Guinea and the Solomon Islands are in a similar situation.

^{****} S Korean president wants to help N Korea restore its forests, *International Herald Tribune*, March 21, 2008, <http://www.ihf.com/articles/ap/2008/03/21/asia/AS-GEN-SKorea-Global-Warming.php>

Box 3: Reducing deforestation in developing countries

The Review notes (Garnaut, 2008, p.30):

For example, developing countries with high current per capita emissions due to deforestation (including Indonesia and PNG) could be expected to reduce their emissions quickly and be financially rewarded for doing so by being able to sell their excess permits.

There is no doubt that curbing emissions from deforestation in developing countries is of critical importance to an effective global climate change regime and a successful outcome from the Copenhagen UNFCCC meeting in 2009. The Climate Institute is currently reviewing proposals that have been put forward internationally and has not come to a clear position on the best way forward at this stage. However, the Review has raised the possibility of Australia's emission trading scheme linking with Papua New Guinea to provide incentives for reductions in deforestation and to supply low cost abatement opportunities to Australia.

A number of key scientific, market, technological, and methodological and equity issues would need to be addressed in any proposal to reduce emissions from deforestation in developing countries (Stern, 2006; Hare, Macey, 2007):

- Potential to destabilise the global carbon market as high volumes of low cost deforestation credits enter the carbon market. Access to the substantial volumes of low cost deforestation credits could also provide incentives for developed countries to delay structural changes that reduce emissions at home.
- The need for national level accounting, monitoring and verification to limit widespread leakage from one region to another.
- Significant levels of capacity building in developing countries will be required for accounting, monitoring, verification and governance to ensure the integrity and robustness of deforestation initiatives.
- High levels of uncertainty associated with estimating deforestation emissions and defining credible emission baselines.
- Ensuring that the system reinforces the process of protecting the forests (and peat lands) and does not undermine the rights of indigenous people.

Also note that early inclusion of deforestation credits in an emissions trading scheme is inconsistent with excluding agriculture and LULUCF from Australia's domestic ETS.

The Review notes (Garnaut, 2008, p.30-32)

It is clear already that per capita allocation will have to play a strong role in principles for national budgets. Indeed, it appears inevitable that if global per capita emissions fall to the level required by stabilisation scenarios, then the current stark

divergences in national per capita emissions rights will inevitably diminish— though variation in national emissions levels will be possible through the trading of emissions rights.

Through time if the global system is to be effective this statement is correct. A system based on Contraction and Convergence would be simple, and would be environmentally and cost effective. However, moving to a system of Contraction and Convergence in the short-term lacks institutional feasibility as the system does not consider national circumstances and the capacity of countries to mitigate (see Höhne, 2006; Boston, 2007). For example, under such a system developed countries are required to reduce emissions less than would be required under other global frameworks and many high capita developing countries (e.g. OPECs, Brazil, Indonesia and Malaysia) are likely to strong short term resist strong emission reduction requirements.

The Climate Institute would encourage the Review to examine other approaches that consider a countries responsibility, capacity and potential to mitigate in making recommendations on the post 2012 global regime.

Implications for post-2012 regime

The ultimate final diplomatic end game in climate talks in Copenhagen will revolve around an agreement between the USA and large developing country emitters such as China and India. For the first time in Bali, developing countries signalled their willingness to take on measurable and verifiable emission obligations. As the South African delegate stated, *“Developing countries are saying voluntarily that we are willing to commit ourselves to measurable, reportable and verifiable mitigation actions. It has never happened before. A year ago, it was totally unthinkable.”*

However, building on this spirit will require strategies to build trust and capacity to fulfil these obligations among developing countries.

Building trust

Unless the USA and other large emitting developed countries commit to substantial domestic action, large developing countries will continue to resist strong measures. Australia can play an important role through signalling a strong domestic emission reduction target and engaging with the USA Administration. The posture of the new USA administration under existing Republican or Democrat presidential candidates is likely to be more favourable to global cooperation on reducing emissions. As a well regarded (and non-European) developed country Australia should be engaging early with all prospective Presidential Candidates to ensure that when they enter office they have the capacity to engage early in talks toward Copenhagen and don't engage in belligerent posturing towards China and India as has marked current Administrations approach. Equally important will be engagement with domestic political leaders in the Senate and Congress to build confidence in international collaborative efforts (e.g. around linkages between Australia's emission trading scheme and emerging US markets, and the role the two countries can play in deploying low emission technology).

Building capacity

Capacity building in developing countries has two main elements. Firstly, building political capacity will be important as developing country leaders will have an eye to the domestic political impacts of agreeing to emission reduction obligations. This is closely tied to building trust but also engagement with stakeholders in key developing countries as suggested above for US domestic decision makers.

Technology transfer and finance will be another important area of capacity building. Carbon markets and domestic clean energy policies are already driving substantial amounts of low emission technology investment in developing countries. Strong developed country emission reduction obligations which allow international trading would accelerate this. However, it is difficult to imagine developing countries agreeing to emission obligations without firm commitments to overcoming barriers to technology transfer and substantial technology financing. Financing reductions in deforestation will also be central for some countries.

Australia's emission trajectory

The Review notes that (Garnaut, 2008b, p.21):

No domestic decision made by Australia in the area of climate change mitigation will have greater international ramifications than the choice of Australia's emissions budget.

As a party to the Kyoto Protocol Australia “strongly supported” the inclusion of a science based range of reductions as guidance for the relevant Working Group on future industrialised countries (Annex 1) post 2012 commitments (UNFCCC, 2007b):

.. the [IPCC] AR4 indicates that achieving the lowest levels assessed by the IPCC to date and its corresponding potential damage limitation would require Annex I Parties as a group to reduce emissions in a range of 25–40 per cent below 1990 levels by 2020 The AWG also recognized that achievement of these reduction objectives by Annex I Parties would make an important contribution to overall global efforts required to meet the ultimate objective of the Convention as set out in its Article 2 [of avoiding dangerous climate change].

There remains some confusion around what this emission reduction range means for Australia. This is not a domestic emission reduction target. In the Kyoto first commitment period, industrialised countries overall (or in aggregate) had an emission reduction target of a 5 per cent reduction below 1990 levels by 2008-2012. Australia negotiated an 8 per cent increase. The range of 2020 targets discussed in Bali sought to define what this overall target for industrialised countries will be in 2020. It is not a range of possible domestic emission reduction targets for industrialised countries. Also, any final national target agreed would be an international obligation not a commitment to reduce domestic emissions by this total amount. Countries would have the opportunity to use international emission trading to help meet any international commitment.

Australia's mitigation potential indicators

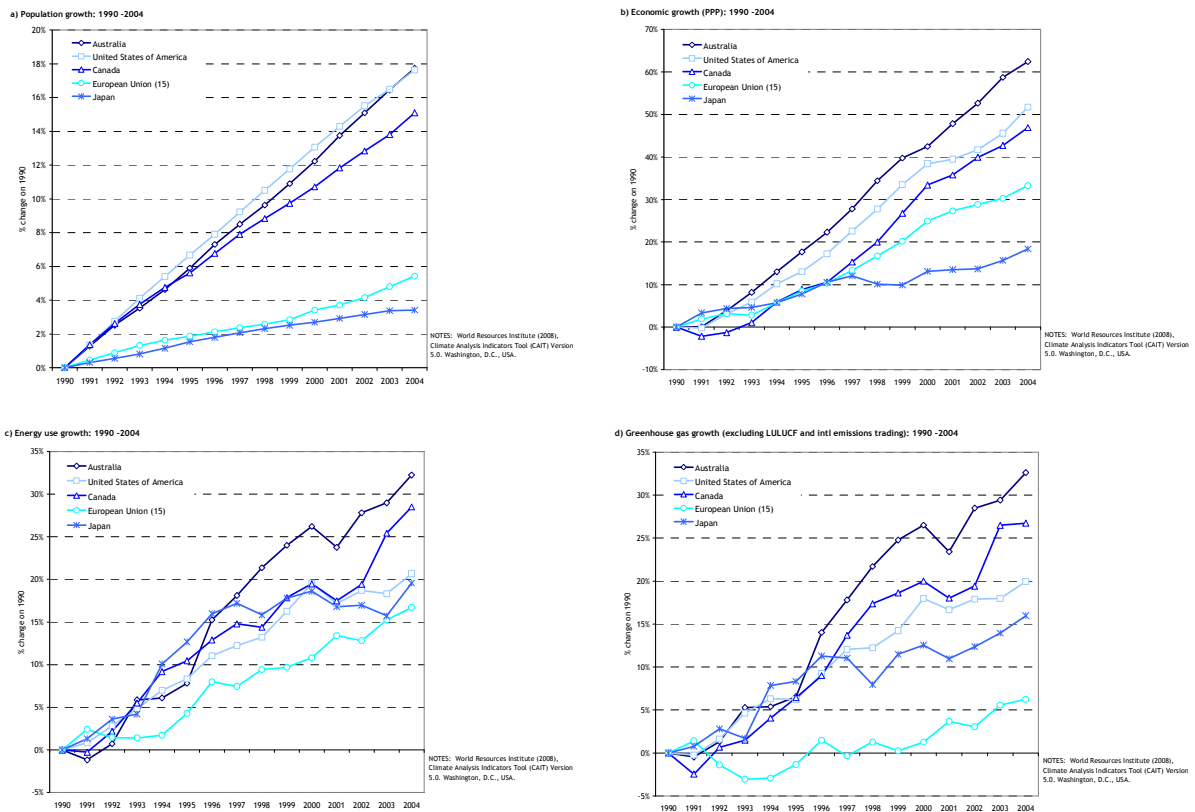
Parties to the Kyoto Protocol are assessing the mitigation potential of various Annex 1 (industrialised) countries to determine appropriate targets for the next commitment period. This includes examination of the opportunities that may exist for Annex 1 countries to use international emissions trading and land use, land use change and forestry (LULUCF) to meet international obligations. A number of indicators have been identified to assess the mitigation potential of individual Annex 1 countries including total GHG emissions, emission trends, total GDP, GDP growth, population, population growth, energy use, emissions per GDP, emissions per capita, energy supply per capita, share of exports in GDP and carbon intensity of electricity generation (UNFCCC, 2007c). However the Review appears to be suggesting two principle indicators, population growth and total emissions (or starting point) (Garnaut, 2008a, p.41). The UNFCCC notes that total emissions and population indicators, in

isolation, are not indicators of mitigation potential in themselves (UNFCCC, 2007c). The Review should therefore examine other indicators in assessing Australia’s mitigation potential, some of which are outlined below:

Population, economy, energy use and GHGs

Figure 11a, b, c and d compare Australia’s population, economy, energy use and GHG growth to a selected group of other industrialised countries. Australia’s population, economy, energy use and GHGs have been growing very strongly compared other industrialised countries.

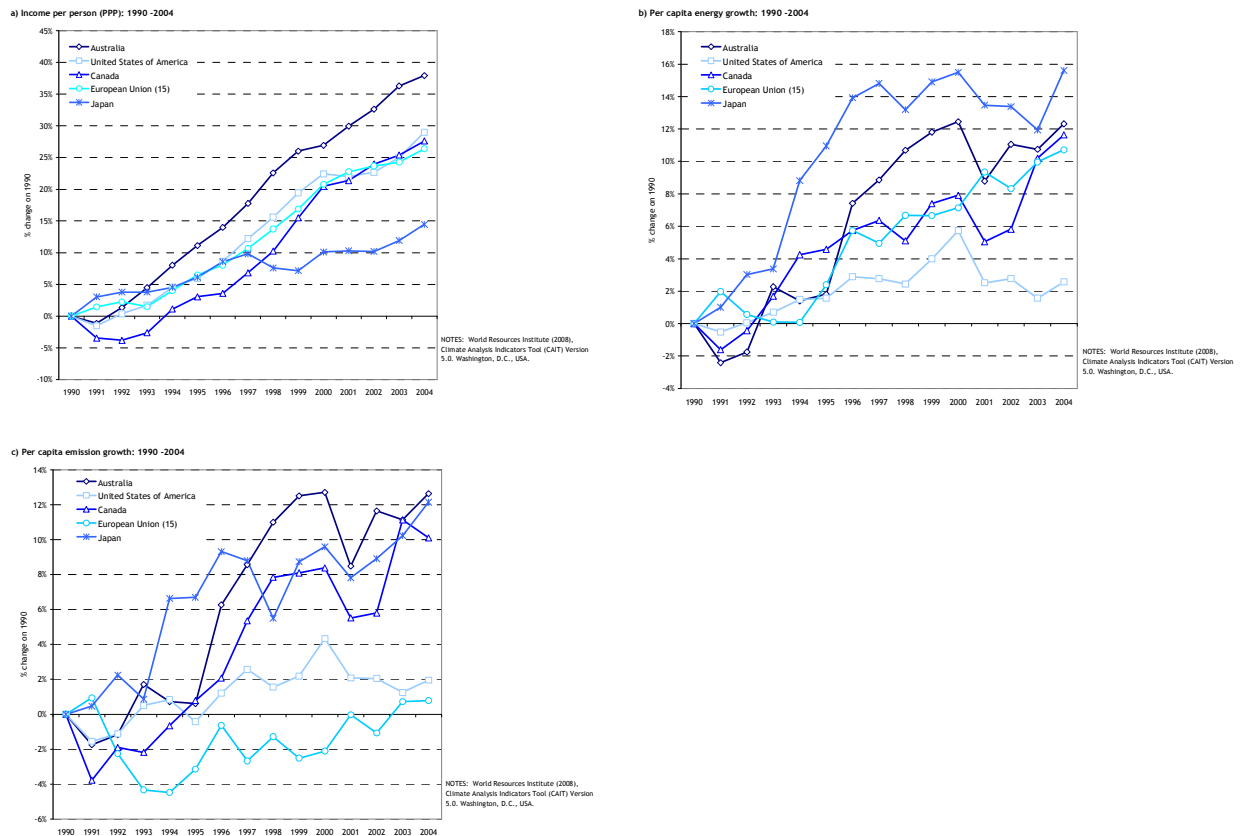
Figure 11: Population, economic, energy and emissions growth (change on 1990)



Per capita income, energy use and GHG

Figure 12a, b and c compare Australia’s per capita income, energy use and GHG growth to a selected group of other industrialised countries. Australia’s per capita income, energy use and GHGs have been growing very strongly compared to other industrialised countries.

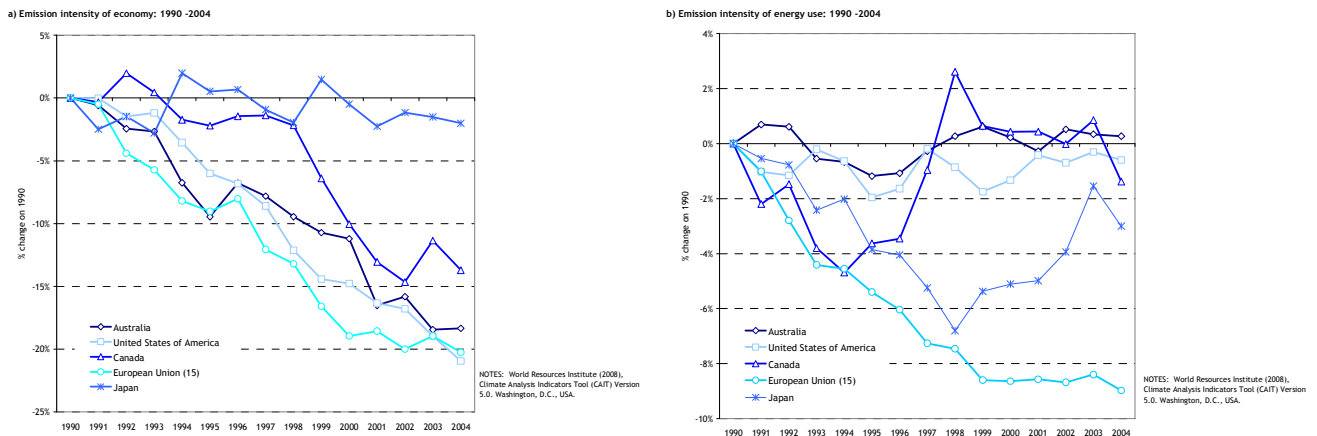
Figure 12: Per capita income, energy use and emissions (change on 1990)



Energy and emission intensity of economy

Figure 13a and b compare Australia's energy and emission intensity of the economy to a selected group of other industrialised countries. The emission intensity of the Australian economy has been declining at a similar rate to other industrialised countries. The exception is Japan which has seen only a slight reduction since 1990. The energy intensity of the economy has increased slightly in Australia since 1990. Other countries have seen slight declines, in particular the EU (15).

Figure 13: Emission intensity of economy and energy (change on 1990)



Energy efficiency improvement

Energy intensity can be driven by a range of factors including structural shifts to less energy intensive service based industries (IEA, 2007). Figure 14 compares estimates of Australia’s technical energy efficiency improvement to other OECD countries. Australia’s energy efficiency improvement between 1990-2004 has been around a third that of other IEA assessed OECD countries (Climate Institute, 2007b). Over the period, Australia’s energy efficiency improved at an average annual rate of 0.3 per cent, while the average in other IEA countries was 0.9 per cent per year. World leaders, Canada, Germany and New Zealand have improved their technical energy efficiency at a rate 4-5 times that of Australia. Australia’s improvement is faster than Austria, Italy and Japan. Table 3 gives some details of technical energy efficiency improvement at a sector level. Australia is performing below the IEA average in manufacturing and services sectors, which together account for about 42 per cent of total final energy use (and a higher proportion of primary energy and emissions because they account for the majority of electricity use). The Climate Institute is currently undertaking a more detailed assessment of how Australia compares to other countries.

Figure 14: Annual average technical energy efficiency improvement: 1990-2004

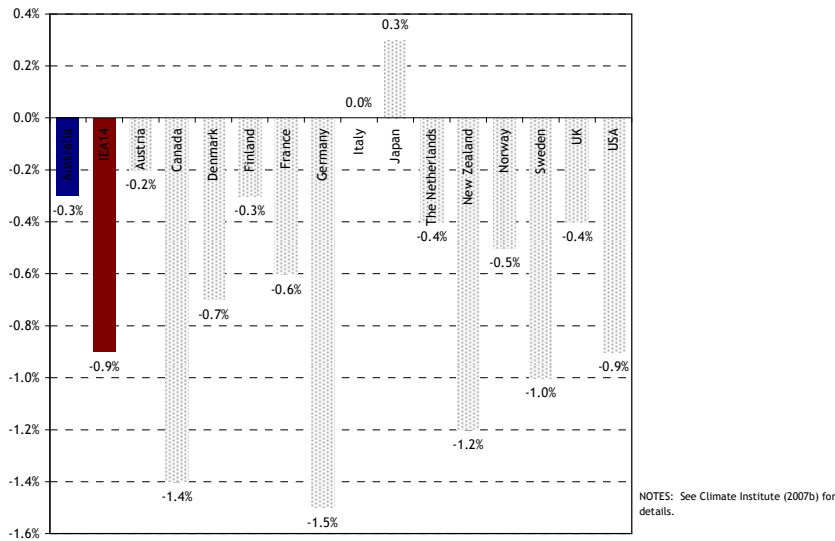


Table 3: Annual energy intensity improvements.

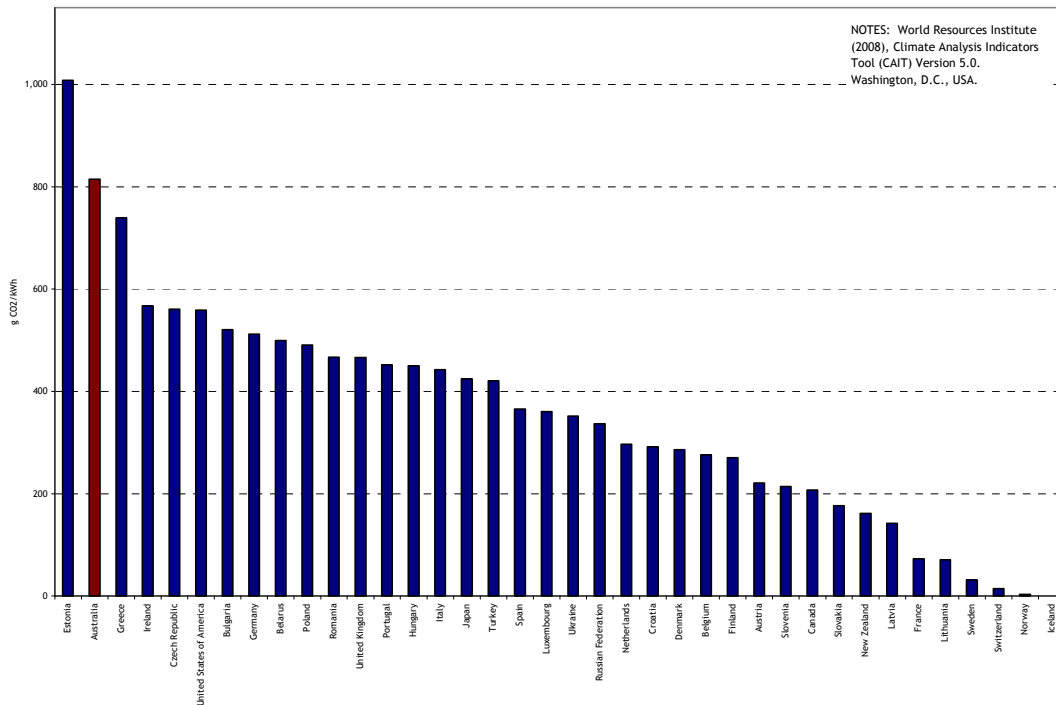
	Overall		Manufacturing		Services		Household		Passenger Transport	
	IEA14	Australia	IEA19	Australia	IEA19	Australia	IEA15	Australia	IEA17	Australia
1990-2004	0.9%	0.3%	1.3%	<i>0.7%</i>	1.1%	<i>0.2%</i>	0.7%	N/A	0.5%	0.8%

Notes: IEA (2007) and assessment by Energy Strategies (Australia). Numbers in *italics* are unpublished Energy Strategies estimates for Australia.

Emission intensity of electricity generation

Figure 15 compares the emission intensity of Australia’s electricity generation to other Annex 1 countries. Australia has the second most greenhouse intensive electricity sector among Annex 1 countries.

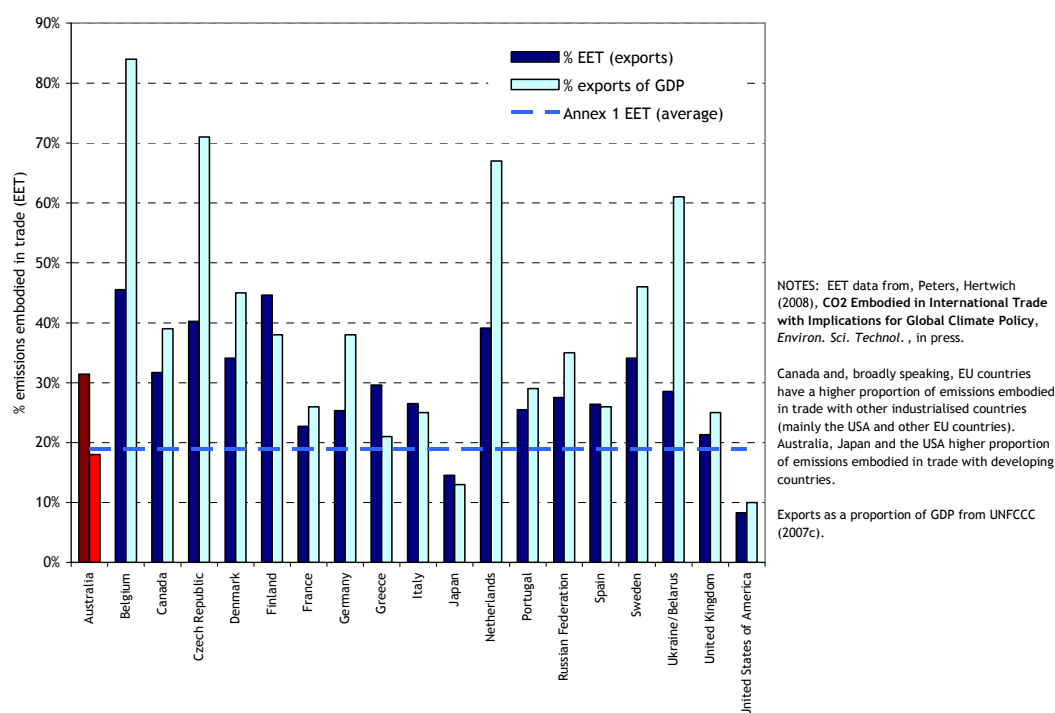
Figure 15: Emission intensity of electricity generation (2004): Annex 1 countries



Emissions embodied in exports and proportion of GDP generated by exports

Figure 16 shows the share of Australia's emissions embodied in exports and proportion of GDP generated by exports. This is compared to a selected group of Annex 1 countries. Australia has higher than average emissions embodied in exports (estimated about 30 per cent of production emissions). However, a number of EU countries and Canada have higher proportions. Australia proportion of GDP generated by exports is lower than average among other Annex 1 countries. Comparison of these two indicators also suggests Australia has higher than average export GHG intensity.

Figure 16: Emissions embodied in exports (% national emissions, excluding LULUCF) and exports as a proportion of GDP.



Australia's 2020 target

As outlined above, based on criteria that judge a nation's contribution to avoiding dangerous climate change Australia should be taking a leadership role in global efforts to reduce emissions. On a per capita basis, Australia carries a high level of responsibility for the problem, relative to other countries (both developed and developing) has the ability to pay for and implement mitigation efforts, and has many potential opportunities to reduce GHG emissions at low cost than other countries. This conclusion is consistent when compared to other developed countries. While Australia does have high population, economic and emissions growth compared to some developed countries (e.g. the EU and Japan), compared to other major emitting developed countries (the USA and Canada) Australia faces similar challenges.

Also while national indicators such as population are important, the structure of the economy and the mitigation potential of particular sectors are likely to be more important in determining Australia mitigation potential. Analysis to date suggests that Australia has yet to unlock its energy efficiency potential and given the high greenhouse intensity of our electricity sector (which accounts for around a third of national emissions) this implies lower cost fuel and technology switching capability than other countries which have already seen the widespread deployment of lower emission power sources.

The above is consistent with The Review which notes that (Garnaut, 2008a, p.56-57):

There are many ways in which Australia is well placed to do well as part of an effective international mitigation effort.

This is driven by factors such as:

- Australia's exceptional human resource base.
- Australia is a major exporter of minerals that will receive advantages from a strong international mitigation effort.
- Australia has exceptionally rich resources for renewable energy.
- Australia is likely to remain a source of relatively low-cost energy despite the carbon price. Australia's near neighbours, first of all but not only Papua New Guinea, have exceptional opportunities to reduce carbon emissions and to expand output of renewable energy in various forms, which could be developed to mutual advantage.
- Australia's past profligacy in energy use has left an exceptional legacy of opportunities for low-cost energy savings in business and amongst households.

The leadership premium

Hatfield-Dodds, Jackson, Adams, et al. (2007) conclude:

Committing now to very substantial reductions in emissions would carbon proof the Australian economy, insulating it from future climate policy shocks, and help to achieve decisive global emissions reductions ... Australia can afford to take a leadership position in committing to substantial reductions in our net greenhouse emissions, in order to help manage the economic risks to Australia, and to contribute to the global momentum and concrete actions required to avoid dangerous global climate change.

This conclusion was based on macro-economic modelling of various emission reduction targets in Australia and a qualitative assessment of the benefits of taking a leadership position in global efforts to reduce emissions. Hatfield-Dodds, Jackson, Adams, et al. (2007) found:

CGE modelling: The modelling presented in this report suggests that the 'leadership premium' associated with committing to substantial emission reductions to 2050 is modest:

- Economic activity increases from less than \$1 trillion to around \$3 trillion by 2050, with GDP and GNP 1.4 to 3.5 per cent lower in the *Carbon Neutral* scenario than in the *60 per cent reduction* and *40 per cent reduction* scenarios.
- Real consumption per person increases from under \$24,000 to over \$58,000 by 2050 in the *Carbon Neutral* scenario, around 3.0 to 4.2 per cent lower than in the *60 per cent reduction* and *40 per cent reduction* scenarios.
- Energy price increases occur earlier in the *Carbon Neutral* scenario, and will require more active policy management, although energy affordability improves across all scenarios, with expenditure required to purchase the average 2005 energy bundle falling from 6 per cent to 3.8 per cent in the *60 per cent reduction* scenario and 3.6 per cent in the *40 per cent reduction* scenario by 2050.

Prudent Risk Management: Making more rapid early reductions helps to manage the economic risks to Australia from uncertainty about climate impacts and the pace of global action in response to it. This is because it is much more difficult and costly to accelerate emissions reductions than to decelerate them in response to improved climate science or changing international circumstances. In particular, incremental tightening of long term emission targets risks the premature retirement of long lived emissions intensive capital assets, such as traditional coal fired power stations.

Leadership and leadership benefits: A clear Australian commitment to decisive emission reductions would help build the confidence and willingness of others to take comparable actions, and provide greater credibility and leverage in mobilising international action to reduce emissions. An associated benefit is that Australia may find it easier to pursue other climate policy objectives, such as in relation to the treatment of emissions intensive traded goods, if it is clear that Australia is not seeking to delay effective global action to reduce emissions. Beginning the journey to very deep cuts in emissions would also have a number of domestic advantages which are difficult to capture in economic models, such as building a flexible domestic policy regime, the development of new industries and technologies, and expanding the benefits of participating new markets in low emission technologies and emissions offsets (see for example MMA, 2006).

The Review proposed four emission trajectories for Australia. A – the Kyoto Target; B – 2020 target based on existing developed countries commitments; C – based on the Government’s 60 per cent reduction target by 2050; and D – based on global action to avoid dangerous climate change. (Garnaut, 2008b, p.24-25).

The Climate Institute does not support the need for Trajectory B. As the Review notes that setting of Australia’s interim target will have important international ramifications and it should be calibrated towards leveraging international action consistent with Australia’s national interest. As the Review and the Australian Government have noted, Australia’s national interest lies in stabilising concentrations of GHG at the lowest possible level.

Australia negotiated a very favourable target in Kyoto. Australia’s ratification of the Kyoto Protocol has help build Australia’s standing internationally. However, other progressive countries and those most vulnerable to the impacts of climate change (such as our neighbours in the Pacific) will be looking to Australia to build on this momentum and support strong interim targets for developed countries. Australia signalling an interim target that is weaker than its existing domestic commitment (Trajectory B) will undermine the nation’s potential leadership position and strengthen the hand of developed countries that are resisting strong 2020 obligations (e.g. Japan, Canada and the USA).

It is The Climate Institute’s view that Australia’s unilateral interim target should be set at around 25 per cent below 1990 levels by 2020. This is based on:

- Economic modelling that suggests that with appropriate policy responses that an interim target of this scale is affordable and manageable (Hatfield-Dodds, Jackson, Phillips, et al. (2007).

- On a per capita basis, Australia carries a high level of responsibility for the problem, relative to other countries (both developed and developing). has the ability to pay for and implement mitigation efforts, and has many potential opportunities to reduce GHG emissions at lower cost than other countries. This implies Australia can and should be taking a leadership position in setting its interim target.
- This interim target would be an international obligation not a domestic reduction requirement. Through international emissions trading, Australia could supplement domestic efforts with opportunities to reduce emissions at low cost in other countries.
- Decisive early action would make it easier for Australia to pursue other climate policy objectives, such as achieving a global agreement that avoids dangerous climate change impacts and in relation to the treatment of emissions-intensive traded goods. It would also build a more flexible domestic policy regime, encourage the development of new industries and technologies, and expand the benefits of participating new markets in low emission technologies and emissions offsets.

If a strong international agreement can be agreed, Australia should be prepared to accept an emission reduction obligation of stronger than around 25 per cent by 2020.

Emission trading design elements

Table 4. outlines the main design elements of the Reviews (Garnaut, 2008b, pp.7-8) proposed emissions trading scheme and provides comments from The Climate Institute. Broadly, The Climate Institute is in agreement with most of the Review’s proposals. Key areas that require further exploration by the Review include:

Australia’s emission trajectory: It is questionable that Trajectory B will allow Australia to leverage international action and would reduce the nations standing as a potential leader in climate change negotiations.

Annual budgets and lending: Official lending should be severely limited, if included at all. Review should explore the use of five year carbon budgets with unlimited hoarding and lending within these periods.

Governance: The Review should explore an independent authority that has a broader scope than just the emission trading system.

Use of permit revenue: The Review should make recommendations on what principles and criteria Government would use in determining the use of emission trading revenues.

Table 4: Summary of comments on ETS model

Design decision proposal	Comments
Setting an emissions limit	
Government should set the emissions limit for Australia. This emissions limit should be expressed as a trajectory of annual emissions targets over time, which define long term budgets.	Broadly agree, as an alternative to annual targets Review should explore the use of five year carbon budgets, or caps, starting with the period 2008-12. Each five year cap would define a "carbon budget" for the period. Emissions can vary between years provided the total over a five year period does not exceed the budget. This provides both certainty and flexibility in the system. Successive five year budgets would be 2013-17, 2018-22. A system of five year carbon budgets would ensure that emissions reductions occur continuously while giving business the flexibility to manage year to year variations in emissions due to external factors (e.g. annual fluctuations in climate).
Trajectories	
Four trajectories should be specified upon establishment of the ETS. The first up to 2012 will be based on Australia’s Kyoto commitments. The other three for the post-2012 period reflect increasing levels of ambition. Movement between them should be based	Agree that maintaining the flexibility to adjust trajectory is vital. However, it appears that Trajectory B might risk reducing Australia’s standing as a potential leader in climate change negotiations, and may provide little international leverage. Trajectory D

on determining the comparability of Australia's response to international effort.	should be clearly defined to ensure business do not interpret it as the maximum emission reduction that Government will require.
Changes to the emissions limit	
Deciding to move from one trajectory to another should only be made on the basis of international policy developments and/or agreements (which should allow for new information and developments of an economic or scientific kind).	Agree with broad sentiments, but consider future Governments may wish to adjust the trajectory based on emerging scientific developments; improved low emission technologies; or to contribute to international confidence or momentum in emission reductions.
Conditions which would lead to a movement from one trajectory to a more stringent trajectory would be specified in advance. Once on one trajectory, government provides five years notice before movement to another. Any gap between the domestic trajectory and international commitments during this period would be reconciled by the independent authority purchasing international permits.	Agree
Coverage	
<i>Gases:</i> Six greenhouse gases as defined by the Kyoto protocol.	Agree
<i>Sectors:</i> Stationary energy, industrial processes, fugitives, transport and waste from scheme outset. Agriculture and forestry to be included as soon as practicable.	Agree in principle but note that a condition for coverage must be that emission measurement be of sufficient accuracy as to not undermine the credibility of the scheme and of permits.
Domestic offsets	
Domestic offsets should be accepted without limits, but will have a small role, given broad coverage.	Agree on the basis that additionality can be assured, and vigorous measurement and verification methodologies are implemented.
Point of obligation	
Set at point of emissions where practical. Where transaction costs are lower than the cost of distortions that may arise, upstream or downstream may be appropriate.	Agree
Permit issuance (or release)	
Permits released according to emissions reduction trajectory. All permits auctioned at regular intervals.	Agree
International linkages	
Opportunities for international linkage of the Australian ETS should be sought in a judicious and calibrated	Agree on the basis that the design of an Australian ETS should help build an effective global carbon

manner.	market.
Price controls	
Not supported.	Agree
Intertemporality	
Unlimited hoarding allowed. Official lending of permits by the independent authority to the private sector allowed, but may be subject to limits, in terms of quantity and time, determined by the independent authority.	Official lending should be severely limited, if included at all. Review should explore the use of five year carbon budgets with unlimited hoarding and lending within these periods.
Treatment of TEEIs	
Some industries rely significantly on emissions-intensive production processes, and are substantially unable to pass costs of emissions through to customers because price of commodity or goods is determined on international markets. Transitional financial assistance (possibly in the form of free permits) should be provided to account for distortions arising from major trading competitors not adopting emissions limits (or pricing).	<p>Agree on the basis that:</p> <ul style="list-style-type: none"> • The rationale for, and introduction of, any insulation must be transparent to ensure the community has confidence in any “special deals”. This will also help ensure fair treatment between companies and sectors. • Insulation should be a transitional arrangement. It should be explicitly linked to the lack of effective carbon pricing in receiving markets. It should be underpinned by regular reviews of new international policy developments such as other countries taking on carbon pricing or the impact of potential border tax adjustment or equivalent emissions permits arrangements. • Insulation should be conditional on industries demonstrating they are meeting world’s best practice standards in greenhouse intensity and technology development. This should be open to regular review in light of global technological developments. • Insulation should be subject to sunset clauses and lock in a gradual reduction in protection to promote best practice and adjustment, and prevent encouraging political pressures in favour of a ‘protection pause’. • Insulation should only be based on the actual “trade-exposed” and “emission intensive” elements of a company’s operation. It should not be applied to those parts of the company’s activities where it can pass on any additional costs to

	customers or which are not emissions intensive.
Governance	
Policy framework set directly by government. Scheme administered by independent authority.	<p>Agree but the Review should explore an independent authority that has a scope that is broader than just the emission trading system. To build confidence, transparency and accountability in the Government's overall response to climate change the independent body could:</p> <ul style="list-style-type: none"> • assess the effectiveness of the current targets and adaptive measures • assess progress towards the targets • report on the impact of ongoing mitigation and adaptive policies and measures, • report on price impacts, pass through of permit values and associated distributional effects • make recommendations on additional (or the phase out of existing complementary) mitigation and adaptation measures <p>After a public consultation process, the independent body should report annually to the Parliament and the Government would be required to table a response. Minutes of the meetings of this body should be published.</p>
Compliance and penalty	
Penalty to be set as a compliance mechanism. Penalty does not replace obligation to acquit permits; a 'make-good' provision would apply.	Agree, noting that this should not be framed as a default price cap.
Use of permit revenue	
<p>Auctioning of all permits will be the source of a substantial amount of government revenue. Governments will need to assess competing priorities for this revenue, which may include:</p> <ul style="list-style-type: none"> • Payments to TEELs (to correct for market failures); • Payments to households; • Structural adjustment to support declining communities; • Payments to firms to correct market failures in relation to new technologies; 	Agree. Permit revenues could also be used to reduce emissions, promote economic efficiency and social goals more generally.

<ul style="list-style-type: none"> • Support for public infrastructure; and • Cash reserves to purchase international permits/offsets to reconcile domestic emissions with international commitments. 	
<p>The political acceptability of the introduction of the ETS would be enhanced by government commitment to transparently return to the community through the mechanisms outlined above or in other ways, all of the revenue generated by the sale of permits.</p>	<p>Agree</p>

Spending the emissions trading dividend

The Review notes (Garnaut, 2008b, p.55):

Auctioning of all permits will be the source of a substantial amount of government Revenue ... There will be many claims on government expenditure as a result of the introduction of the ETS.

The Climate Institute would encourage the Review to set out clear criteria for the Government and others to access these claims.

The IPCC note that (Gupta, Tirpak, Burger et al, 2007) four principal criteria for evaluating environmental policy instruments are reported in the literature:

- Environmental effectiveness – the extent to which a policy meets its intended environmental objective or realizes positive environmental outcomes.
- Cost-effectiveness – the extent to which the policy can achieve its objectives at a minimum cost to society.
- Distributional considerations – the incidence or distributional consequences of a policy, which includes dimensions such as fairness and equity, although there are others.
- Institutional feasibility – the extent to which a policy instrument is likely to be viewed as legitimate, gain acceptance, adopted and implemented

Table 5, assesses current proposals for the allocation of the emissions trading dividend against these criteria. Two criteria are used under environmental effectiveness. “Emission reductions” which would include support for domestic and “Early action from other large emitters” to reflect the potential impacts that domestic policy decisions could have on the development of global climate policy and effective emissions reductions in other countries.

- **Promote energy efficiency, public transport and financial support for vulnerable low income communities:** These proposals score highly from the point of view of

social equity and as long as policies don't lock in low income communities to high energy use would also reduce emissions.

- **Free allocation of permits or funding one off payments to large emitters to offset the loss of asset value or operating profits:** Theoretically these payments would not encourage or discourage emission reductions. However, linking transitional assistance to the deployment of low emission technology could accelerate emissions reductions, but it is likely that greater reductions could be achieved by allocating these resources through an open and competitive process.

From one point of view, many citizens are likely to give priority to using available funds to assist disadvantaged groups and regions but not industries which produce significant emissions. Some electricity generators may suffer disproportionate impacts compared to other businesses from the introduction of the emissions trading system and some argue it would therefore be equitable to provide transitional assistance. There is a danger that if government accepts this logic a long line of other industries will join the queue for assistance and claim they are also disproportionately impacted.

The institutional feasibility of these payments is unclear. Vested interests will inevitably seek to overstate the costs of failing to provide structural support. The community may perceive transferring wealth from Government (tax payers) to large energy companies to be unfair as these companies are able to raise electricity prices to cover most or all of their greenhouse liabilities.

- **Insulating trade exposed, emissions-intensive industries from competitors in international markets which do not face a price on carbon:** Insulating greenhouse intensive trade exposed industries could help avoid carbon leakage to other countries. This has the advantage of allowing more rapid action to reduce the emissions associated with domestic production and consumption of goods and services, while allowing a more gradual adjustment in industries servicing global markets. Given the relatively high greenhouse intensity of Australian electricity (due to the very high share of coal fired generation) it is possible that avoiding leakage may slow reductions in global emissions.
- **Structural adjustment payments to affected communities:** These proposals score highly from the point of view of social equity but are largely neutral from other points of view.
- **Fund further development and deployment of new and existing low emission technologies:** Existing Government policies such as the Renewable Energy Target will provide substantial support for the deployment of clean energy in Australia. However, additional funding and incentives for low emission technologies score highly from an emission reduction point of view, especially where deployment and innovation market failures limit the uptake of existing (e.g. energy efficiency, existing renewable energy) and new low emission technologies (such as fossil fuels

with CCS, geothermal, and large scale concentrated solar technologies). With a robust policy suite we can create policy flexibility by avoiding locking in new high emission technologies such as traditional coal fired generation and ensure all new load is met by clean energy sources.

The demonstration and deployment in Australia and other countries of clean energy will also build confidence around the feasibility of achieving significant reductions in emissions internationally. These proposals are also relatively cost effective as early deployment of technologies would be likely to accelerate innovation and the learning by doing that can be expected to significantly reduce the total cost of emission reductions over the long-term (e.g. MMA, 2007).

- **Support broader macro economic reforms such as reductions in payroll and corporate taxation, and barriers to workforce participation:** These proposals score highly from a cost effectiveness and institutional feasibility stand point. Reductions in inefficient existing taxes would be expected to have macro-economic benefits, reduce the macroeconomic impacts of introducing emissions trading, and offer the opportunity to fully or partly offset the impacts of emission trading on business, communities and specific groups.
- **Funding to assist technology transfer, pollution reduction or adaptation initiatives in developing countries:** Technology, adaptation and capacity building finance from developed to developing countries will be a critical ingredient in building developing countries support for emission reduction obligations. Given developed countries are primarily responsible for climate change it is also highly equitable. Allowing well documented offshore emission reductions to be used to acquit domestic emissions on a 1:1 or pro-rata basis can also improve the cost effectiveness of national and international emission reductions.
- **Establish an Australian climate change adaptation fund, similar to the Future Fund, to ensure adequate funds available for future adaptation needs:** On equity ground this scores highly as the current generation is decreasing the economic burden on future generations as they are forced to respond to inevitable climate change impacts.

Based on this high priority for revenue from the emissions trading dividend should be given to supporting vulnerable low income communities, funding further development and deployment of new and existing low emission technologies, and assisting technology transfer, pollution reduction or adaptation initiatives in developing countries.

Managing potential impacts on the disproportionately impacted industries and greenhouse intensive trade exposed sectors should not be ignored and managing them will be an important matter for government. Adjustment assistance for non trade exposed greenhouse intensive industries, such as electricity generators, will need careful consideration and should be balanced against other priorities. Critically, any adjustment

assistance decisions must be transparent, ideally on recommendations from an independent arbiter, to ensure community confidence.

Table 5: Allocation of the emissions trading dividend: Assessment of proposals

	Environmental effectiveness		Cost effectiveness	Distributional consequences (Equitable)	Institutional feasibility (Political sustainability)
	Emission reduction	Early action from other large emitters			
Promote energy efficiency, public transport and financial support for vulnerable low income communities	+	0	-/+	++	++
Fund one off payments to large emitters to offset the loss of asset value or operating profits	0	0	-/+	-/+	-/+
Insulate emissions-intensive industries from competitors in international markets not facing a price on carbon	-/0	0	-	-	0/+
Structural adjustment payments to affected communities	0	0	0	++	++
Fund further development and deployment of existing and new low emission technologies	++	++	+	0	+
Support broader macro economic reforms such as reductions in payroll and corporate taxation	0	0	++	0	++
Funding to assist technology transfer, pollution reduction or adaptation initiatives in developing countries	++	++	-/+	++	+
Establish a climate change adaptation fund, similar to the Future Fund, to ensure adequate funds available for future adaptation needs	0	0	0	++	+
++	Strong positive contribution to criteria				
+	Has some positive contribution to criteria				
0	Neutral				
-	Has some negative impact in relation to criteria				
--	Strong negative impact in relation to criteria				
0/+	Uncertain, may be positive				
+/-	Uncertain, ambiguous impact				
-/0	Uncertain, may be negative				

References

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