



BUSINESS COUNCIL OF AUSTRALIA

STRATEGIC FRAMEWORK FOR EMISSIONS REDUCTION

APRIL 2007

Strategic Framework for Emissions Reduction

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Business
Council of
Australia



Introduction

Australia has sustained a significant period of economic growth and prosperity. Looking forward, however, there are a series of important challenges, including managing the potential impacts of climate change, which will require a renewed national effort in economic reform so as to ensure that Australia can continue to prosper.

Recognising that a long-term risk management approach is necessary to address the impacts of climate change, the Business Council of Australia (BCA) commissioned Rod Sims of Port Jackson Partners Limited (PJPL), to undertake research on appropriate policy responses. This work and the experience and expertise of the BCA Members has provided the basis for the BCA position on climate change and emissions trading detailed in this paper.

The BCA policy position has been framed by the following five considerations.

1. An effective, sustainable response to climate change is ultimately about moving from the current high-emission global economy, to a low-emission economy. Given the current reliance on high-emission products and services permeating through all levels of the economy, we should be under no illusion about the scale, economic cost and complexity of this transition, one which is arguably the most far-reaching since the industrial revolution.

Such a transition clearly does not lend itself to quick-fixes or knee-jerk policy. **In fact, given the significance of the transition, short-sighted or expedient policies to tackle the issue may well result in decisions that run counter to effective, lasting solutions.**

2. The challenge of reducing emissions will be won or lost at a global level. **Developing countries are likely to contribute 70% of the growth in future world emissions, and will soon be the source of the majority of world emissions.**
3. The most effective system to reduce emissions is one primarily based on a market solution. Market structures have, over the course of many years, embedded production and consumption signals and behaviours that underpin the current high-emission global economy. **We now need to provide price and other signals to modify these behaviours and patterns in order to effectively evolve to a low-emission global economy.**
4. Given the scope and scale of the transition required to ensure a reduction in emissions, **a multifaceted approach involving a range of complementary policies is critical.** While a market-based solution is an essential part of this approach, other supporting policies and initiatives will be required.

In particular policy support will be required to ensure the development and deployment of the breakthrough technology that will ensure the shift to a low-emission economy. Policies will also be required to build Australia's adaptation and mitigation capabilities and support greater energy efficiency across all sections of the economy.

5. The necessity of a global-based solution does not mean Australia cannot make a significant contribution to such a solution, or demonstrate leadership by formulating responses that can be used as a template or guide for other countries to adopt. **Australia can and should adopt an approach where, through diplomatic and other channels, it contributes to a development of a global market response. Australia can also implement relevant national policies and strategies which enable a global solution.**

Australia's national response should:

- reduce emissions relative to a business-as-usual outlook;
- ensure the abatement is that which is lowest cost;
- establish mechanisms to ensure Australia's competitiveness and trade-exposed industries are not adversely affected in the absence of a global carbon price; and
- increase investment certainty to enterprises and investors.

The BCA position on climate change and emissions trading recognises that it will be the strength of the Australian economy in the future – not its diminution – which will ensure Australia is able to address the potential risks associated with climate change.

Some have argued for an immediate start to phasing-out those sectors of the Australian economy which contribute most to emissions, without any apparent regard to how the livelihoods and lifestyles of all Australians are directly and indirectly linked to our current high-emission domestic and global economy.

A strong economy is the key to funding the low-emission technology necessary to support what will continue to be an energy intensive world while at the same time reducing greenhouse gas emissions.

A strong economy will also provide the resources to fund other transition strategies that will be required as we move away from a high-emission economy.

BCA Position on Global and Domestic Action to Respond to Climate Change

A prosperous economy will be essential to help deal with the consequences of action taken to reduce greenhouse gas emissions and transform a high-emission global economy to a low-emission global economy.

Sensible risk management requires a long-term and regularly reviewed policy framework for climate change. We must be able to adapt the policy response as information and scientific knowledge improves and technology develops.

Given the scope and scale of the transition implicit in reducing emissions, a multifaceted approach involving a range of emission reduction strategies is critical.

A global 'cap and trade' emissions trading scheme, which includes all countries and which sets a maximum level of emissions, is an essential part of this multifaceted approach to climate change.

While this market-based approach is an essential feature, other supporting policies and initiatives will be required. Policies to ensure the research, development, demonstration and deployment of the necessary technology solutions are essential. Adaptation and mitigation capabilities will need to be enhanced. An ongoing focus on ensuring greater energy efficiency in homes and business will be essential.

Global Principles

A workable global response to climate change should be underpinned by the following principles.

These principles provide the basis not only for a long-term global mechanism but also the basis on which to build national and regional schemes which can be linked to form a far-reaching global response.

1. *Set both immediate and long-term global emission reduction targets, albeit ones that can be differentiated to suit particular country circumstances designed to achieve the necessary greenhouse gas reductions.*
2. *Through a market-based approach, ensure targets are passed down to business enterprises.*
3. *Build a response around a 'cap and trade' emissions trading scheme.*
4. *Have a linked set of national schemes that conform to certain parameters and allow trade between them.*
5. *Ensure a pathway that sees all the major emitters (countries) included in the scheme.*
6. *Have other supporting measures sit alongside the central mechanism and trade system.*
7. *Provide households and individuals with the knowledge and capacity to contribute to emissions reduction.*

Features of Australia's Policy Response

As part of Australia's risk management policy it should develop a domestic emissions trading scheme which can be linked globally and increase business certainty.

The initial design of the scheme must be in a manner that addresses the additional cost on production and export which cannot be passed on to the consumer. It must also provide a mechanism to ensure the ongoing competitiveness of Australian businesses until all competitors face a similar carbon price signal.

In parallel, the current diverse and unrelated policy approaches at both the federal and state level to reduce emissions or provide industry support should be brought into a national trading scheme or harmonised or wound up.

National policy action to address the risks associated with climate change should:

- establish long-term emissions reduction targets for Australia with yearly targets and regular reviews;
- develop a national policy framework to reduce emissions and in doing so ensure a review and rationalisation of current federal and state programs;
- use a market-based approach ('cap and trade') to ensure lowest cost abatement choices can be made;
- establish mechanisms to ensure Australia's trade-exposed industries are not adversely affected when their competitors do not face a carbon price signal;
- ensure Australia can be part of a globally aligned system in the longer term;
- complement emissions trading with relevant research and development, technology, industry policies (e.g. to support development of low emissions technologies) and design standards; and
- build an informed and resilient community able to contribute to the ongoing reduction in emissions.

Essential Features of Australia's Emissions Trading Scheme

The challenge in designing Australia's emissions trading scheme is to ensure ongoing economic growth while reducing greenhouse gases over the long term. Specifically, Australia's approach to an emissions trading scheme should:

- make the scheme a long-term one (at least 30 years) to increase greenhouse gas emission reduction certainty and investor certainty;
- have both a long-term emissions reduction target and yearly targets to provide the incentive for emissions reduction;
- include a first phase which involves the establishment of information collection and measurement and verification mechanisms for businesses and the secondary market;
- include as many greenhouse gases as possible;
- maximise the number of sectors that are included in the scheme. If it is not possible to include a particular sector introduce policies which ensure commensurate emissions reductions in that sector;
- allow maximum offsets (national and international) to meet abatement targets;
- issue free permits to compensate enterprises for the economic loss from the change in the 'rules of the game';
- offset the competitiveness impact of the scheme on 'trade-exposed' industries for as long as necessary providing transitional arrangements through the permit issue process;
- cap the price of permits and consider other relevant 'safety valve' mechanisms;
- establish an 'RBA-like' permit issue authority;

- ensure the scheme facilitates an active secondary market to provide a rising but reasonably stable forward permit price curve; and
- ensure effective governance structures that enable confidence in the market.

Work on a Multifaceted Approach

Global reduction of greenhouse gas emissions and a broad response to the potential impacts of climate change will require a multifaceted approach on Australia's and the world's part. **This approach will need to be long-term in nature and encompass a range of policies, programs and market mechanisms suitable to the structure of individual country economies and their stage of development.**

Australia will need to contribute to a global response through its diplomatic relationships within the region and internationally. A way needs to be found that provides all countries with the capacity to contribute to solutions, resilience and adaptation.

A 'cap and trade' scheme will set a price for carbon globally or within Australia but this may not be sufficient to ensure the development and deployment of technology to support emissions reduction. As a priority, there will be a requirement for policies to support ongoing research and development including linked international efforts to identify and develop low-emissions technology, clean coal technology and renewable energy sources.

Energy efficiency, both at the enterprise and domestic level, will be an important contributor to emissions reduction. An emissions trading scheme should provide the appropriate indicator to households and business through a price response, however, if this is not sufficiently strong enough then additional policies may be required.

The Challenge Ahead

It is essential that a long-term policy framework is established which manages the risks of climate change, while minimising the economic cost. Such a market-driven framework must be capable of review and adjustment, as our understanding of climate change and the role of greenhouse gases expands and solutions become available.

Australia's ongoing challenge will be to implement long-term economically sustainable solutions to ensure greenhouse gas emissions reduction. This will involve national responses which allow Australia to link in with emissions reductions schemes emerging elsewhere in the global economy.

Australia's response, as well as the global response, must be multifaceted. Together with emissions trading, technology and adaptation will play a significant role in providing the solution to reducing greenhouse gas emissions, as will ongoing efforts to make our energy supply and consumption practices more efficient.

**Determining the
appropriate policy
principles to guide the
response to the greenhouse
challenge**

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Report prepared for the
Business Council of Australia

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OVERVIEW

Sensible risk management requires that greenhouse policy responses start immediately and continue over the longer term, but are flexible enough to be adjusted as information and scientific knowledge improves. While in theory we should take greenhouse gas abatement action until the marginal cost of adaption equals the marginal cost of mitigation, we remain a long way from understanding where this balance lies.

The typically discussed abatement targets are challenging. They require at least a 50% reduction in the global economy's emission intensity (volume of emissions relative to the size of gross domestic product) compared to business as usual trends by, say, 2030-2050.

The economic implications of such reductions are causing all countries – developed and developing – considerable concern. One way to assess these economic implications is to consider a cost curve of abatement options. Such a global cost curve shows that abatement measures are needed across a wide range of sectors and in all countries. If the lowest cost abatement measures are pursued the economic costs of global action can be contained to manageable levels.

The appropriate way to meet the most likely emission reduction targets is by the inclusion of all countries in a global, market-based scheme. While the developed world is responsible for most of the past greenhouse gas build up, developing countries will likely contribute 70% of the growth in future world emissions, and will soon be the source of the majority of world emissions.

This paper develops a number of key principles which could underpin global action.

KEY PRINCIPLES WHICH COULD UNDERPIN GLOBAL ACTION ON GREENHOUSE GAS ABATEMENT

- Set yearly global emission reduction targets stretching out into the long term, albeit ones that can be differentiated to suit particular country circumstances
- Rely largely on market-based approaches, rather than schemes where governments determine the source of abatement, and ensure targets find their way to enterprises
- Build the policy response around a cap and trade emissions trading scheme
- Have a linked set of national schemes that conform to certain parameters and allow trade between them
- Ensure a pathway that sees all the major emitters included

- Have a range of measures sit alongside the central mechanism of a cap and trade system to, for example, improve energy efficiency and assist investment in low emission technology.

While the European Union's Emissions Trading Scheme (EU-ETS) has many deficiencies, it has provided valuable lessons that can guide the development of future cap and trade schemes. A number of preferred features for emission trading schemes have been developed, and most of these features are not part of the current EU-ETS.

PREFERRED COMMON FEATURES OF EMISSIONS TRADING SCHEMES

- Only commence trading under the scheme when all the information and measurement and verification mechanisms are in place
- Include as many greenhouse gases as possible
- Maximise the number of sectors that are included in the scheme and, at a minimum, introduce equivalent carbon price increases for any excluded sectors
- Allow maximum offsets using baseline and credit arrangements to meet abatement targets
- Make the scheme a long term one (at least 30 years) to provide greenhouse gas emission and investor certainty
- Issue permits for free to compensate enterprises in particular sectors for the economic loss from the change in the "rules of the game"
- Establish an "RBA-like" permit issue authority with fixed rolling annual permit allocations or sales
- Ensure the scheme facilitates an active secondary market to provide a rising but reasonably stable forward price curve
- Ensure sound governance structures that are mutually recognised in the linked schemes.

The Commonwealth is considering whether, in addition to the push for a global response to the greenhouse challenge, any "... additional steps ... might be taken, in Australia, consistent with the goal of establishing such a [workable global emission trading] system". These steps will clearly be beyond current policy.

It is reasonable to assume that the Commonwealth will consider steps towards a comprehensive national market based response, and a range of measures that can support such a move.

With this in mind a number of objectives or criteria have been developed to guide any national policies.

OBJECTIVES OR CRITERIA FOR THE ASSESSMENT OF ANY NATIONAL POLICIES

- To drive any national market-based response:
 - Establish yearly targets leading to a longer term aspirational target to achieve reduced emissions relative to a business-as-usual outlook
 - The abatement achieved should be that which is lowest cost, which favours a comprehensive cap and trade system
 - Any scheme must be part of a co-ordinated strategy to develop a global scheme
 - Put in place all the prerequisite steps before trading is allowed to begin
 - Permits or offsets from overseas should be accepted without limit, provided there is an appropriate authentication of the traded permit or offset
 - Trade exposed enterprises must be fully protected until our global competitors are part of a like scheme
 - Enterprises should be able to invest with certainty through a long term scheme with fixed annual permit issue by an “RBA-like” entity
 - Inconsistent schemes should be phased out as quickly as possible
 - Ensure an active secondary market
 - Provide a number of “safety valves” such as capping the price of permits until certain milestones are met
- For other supporting measures:
 - Support the development of low emission technologies
 - Consider whether any emission or energy compulsory standards need to be implemented
 - Improve Australia’s information base on greenhouse issues
 - Increase Australia’s resilience to climate change
 - Use international diplomacy to push for a global compact on emissions.

We should not be too pessimistic concerning a global solution. While the developing countries will not want to limit their growth they must be included if the world is to have any chance of meeting global abatement targets. This means that developed and developing nations must “cut a deal”. The developed nations have the money to achieve this, and all nations can see the need for action.

With Australia’s close links to some key countries, and with our ability to learn the lessons from the policies of others, we are now well placed to provide some intellectual leadership on these issues.

Determining the appropriate policy principles to guide the response to the greenhouse challenge

1 The purpose of and background to this paper

The Business Council of Australia (BCA) has requested advice on the principles that should guide appropriate policy responses to the greenhouse challenge. The objective of this work is to assist the BCA in formulating its position on these issues.

The BCA has made it clear that this work is not intended to design any particular mechanism. The main emphasis is to be on the framework and structural principles.

While the focus of this paper is to be on a global response, the BCA has also sought advice on the interim or transitional steps that Australia could take in the lead up to the creation of an effective global market for greenhouse gas emissions. This is to be done in terms of identifying a set of national objectives or criteria to be used in assessing any national initiatives.

As with all issues the BCA tackles, a whole of Australia view must be adopted to make any position relevant to the wider debate. The approach taken, therefore, is to seek the appropriate position for Australia: the position adopted must pass the test of “this is what we would do if the decision were left to us.”

Likewise, there is little point adopting ideal but impractical positions. The objective is not to be “pure”, it is to be practical, albeit based on strong, logical foundations.

There are nine background perspectives that are relevant to this paper:

- The need to take a risk management approach to the greenhouse challenge
- The BCA President’s address to the BCA 2006 Annual Dinner
- The Prime Minister’s Task Group’s Issues Paper
- The recent Intergovernmental Panel on Climate Change (IPCC) report
- The composition of Australia’s greenhouse gases
- The typical targets discussed for long term reductions in emissions
- Concerns about the economic implications of policy action to meet the targets for long term reduction in emissions
- Some lessons from the European Union Emissions Trading Scheme (EU-ETS)

- The fact that developing countries are forecast to be responsible for nearly three quarters of the growth in future world emissions.

Each will now be briefly addressed in turn.

1.1 The need to take a risk management approach to the greenhouse challenge

While there is agreement that global atmospheric concentrations of greenhouse gases are increasing due to fossil fuel use and land use change, much else is uncertain. As the Intergovernmental Panel on Climate Change has indicated (see Section 1.4) there is 90% confidence that this human activity has led to warming, with many negative consequences, but the precise outcomes in terms of temperature and sea level increases and other effects are not yet well known.

There remains a range of views on the effects of global warming, the effectiveness of adaption to these effects, and therefore the extent of greenhouse gas reductions required. While in theory we should take greenhouse gas abatement action until the marginal cost of adaption equals the marginal cost of mitigation, we are a long way from understanding where this balance lies.

Prudent risk management, therefore, requires policy responses that will deliver immediate action, will continue over the longer term, but which also are flexible enough to be adjusted as our information and scientific knowledge improves.

Indeed, it is a risk management approach that will drive countries to early action. While the most likely outcomes predicted from global warming are cause for concern, it is the apparently least likely outcomes that can cause alarm. Given the scientific uncertainty over the rate and effects of warming, the push for action will be to ensure these less likely outcomes are avoided.

In addition, however, given the size and nature of the issue, we must get the policy responses right. The policy responses will inevitably cause economic disruption and pain. To minimise this, well thought through measures are required.

1.2 The President's address to the BCA's 2006 Annual Dinner

This provides a starting point for this paper. Some relevant statements are as follows:

- "I'm not going to enter the debate about the connection between increased greenhouse gas emissions and atmospheric warming. Some will argue against such a connection but they are now in a very small minority".
- "... an essential part to tackling the problem remains an internationally agreed and accepted market framework – a framework that provides economies with real and lasting incentives to cut their emissions without suffering disproportionate impacts."
- "(We need) a market-driven global compact. It has to be global because climate does not acknowledge market boundaries ... it has to

be market-driven because only a clear and unambiguous link between carbon emissions and market value can provide ... consistent and long-term motivation to reduce emissions.”

- “In summary, we now need to take the lessons from Kyoto and develop a new framework for a global agreement that cuts emissions in the long term. For its part, the BCA will focus its near-term efforts on identifying the principles to achieve an effective global market for carbon emissions.”

1.3 The Prime Minister’s Task Group

At the BCA’s 2006 Annual Dinner the Prime Minister announced the formation of a joint government/business Task Group "to examine [...] what form an emissions trading system, both here in Australia and globally, might take to make a lasting contribution to a response to the greenhouse gas challenge”. The formation of this Task Group increases the importance of this paper. These issues are now more immediate, and sound and practical positions are required.

On 6 February 2007 the Task Group released an issues paper. Among other points, the Task Group mentioned the following:

- “The increasing weight of scientific evidence indicates that there is significant and damaging growth in the level of greenhouse gases arising from human activity. This will have a detrimental effect on the global environment and generate economic costs ... there is a growing acknowledgement that governments ... should act ... The warning signs cannot be ignored.”
- “... without further action, ongoing strong economic growth is expected to result in emissions rising to 127% of 1990 levels by 2020” (in Australia).
- “There is not yet agreement to launch negotiations on a post-Kyoto international framework ... European and a number of other developed countries have indicated a preparedness to take on further commitments, but this should be accompanied by the development of a pathway by which major developing countries would make contributions to the overall global effort to cut emissions.”

1.4 The IPCC Assessment Report

The Intergovernmental Panel on Climate Change (IPCC) released its Fourth Assessment Report in February 2007. This report describes the natural and human drivers of climate change and assesses the likelihood of potential outcomes from global warming. The Fourth Assessment Report is a collaborative report and arrives at its conclusions after gaining consensus from participants.

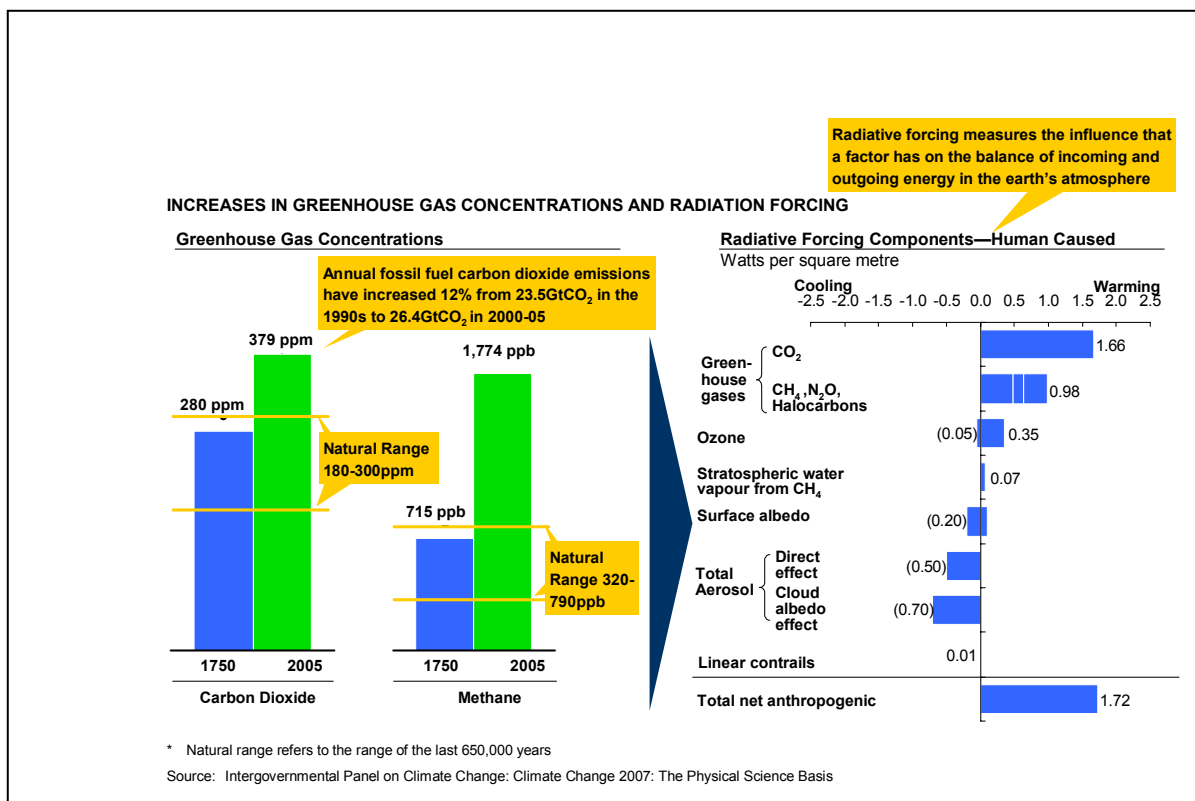
The key conclusions of the report are as follows:

- “Global atmospheric concentrations of carbon, methane and nitrous oxide (the key greenhouse gases) have increased markedly as a result

of human activities since 1750 and now far exceed pre-industrial levels” (see Exhibit 1).

- “The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land use change, while those of methane and nitrous oxide are primarily due to agriculture.”

Exhibit 1



Scientific understanding of the impact of global warming arising from human activities has improved, leading the working group to conclude with “very high confidence (at least a 9 out of 10 chance of being correct) that the globally averaged net effect of human activities since 1750 has been of warming”. Global warming, or cooling is measured by radiative forcing. A positive forcing will lead to an increase in energy retained by the earth’s atmosphere and hence lead to warming. Human activities have resulted in a number of positive and negative impacts on net radiative forcing. Greenhouse gases and halocarbons have contributed 2.64Wm⁻² to current radiative forcing as shown in Exhibit 1 above. Other increases in radiative forcing include ozone formation in the troposphere as a result of nitrogen oxides, carbon monoxide and hydrocarbons and stratospheric water vapour formed from methane. On the other hand, aerosol pollution from sulphates, organic carbon, black carbon and dust have caused a decrease in radiative forcing.

The working group also assessed the likelihood of an increase in adverse weather trends as a result of global warming. These are summarised in Exhibit 2.

Exhibit 2

LIKELY IMPACTS FROM CLIMATE CHANGE			
Assessed likelihood, probability of occurrence			
Impact	Likelihood that trend occurred in late 20th century	Likelihood of human contribution to observed trend	Likelihood of future trends based on projects for next century
• Warmer and fewer cold days and nights over most land areas	Very likely (>90%)	Likely (>66%)	Virtually certain (>99%)
• Warmer and more frequent hot days and nights over most land areas	Very likely (>90%)	Likely (>66%)	Virtually certain (>99%)
• Warm spells/heat waves, increasing frequency	Likely (>66%)	More likely than not*	Very likely (>90%)
• Heavy precipitation events, increasing frequency	Likely (>66%)	More likely than not*	Very likely (>90%)
• Area affected by droughts increases	Likely (>66%)	More likely than not*	Likely (>66%)
• Intense tropical cyclone activity increases	Likely (>66%)	More likely than not*	Likely (>66%)
• Increased incidence of extreme high sea level	Likely (>66%)	More likely than not*	Likely (>66%)

Note:

- Even if greenhouse gas concentrations were stabilised, warming and sea level rise would continue for centuries due to timescales associated with climate processes and feedback

Average 2090 temperatures will increase by 1.1–6.4 °C

Tropical storms will become more intense and move pole ward

2090 sea levels will rise by 0.18–0.59m and snow cover, glaciers and polar sea ice will shrink

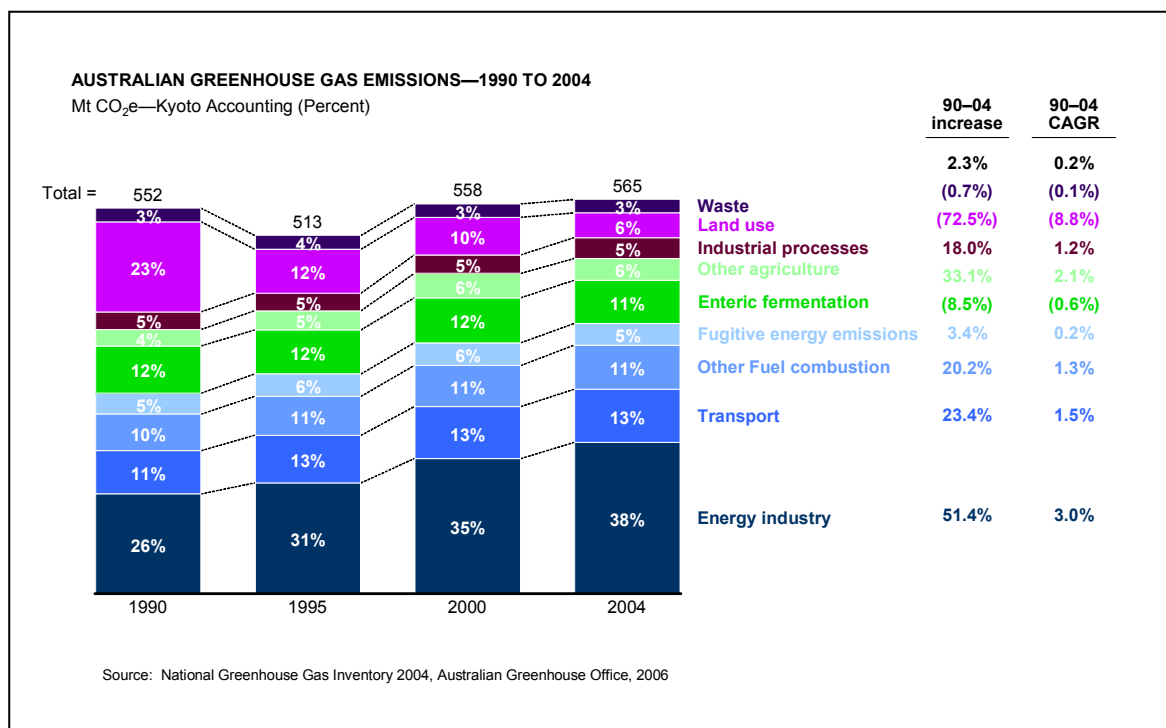
* Magnitude of human contribution not assessed, expert judgement used to determine likelihood of human contribution

Source: Intergovernmental Panel on Climate Change: Climate Change 2007: The Physical Science Basis

1.5 The composition of Australia's greenhouse gases

Australia's energy industry accounts for over a third of Australia's greenhouse gas emissions, agriculture 17%, the transport sector 13%, and other fuel combustion 11%. This can be seen in Exhibit 3. Appendix 1 explains the emissions categories.

Exhibit 3



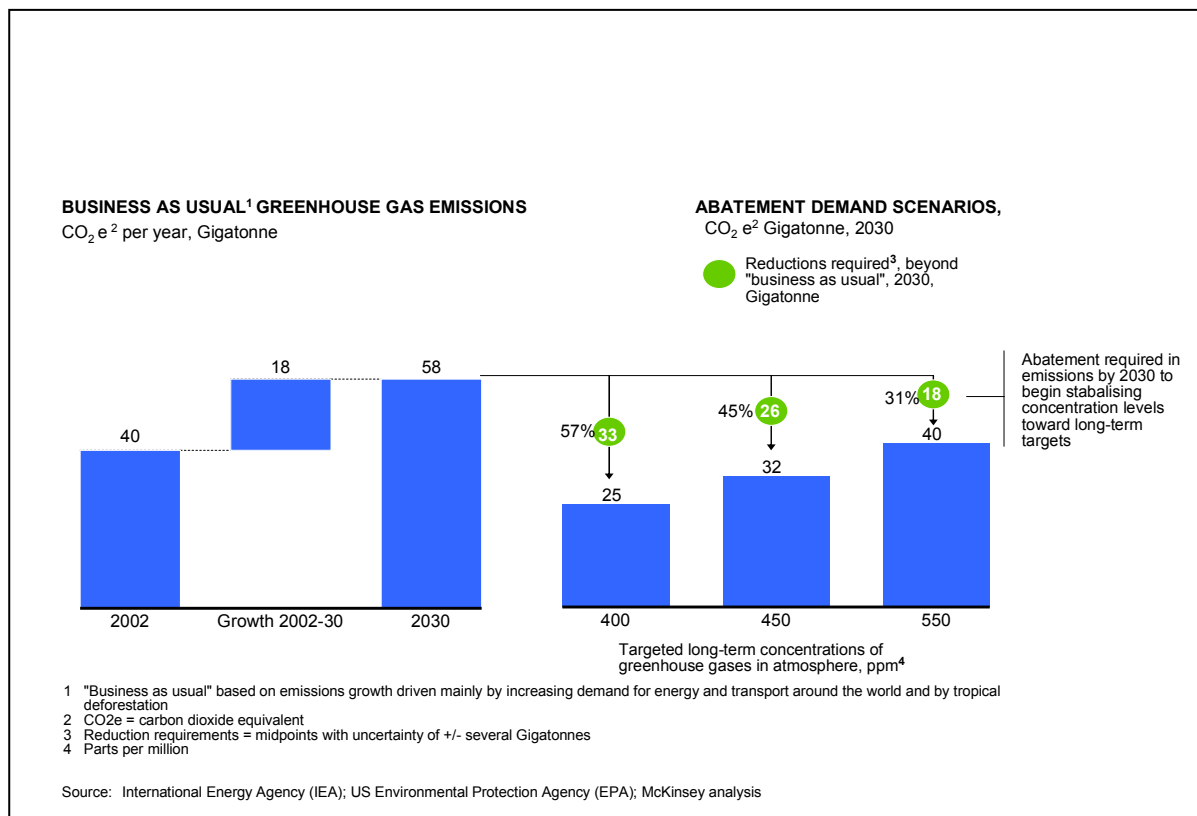
In recent years Australia's energy industry has been the fastest growing source of emissions, followed by transport.

1.6 The typical targets discussed for long term reductions in emissions

Three of the emission reduction targets often discussed are those that would, respectively, cap the long term concentration of greenhouse gases in the atmosphere at 550, 450 and 400 parts per million (ppm), a measure of the share of greenhouse gas molecules in the atmosphere. Such targets are consistent with those mentioned in last year's Stern Report (The Economics of Climate Change), which noted that the current level is 430 ppm of carbon dioxide equivalent gases (CO₂e), and that they are currently growing at 2ppm each year.

While there is not a clear consensus on the emission reductions required to achieve these targets one estimate says that reductions of 31-57% are required against "business-as-usual" levels by 2030. This is shown in Exhibit 6. Note that Stern suggests stabilisation of greenhouse gas levels in the atmosphere requires emissions to be at least 25% below current levels by 2050, which is broadly in line with the estimates in Exhibit 4.

Exhibit 4



Clearly such reduction targets are challenging. They require at least a 50% reduction in the global economy's emission intensity (volume of emissions relative to the size of gross domestic product) compared to business-as-usual trends by 2030-2050.

1.7 Concerns about the economic implications of policy action to meet the targets for the long term reduction in emissions

Concerns about the economic implications of taking policy action to reduce greenhouse emissions are widespread. Indeed, the main global responses so far illustrate that economic growth and competitiveness issues are at the forefront of the thinking of most countries.

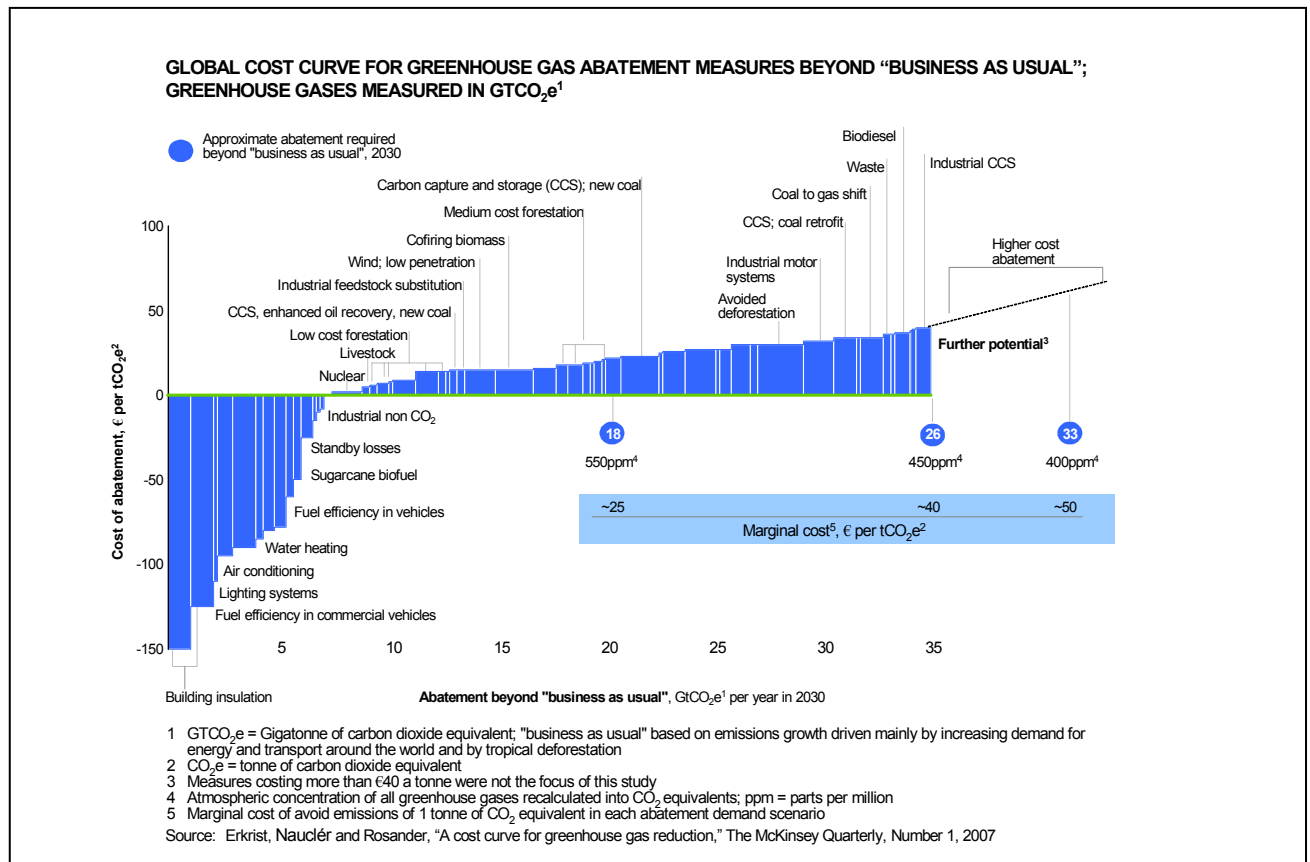
- While many countries ratified the Kyoto Protocol (see Appendix 2 for a brief description of the Kyoto obligations) not all passed the obligation on to their business sectors or placed a price on carbon (for example, Canada and Japan).
- Many developed countries are struggling to meet their Kyoto obligations which require only modest reductions in emissions compared to the likely ultimate targets as discussed in Section 1.6 above (see Appendix 3 for a description of performance against the Kyoto targets by many countries).

- While Australia will likely meet its Kyoto target this is almost completely due to reduced land clearing, a benefit that will not be available in future (see also Appendix 3).
- Within the EU there are now significant competitiveness concerns expressed by companies which are competing with non-EU companies where no price of carbon has been imposed.
- The USA and Australia did not ratify Kyoto, citing concerns about the competitiveness of their industries.
- Developing countries did not have obligations under Kyoto and so were not required to limit emissions in large part because of concerns about limiting their economic growth.

Many estimates have been made of the macroeconomic effects of taking action. Stern, for example, summarises these when he says that “central estimates of the annual costs of achieving stabilisation between 500 and 550 ppm CO₂e are around 1% of global GDP, if we start to take strong action now”.¹ The Australia Bureau of Agricultural and Resource Economics (ABARE) in its 2006 report, *The Economic Impact of Climate Change Policy: The Role of Technology and Economic Instruments*, estimated the economic impact on the Australian and global economies from alternative climate change policies. The results for Australia ranged from a GDP fall of -1.7% (under a global scheme, as Stern assumes) to -10.7% (where Australia adopts much deeper emission cuts than other countries) relative to the reference case.

A more insightful approach, perhaps, is to adopt a microeconomic or industry view. A recent survey, for example, has developed a global cost curve which shows the cost of feasible abatement measures in 2030. This period was chosen as one long enough to draw sound conclusions but short enough to make reasonably factual assumptions. While not all the technology is currently available, the authors judged that it would be before 2030. The cost curve is shown in Exhibit 5.

¹ See pvii of the Summary of Conclusions



At the low end of the curve are measures that will improve energy efficiency, such as better insulation in buildings. Higher up the curve are measures that adopt more greenhouse gas efficient technologies and measures that protect or replant tropical forests.

Against the cost curve the authors compare the abatement required to achieve the 450 ppm CO₂e target: that is, to abate 26 gigatonnes a year by 2030. With this target, and assuming measures are implemented in order of increasing cost, the marginal cost per tonne of emissions avoided would be 40 euros (about A\$65/t). The authors put the total cost for the global economy at 0.6% of GDP in 2030.

1.8 Some lessons from the European Union Emissions Trading Scheme (EU-ETS)

Governments have used trading schemes to deal with environmental issues for some time now. Perhaps the first success came with the 1990 USA scheme to reduce emissions of sulphur dioxide. Emissions were reduced by 50% in the first five years of the scheme, and at a much lower cost than through other policy mechanisms. In 2002 the UK established a voluntary carbon emissions trading scheme, and in 2005 the EU established its ETS. This is by far the largest such scheme.

In the EU-ETS member states set a European Commission-approved national cap on emissions, along with a plan for allocating permits to installations. The first phase of the scheme (2005-07) requires that power plants and factories in emission

intensive industries (iron and steel, cement, glass, paper), accounting for nearly half EU emissions, have a permit to emit as measured by how much oil, gas or coal is used in each location. From 2008 more industries will be included. Companies can use permits that were allocated, or purchase additional ones from companies who are willing to trade them.

Any move towards a global market-based scheme will need to build on, and draw the key lessons from, the EU-ETS. The main lessons are likely as follows.

- The scheme has no established mechanisms beyond 2012. As shall be discussed later this means that no longer term (and necessarily higher) price signal is being sent, and the uncertainty of what will happen post 2012 is inhibiting investment in emission intensive activities².
- Valuable lessons were learnt in relation to permit allocation that should guide behaviour in any future scheme. In brief:
 - Permits were issued for free and apportioned on the basis of past emissions, which resulted in windfall gains for some as the cost structure of the power sector in particular increased in broadly the same way as if permits had been purchased (see section 3.5 below).
 - Future permit allocation was to be based on new information in relation to production. There is thus an incentive for firms to increase their production, to gain more valuable permits at a later allocation of them (see also section 3.5 below).
- The unanticipated increases in energy prices saw many emission intensive industries adversely affected, with claims also of a loss of European industry competitiveness relative to non-European competitors whose firms did not face similar penalties (whether or not they were located in countries that had accepted Kyoto targets)³.
- Concerns have been expressed about the high level of permit allocations. Indeed, the combination of the level of permit allocation and mild weather has now seen permit prices fall significantly, which blunts the intended incentive for emission abatement.
- Concerns were also expressed about the effects on industry competitiveness within the EU of the different permit allocation methods to particular sectors adopted by member states. For example, there were concerns at proportionately more permits being issued to a sector within one country relative to others due to a different starting benchmark being applied⁴.

² European Commission Directorate General for Environment, McKinsey & Co and Ecofys, "Review of EU Trading Scheme – Survey Highlights", 2005

³ Alliance of Energy Intensive Industries, "The impact of EU Emission Trading Scheme on power prices: remedial action urgently needed", Position Paper 2005

⁴ Oliver Rapf, WWF European Policy Office, Brussels, "Emission Trading in Europe", WWF Workshop, November 30, 2005

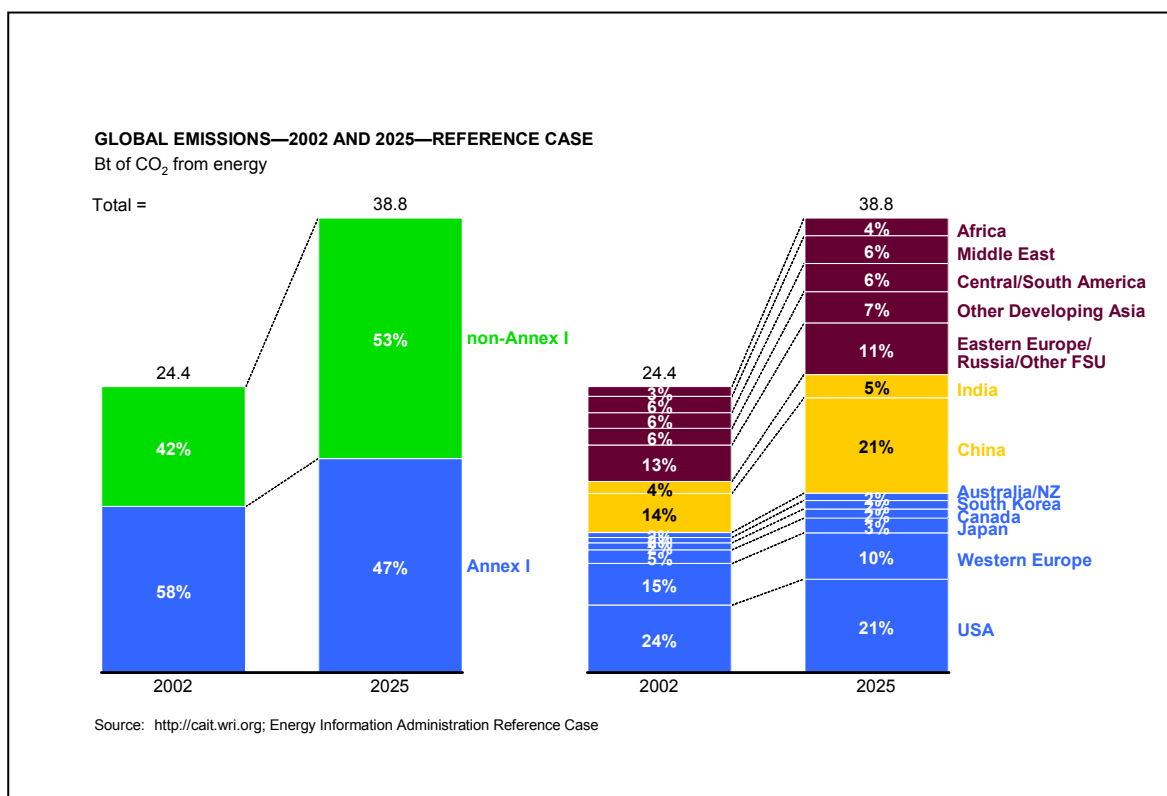
- Concerns have also been expressed about the limited nature of the EU-ETS, with calls to increase the number of sectors and greenhouse gases included in the scheme⁵.

Whatever its deficiencies, the EU-ETS remains the point of comparison for all that will follow in terms of greenhouse policy. The breadth and nature of the scheme makes it an essential learning step.

1.9 The composition of growth in world emissions

While developing countries contributed 42% of world carbon dioxide gas emissions from energy in 2002, they are expected to contribute 53% by 2025. This is shown in Exhibit 6. The developing countries are generally referred to as non-Annex 1 countries as they were not required to reduce emissions under the Kyoto Protocol in recognition of the fact that developed countries have contributed most to the past greenhouse gas build up.

Exhibit 6

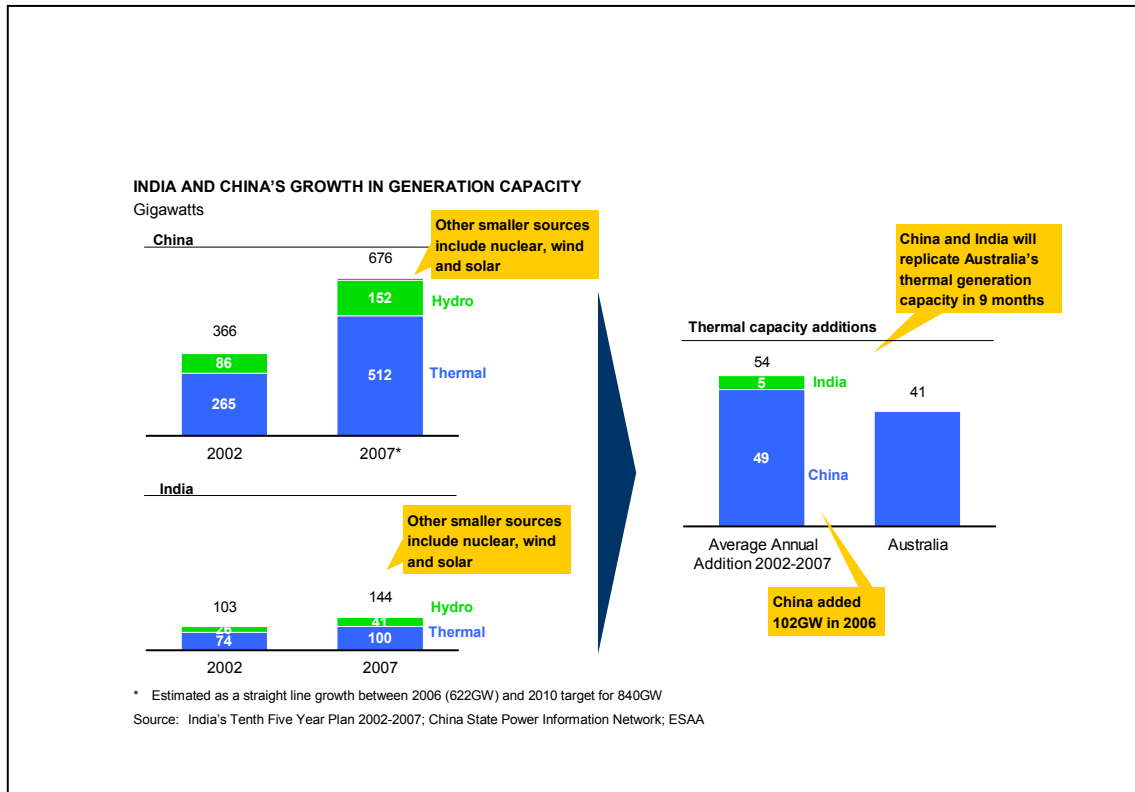


What is more stark is that developing countries are forecast to be responsible for 72% of the expected 14.4 billion tonne growth in CO₂ emissions from energy by 2025. China alone could be the source of 21% of world emissions from energy by 2025, and India 5%.

⁵ Klepper and Peterson, “Emissions Trading, CDM, JI and More: The Climate Strategy of the EU”, Published report in the Energy Journal

It is worth reflecting on the expected strong growth in emissions from energy from China and India. Over coming years these two countries are likely to replicate Australia's entire thermal generation capacity every 9 months. This is shown in Exhibit 7.

Exhibit 7



The point is not that any effort to reduce greenhouse gas emissions in Australia is insignificant. On the contrary, Australia is a high emitter per capita, many times that of China and India, although much of this is due to our export industries rather than our own consumption. The point is, however, that there is tremendous momentum behind emissions growth in the world from developing countries.

2 The key principles which should underpin global action on greenhouse gas abatement

In determining the key principles which should underpin the necessary global action on greenhouse gas abatement it is appropriate to keep in mind three core objectives, which are taken from the Task Group's Issues Paper.

- “Any policy solution must be:
 - Environmentally effective ... an acceptable global environmental outcome
 - Economically effective ... outcomes should be achieved at lowest possible cost ...
 - Politically acceptable ... capable of attracting sufficient support internationally, including the participation of developing nations.”

These three objectives guide us to the following principles.

2.1 Set yearly global emission reduction targets leading to a long term target, albeit ones that can be differentiated to suit particular country circumstances

To be environmentally effective countries need to agree binding emission reduction with both immediate and long term targets, and targets covering each year in between.

Immediate targets must be set so that immediate global action is required.

Long term targets, and targets covering each year in between, are also required so that everyone can begin planning to achieve the ultimate required reductions. There is little point aiming only at immediate targets that will be very different to what will be required in, say, 20-30 years. The long term targets need to link to commercial investment horizons, so that investment decisions are sensibly informed.

The problem with setting a long term target is that there is much that is currently uncertain. Governments could agree a target for 2030 or 2050 based on the need to reach, say, 450 ppm CO₂e and then find that the costs of mitigation or adaption are very different to what informed the original decision.

It seems better, however, to set such a target based on the best available science and according to well established criteria and then revise it later as our knowledge improves. There seems less uncertainty in having a target, subject to revision according to set criteria, than providing no guidance at all.

In allocating the global target among countries different targets can be set. These differences can be based on the level of economic development (see Section 2.5 below) and on the starting level of emission intensity of economic activity (the higher the starting level the harder the adjustment will be).

2.2 Rely largely on market-based approaches, rather than schemes where governments determine the source of abatement, and ensure targets find their way to enterprises

To be economically effective market based approaches should be pursued. Market-based approaches typically include emissions trading and emissions taxes. Such an approach contrasts with one where the government determines the source of greenhouse gas abatement.

There are two broad reasons for preferring a market-based approach.

First, and most important, governments cannot know the marginal abatement costs of all, or even the main, sources of abatement. If governments determine the sources of abatement they will not be those that are lowest cost.

Second, governments are susceptible to political influences that may not take them in rational directions when product and investment choices are being made.

The most common examples of schemes where governments determine the source of abatement in Australia are the various renewable energy targets set by the Commonwealth and some State Governments. In essence they require that:

- Abatement comes only from the electricity sector; and
- That it comes via renewable energy, rather than reduced emissions from the vast bulk of existing or new electricity generation.

Such schemes do not have lowest cost abatement as their goal or outcome.

It also follows that national targets need to be passed down to the enterprises where economic decisions are made. This can be a controversial point when talking in a global context. That is, it is one thing for some countries to insist that others meet a target; it can be a very different thing for those countries to insist that other countries' targets be met in a specific way (i.e. by market based responses).

It is important, however, that countries agree not only on targets but also on the emission reduction mechanism. This is because the steps have to be taken by consumers and by those enterprises investing in productive assets, whether the focus is on Australia or China. Only consumers and enterprises can take the actions required in a low cost way.

2.3 Build the policy response around a cap and trade emissions trading scheme

There are many different market-based schemes that have been or can be devised. The most common are:

- An emissions trading scheme
 - Using cap and trade
 - Using baseline and credit
- An emissions tax.

In broad terms a cap and trade scheme operates as follows.

- A cap or limit is placed on the total emissions allowed, for example, 90% of current levels.
- Permits are issued consistent with this cap, which allow holders to emit a unit of emissions, typically one tonne of carbon dioxide equivalent (CO₂e).
- Firms can either reduce their emissions to a level below their holding and trade their excess permits, or not seek to reduce their emissions and instead buy permits from others, or some combination of these approaches.

There are a number of baseline and credit schemes. One is where a baseline of emissions is set and tradeable credits are created by reducing emissions below the baseline, and these credits can then be traded. There can be, however, no obligation to meet the baseline, and no permit is required for emissions. Such a baseline and credit scheme is, therefore, not recommended as a general approach but it is relevant to some sectors and possibly some countries. An alternative baseline and credit scheme requires that emissions over a baseline are only allowed when a credit has been purchased. One problem here is the need to set and reset the baselines.

A cap and trade emissions trading scheme also contrasts with the other main market-based option which is an emissions tax. In essence, this latter approach seeks to determine the detrimental effect of greenhouse emissions (or externality) and tax them so that emitters face the full cost (the actual cost plus the tax or externality cost) of their actions.

It is important to state that both a cap and trade system and an emissions tax can each yield an efficient economic response. Where they differ is in terms of the certainty of abatement, and their implications for equity or the distribution of the benefits and costs from any scheme.

The main reasons for preferring emissions trading over an emissions tax are as follows.

- A trading scheme can provide the tools that allow companies to manage their risk through a secondary market in permits, which will facilitate greater long term-certainty than a tax. (See Section 3.6 below) While a tax provides price certainty, it cannot be guaranteed that the level of the tax will not change as the “externality” or harm thought to be caused by emissions is not likely to be stable over time.
- With trading, companies may more easily find lower cost abatement through action such as planting trees to create credits (see Section 3.3 below).
- An emissions trading scheme need not see any revenue flowing to governments, (depending on how permits are allocated – see Section 3.5 below), whereas an emissions tax sees a significant financial transfer from the private sector. This raises at least two issues:

- Some will be sceptical that governments will take steps to make an emissions tax revenue neutral, or to spend any net revenue wisely.
- There will be significant winners and losers from the imposition of a new tax and the reduction of others.
- Of most importance, emissions trading, through the cap, provides certainty in terms of environmental outcomes.

There are two main advantages claimed for an emissions tax.

- It is claimed that it provides certainty as to the cost of emissions, but this is only true if the harm caused by emissions stays constant over time.
- It is also said to be less complex to administer than emissions trading, but much depends on whether, for example, offsets are allowed against tax obligations such as through planting trees. A tax still requires detailed measurement and reporting systems.

This first advantage is important, and will be discussed in Section 4.

2.4 Have a linked set of national schemes that conform to certain parameters and allow trade between them

There are three potential models that could be pursued.

- A single global scheme operating at an enterprise level across all countries and administered by an international market operator.
- A global model that evolves from many national or regional schemes with different characteristics but with rules that recognise foreign permits or credits towards meeting a domestic emissions liability.
- A global model of national or regional schemes where emission abatement can only occur within the national or regional boundary (trading is not allowed).

The middle option is preferred provided some common features are prescribed. The suggested features are outlined in Section 3 below. In particular, this option allows countries to design schemes to suit their own needs rather than a single scheme that results from considerable multilateral compromise.

The problems with the single global scheme are the difficulty in reaching agreement on all features of a cap and trade scheme and the complexity that would be required to cater for the particular circumstances in many countries. Such an approach could yield either an unworkable scheme, or one of extreme administrative complexity and cost. It will also likely lead to a scheme over which Australia would have little influence.

While some argue for separate national schemes without trading to preserve the maximum national sovereignty⁶, such an approach will not yield lowest cost abatement since each country can only source abatement from within its own national borders.

Trading abatement reduction and credits between countries, of course, requires that each country recognises the integrity of abatement and credits created elsewhere. This can be a judgement of each country to determine which other schemes should be recognised.

Trading between countries will provide its own discipline in that it will force the price of permits to a reasonably uniform level. Where the price of permits differs significantly between countries traders can arbitrage between these markets by buying the lower priced permits and selling them in the higher cost markets.

2.5 Ensure a pathway that sees all the major emitters included in the scheme

This principle is both fundamental and controversial. It is fundamental because without the inclusion of all emitters the world will not achieve its environmental objectives. Whether the greenhouse “battle” is won or lost will be determined at the global level, not the national level. It is controversial because developing countries raise important equity arguments that must be addressed.

2.5.1 The need to include all major emitters

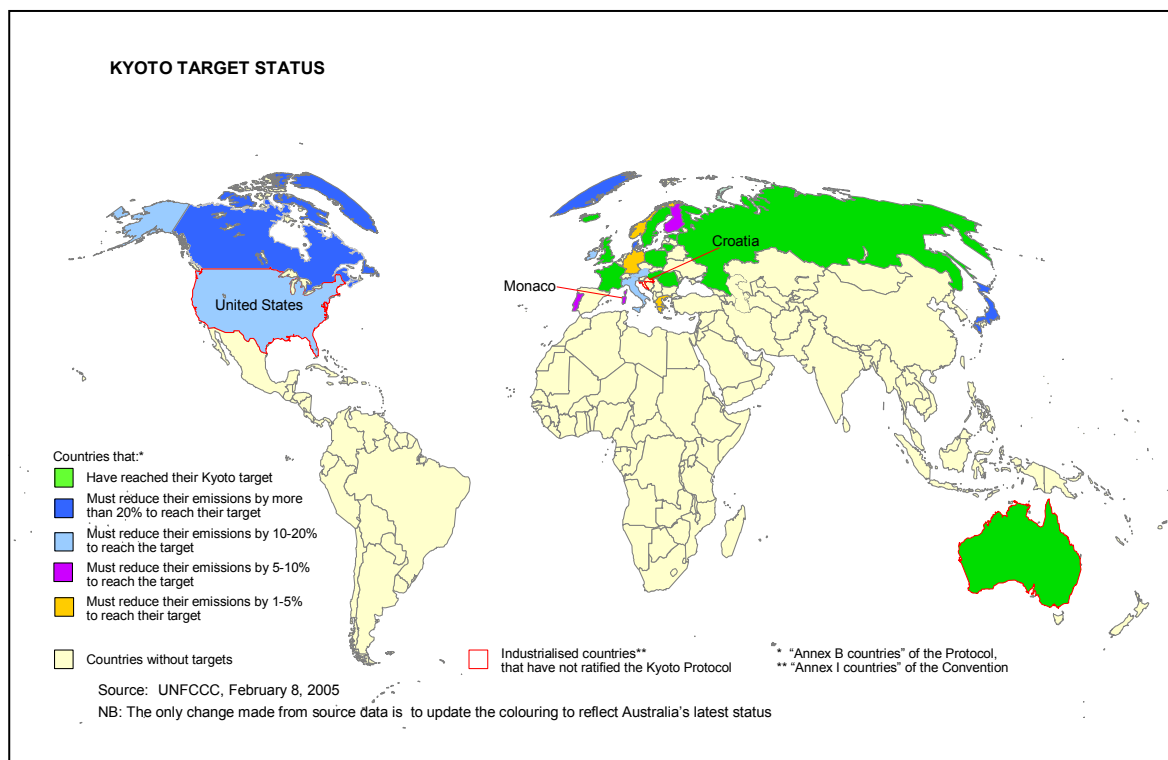
The logic for the inclusion of all major emitters is clear.

First, greenhouse gases are a problem wherever they are produced. If many countries are excluded then the economic pain is only felt by some countries while every country benefits. This represents a classic “free rider” problem.

⁶ As Canada is proposing in its draft legislation

Exhibit 8 illustrates those countries without targets, and those with them and whether or not they will likely meet their targets. As discussed in Appendix 3, those who will meet their Kyoto targets often benefited from fortuitous circumstances (the UK shift from coal to gas that already had its own momentum, the clean up of old Soviet-bloc industry, Australia's reduced land clearing).

Exhibit 8

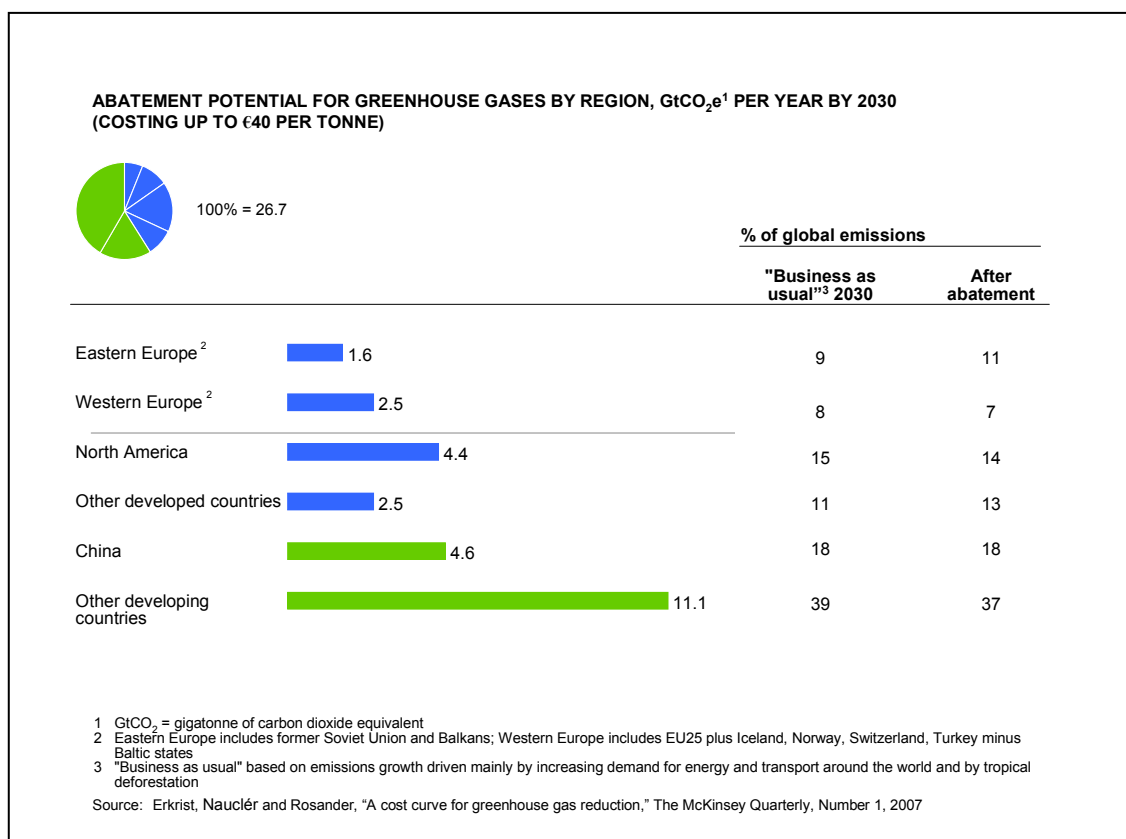


Second, and at its simplest, the most commonly mentioned global targets (say, a 50% reduction from business as usual levels by 2030 or 2050) can only be met if all emitters are involved. By 2050 developing countries will be responsible for considerably more than 60% of the world's emissions⁷.

Third, the majority of the world's low cost abatement lies in developing countries. This is shown in Exhibit 9 based on the analysis cited earlier to achieve 450 ppm CO₂e with a marginal cost up to 40 euros a tonne.

⁷ See Jakeman and Ford, "Climate Change Policies", Australian Commodities, Vol 13, No. 4, December Quarter 2006, p 698

Exhibit 9



Developing countries have a high share of low cost emissions for at least three reasons according to the authors of Exhibit 9.

- They have large populations.
- It is cheaper to abate new growth versus reducing existing emissions (especially in power generation and manufacturing).
- Tropical countries have much of the potential to avoid emissions in forestry for 40 euros a tonne or less (see Exhibit 5 above).

This last point is worth highlighting. "Forestry measures – protecting, planting and replanting forests – make up 6.7 gigatonnes of the overall 26.7 gigatonnes of the potential abatement at a cost of 40 euros per tonne. We estimate that for no more than 40 euros a tonne, tropical deforestation rates could be reduced by 50% in Africa and by 75% in Latin America"⁸. Such forestry measures, of course, also bring broader benefits such as reducing salinity and preserving biodiversity.

⁸ Per-Anders Erkrst, Tomas Nauclér and Jerker Rosander, "A cost curve for greenhouse gas reduction", The McKinsey Quarterly, 2007, Number 1

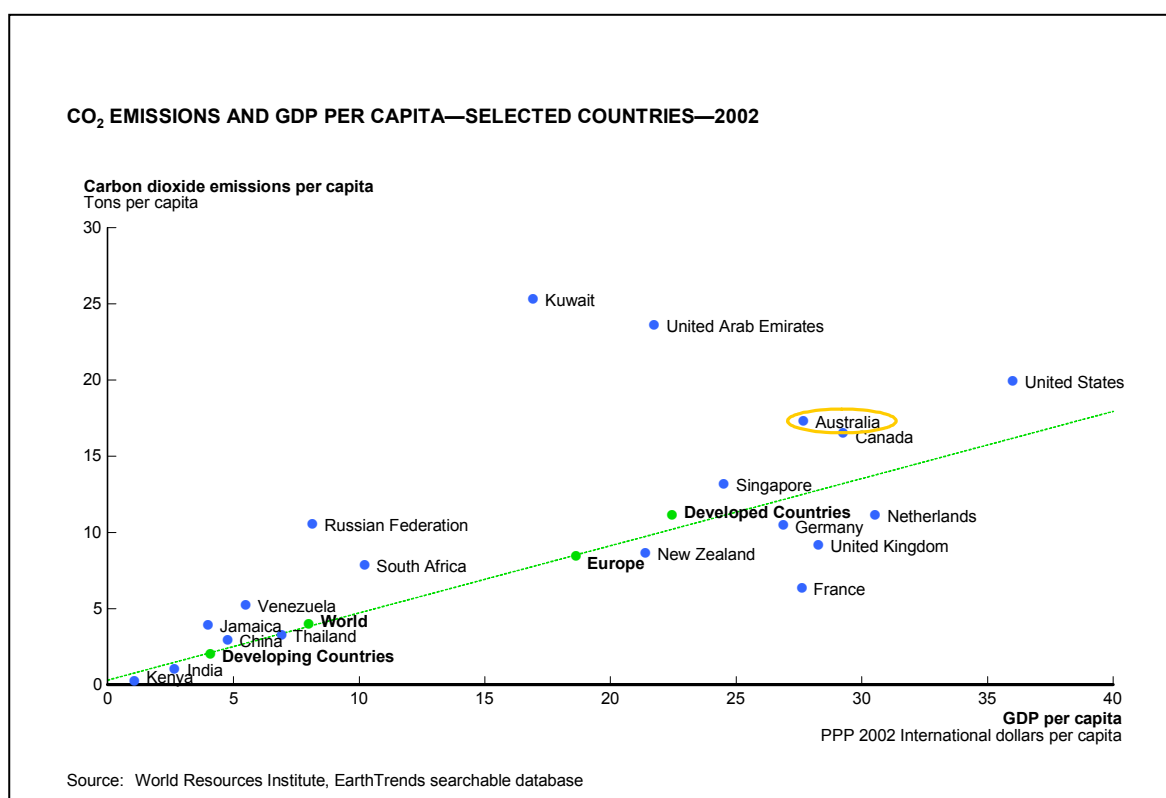
Fourth, the main impacts of global warming will likely fall on developing countries because they are hotter and more dependent on agriculture.

2.5.2 Finding appropriate mechanisms to see developing countries included in abatement targets

Developing countries, of course, argue that the current developed countries were able to grow their economies without emission limits, so developing countries should be excluded from any obligation to curb emissions for some time. This argument saw their exclusion from any targets under the Kyoto Protocol.

Developing economies currently have much lower emission intensive economies. Exhibit 10 shows that in general, developed economies are over five times more emission intensive (or emissions per unit of GDP) than developing economies. Note that this chart refers to CO₂ only; if methane is included some country rankings change, but the data is not as comprehensive.

Exhibit 10



While these equity arguments are sound, the facts are that while developing countries may not have been a large part of the problem, they must be part of the solution. A number of approaches are possible.

One approach to this issue that is often discussed is to agree on a level of per capita emissions that can apply to both developed and developing countries at a future date. Such a level will require that developed countries curb their emissions, while allowing developing economies to continue to

grow their emissions to accommodate their high growth. By drawing a line between today's per capita emissions and the eventual agreed level both immediate and longer term targets can be set.

It is important to note that such a regime will not necessarily mean that the physical emission intensity of each country will be the same, for two reasons.

- Different emission targets may be negotiated, as under Kyoto, to recognise the different resource bases of particular economies.
- More fundamental, with companies able to acquire and trade credits across national borders, targets will be more financial than physical from an individual country's point of view, making them more effective and efficient.

Such a regime has considerable appeal in both logic and equity, although there are a number of issues with it. For example:

- The date for eventual per capita equalisation would need to be set a long way into the future to minimise economic disruption.
- Any per capita emission intensity target would need to be set with care so that it did not see global emissions exceed the overall target, and was able to be adjusted as the world's scientific knowledge improves.
- It means that while trying to curb emissions overall, some countries would have a licence to increase emissions, albeit to levels lower than otherwise.
- This could provide incentives for countries to increase their populations.
- Such a regime may see the initial adjustment burden focussed even more on some companies in developed countries than if the immediate incentives given to developing countries were more broadly based in terms of increased general or targeted aid.

Other proposals for the inclusion of developing countries avoid setting arbitrary future deadlines or grace periods and instead focus on a differentiated approach where countries would adopt commitments once particular hurdles are met. For example, when credits under the Clean Development Mechanism (CDM – see Appendix 2 for an explanation of this), a baseline and credit system or other voluntary mechanisms reach certain levels⁹.

⁹ See "The Sao Paulo Proposal for an agreement on future international climate policy, Discussion Paper for COP-12 and COP-MOP-2, Nairobi, Kenya, 2006

An additional intermediate step is to seek to move the CDM mechanism from a project to a program basis over time, and then to a cap and trade system.

In finding pathways for developing countries to be included in commitments there is benefit in the convergence of policies in relation to greenhouse and poverty alleviation. It should be possible through technology transfer, mechanisms such as CDM, aid and differentiated targets to reduce greenhouse gases and make significant inroads into world poverty. Put another way, while developing countries must share in the effort to reduce emissions, they do not need to share the economic burden of doing this in the same way.

Against the background of its Presidency of the EU and Chairmanship of the G8 the German Chancellor Angela Merkel recently stated at the 2007 World Economic Forum in Davos that only a mandatory target for every polluting country could succeed. “We need a binding regime that includes all of those who produce emissions. Of the overall CO₂ emissions we (the EU) have 15%: 85% of these emissions come from somewhere else and the share of Europe is going to go down, so it is a global responsibility.”

The logic is clear. The mechanisms must now be found.

2.6 Have a range of measures sit alongside the central mechanism of a cap and trade system

Sir Nicolas Stern in his 2006 Report stated that ... “Climate change is the greatest market failure the world has ever seen ... Three elements of policy are required ... The first is the pricing of carbon ... the second is policy to support innovation and the deployment of low carbon technologies. And the third is action to remove barriers to energy efficiency ...”¹⁰

Without policy change in all three areas the market may not respond as it should. While a cap and trade system will supply a price for carbon, it may not sufficiently reward those who develop and deploy new technology, as others can learn from their efforts, yet the initial movers cannot capture sufficient benefit from this.

The obvious example of a technology that could justify support is post combustion carbon capture and storage from existing coal-fired electricity generation. This reflects the widespread use of coal for power generation worldwide, but particularly in China and India.

The issue, of course, is the need to avoid the problems associated with governments “picking winners”. That is, just as there is “market failure”, so there is “government failure”.

Energy efficiency is also complicated for the same reason. The cost curve in Exhibit 5 shows that 6 gigatonnes of abatement can be gained through measures with

¹⁰ The Economics of Climate Change, page viii, Summary of Conclusions

a zero or negative life cycle cost. This potential appears in improved building insulation and lighting, or from increased vehicle fuel efficiency. The question arises whether a further price signal would help or whether other, possibly mandatory, measures are required.

The concern again with introducing a category of “other” measures is the licence such a heading gives governments to impose a range of measures, some sensible and some not (which is, of course, a subjective judgement).

It is preferable to bring most such measures within an emissions trading regime (see Section 3.2 below). If this is not possible, then it may be necessary to apply new technical standards and rules.

In addition to addressing these market failures, of course, countries also need to focus on adaption measures and they need to continue to invest in understanding the science of climate change.

3 The preferred common features of emissions trading schemes

The principles just discussed in Section 2 capture the preferred framework to respond to the greenhouse challenge. In addition, there are some features that the linked emission trading schemes could exhibit. It is acknowledged that what follows probably goes beyond what countries would require of other linked schemes. It is useful, however, to highlight some desirable features of emission trading schemes.

3.1 Include as many greenhouse gases as possible

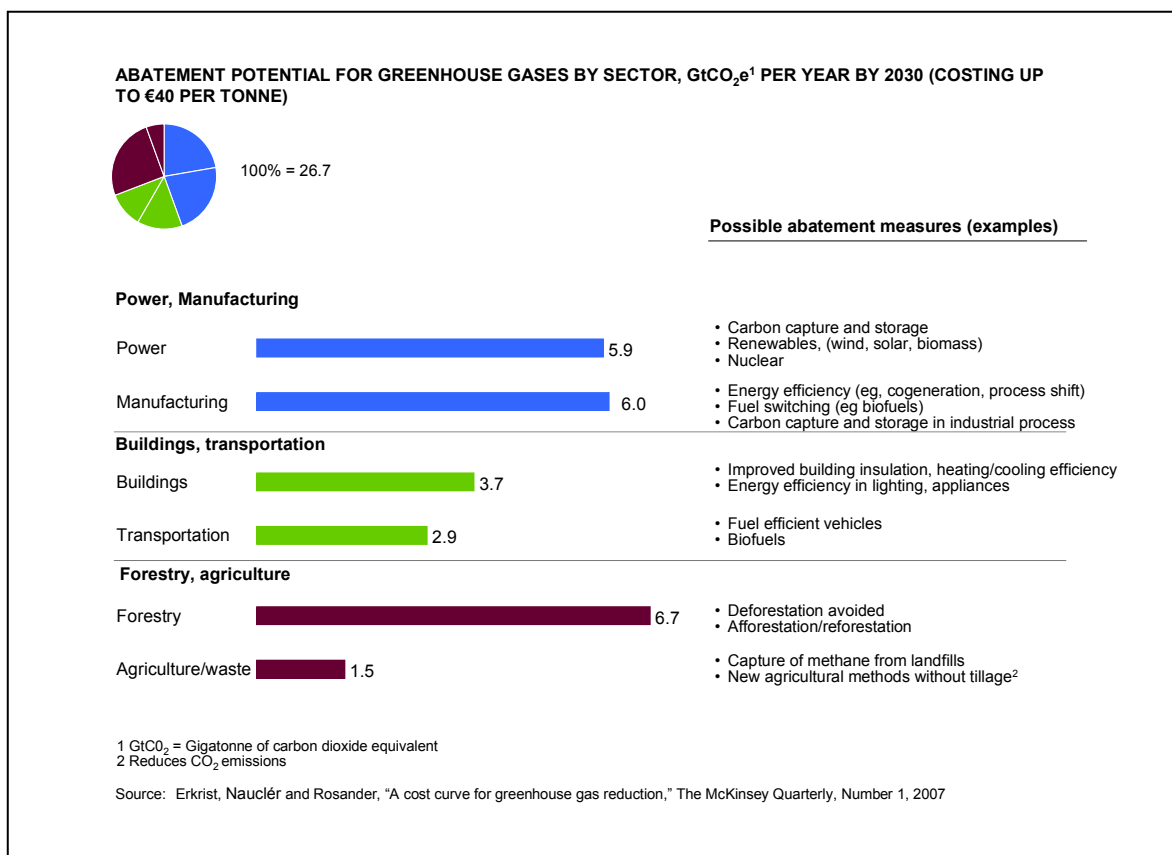
Lowest cost abatement will come from having the broadest possible emissions trading scheme, which means including as many gases as is feasible. Carbon dioxide accounts for 69% of Australian emissions, methane 23%, nitrous oxide 7% and the rest 1% (perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride). These small sources of emissions have a high impact on the climate per volume and usually occur in well-defined industrial processes, so their inclusion may be cost effective.

Governments should be urged to find ways to make the inclusion of all greenhouse gases cost effective. The key point is that if large abatement reductions are required all sources of abatement need to be included in any scheme.

3.2 Maximise the number of sectors that are included in the scheme

Likewise, the required large abatement reductions require that as many sectors as possible are included in the scheme. It is worth highlighting, for example, that by one estimate power generation and the manufacturing sector account for less than half of the relatively low cost potential for reducing global emissions. This is shown in Exhibit 11.

Exhibit 11



If policy makers want to reduce abatement at lowest cost they must include as many sectors as possible in the emissions trading scheme.

This can, of course, prove administratively difficult if the trading scheme is applied "downstream"; that is, as close as possible to users of the final product. It can often then involve numerous small emitters, or consumers, rather than a few large companies. In such circumstances consideration needs to be given to applying the scheme "upstream" to where the product is made which will usually be more efficient. The cost of permits will then inevitably be passed on by these upstream companies as higher prices to consumers.

The question arises, for example, whether including the transport sector would be of benefit. Emission permits could be required by all refineries for both the direct emissions from refining, and for the emissions that would occur from the subsequent use of the fuel (for example, when driving a car). In the latter case this would provide an incentive for the production of less carbon intensive fuels, and the possibly blunt instrument of a general rise in the price of fuel that may encourage the purchase of more fuel-efficient cars. Although the elasticity of demand could be modest, recent responses to the increase in Australian petrol prices may indicate otherwise.

It has been argued by some during the preparation of this paper that oil refiners should not be exposed to the risk of volatile permit prices. That is, if permit prices are volatile the cost of permit acquisition could vary between refiners which

could make it difficult for some to recover all of their permit acquisition costs. While this level of uncertainty will apply to all enterprises that need to acquire permits, it may be worth also considering an equivalent tax on petrol as an alternative.

There are also alternative mechanisms to include the transport sector, for example, baseline and credit or CDM-type approaches. Such approaches would establish a baseline for fuel usage and allow credits for verified mechanisms that yield continuing fuel usage reductions.

Such approaches are already in use with efficient lighting. An organisation called Easy Being Green distributes efficient light bulbs for free and claims a credit under the current NSW Greenhouse Gas Abatement Certificate Scheme.

In agriculture there may be many opportunities. Afforestation or reducing deforestation should be able to deliver credits, and a price signal could encourage farmers to increase the organic carbon levels in their soils. In relation to the latter, farmers could claim credits for maximising their ground cover, maintaining a green crop on the land for most of the year, minimising soil disturbance and improving soil biology. Baseline and later soil measurement would be required but the effect could be significant¹¹.

The key point is that the presumption should be the inclusion of all sectors unless it can be demonstrated that their inclusion is not efficient.

Carbon pricing signals must, however, be introduced wherever possible. This may mean imposing the emissions trading obligation upstream of where decisions are made, or imposing an emissions tax to send an equivalent price signal.

3.3 Allow maximum offsets using benchmark and credit arrangements to meet abatement targets

A major benefit of a cap and trade system is the incentives provided for enterprises to seek out offsets from, say, preventing deforestation, installing energy efficient light bulbs or improving organic carbon levels in soils. The CDM and Joint Implementation (JI) mechanisms described in Appendix 2 also take advantage of this approach.

Since the greenhouse challenge is a global problem there seems little logic placing limits on these mechanisms, as the Kyoto Protocol and the EU-ETS seek to do (see Appendix 2). Limits were placed because of concerns over verification against a business as usual benchmark, and because of an emotional desire to see each country experience broadly equal abatement activity on its own soil.

Concerns about verification, or whether the actions would have occurred anyway, should be addressed directly through the governance arrangements. In addition, it is probably better not to seek purity: it would be unfortunate not to

¹¹ See Rod Rush. "Soil carbon sequestration – an opportunity ignored", 2007, a paper prepared for presentation to the NSW Government so that such an approach may qualify under the current NSW GGAS

approve many appropriate credits in the interests of avoiding a few inappropriate ones.

Indeed, at the extreme, there is no reason why a country's abatement target needs to be achieved within its borders at all if enterprises can find all the required abatement elsewhere. Australia should push for the required changes in any future Kyoto-style arrangements to achieve this.

The potential benefits of these mechanisms are large. For example, using the most thermal efficient electricity generation or steel making technology now in use in Australia would bring major emission reductions in India, China and Indonesia to the benefit of these countries and the global community.

3.4 Make the scheme a long term one to provide greenhouse gas emission and investor certainty

As indicated in Section 2.1 both immediate and longer term targets are required with yearly targets in between. Such targets underpin an emission trading scheme that does not need an end point. The targets themselves define the number of emission allowances issued in each year.

The EU-ETS only runs until 2012, in line with the targets in the Kyoto protocol. While perhaps appropriate for an initial trial scheme this end date has caused considerable investor uncertainty in the EU amongst those investing in emissions intensive assets.

To provide the necessary certainty, therefore, emissions trading schemes should:

- Run for at least 30 years on a rolling basis to reflect the longest commercial investment planning horizons.
- Have a well understood abatement target for each year that would only be adjusted by an independent, well qualified body in accordance with set legislated criteria (see section 3.5.6).
- Lock in the targets on a rolling basis for a period that reflects the usual bankability criteria for projects (say, 10 years).

The fundamental advantage of a long term scheme with a declining emission target over time is that it will send a much higher price signal in later years than earlier ones, and so encourage new technology development.¹²

¹² Note that when allowing the banking and borrowing of permits the forward price curve of permits will largely reflect the risk free interest rate (see Section 3.6 below). This is because banking and borrowing allows permit holders to use their permit at any time so the permit price difference over time will reflect only the interest cost of holding the permit (i.e. cash forgone now but gained later). Much depends, however, on how deep the forward market is over longer periods of time (see Section 3.5.5.). Note also that the bilateral over-the-counter (OTC) market can also provide a longer term price signal.

3.5 Institute a permit allocation system that minimises the need for other structural adjustment assistance to those affected by this significant policy change

There are at least two key permit issue decisions.

- Should permits be issued according to emissions or the economic loss suffered by enterprises with the introduction of emissions trading?
- Should permits be auctioned or issued for free?

Other permit allocation issues are also discussed in this section. These issues go beyond what would be required of globally linked schemes, but it is convenient to canvass these important issues here.

3.5.1 Do not issue permits according to the level of emissions

The importance of the first issue was shown in the EU-ETS, as discussed in Section 1.8 earlier. The outcomes demonstrated there show that permits should not be issued according to the level of emissions.

Permits in the EU-ETS electricity sector, for example, were issued for free to cover most but not all of the electricity sector's needs. "In line with economic theory, these companies pass on the costs of these allowances in the price of electricity ... Companies can either use these allowances ... or sell them ... For a company using an emission allowance, this represents an opportunity cost ... (which is added) to its other (variable) costs. ... pass through rates vary between 60% - 100% ... depending on the carbon intensity of the marginal production unit and various other ... factors"¹³.

There were two problems:

- Electricity companies made windfall profits.
- This free issue equal to nearly all their needs did not stop electricity prices rising considerably which harmed energy intensive and/or trade exposed industries to an extent not predicted.

The other problem was that the permit issue mechanism provided an incentive to increase some emissions rather than reduce them.

- Allowances were allocated for 2005-07, and then were to be allocated every five years taking into account new information. If a firm reduced its production it would likely receive fewer of these valuable allowances in subsequent periods.

¹³ Sijm, Neuhoff and Chen, "CO₂ cost pass-through and windfall profits in the power sector, Climate Policy 6 (2006), p49-50

- In the national allocation plans allowances are allocated free to new entrants – a new entrant could include an existing plant increasing production¹⁴.

3.5.2 Issue permits to compensate for any significant economic loss from the change in the “rules of the game”

The alternative is to issue permits (or the proceeds from an auction) according to the economic loss suffered by enterprises with the introduction of emissions trading. It must be recognised that the introduction of such a scheme represents a major change in the economic “rules of the game”.

There seem at least three instances of economic loss.

- Enterprises in sectors where the emission intensity of production varies significantly, and which are not trade exposed
 - The classic example is the electricity sector where, say, coal-fired power stations are twice as emissions intensive as gas-fired. If the marginal unit in the dispatch is usually gas-fired then such generators may suffer little loss, and so need little or no compensation, but coal-fired generators will suffer significant loss.
- Enterprises whose cost of production will increase significantly with a new cost on emissions, whose elasticity of demand is high and which are not trade exposed
 - That is, as costs and therefore product prices rise, demand and therefore profits will fall.
- Enterprises whose cost of production will increase significantly with a new cost on emissions but who are trade exposed **and** in a situation where not all competitors are in such a scheme.
 - Australia’s mining, aluminium, steel, paper and cement industries, for example, are emission intensive in terms of their cost of production and they are exporters or exposed to import competition.

In the first two cases there is a permanent loss of value with the introduction of the scheme – the extent will depend on the cost of emissions (or permit prices). In the third case the loss occurs only until competitors face a like scheme.

3.5.3 Avoid the practical problems with auctioning permits

The second issue is whether permits should be issued freely to compensate for the above economic loss, or auctioned with the proceeds going

¹⁴ See Damien Demailly and Philippe Quiron, “CO₂ abatement, competitiveness and leakage in the European cement industry under the EU-ETS: grandfathering versus output based allocation”, Climate Policy 6, 2006, p95-6

to those who suffer the economic loss. The differences are likely more political than economic.

- First, since the economic loss suffered by enterprises could well be less than the value of the permits, some permits may be auctioned anyway.
- Second, a practical problem with auctions is the revenue they generate for governments, which is a net drain from the rest of the economy. This drain can be offset if the auction proceeds go to compensate those who lose from the introduction of the scheme, or to the reduction in other taxes, and so support underlying demand in the economy. The concern is that governments will be pressured to spend the proceeds in ways which could see an allocation of resources to projects which could not otherwise justify them.
- Third, it may be better to compensate the losers from this “change in the rules” via permits than cash
 - Some could mistake the latter as a “subsidy” rather than “just compensation”
 - Permit issue may be more GATT-friendly than cash allocations
 - Most important, the price of a permit reflects the immediate costs of the scheme.
- Fourth, an auction requires firms to find significant cash. For example, a \$20/tonne price for Australia’s ~600 million tonnes would require \$12bn to be found per annum.

The main practical argument favouring auctions is that they may provide more stimulus to the secondary market (see Section 3.6 below).

Overall, it seems best to issue the permits for compensation for free.

3.5.4 Seek to reflect recent actions to reduce emissions in the permit allocation mechanism

There is merit in the permit issue taking into account any recent actions taken by particular companies to reduce emissions. This is important for equity, and to avoid firms ceasing their actions to reduce abatement until the emissions trading scheme is operational. The issue is how best to do this.

One approach is to allocate permits according to industry best practice in emissions. While conceptually appealing, there may be practical issues with governments seeking to determine what constitutes best practice in an industry.

An alternative is to take into account the recent benefits of demonstrated action firm by firm.

Another is to set the emission or energy benchmark against performance some years back.

The key point is that any permit allocations to compensate for economic loss needs to be simple and with minimum dispute.

3.5.5 Consider issuing permits annually, for use in any year

With credible annual emission targets (see section 3.4 above) it may be sufficient to issue permits on a yearly basis. That is, there may not be a need to issue them up front for each of the next, say, 30 years, or to issue perpetual permits.

This is because if there is sufficient certainty over permit issue the secondary market could provide “products” for future years (see section 3.6). Compensation formulas, for example, could be set so that even trade exposed companies will know their future compensation levels.

Annual permit issue may be easier than having to determine up front how to allocate later year permits. This applies particularly to trade exposed industries where any loss will depend on when all competitors join the scheme and their production levels in future years. It is also useful to avoid a large once-up flow of auction proceeds which would benefit people today at the cost of future consumers, and which would impose a large burden on companies to find the required cash.

Some could argue that those suffering a permanent loss that can be assessed up front (e.g. coal-fired electricity generation) may wish the certainty of all their compensation (i.e. their stream of permits) being provided at once. Such enterprises can, however, effectively “cash out” by trading their contractual entitlement to a continuing stream of permits on the secondary market.

These issues are complex, but they are fundamental to effective market operation. It may be, for example, that some much later year and dated permits will need to be issued to provide some price discovery beyond the period that financial markets will provide prices. There is a difficult balance here in terms of how many later year permits would need to be issued to achieve the required price discovery.

3.5.6 Establish an “RBA-type” permit issue authority

There are two tasks that could best be carried out by an independent body staffed by qualified professionals and with a board composed of people with relevant skills.

- The continuing 10 year out rolling target adjustment process. (Note that the Government would establish the original yearly targets as well, of course, as the long term aspirational target).
- The permit issue to compensate those enterprises suffering economic loss.

Of course, both tasks would be carried out subject to strict guidelines in legislation, which can be changed at any time by Parliament. In this sense

any such body would operate just as the Reserve Bank of Australia; note that the Government can override RBA decisions but must notify Parliament if it does this.

The two tasks are related but different. The target adjustment process must reflect the latest science and economics to judge the continuing need and cost of abatement, and the cost of adaptation. The permit issue task requires economic and commercial skills. Given that the tasks are closely related it seems better to have one rather than two institutions.

3.6 Ensure the scheme facilitates an active secondary market

An active secondary market is fundamental. Indeed, it is probably the dominant reason for favouring emissions trading over a carbon tax. It brings at least three key benefits.

- As with any secondary market it is the most efficient way for those who need permits to gain access to them for the current and future years. Large and small enterprises can gain access to permits equally, as there will be many active traders who can provide advice and undertake trades.
- It can provide a forward price for permits for as long as firm emission targets are set, which is fundamental for investor certainty.
- As emission caps reduce in later years they will provide a high price signal which can justify investment in new approaches or technology.

3.6.1 Some lessons from the EU-ETS

The EU-ETS provides at least three lessons in relation to secondary markets.

- With the scheme uncertain post 2012 the market cannot provide useful forward signals for investors.
- Permit issue became uncertain which led to large swings in permit prices.
- Permits were issued to enterprises that were not used to trading them – they “sat” on them for their own use, which reduced market liquidity. In addition, some firms who received permits valued them at zero on their books and then faced accounting issues when they wished to trade them.

It is this last point which favours the auction over the free issue of permits. It is unlikely, however, to be a determining consideration.

3.6.2 Likely key requirements for an active secondary market

There seem a number of key requirements for an active secondary market.

- Legislation is required that allows permits to create a clear property right to emit.
- Firm yearly caps on emissions are required for many years out, say 30 years (see Section 3.4 above).
- There needs to be confidence in the integrity of the future target setting and permit issue process (see Sections 3.5.5 and 3.5.6 above).
- Permits can be banked and borrowed to maximise liquidity in the market. If there is integrity in the permit issue process, a declining emissions cap and a strong credit review process, borrowing will not undermine the objectives of the scheme (see 3.6.3 below).

There may be concerns that allowing maximum overseas offsets may make it difficult for the market to form a coherent view on forward market prices. This should not be a problem as, for example, the CDM mechanism is worldwide and world judgements on its forward curve are already well formed. Indeed, having emission trading schemes linked in that they can trade with each other should lead to a convergence of national forward curves or future prices and greater price stability.

It is also worth highlighting that, wherever possible, existing market infrastructure should be utilised including registries, trading platforms and clearing and settlement facilities. Some of Australia's existing schemes (see Section 4.2.8) have developed their own registries and platform which has led to unnecessary duplication and less familiarity for market participants.

3.6.3 Allowing “borrowing” from the financial market

The idea floated here requires further discussion with those in financial markets but it is worth putting into the debate.

The idea is not to allow individual firms to borrow in the sense that they fail to provide a permit for their current emissions but promise to do so in future. The idea instead is that “authorised dealers” in the financial market can borrow from the RBA-like issuing authority.

Enterprises wishing to borrow would do so from these authorised dealers. Financial market participants could provide a permit to the enterprise but must acquit this to the regulating identity at a future time by, for example, purchasing from a later annual auction of permits.

There would likely be a high effective interest rate on the transaction created by the rising forward curve. That is, permits sold at subsequent auctions will be expected to be more expensive with a declining emissions cap and, of course, financial market participants will add a premium to allow for the uncertain price they will have to pay at that later date.

Borrowing in this way brings an important advantage in that it reduces permit price volatility. Without borrowing permit prices will swing according to changes in the supply and demand for them in any one year (which could

depend on, for example, weather patterns). With borrowing, prices will better reflect long term demand and supply and so be more stable¹⁵.

Note also that the risk on the financial integrity of the borrower lies with the financial market participant. Just like in the financial markets they will require some form of security to cover their exposure to the borrower.

Finally, under this mechanism it is very unlikely that there will be large scale borrowing to be paid back at a much later date. This is because the relevant financial institutions will apply the same standards of credit analysis they apply to any decision to extend credit. It is much more likely that there will be minor borrowing to smooth out emission permit demand “bumps”. This provision would, for example, allow firms to keep operating while making the investment to reduce emissions at a later date.

3.7 *Ensure sound governance structures that are mutually recognised in the linked schemes*

This point is self evident, but no less important for that.

The governance structures must, among other things, include:

- Sound emission measurement and reporting systems, both in terms of starting benchmarks and over time.
- Accessible and up-to-date permit registries and clearing mechanisms.
- Target setting and permit issue processes with integrity (as already discussed).
- Clear, enforceable penalties.
- Legislative certainty.

The above is not meant to be complete, but indicates the nature of what will be required. It is important that all key design elements are compatible between schemes, and that the scheme’s governing institutions meet regularly to draw lessons and seek scheme convergence across nations wherever possible.

¹⁵ With banking and borrowing forward permit prices will reflect the available arbitrage between years and so the risk free interest rate, but they will be set based on a longer term view of supply and demand. Without borrowing in particular the forward prices will alternate between being determined by this arbitrage on the one hand and by more immediate supply and demand forces on the other, and so they will be more volatile.

4 Objectives or criteria for the assessment of any national policies

The Government's Task Group Terms of Reference requires it to "... report on additional steps that might be taken, in Australia, consistent with the goal of establishing such a (workable global emissions trading) system". These are clearly steps well beyond current policy.

It is reasonable to assume that the Task Group will consider steps towards a comprehensive national market based response, and a range of measures that can support such a move. With this in mind the objectives or criteria considered in this section will be grouped under these headings.

Before addressing these headings some preliminary points need to be made.

4.1 Issues relevant to considering a coherent national response

There are a number of important points that can be made in relation to a coherent early national response.

First, the current greenhouse policy uncertainty is already affecting Australian businesses. They are being adversely affected by the current disparate and often poorly formulated policy responses from governments to date. In particular, each State has very different policies, and most seek to pick technology winners (the exception is the NSW NGAC scheme, which is reasonably soundly based). Likewise, the Commonwealth's Mandatory Renewable Energy Target's (MRET's) focus is only on renewable energy, so it is not focussing on lowest cost abatement.

One way to illustrate this effect is to consider the position of those contemplating baseload electricity generation investment. The lowest cost baseload generation (coal-fired) faces the largest potential cost from future greenhouse responses. Those facing lower potential costs (gas-fired, renewables, nuclear) are not currently economic and/or are not suited to baseload generation. Do investors go for investment in coal-fired generation, given the potential for later cost increases that could make their investment uneconomic? Or do they invest in baseload gas-fired or other lower emission technology knowing that this generation will not often be dispatched as it is not currently competitive with coal-fired generation? Such uncertainty is causing under-investment in Australia's baseload electricity generation.

Second, and linked to the first point, the current disparate and poorly formulated responses to the greenhouse challenge to date mean that Australia's overall welfare would be improved if more efficient greenhouse policy was to substitute for current policies. It is not just current policies that are a concern. Greenhouse-specific regulatory hurdles for particular projects are also occurring with growing frequency.

Third, if Australia moves early it can put in place sensible arrangements without the compromise inherent in international negotiation. Further, sensible

Australian policy might help guide future international policy. This could apply, for example, in allowing country abatement targets to be achieved by abatement elsewhere, without limit, which is inconsistent with the current Kyoto protocol and EU-ETS.

Finally, Australian enterprises can gain the skills required to participate in such schemes at an early stage and in a measured way.

On the other hand there are some obvious concerns.

The main concern is the effect on individual enterprises from any change in “the rules of the game”. While many sectors will be affected whether any scheme is domestic or global, some will be significantly adversely affected by a national scheme. This is because Australia, due to its resources endowment, provides many emission-intensive exports whose main competitors often can or will be in developing countries.

Another key concern is that if some countries proceed alone this lessens the pressure on other countries to deal with what is a global problem.

These concerns are already in evidence overseas. Companies in the EU complain of competitiveness concerns in relation to companies from countries without an emission trading scheme (be they countries that have ratified Kyoto or not). Further, negotiations on future international arrangements are becoming difficult as developed countries seek at least some minimum undertaking from developing countries.

In addition, we need to be sure that we act in a way that allows for flexibility to adapt our policies as we gain more information on the costs of abatement and mitigation.

4.2 Objectives or criteria that should drive any national market-based response

There would seem to be at least 10 objectives/criteria that should guide any national market-based response were the Government to consider such a move.

4.2.1 Establish clear yearly targets as well as a long term target that will drive reduced emissions relative to a business-as-usual outlook

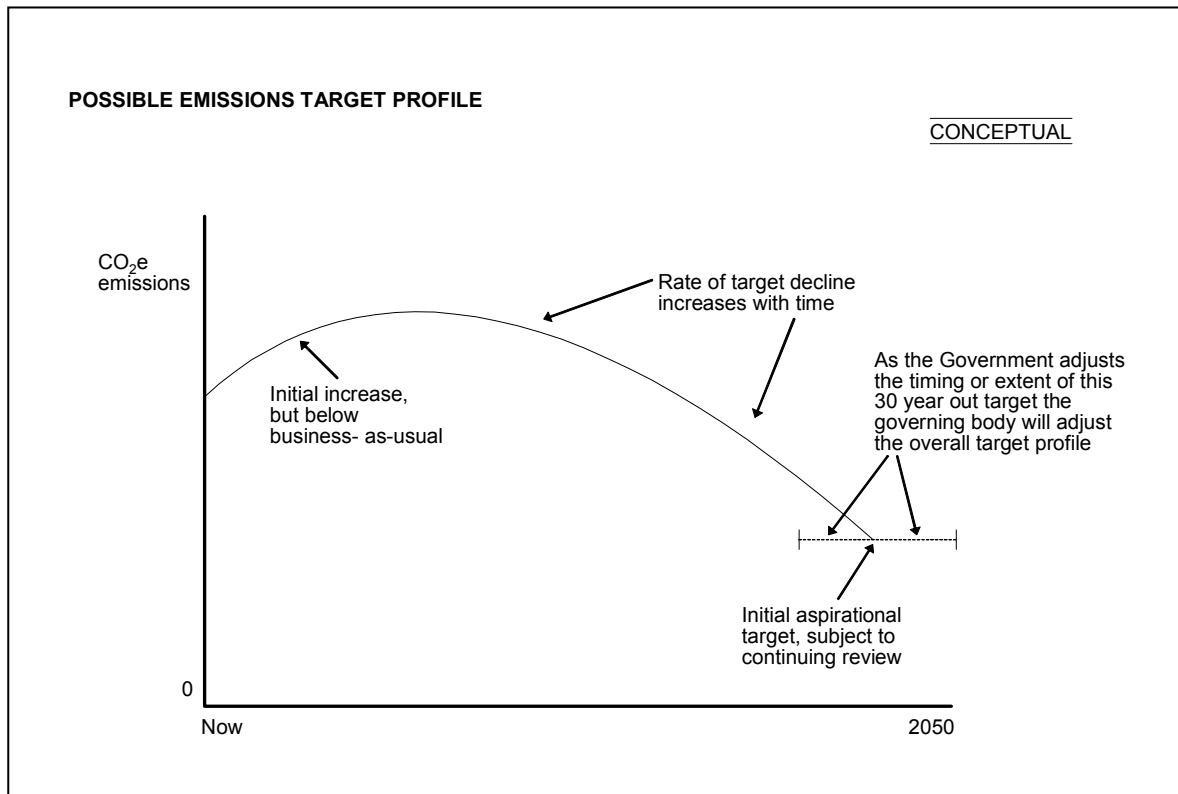
This is, of course, a fundamental outcome from any measure. Consistent with what was stated in Section 2 this would require a series of emission reduction targets starting as soon as the appropriate systems and mechanisms are in place and stretching out for at least 30 years on a rolling basis with an ever declining emission cap.

In setting the 30 year targets a number of considerations should be kept in mind. Note that it is proposed that the initial yearly targets should be set by the Government, and updated by the governing (RBA-like) authority.

- First, any emissions cap should allow the Australian economy to make the transition sensibly
 - There is no point setting early targets that will not be met. Credibility is important, and any early success or failure will build on itself.
 - Significant reductions in emissions represent an important change. Making haste carefully will ensure that the inevitable mistakes and disruption will be kept to a minimum.
 - If Australia commits to reduce emissions significantly before others this increases the risks. This is another reason to move carefully.
- Second, any initial target must be consistent with an appropriate long term target. This will be based on necessarily inadequate judgements about where the marginal cost of adaption equals the marginal cost of abatement.
- Third, the targets must be reviewed continually but consistent with the aim of providing investor certainty (see Section 4.2.7 below). Following Section 3 above this means:
 - The RBA-like governing authority could reassess the targets it sets after the 10 year period on a transparent basis against the legislated criteria, and the final government-set “aspirational” target
 - Governments need to review these criteria and final aspirational target and reset them based on whether there are major changes in the greenhouse “landscape” such as changing scientific understanding on greenhouse effects, international approaches to greenhouse abatement or technology breakthroughs.

It is possible from the above that Australia’s profile for our emissions target could look like that in Exhibit 12 below.

Exhibit 12



Sensible, credible targets are an essential element of greenhouse policy,

4.2.2 The abatement achieved should be that which is lowest cost, which favours a comprehensive cap and trade system

This objective is in sharp contrast with most of Australia's existing measures. It clearly favours a comprehensive (in terms of sectors and gases) domestic cap and trade system, subject to the other criteria listed below. Lowest cost abatement can only be achieved when the largest number of sectors and gases are being targeted.

4.2.3 Any scheme must be part of a coordinated strategy to develop a global scheme

This objective, firstly, dictates that Australia should only consider a cap and trade system as this is the direction already taken by the EU, California and Oregon, and the North Eastern States in the USA (RGGI). Such an approach can also link in with any developing country baseline and credit schemes.

In designing a domestic scheme we can allow credits from such schemes, even if this is only a one way recognition: that is, we can recognise permits generated by other schemes even if they do not recognise our permits. The key criteria for recognition will be whether overseas permits are backed by credible governance arrangements that see genuine abatement, and are not double counted.

Second, any Australian moves must have a close eye to increasing our ability to influence the international debate, and must have sufficient policy integrity to provide guidance and encouragement to others to move also.

4.2.4 While policy announcements could require an immediate start, be sure to put in place all the prerequisite steps before trading is allowed to begin

To reduce uncertainty, and to begin achieving the objectives of any scheme, an immediate start has advantages if the Commonwealth Government decides to take significant domestic policy steps. It is very important, however, to be clear about what an “immediate start” involves.

Any announcement of a domestic emissions trading scheme will not mean instant trading. Instead it will mean taking the many steps required to put the required infrastructure in place.

The EU-ETS suffered from allowing trading before all the necessary infrastructure was in place in terms of measurement and reporting. This is another lesson we should learn from the EU-ETS.

At a minimum, and at a high level, the following will need to be completed before trading begins.

- Establishment of the appropriate institutions, such as the RBA-like entity described in Section 3.5.6 above which can implement the other steps described below.
- Accurate measurement and reporting protocols and systems across all sectors for all emissions whenever practical. While the electricity sector appears to have well established systems, some other sectors do not.
- Appropriate verification of the monitoring systems and reports.
- Determination of which sectors and gases will be included based on appropriate cost/benefit analysis.
- Establishment of the required national registries.
- Community education programs so that people understand what they must do, and what the likely impacts will be.
- Establishment of the yearly targets based on sound science and prudent risk management principles.
- Formulation of appropriate penalties for non compliance.
- Formation of the required trading platforms.
- Establishment of appropriate offset verification mechanisms, to deal with both domestic and international offsets.

Successful emissions trading will require deep political acceptance. Such acceptance will not be forthcoming if any scheme is too narrowly based,

damages Australia's competitiveness, or is poorly or prematurely implemented. Such a scheme will also not encourage other countries to follow.

As already stated in Section 1.1, given the nature and size of the greenhouse challenge it is crucial that the key policy responses are well designed and implemented.

4.2.5 Permits or offsets from overseas should be accepted without limit

Linked to the previous point there seems no logic in limiting the level of abatement accepted from overseas provided it is genuine. Greenhouse gases are a global challenge. Australian companies should have an incentive to find the cheapest source of abatement worldwide. Indeed, this is a key point.

One advantage of moving early is the ability to find the cheapest abatement worldwide to meet any Australian targets. To limit the source of abatement to that which occurs domestically is to remove one of the few commercial advantages of moving early.

In discussions during the preparation of this paper three arguments were put against unlimited permits or offsets from overseas. All are capable of being met or refuted.

- First, unlimited permits or offsets from overseas may prevent Australia from making the necessary structural changes to its economy
 - Either few other countries will implement emissions trading or other significant measures, in which case Australia should continue to seek the lowest cost abatement overseas; or other countries will quickly implement like schemes and Australian industry will adapt and increasingly rely on internal sources of abatement. Australian industry should judge this timing, not governments.
- Second, it has been argued that such unfettered access to overseas credits or permits could introduce instability into our domestic permit prices over which we will have no control, or it will be inconsistent with a price cap (see Section 4.2.10 below)
 - On the contrary, being linked to a deeper overseas market will likely bring price stability rather than volatility
 - If Australia caps the price of its permits for a period we can still gain access to overseas credits and permits, but this will be one-way trade as overseas countries will not accept our permits as to do so would be to accept our price cap.
- Third, we need to ensure any overseas permits or offsets are real
 - We will need to be able to verify overseas systems to ensure additionality in particular, that is, to ensure that the emission

reduction behind the permit or credit would not have occurred anyway, and will continue.

At its core there is a parallel here with free trade in a GATT context. Just as countries have determined that it makes sense to import when others are more efficient at producing an item (they have a comparative advantage), so it makes sense to allow permits and credits to be traded to an unlimited extent. Like the benefits of trade, it will lead to lowest cost abatement for the world.

It should, therefore, be clearly stated that any Australian scheme will accept permits created in any credible market, CERs created under the CDM mechanism, and genuine credits outside CDM such as unlimited reforestation provided it passes sensible additionality tests.

4.2.6 Trade exposed enterprises must be fully protected, as well as other enterprises significantly adversely affected

This is fundamental. There would be little logic, for example, in sending production and emissions overseas to satisfy an unchanging world demand because we reduce our competitiveness. Such a scheme would certainly not inspire others to follow our example. Many of our competitors are not as emission efficient so the level of global greenhouse gases would increase, not decrease as intended (India and China, for example, have steel plants that emit more than double the CO₂ emissions per tonne of steel that Australian plants do).

All of the points in relation to permit allocation from Section 3.5 above apply. That is, there should be an annual issue of free permits to compensate:

- Enterprises in sectors where the emission intensity of production varies significantly.
- Enterprises whose cost of production will increase significantly with a new cost on emissions and whose elasticity of demand is high.
- Most important, enterprises whose cost of production will increase significantly with a new cost on emissions but who are trade exposed to countries without a like scheme. This can reach quite deeply into Australian industry. For example, those who make goods that use significant amounts of Australian steel and compete with imports will need compensation.

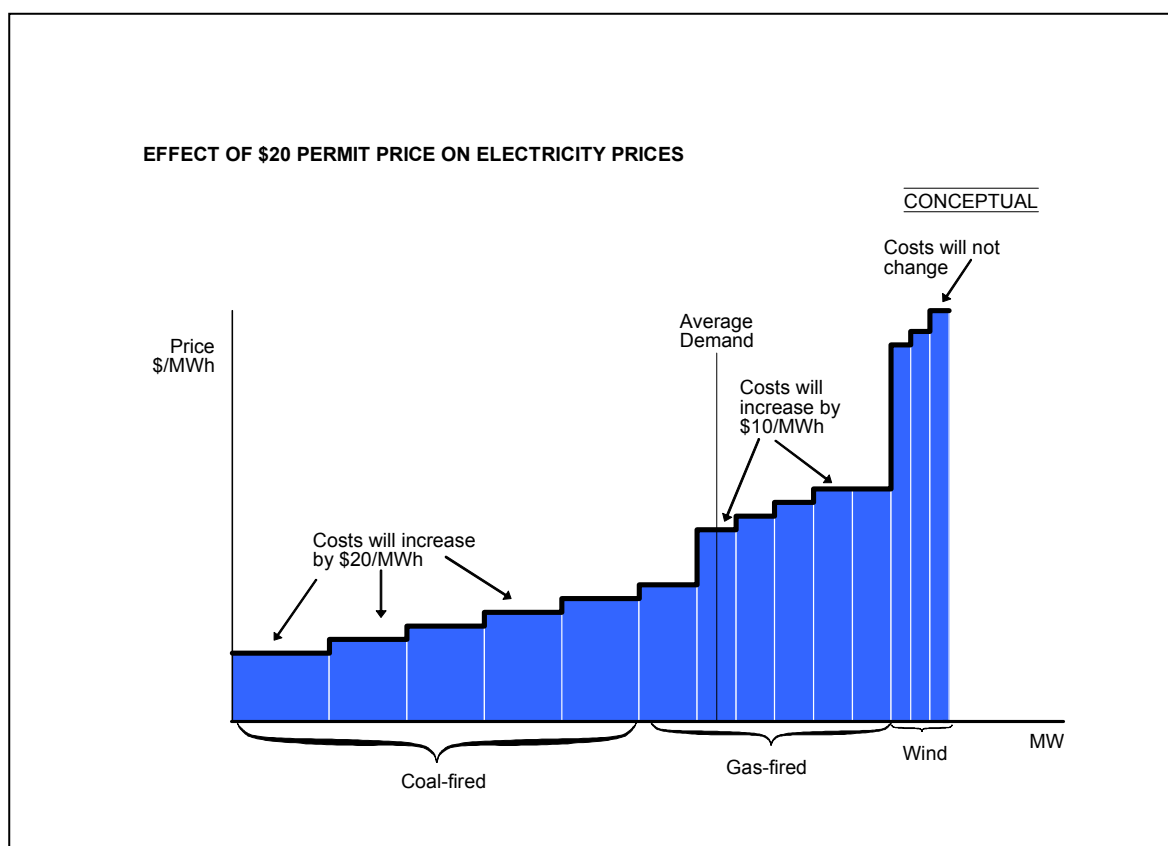
More detail on permit allocation

Given the importance of this compensation issue it is worth illustrating how it could work.

In the case of the electricity sector, for example, the emission intensity of production varies significantly. For example, coal-fired generation usually emits around one tonne CO₂ for each 1 MWh produced; gas-fired generation half that; and renewables can cause no emissions. If it is assumed (as can

often be the case) that gas-fired generation is the price setter (i.e. where supply most often meets demand) then it is reasonable to assume that if permit prices equal \$20 for one tonne of CO₂e then electricity prices will increase on average by \$10/MWh. This is illustrated in Exhibit 13.

Exhibit 13



In this situation gas-fired generation is no worse off with the introduction of emissions trading. They must pay \$10 extra for each MWh produced, but they can increase prices by this amount. Coal-fired generators, however, see their prices increase by \$10/MWh, but their costs increase by \$20/MWh. Gas-fired generators do not need compensation; coal-fired generators do.

In practice the situation is more complicated. Demand varies during the day and coal and gas-fired generation will alternate as the marginal supplier. There are, however, a number of electricity system models that can estimate the effects of a \$20 permit price on electricity prices.

The loss to the coal-fired generator is, of course, permanent (but it will vary through time with permit prices). It does not depend on whether the emissions trading system is global or national.

By contrast, the trade-exposed sector is significantly disadvantaged by a domestic scheme, not necessarily a global one. They would require compensation as long as their international competition comes to a significant extent from countries without an equivalent cost on emissions.

Compensation to the trade-exposed sector would need to cover the issue of permits for their own emissions, and the issue of permits to cover the increased cost of their inputs due to the scheme. A steel maker, for example, would need to receive approximately 2.2 permits for each tonne of steel produced, as well as a permit for each 2 MWh of electricity consumed (assuming gas-fired generation is the marginal supply unit).

Other issues for the trade exposed sector

It would be sensible to test that any compensation regime for the trade exposed sector does not run into GATT issues before settling the detail of any scheme.

The compensation via permit issue for the trade exposed sector should also accommodate plant expansions and new capacity by new entrants. This is the only way to protect Australia's competitiveness. Indeed, until our competitors face a similar scheme the basic logic for compensation is the same for both existing players and new entrants. To support new investments there should be long-term enforceable allocations of permits while ever our competitors do not have a like scheme.

One problem with this full compensation is that trade exposed enterprises have no particular incentive to reduce emissions, directly from their own processes or indirectly from those they buy their inputs from (for example, electricity – apart, of course, from their desire to reduce these large costs generally). An additional mechanism could, therefore, be put in place.

It is suggested that the direct and indirect emissions be measured from such trade exposed enterprises and that they then be subject to a rolling baseline and credit scheme. This would allow these enterprises to create credits if they are below the emission baseline. The baseline would be reset on a rolling basis to provide an incentive for continuous improvement. Whether or not there are penalties for not meeting the baseline would need to be determined.

Note that in the case of the non trade exposed enterprises that receive compensation this can take the form of a one-off compensation assessment. Once undertaken they will then have every incentive to reduce emissions. In the case of the trade exposed sector, however, their compensation must be determined annually based on whether their competitors are yet subject to a like emissions trading scheme. This continuing assessment removes their incentive to reduce emissions, which is why the above additional mechanism should at least be considered.

It should also be noted that the trade exposed sector has another incentive to be emission efficient. As Australia's competitors introduce like schemes the compensation will cease and emission efficiency will become a key source of competitive advantage.

It is also worth noting that compensating the trade exposed sector (or, indeed, electricity generators) can impose an additional cost on other sectors.

Much will depend on the extent to which Australia's emission target takes into account this compensation until a global scheme is in place.

4.2.7 Enterprises should be able to invest with certainty

All the parameters discussed in Section 3.4 should be considered. That is, the scheme could run for at least 30 years on a rolling basis; emission abatement targets could be fixed for, say, 10 years on a rolling basis with clear guidelines for targets after that to ensure projects can be bankable; and the target setting and permit issue process could be run by an RBA-like body.

In addition, all sectors should be included from the beginning. To start with one sector, such as electricity, with the intention of including others at some later date, would create uncertainty across the economy. It will not take that much longer to settle the full scheme details, or at a minimum to provide a firm timetable when various sectors will be included. We need to avoid the situation where the more politically sensitive sectors such as transport (which will increase the price of petrol) are excluded, and the burden of emission reduction is therefore put onto the rest of the economy.

4.2.8 Inconsistent schemes should be phased out as quickly as possible

One main justification for a coherent national response is to have a measure that can replace the current ad hoc schemes. Clearly a domestic emission trading scheme would be inconsistent with MRET and other renewable schemes, with the NSW NGAC scheme, with the Queensland Gas Certificates Scheme, and with any Western Australian carbon tax.

The key principles are that:

- There should be only one scheme in Australia putting a price on carbon.
- It is inconsistent with an emissions trading scheme to have schemes that bias towards one form of technology over others.
- Investors will not achieve certainty while there is the likelihood of new schemes.

Indeed, if existing schemes are not phased out it is unlikely that any domestic emission trading scheme will attract wide support. Of course, those currently benefiting from such schemes would need to have their current benefits "grandfathered" in some way.

In addition, it also follows that with any domestic emissions trading scheme there would be no need for any separate greenhouse-related regulatory hurdles on projects.

Preliminary advice indicates that the Commonwealth likely has numerous heads of power under which it can ensure this outcome. While it is to be expected that all State Governments would acknowledge that this is a national issue, and will be pleased to vacate the field to facilitate a national

emissions trading scheme, it would help provide certainty if the Commonwealth were to ensure this is the case.

4.2.9 Ensure an active secondary market

This point is included simply to reinforce all the points made in Section 3.6 above.

4.2.10 Introduce some “safety valves” such as capping the price of permits until certain milestones are met

It is important to realise that consumers will see a reduction in welfare overall from the introduction of emissions trading (or a carbon tax). This is because the effect of emissions trading is to divert effort into producing the same goods and services we enjoy now but with lower emissions. Thus, the electricity, cement, steel, paper and other products we all consume must cost more than currently as, for example, more gas or wind power is used than coal to generate the same electricity, or money is spent to reduce emissions when producing the same level of cement.

There are two separate reasons, therefore, for “safety valves” such as capping the price of permits.

First, Australia should cap the price of permits until sufficient countries have linked emission trading schemes. While Australia can protect its trade exposed enterprises to a large extent there is still an overall economic burden of such a scheme. The cap can be adjusted depending on how many countries have like schemes.

Second, there is merit in a careful start. An emission trading scheme is a large and complex change. The price cap provides effective “training wheels” and it allows Australia to adjust the cost of mitigation to the evolving cost of adaption. In this way the cost of mistakes, which are inevitable, will also be limited.

It is unclear how long the price cap would need to be in place. In terms of the second reason for having it, a period of 3-5 years may be sufficient.

The price cap can be implemented by having the permit issuing authority standing ready to issue unlimited permits at a given price. While this can affect the short term emission reduction it should not affect the underlying abatement incentives from the scheme. This is because the secondary market will produce a forward curve with prices for longer term permits which reflect the long term emission reduction target. If this caps emissions well below today’s levels then longer term permit prices should be very high. It is these prices that will signal the required investment in new technology.

It is important that the price cap reflect an estimate of the price needed to achieve the abatement target set in the early years. Otherwise the price path of permits over time (or the yield curve) will not be smooth; if the short term

price is held artificially low this could prevent the realisation of higher long term prices.

It could also provide an incentive for people to bank their permits with the intention of selling them at a later date to benefit from a sharply rising forward price.

This point is consistent with that made in 4.2.1. In the early years the emissions cap should allow the economy to transition sensibly, which would support a modest price cap.

It is worth highlighting some recent analysis by the Electricity Supply Association of Australia (esaa). This suggests that the cost of carbon capture and storage may only be about \$15-25/MWh above current coal-fired generation, yet such technology has only one fifth the level of emissions. There is, of course, still considerable uncertainty over these cost estimates. The point is, however, that relatively modest prices can drive significant changes.

A price cap could be seen as inconsistent with trying to create a vibrant secondary market. While it is not ideal, discussions with financial sector participants suggest that, when combined with all the other elements already discussed, a price cap will not undermine the development of a vibrant secondary market.

4.3 Objectives or criteria for other supporting measures

In addition to any interim steps being built around a market based measure consideration would also need to turn to other supporting measures. The Australian Business Roundtable on Climate Change in particular has also focussed on such measures.¹⁶

4.3.1 Support the development of low emission technologies

A comprehensive global study of the required steps that need to be taken has found that "... almost three quarters of the potential to reduce emissions comes from measures that are either independent of technology or rely on mature rather than new technologies".¹⁷ That said, however, over a quarter of the measures do require the deployment of new technology, in the power sector in particular (such as post combustion carbon capture and storage).

To assist the deployment of this new technology the Government could consider some form of fiscal incentive. Section 2.6 above mentioned that

¹⁶ See Australian Business Roundtable on Climate Change "The Business case for early action", April 2006.

¹⁷ Erkrst, Nauclér and Rosander, "A cost curve for greenhouse gas reduction," The McKinsey Quarterly, 2007 Number 1, page 40

those who initially deploy such technology may not be able to capture all the benefits from their investment.

The key point must be that any government support must leverage private sector decision-making. Whatever assistance is given, it must be the market and not governments that “pick the winners”.

4.3.2 Consider whether any emission or energy compulsory standards need to be changed

This suggestion also follows from Section 2.6 above, and needs to be approached with some care. There could be some immediate changes to building codes or appliance standards as shown by the recently foreshadowed phasing out of incandescent light bulbs in favour of compact fluorescent lights requiring only 20% of the electricity. Such moves, however, should only occur where the new standard or code will reduce costs, and it is judged that inertia currently prevents people from changing their consumption patterns anyway. Other changes could await the response to the combination of increased prices and education.

While there have been consumer awareness campaigns on many greenhouse measures they may have more “bite” in future if accompanied by price increases in petrol and electricity as a direct result of a market mechanism. It is worth noting the following:

- The Energy Supply Association of Australia (esaa) has estimated that the measures required to reduce electricity emissions by 30% below 2000 levels by 2030 will increase electricity prices by 20-50%.¹⁸ Such an increase accompanied by further education in energy efficiency could have a major effect.
- When petrol prices increased recently by over 30% to reflect rising oil prices there was considerable anecdotal evidence of a trend to purchasing more fuel efficient motor vehicles.

The key issues are how sensitive demand will be to changes in prices, and how much direct influence governments should have over what people can buy and use. In a market economy it seems better to try market solutions first and only turn to government decision-making when the evidence of market failure is clear. Every change has a cost which we should seek to minimise through market-based decision making.

4.3.3 Improve Australia’s information base on greenhouse issues

There are a number of steps that can be taken.

- Australia could understand better its full greenhouse gas abatement cost curve (that is, replicate Exhibit 5 above for Australia)

¹⁸ esaa, “Emissions targets and least cost generation options”, November 2006

- Australia could build the modelling capacity to estimate the full economic cost of climate change on a continuing basis so that the cost and benefits of future mitigation and adaptation actions are clearer.

4.3.4 Increase Australia's resilience to climate change

Governments can do more to prepare Australia for the impact of climate change. More consideration can go into how we integrate adaptation policies into, for example, our development and planning policies at all levels.

Adaptation policies could affect how we deal with water, health, biodiversity and climate-dependent industries. While Australia's current problems with urban and rural water are much more man-made (no new supply sources built in 20 years, over-allocation of rural water) than natural, clearly future water planning requires that the impact of climate change be fully taken into account.

4.3.5 Use international diplomacy to push for at least some modest move towards a global compact on emissions

If the world is to tackle the greenhouse challenge clearly all major emitters must be on board in some way and so there is a key role for continuing international diplomacy. Whether major developing country emitters adopt a phased approach, a baseline and credit scheme or an approach where commitments depend on particular hurdles matters less than gaining their inclusion in some way.

5 Addressing the greenhouse challenge

Sensible risk management requires well considered and flexible policy responses to the greenhouse challenge. As we improve our understanding of the costs of mitigation and adaption we need to be able to adjust our policy responses. Indeed, we need to set yearly targets for greenhouse abatement that run for at least 30 years, we need policies to achieve these targets, and we need to keep both the policies and targets under constant review.

We should not be too pessimistic concerning a global solution. The EU has moved, as have many key States in the USA. The USA's approach overall will likely change in 2008 if not before.

While the developing countries will not want to limit their economic growth they must eventually be included to solve the problem. This means that the developed and developing nations must "cut a deal". The developed nations have the money to achieve this, and all nations can see the imperative for action.

With Australia's close links to the USA, China, India and other relevant countries, and with our ability to learn the lessons from the policies of others, we are well placed now to provide some intellectual leadership on these issues.

* * *

Appendix 1 – Emissions categories (from Exhibit 3)

Energy industry: fuel combustion to provide electricity generation, petroleum refining, gas processing and solid fuel manufacturing.

Transport: emissions from road, rail and domestic air and water transport. Rail includes railways but not electric rail, which is covered under electricity generation.

Other fuel combustion: manufacturing industries and construction, (steel, non ferrous metals, pulp and paper and food processing) and other sectors (energy use by commercial institutional and residential sectors as well as fuel use by agricultural, fishery and forestry equipment and all remaining fuel combustion emissions).

Fugitive energy emissions: emissions from coal mining and handling and oil and natural gas production, processing and transportation.

Enteric fermentation: emissions associated with microbial fermentation during digestion of feed by ruminant domestic livestock.

Other agriculture: emissions from sources including manure management, rice cultivation, agricultural soils, prescribed burning of savannas and field burning of agricultural residues.

Industrial processes: sources of emissions include cement clinker and lime production, industrial smelting processes, metal production, the chemical industry and refrigeration and air conditioning equipment.

Land use: Includes afforestation and reforestation and reduction of deforestation.

Waste: predominantly methane from decomposition of organic matter in landfill and sewerage systems.

Appendix 2 – Flexibility mechanisms under the Kyoto Protocol

The Kyoto Protocol aims to cut total greenhouse gas emissions by at least 5% from 1990 levels by 2008-12. Countries (or regions in the case of the EEC) that ratify the Protocol commit to individual, legally binding targets to limit greenhouse gas emissions. Most countries agreed to reductions from 1990 levels, but Norway, Australia and Iceland have targets above 1990 levels (1%, 8% and 10% respectively).

The targets cover the six main greenhouse gases, and in order to achieve the specified abatement countries are obliged to put in place domestic policies and measures. Countries may either reduce emissions or may offset emissions by removing emissions from the atmosphere using eligible "carbon sinks" in the land-use change and forestry sectors. This creates Removal Units (RMUs).

If a country does not meet its target, it must submit 1.3 times its shortfall in the second commitment period as a penalty. "Selling" eligibility under trading is also then suspended.

The Protocol has three flexibility mechanisms designed to assist Annex 1 countries meet their obligations in a cost effective way by taking advantage of cheaper abatement opportunities than may be available domestically. The three mechanisms are the Clean Development Mechanism (CDM), Joint Implementation (JI) and Emissions Trading. CDM and JI are both project based mechanisms. Domestic action, however, must be a "significant element" of efforts to meet obligations, and use of the flexibility mechanisms must be "supplemental to domestic action."

In order to participate in the flexibility mechanisms countries must be Annex 1 countries and must have ratified the Kyoto Protocol. Businesses, environmental NGOs and other legal entities may participate in the mechanisms, but governments retain responsibility for meeting targets.

Clean Development Mechanism (CDM)

Under the CDM Annex 1 countries may implement projects which reduce emissions in non-Annex 1 countries and claim the reductions (Certified Emission Reductions – CERs) to meet their own target. CERs should not be based on emissions reductions from nuclear facilities. CERs based on afforestation and reforestation up to a maximum of 1% of a country's base year emissions may be used to meet annual obligations. The first CERs were issued in 2005.

Joint Implementation (JI)

Under JI Annex 1 countries may implement projects which reduce emissions in other Annex 1 countries and use the Emission Reduction Units (ERUs) generated to help meet their own targets. ERUs will be valid from 2008.

Emissions Trading

Under emissions trading a country may buy units of emissions allowances from other Annex 1 countries and use them to meet its obligations. Each country must hold a minimum "commitment period reserve" to prevent them being unable to meet their own obligations by overselling units.

Application of flexibility mechanisms in the EU-ETS

Under the EU-ETS member countries may use CERs from CDM projects and ERUs from JI projects to help meet their Kyoto obligations. CDM credits can be used in EU-ETS from 2005 and JI credits may be used from 2008. All types of CDM and JI credits are permitted, except from nuclear facilities and currently from carbon sink projects.

As specified in the Kyoto Protocol and the Marrakech Accords, the use of project-based credits should be supplemental to domestic action and domestic action must therefore be a significant proportion of emissions reduction efforts.

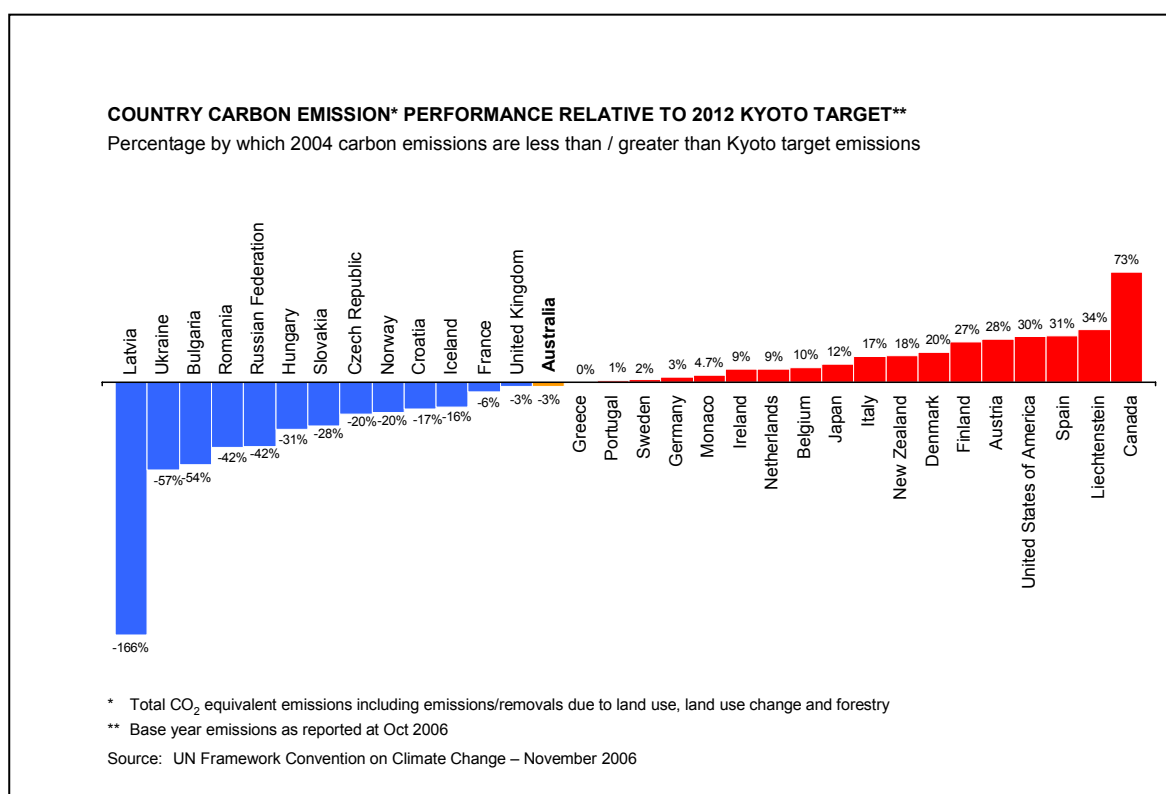
EU member states may decide on national limits for the use of CDM/JI credits in the EU-ETS. As an example, the Netherlands has determined that companies may use CDM/JI credits to cover emissions up to limit of 8% from 2008. Until 2008 there is no limit.

Appendix 3 – Developed country performance against the assigned Kyoto targets

A range of targets were assigned to countries under the Kyoto Protocol. Most countries had to achieve an 8% reduction in emissions from 1990 levels by 2012, but some countries negotiated different targets. Australia, for example, negotiated a target 8% above 1990 levels.

Many countries are not expected to meet their 2012 targets. This is shown in Exhibit A3-1.

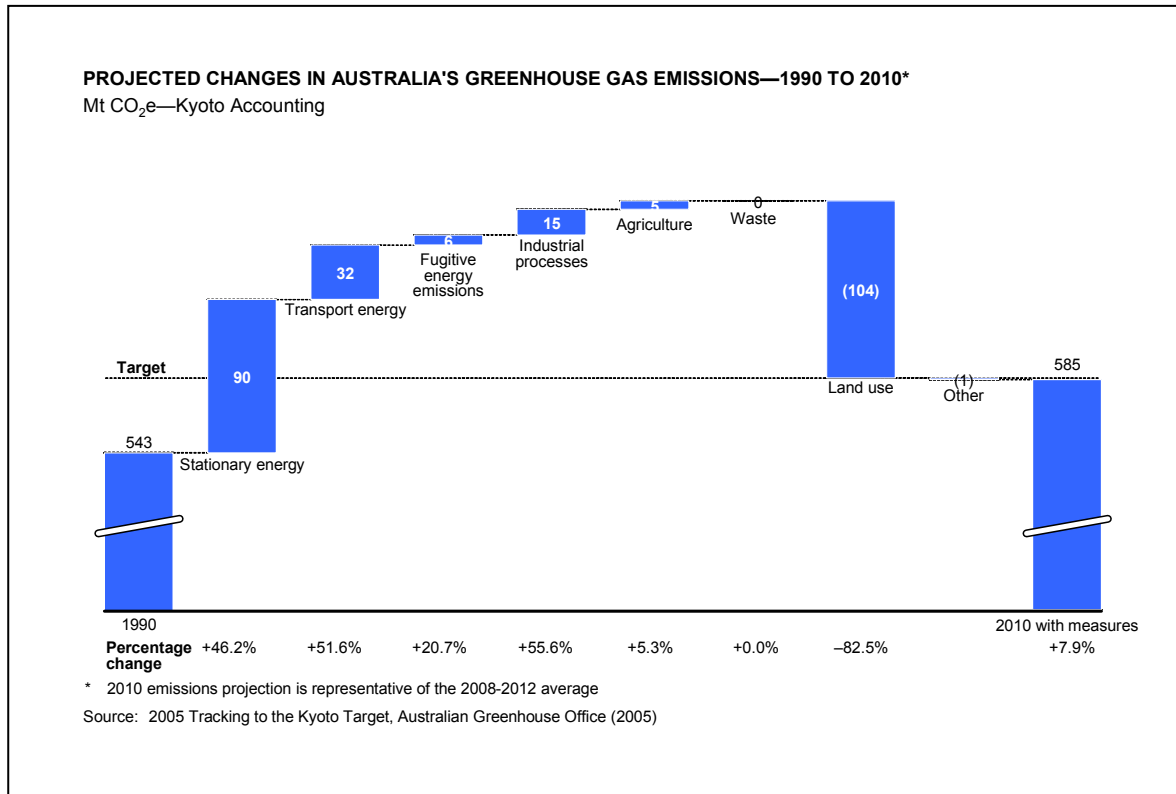
Exhibit A3-1



It is worth noting that many countries that will meet or exceed their targets had favourable developments occurring anyway. The United Kingdom, for example, was moving to replace coal-fired generation with gas, and Germany could clean up much of the old technology industrial sector in the previous East Germany. Indeed, many of the ex-communist countries benefited in this way.

Australia will also broadly meet its Kyoto target due to a fortunate development, albeit one driven by policy change. In Australia there has been a large reduction in land clearing since 1990 levels.

Exhibit A3-2



Australia, like many other countries will find it difficult to meet any future reduction target.

Bibliography

- Ahammad, Matysek, Fisher, Curtotti, Gurney, Jakeman, Heyhow and Gunasekara, “Economic impact of climate change policy”, ABARE Research Report, July 2006
- Alliance of Energy Intensive Industries, “The impact of the EU Emission Trading Scheme on power prices: remedial action urgently needed”, Position Paper, 2005
- Australian Business Roundtable on Climate Change, “The business case for early action”, April 2006
- Australian Greenhouse Office, “Issuing the permits”, Discussion Paper 2, June 1999
- Australian Greenhouse Office, “National Greenhouse Gas Inventory”, Australian Government, 2004
- Bodansky and Chou, “International climate efforts beyond 2012: a survey of approaches”, Pew Centre on Global Climate Change, December 2004
- Carbon Trust, “Allocation and competitiveness in the EU ETS - options for Phase II and beyond”, June 2006
- Demailly and Qiron, “CO₂ abatement, competitiveness and leakage in the European cement industry under the EU-ETS: grandfathering versus output based allocation”, Climate Policy 6, 2006
- Ecofys and McKinsey and Company, “EU ETS Review, report on International Competitiveness”, European Commission, Directorate General for Environment, December 2006
- Ecofys and McKinsey and Company, “Review of EU Trading Scheme – Survey Highlights”, European Commission Directorate General for Environment, 2005
- Economist, “Survey: the heat is on”, September 7, 2006
- Ellerman and Jaskow, “Emissions trading in the US”, Pew Centre on Global Climate Change, May 2003
- Energy Futures Forum, “The heat is on: the future of energy in Australia”, CSIRO, 2006
- Energy Supply Association of Australia, “Emissions targets and least cost generation options”, November 2006

- Energy Supply Association of Australia, “Energy and emissions study: Stage 2 report”, February 2007
- Erkrst, Nauc ler and Rosander, “A cost curve for greenhouse gas reduction,” The McKinsey Quarterly, 2007 Number 1
- European Environment Agency, “Greenhouse gas emission trends and projections in Europe”, EEA Report, No. 9/2006
- Intergovernmental Panel on Climate Change, “Climate Change 2007: The Physical Science Basis”, 2007
- Jakeman and Ford, “Climate change policies, integrating developing countries into the architecture of policies”, Australian Commodities, December Quarter, 2006
- McKibbin, “Sensible climate policy”, Lowy Institute, February 2005
- McKibbin and Wilcoxon, “Climate policy and uncertainty: the roles of adaption versus mitigation”, ANU, Economics and Environment Network Working Paper, EEN0306, March 2003
- National Emissions Trading Taskforce, “Possible design for a National Greenhouse Gas Emissions Trading Scheme”, 2006
- Neuhoff, Martinez and Sato, “Allocation, incentives and distortions: the impact of EU ETS emissions allowance allocations to the electricity sector”, Climate Policy 6, 2006
- Pearce and McKibbin, “Timing, competitiveness and carbon prices”, Centre for International Economics, February 2007
- Pew Centre on Global Climate Change, “The European Union Emissions Trading Scheme (EU-ETS): Insights and Opportunities”, March 2005
- Philibert and Reinard, “Emissions trading: taking stock and looking forward”, OECD Environment Directorate, International Energy Agency, 2004
- Rush. “Soil carbon sequestration – an opportunity ignored”, a paper prepared for presentation to the NSW Government, 2007
- Saddler, Muller and Cueras, “Competitiveness and carbon pricing”, The Australian Institute, Discussion Paper No. 86, April 2006
- Sijm, Neuhoff and Chen, “CO₂ cost pass-through and windfall profits in the power sector”, Climate Policy 6, 2006
- Stern, “The Economics of Climate Change”, HM Treasury and the Cabinet Office, 2006