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Productivity Commission

Productivity Commission Submission to the Prime Ministerial Task Group on Emissions Trading

Productivity Commission Submission

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Foreword

Recent reports and events have brought a greater sense of urgency to the debate about Australia's policy response to climate change. However, some fundamental realities for Australia remain unchanged. Our economy is more 'greenhouse gas intensive' than the economies of most developed countries. But at the same time we are a negligible overall contributor to the world's greenhouse gas emissions.

This means that actions to reduce emissions are likely to prove relatively costly for the Australian community, yet this country's efforts in isolation can make little difference to climate change. The enduring implication for Australia, as for many other countries, is that policy choices need to be seen in the context of achieving an effective international response. Moreover, any policy initiatives by us in the interim, need to be calibrated to the prospect and nature of such an international response.

The Prime Ministerial Task Group process provides an important opportunity to advance understanding about the relative merits of different approaches and design features at both the international and domestic levels.

In the limited time available, the Commission has had to confine its contribution to outlining relevant frameworks and principles. Even at this level, however, there are complexities and uncertainties about the best ways forward. There is much at stake for the Australian community in getting the right, nationally coherent, policy on climate change. In the Commission's view, this will require considerably more analytical work and public consultation.

Gary Banks
Chairman
March 2007

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Abbreviations

CDM	Clean Development Mechanism
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
ETS	Emissions Trading Scheme
GDP	gross domestic product
GGAS	Greenhouse Gas Reduction Scheme
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
MRET	Mandatory Renewable Energy Target
OECD	Organisation for Economic Cooperation and Development
PC	Productivity Commission
R&D	research and development
UNFCCC	United Nations Framework Convention on Climate Change

Key points

- There is a growing consensus that the anthropogenic contribution to climate change could pose serious risks to future generations and that coordinated action is needed to manage these risks. However, uncertainty continues to pervade the science and geopolitics and, notwithstanding the Stern Review, the economics. This is leading to divergent views about when and how much abatement effort should be undertaken.
- To be fully efficient and effective, greenhouse gas (GHG) abatement must occur globally. Effectiveness increases with the coverage of emissions and of emitting countries. Below a certain threshold, any abatement action will have little effect.
- It is in Australia's interest to participate in the design of a multilateral framework — for example, pressing for:
  - emission caps for all major emitting countries that are supported by strong verification arrangements, and can react flexibly to new information;
  - allowance to gain credits for emission reduction projects in other countries and also flexibility in rules on land cover change.
- Independent action by Australia to substantially reduce GHG emissions, in itself, would deliver barely discernible climate benefits, but could be nationally very costly. Such action would therefore need to rest on other rationales.
  - Facilitating transition to an impending lower emissions economy is the strongest rationale for independent action, but it is contingent on the imminent emergence of an extensive international response.
- Current climate change policy in Australia is a disjointed, fragmented patchwork of measures across sectors and jurisdictions. The potential impact on resource allocation (for example, firm location) underscores the need for a national approach.
- A national approach should be based on GHG pricing — through an emissions tax or an emissions trading scheme. Due to its administrative simplicity, a tax has some merit as a transitional tool and could be introduced in a revenue neutral way.
- If it were decided to introduce a national emissions trading scheme:
  - to constrain costs, the emissions price should be kept modest via a 'safety valve' until a multilateral regime that comprised major emitting countries was in place;
  - to limit adjustment costs and international relocation of production, it may be appropriate to mitigate the most adverse competitive impacts on energy-intensive producers until an international regime is in place;
  - existing regulations that substitute for emissions trading should be discontinued.
- Other policies may be warranted to address related market failures. These include support for relevant technological development and deployment, addressing barriers to energy efficiency and carbon capture and storage, and research into adaptation strategies. To optimise use of the community's abatement dollar, all policy proposals should be subject to comparative assessment — such as cost per tonne of GHG emissions reduction or storage.

1 Policy-making under uncertainty

The Task Group and the Taskforce

The *Prime Ministerial Task Group on Emissions Trading* was established in December 2006 and asked to report by 31 May 2007. Under the proviso that the competitive advantages Australia enjoys through its reserves of fossil fuels and uranium be preserved, the Task Group is to assess how Australia can contribute to reducing greenhouse gas (GHG) emissions and, in particular, to advise on:

- the nature and design of a workable global emissions trading system in which Australia would be able to participate; and
- additional steps that might be taken, in Australia, consistent with the goal of establishing such a system.

In August 2006, prior to the establishment of the Task Group, the *National Emissions Trading Taskforce* released a discussion paper on the design of a national emissions trading scheme (NETS). The Taskforce was established by State and Territory Governments and it intends to recommend a preferred NETS design later this year. In relation to this, the Council for the Australian Federation (CAF) stated in its 9 February 2007 Communiqué that:

> Premiers and Chief Ministers expressed their expectation that the Prime Minister would make a commitment to the introduction of a national emissions trading scheme following receipt of the Task Group report in May 2007.
>
> If the Commonwealth refuses to commit at this time, the States and Territories will introduce an emissions trading scheme by the end of 2010. (CAF 2007, p. 5)

The Task Group's reporting timeframe and CAF's deadline for its 'default' emissions trading scheme are indicative of the greater sense of urgency that has catalysed the climate change policy debate following the Stern Review (released in October 2006) and the Intergovernmental Panel on Climate Change's (IPCC) summary report on the physical climate science (released in February 2007).

Climate change — science and economics

The IPCC's consensus view about human activity and global warming and the Stern Review's call for strong early action to reduce GHG emissions have brought greater urgency to debates about how to manage climate change. Given their influence on current policy decision making, it is useful to examine these analyses.

The growing scientific consensus

It is universally accepted that, since the pre-industrial era:

- emissions and atmospheric concentrations of GHGs have increased;
- the Earth has warmed by around 0.7 C; and
- human activity has contributed, and will continue to contribute, to increasing the atmospheric concentrations of GHGs.

It is also accepted that, because GHGs reduce outgoing infrared radiation (positive climate forcing), higher atmospheric concentrations of these gases will, other things being equal, lead to higher surface temperatures. Indeed, there is an emerging consensus that anthropogenic emissions have already caused the Earth to warm. In 1995, the IPCC observed that the 'balance of evidence suggests a discernible human influence on global climate' (IPCC 1995, p. 1). By 2001, it considered that this influence was 'likely' and in February 2007, reported that most of the observed increase in temperatures was 'very likely' due to increases in anthropogenic GHG emissions.[1]

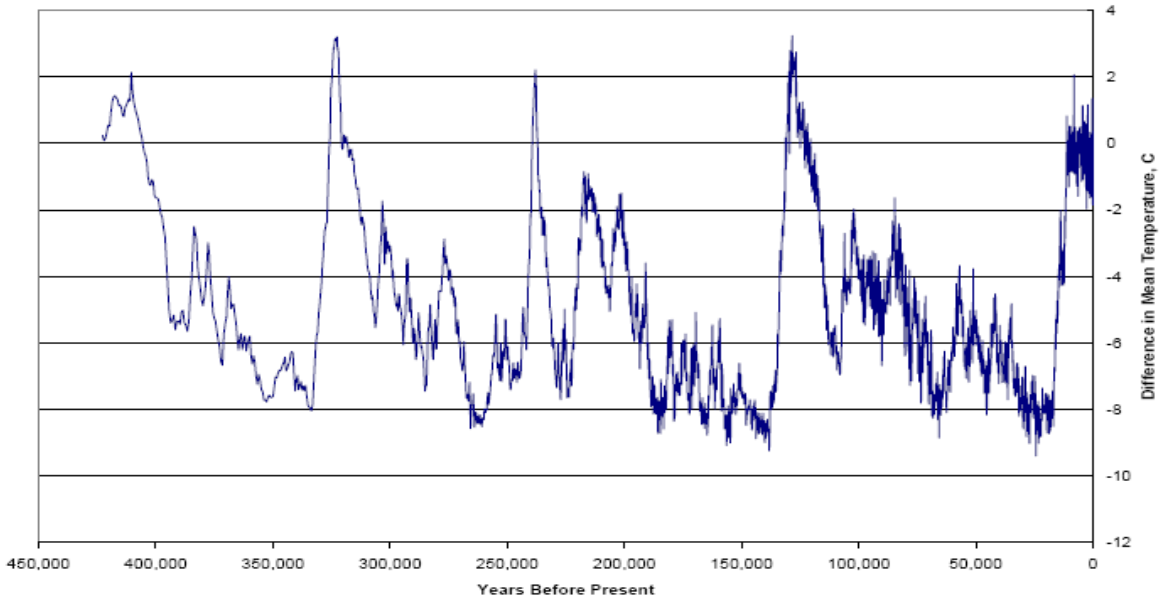
Projections of the impacts of higher atmospheric concentrations of GHGs are based on climate models, which approximate dynamic systems, where many climate forcings (positive and negative) — such as aerosols, clouds and oceans — are not well understood. As the IPCC has noted:

> In climate research and modelling, we should recognise that we are dealing with a coupled non-linear chaotic system, and therefore that the long-term prediction of future climate states is not possible. The most we can expect to achieve is the prediction of the probability distribution of the system's future possible states by the generation of ensembles of model solutions. (IPCC 2001, p. 774)

[1] 'Likely' equates to a greater than a 66 per cent probability of occurrence and 'very likely' a greater than 90 per cent probability. These probabilities reflect a consensus judgement. The IPCC has two higher probability standards — 'extremely likely' and 'virtually certain' (IPCC 2007).

The complexities associated with making climate projections about anthropogenic emissions are highlighted by the volatility in temperatures from *natural* climate change over the last 400 000 years (figure 1.1).

Figure 1.1 **Global temperature record, Vostok ice core data**



Source: McKibbin (2007).

More specifically, there is scientific uncertainty about the:

- precise extent of the relative contributions of human activity and natural phenomena to warming;
- degree of climate sensitivity to different GHG concentrations;
- effects of temperature changes on natural and human systems — particularly at regional levels; and
- timing and severity of climate change.

Additionally, there is economic uncertainty about:

- the costs and benefits of business-as-usual emissions;
- the benefits (in avoided damage costs) of abatement action;
- the costs and benefits of adaptation; and
- the nature and likelihood of future technological change (for both abatement and adaptation).

Formulating a response

The emerging scientific consensus on anthropogenic contributions, and the range of projections of climate change and its effects if emissions continue unabated, establish a strong case for a policy response. In principle, an ideal policy response would aim to curb global anthropogenic emissions of GHGs to a level where the costs of additional reductions equated to the benefits. In practice, however, formulating an appropriate response is not straightforward.

The science points to climate change as a *global* problem because the projected climatic impacts of further GHG emissions are unrelated to the source of the emissions (chapter 2). While it is apparent that addressing a global externality requires collective action by sovereign nations, coordination is complicated by the fact that the costs and benefits of climate change, as well as of abatement and adaptation, would vary by country and regions.

The timing and costs and benefits of abatement also complicate the formulation of a response. Early abatement action involves relatively certain and concentrated costs, whereas the uncertain and diffuse benefits arrive much later. Economists use 'discounting' to bring the costs and benefits to a common timeframe, but the practice can be contentious (see below). Issues of an ethical nature (weighting of the welfare of current and future generations) and political-economy considerations (visible losers and nebulous gainers) are raised.

These scientific and economic uncertainties also pose policy dilemmas. For example, is it better to incur costs early for uncertain benefits, or to delay action until more is known, with the risk of higher (intergenerational) damage, adaptation and mitigation costs? If climate change turns out to be less serious than predicted or a future technology can address it more cost effectively, then early action could impose an unnecessarily large burden on near generations. Conversely, if action is delayed and the prognosis worsens, opportunities for adopting low-cost abatement measures may have passed, shifting a greater adjustment burden onto future generations.

However, uncertainty does not justify inaction. The standard response in the climate change literature is a 'policy ramp' approach, involving relatively modest GHG emission reductions in the near term, with measures intensifying over time as uncertainties become resolved (Nordhaus 2006b; Kelly and Kolstad 1999). The policy ramp, which is akin to an insurance decision, involves a greater burden on (presumably more wealthy) future generations.

Recently, the Stern Review challenged the policy-ramp approach, calling for strong early action.

Does the Stern Review involve new economic insights?

The Stern Review commanded worldwide attention through its central message that:

> … if we don't act, the overall costs and risks of climate change will be equivalent to losing at least 5 per cent of global GDP each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20 per cent of GDP or more. In contrast, the costs of action — reducing greenhouse gas emissions to avoid the worst impacts of climate change — can be limited to around 1 per cent of global GDP each year. … So prompt and strong action is clearly warranted. (Stern 2007, p. xv)

The Review estimates future economic damages that are substantially higher, and abatement costs that are lower, than those in most other studies using similar economic models.[2] Its analysis and conclusions have been welcomed by many, but have received a mixed response from economic analysts.

The two most important (of many) factors driving the Review's conclusions, and especially the derivation of damage costs attributable to climate change, are that (1) it incorporates a particular view about aversion to risk and (2) it employs very low discount rates.

The Review contends that averaging across possible outcome scenarios (a methodology used by the IPCC and others) can conceal the risk of worse than expected outcomes. Many economists acknowledge that frameworks for dealing with uncertain catastrophes are not particularly satisfactory. The Review's attempt to incorporate the 'long tail' of the probability distribution involving catastrophic outcomes is creditable. In essence, the Review adopts a particular value judgement in focusing on small and uncertain probabilities in its cost-benefit calculus.

That said, it is the Review's choice of low discount rates (amounting to about 1.4 per cent) that has the most powerful effect on its analysis and conclusions (box 1.1).

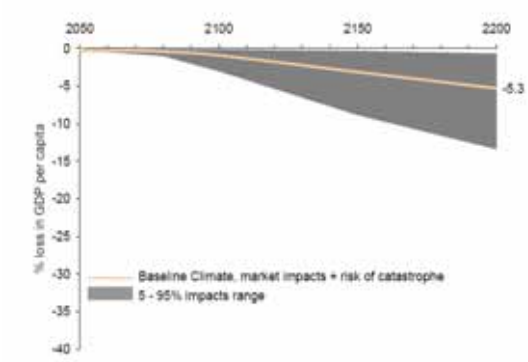
[2] The Review was initiated by British Prime Minister Tony Blair and closely followed the UK House of Lords Select Committee on Economic Affairs report also entitled *The Economics of Climate Change* (House of Lords Select Committee on Economic Affairs 2005a). That report was relatively sanguine about the potential costs and benefits of climate change and raised doubts about the rigour of the IPCC processes contending, for example, that some of the IPCC's emissions scenarios and documentation are influenced by political considerations. The UK Government's response (House of Lords Select Committee on Economic Affairs 2005b) was dismissive.

Box 1.1 **The Stern Review's approach to discounting**

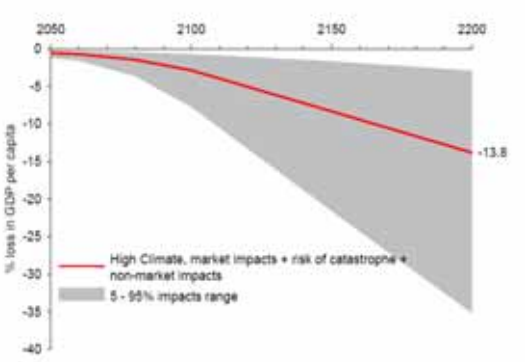
Based on its treatment of risk (text above) and the low discount rate used, the Stern Review concludes that climate change poses costs equivalent to 5–20 per cent of GDP each year. These cost estimates have a wide range of uncertainty (figure below).

Figure **Damage costs**

Panel [a] low estimate



Panel [b] high estimate



Source: Stern (2007).

A discount rate was required to convert damage costs into 'balanced growth equivalents' — the loss in annual GDP, now and forever, that would deliver the same utility, or welfare, as the damage costs over time. On ethical grounds, the Review does not discount the welfare of people in the future, but it does discount future consumption gains or losses in proportion to how much wealthier people will be in the future. This leads to discount rates of about 1.4 per cent, which are very low by conventional standards and low compared with other appraisals by eminent economists in this field.

Nordhaus (2006b) argues that low discount rates can lead to unrealistically large sacrifices being required of the current generation to increase the incomes of far-future generations by even a tiny fraction. Dasgupta (2006) advocates higher discounting in the expectation that, even with climate change impacts, future generations are expected to be wealthier. The Review acknowledges the different views about discount rates — a postscript presents a sensitivity analysis which shows that increasing the pure rate of time preference from 0.1 per cent to 1.5 per cent causes the damage costs for the Review's low estimate (panel a) to decline from 5 per cent of GDP to 1.4 per cent (Stern 2007, p. 668). Moreover, plausible alternative ethical perspectives yield considerably higher discount rates and, therefore, very much lower damage costs.

Various analysts believe that discount rates should be based on the trade-offs across time that people actually make. An example of this approach is the DICE model developed by Nordhaus, which seeks to fit observed market interest rates, and rates of private and public savings and investment, by assuming a pure rate of time preference of 3 per cent, declining to 1 per cent over the next 300 years (Nordhaus 2006b). Under growth assumptions similar to those in the Review, this yields a discount rate that is initially around 3 times greater than the Review's 1.4 per cent. This market-based approach to discounting is not, however, universally agreed for evaluating climate change (Arrow et al. 1996; Weitzman 2007).

The choice of discount rate reflects an ethical view that future and current generations should be valued equally today. Put simply, this means that a 10 per cent loss in consumption for a person in 2200 is valued at very nearly the same cost as a 10 per cent loss in consumption for someone today, even if the person in 2200 is significantly wealthier. Tol and Yohe (2006) estimate that perhaps up to half of the damage costs reported in the Review arise 200 years and more into the future, indicating the impact of low discount rates. Alternative ethical perspectives have been shown to yield different conclusions on discount rates (for example, Nordhaus 2006b; Dasgupta 2006).

Apart from debates about the Review's treatment of risk and discounting, other economists have suggested that the Review displays a systematic tendency to use studies and approaches that err toward high damage costs and low mitigation costs. For instance, it has been suggested that the Review:

- adopts an asymmetric cost–benefit analysis, because the costs of climate change are relative to pre-industrial GHG concentrations, whereas mitigation costs are for stabilisation at a much higher level (Tol and Yohe 2006);
- uses a population growth baseline that generates high emissions and therefore high climate change damages — scenarios with more plausible population growth trends would arrive at lower damage costs (Carter et al. 2006); and
- fails to account adequately for adaptation and therefore inflates the costs of climate change (Byatt et al. 2006; Carter et al. 2006; Mendelsohn 2006; Tol and Yohe 2006).

The Review's approach led Weitzman (2007) to comment that:

> … my most charitable summarising interpretation of [the Review's] urgent tone is that the report is an essay in persuasion that is more about gut instincts regarding the horrors of uncertain rare disasters whose probabilities we do not know than it is about economic analysis as that term is conventionally understood. (p. 25)

In light of the different ethical positions that prevail throughout the community, the Review might have better served policymakers by giving a range of estimates and fully informing them of the implications of the adopted assumptions and methodologies on the damage and abatement cost estimates.

An emerging economic consensus?

Irrespective of the Stern Review, a case for action to address climate change remains. Mainstream economic assessments support policies that 'go far beyond current global emissions reductions' (Nordhaus 2006b, p.15). The 'economic

consensus' is for action to address climate change, but with contention about the timing of the collective abatement path. Pragmatically, for Australia the consideration is more strategic — that is, how this country should prepare for, or respond to, any emerging global GHG abatement regime.

Geo-politics and an Australian response

Climate change policy must contend with complex geo-political dimensions:

- all of the 192 nations that comprise the United Nations have emitted and continue to emit GHGs, yet the consequences do not fall proportionately on them;
- much of the stock of anthropogenic GHGs has arisen as a by-product of the economic progress of developed nations, yet much of the anticipated growth in future emissions will come from countries embarking on a similar pursuit of economic progress; and
- the costs of climate change are likely to be mainly borne by future generations — a weak political constituency.

In principle, a consensus framework could target the climate change externality with each nation sharing the burden by instituting emissions reductions consistent with an overall global stabilisation goal. (What form such a framework might take and how different formulations might accord with Australia's interests are discussed in chapter 2.)

Non-consensus scenarios, including independent action,[3] which do not involve burden sharing, inevitably bring some competitive fundamentals into focus. In Australia's case:

- independent action would not, in itself, achieve discernible climate benefits because, despite its relatively high per capita emissions, Australia contributes

[3] The terms 'independent', 'unilateral', 'bilateral', 'plurilateral', 'multilateral' and 'global' are generally located on a spectrum ranging from a wholly independent policy response to responses with different degrees of inclusiveness by other nations. Many countries, including Australia, are already taking different forms of unilateral or independent action (eg renewable energy targets and public support for R&D). In this submission, 'independent' refers to a major GHG abatement strategy (such as an emissions trading scheme) taken independently of a consensus-based framework. Other terms sometimes used include 'early mover', 'transitional', 'interim' or 'first wave'. These can be interpreted as an expectation that any major 'independent' policy response would be in advance of a wider multilateral mechanism.

only around 1.4 per cent of global GHG emissions.[4] To put this in perspective, Australia's total annual GHG emissions constitute less than the United States and China each emit in a month (table 1.1);

- Australia's high living standards derive in part from the largely efficient use of an abundance of low cost fossil fuels, reflected in relatively high per capita emission levels. As a result, substantially reducing GHG emissions would be costly for the Australian community, with costs borne mainly by consumers and the owners (and employees) of businesses that directly or indirectly rely on the intensive use of GHG producing energy sources.

Table 1.1 **Australia's relatively low contribution to global emissions**

Carbon dioxide emissions from fuel combustion, by highest emitters, 2004

Country	*CO_2 Emissions*		*CO_2 Emissions per capita*
	Million tonnes	Per cent of world total	Tonnes/person
United States	5 800	21.8	19.8
China	4 732	17.8	3.7
Russia	1 529	5.8	10.6
Japan	1 215	4.6	9.5
India	1 103	4.1	1.0
Germany	849	3.2	10.3
Canada	551	2.1	17.2
United Kingdom	537	2.0	9.0
Italy	462	1.7	8.0
South Korea	462	1.7	9.6
France	387	1.5	6.4
Mexico	374	1.4	3.7
Iran	369	1.4	5.5
Australia[a]	354	1.3	17.6
World total	26 583	100.0	4.2

a Data for Australia's share of world emissions is less than reported in AGO (2005b) due to differences in the year and data sources.

Sources: OECD (2007); World Bank (2007).

These considerations, while important, do not mean that Australia should do nothing before a global consensus emerges. This submission assesses several proposed rationales for interim action (chapter 3). However, such considerations underscore the critical importance of acting following careful analysis rather than rashly — a point noted recently by the United Kingdom's Better Regulation Commission:

4 Based on emissions of carbon dioxide (AGO 2005b). Available data (from 2000) show that Australia accounts for a similar share of global emissions when the six main GHGs, covered by the targets set out in the Kyoto Protocol, are included (Baumert, Herzog and Pershing 2005).

> The Better Regulation Commission has reviewed the regulatory implications of the Stern report, and today issues a strong warning to all: make haste in creating law and repent with the resultant poor regulatory outcome at your leisure. A good policy outcome depends on the quality of the regulatory framework crafted to implement it. The issue is too important to get it wrong; it deserves the most sophisticated response possible. We must not let climate change become a victim of 'quick fix' legislation. Failing to live up to expectations and consequently losing public support is a real possibility, and one that must be avoided. (Haythornthwaite 2007, quoted in BRC 2007, p. 1)

The Productivity Commission broadly endorses this sentiment.

The Commission's approach

The causes and bio-physical impacts of global warming are scientific issues for which the Commission claims no particular expertise. How to evaluate and compare different options of addressing climate change, however, has a strong economic dimension. In an earlier incarnation, the Commission produced the first report on the economics of climate change from an Australian perspective — *The Costs and Benefits of Reducing Greenhouse Gas Emissions* (1991). As the Commission then found, the economics of climate change presents immense challenges for governments, because it is an extreme case of policy-making under uncertainty. Notwithstanding progress in scientific knowledge since then, this remains true today.

Conceptually, a global response must derive from a clear objective — coordinated action by all major emitters to internalise an externality (chapter 2). Independent action, on the other hand, is governed by different objectives — some primarily strategic, with key considerations being the expectation about whether and when a workable global solution may emerge (chapter 3) and the degree to which any early action by Australia might influence this. For example, if it were considered that a multilateral consensus were imminent, then, for domestic resource allocation reasons, Australian policy might be pitched widely across all sectors of the economy. Conversely, if it were considered that a multilateral consensus was unlikely, a purely economic assessment might imply the need for a more modest and targeted approach, with mechanisms to immunise trade-exposed sectors from the deleterious consequences for Australia's competitiveness.

Consistent with the Task Group's terms of reference, this submission focuses on the elements of:

- *a workable global solution (chapter 2)*: The process of iterating to a global framework could take a long time and Australia should be careful not to deal

itself out of the design of any emerging system. It is likely that the 'rules' associated with any emerging multilateral framework will be of critical importance to Australia.

- *an interim national policy (chapter 3)*: As independent action will in itself deliver little discernible climate benefit, a decision to adopt this course would need to be based on other factors. More generally, there is a need to ensure that climate change policy is approached from a national perspective, rather than being an uncoordinated patchwork of policies arising within different jurisdictions.

There is a need for an informed, transparent assessment of the costs and benefits to Australia of independent, group and global action, as well as of the particular regulatory alternatives available. Considerable attention should be directed at the development and design of a suite of consistent measures to target the best mix of abatement and adaptation, within a framework that is flexible enough to respond to changes in the state of knowledge and international developments.

Given the timeframe for the Task Group's review, the Commission has had to limit its contribution to higher level principles and framework considerations. Further, more detailed analysis and public consultation will clearly be necessary to ensure that there is a well informed basis for policy action at the national level.

2 Towards a workable global solution

Climate change is a global problem. The impact of greenhouse gases (GHGs) does not depend on where they are emitted, and most countries can do little to influence climate change (the United States and China being the main exceptions). This is particularly the case when a country's own share of total emissions is relatively small and the emissions of other countries are expected to continue growing rapidly.

Some basic economic perspectives

In economic terms, climate change can be described as a global 'externality'. Without political intervention, the polluters that are contributing to it do not take into account the damage caused by their emissions. In the presence of such an externality, the normal operation of markets can lead to excessive emissions and fail to produce a welfare-optimising use of the available resources.

In theory, this 'market failure' can be rectified by a tax on GHG emissions equal to the damage caused by the emission of an additional tonne of carbon dioxide (CO_2) (or the equivalent of other gases).[5] Baumol and Oates (1971) show that environmental taxes are an efficient instrument for achieving environmental targets, even if the optimal level of pollution cannot be derived from a quantitative analysis of marginal costs and benefits.

An alternative solution attributes market failure to the fact that there are no property rights for the damaged environmental media. If such property rights are able to be adequately defined, negotiations or market forces may be used to establish a price for the right to pollute. Emission permits are an instrument for defining property rights over environmental resources (Coase 1960; Dales 1968).

Climate change is the result of a stock externality. That means that the effect on radiative forcing at any point in time depends on the concentration of GHGs in the

[5] The contribution of different gases to climate change can be compared on the basis of their global warming potential. Commonly, the global warming potential of GHGs is expressed relative to that of CO_2 and their quantity measured in terms of CO_2 equivalents (CO_2e).

atmosphere.[6] This implies that the point of time when emission abatement takes place has little influence on global warming as long as the total amount of GHGs emitted does not change.

A given emissions target can be achieved most cost-effectively if the (marginal) costs of mitigation can be equalised across all sources of GHGs, regardless of the type of gas and when, where and by whom it is emitted.

The international political framework

Ideally, action to address a global externality should be taken at a global level. As there is no 'world government' to impose such a solution, comprehensive global action would have to be based on the voluntary participation of almost 200 sovereign nations. However, such broad participation will be very difficult to achieve in the foreseeable future for a number of reasons.

As discussed in chapter 1, there is still substantial uncertainty about the severity and speed of climate change, the damages and/or benefits it will cause in different regions, and the costs of abatement for different economies over time. This leads to conflicting views and interests regarding what and how much action should be undertaken to mitigate GHG emissions, as well as how urgently action should be taken.

In addition, since any one country's abatement effort will barely affect climate change (with the exception of the largest emitters), many will have an incentive to 'free-ride' and profit from multilateral efforts without contributing to them.

Finally, there are conflicting views on who should bear the costs of mitigation efforts. Developing countries continue to argue that industrialised countries are responsible for the majority of current and accumulated emissions, and have better financial and technological means to fight climate change. In contrast, some industrialised countries (in particular the United States) demand that at least the most important developing countries should actively participate in a multilateral regime, lest the ecological- and cost-effectiveness of the system be impaired and undue costs placed on industrialised countries.

The United Nations Framework Convention on Climate Change

In recognition of the global nature of climate change, in 1988 the United Nations General Assembly adopted a resolution to initiate a process 'to deal with climate

[6] Since some gases have a long life-time this stock is substantially higher than the emissions in any particular year.

change within a global framework' (United Nations General Assembly, Resolution 43/53). As a result, the United Nations Framework Convention on Climate Change (UNFCCC) ('the Convention') was adopted in 1992 and came into force in 1994. As of November 2006, 190 countries and the European Community had ratified the Convention making it one of the most universally supported international agreements in existence.

The Convention's ultimate objective is 'to achieve … stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'. This objective 'should be achieved within a timeframe sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner' (UNFCCC, Article 2). Individual countries should contribute to this objective 'on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities'. Therefore developed countries — which are listed in Annex I of the Convention — should 'take the lead in combating climate change and the adverse effects thereof.' (UNFCCC, Article 3)

The Convention does not specify an overall target or time paths for emission reductions or concentrations of GHGs in the atmosphere. It calls on Annex I countries to reduce their GHG emissions to 1990 levels by the year 2000, but this target was non-binding and not sufficient to contain climate change.

Any further obligations must be negotiated among the parties of the UNFCCC. The first attempt to do so was the Kyoto Protocol negotiated in 1997.

The Kyoto Protocol

The Kyoto Protocol ('the Protocol') commits Annex I parties to individual, legally binding targets to limit or reduce their GHG emissions during the period 2008–2012. Thirty-five countries and the EU-15 have entered into a commitment to reduce emissions below specified levels. Australia and the United States are the only Annex I countries that have not ratified the Kyoto Protocol.

Key features of the Protocol include:

- Coverage of six GHGs — carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride. Emissions targets are expressed in terms of CO_2 equivalents (CO_2e).
- Allocation of quantitative emission limits to participating parties, but freedom to choose which policies to implement to reduce emissions or increase the amount

of GHG removed from the atmosphere (using so-called carbon 'sinks' in the land use, land-use change and forestry sector). Appendix A outlines some of the domestic policies currently in place.

- Establishment of three mechanisms known as joint implementation (JI), the clean development mechanism (CDM) and emissions trading (ET).[7]
  - These allow parties to take advantage of opportunities to reduce emissions or increase GHG removals in countries where it costs less than domestically, and thus to minimise the costs of meeting emissions targets. These mechanisms break the nexus between where abatement is undertaken and who bears the costs.
  - Only nations, not individual emitters, can participate in this trading system. Governments are responsible for establishing domestic policies that allow their economies to best profit from trading opportunities.

This architecture allows individual parties to the protocol to take into account national constraints and values in fulfilling their targets. Although allowing countries to implement inefficient measures may impair the global efficiency of the regime,[8] it may be an important pre-condition for broader membership, as most countries are naturally reluctant to sacrifice more sovereignty than necessary.

Proposals for a post-2012 framework

The Kyoto Protocol covers the period from 2008 to 2012. A follow-up framework would need to come into force before the end of 2012 to avoid a period of uncontrolled emissions. This would also need to be agreed in advance to enable emitters to implement the necessary compliance measures, and to reduce uncertainty about future carbon constraints.

In 2005, parties to the Kyoto Protocol agreed to start negotiations to extend the Protocol beyond 2012 and to launch talks under the UNFCCC with countries which have not ratified the Kyoto Protocol. The 2006 UN climate conference in Nairobi failed to set firm deadlines for the conclusion of negotiations on a new agreement, but decided to review the Kyoto framework at its next meeting. This means that

[7] Under JI, an Annex I party may implement a project that reduces emissions or increases removals of GHGs in the territory of another Annex I party, and count the resulting emission reduction units (ERUs) towards its own target. Under the CDM, Annex I parties may implement projects in non-Annex I countries that reduce emissions and use the resulting certified emission reductions (CERs) to meet their own targets.

[8] Not taking advantage of the lowest-cost mitigation options will in the first place harm the concerned country, but may also raise the costs for other parties.

negotiations might be stalled until the subsequent UNFCCC meeting in late 2008. While some parties have requested that a new agreement be concluded by 2009, others have expressed concerns that substantial progress in negotiations is unlikely until quite some time after the next US President is inaugurated in January 2009.

Numerous proposals for a post-2012 framework have been tabled in the political and academic arenas (too many for a detailed discussion in this submission). Box 2.1 describes the main design elements and options that most proposals contain.

Box 2.1 **Alternative approaches to a post-2012 framework**

Kyoto or non-Kyoto: A future framework may or may not be based on the Kyoto Protocol. While the European Union strongly supports the Kyoto approach and has designed its domestic policies to be consistent with the Protocol's rules, the United States may be reluctant to support Kyoto or other agreements in the UN framework. Under a Kyoto-style architecture — a 'targets and timetables' approach combined with flexible mechanisms — the negotiations will focus on issues such as: participation, quantifying targets and timetables, rules for flexible mechanisms and sinks.

Targets vs policies: The 'targets approach' of the Kyoto Protocol emphasises the need to reduce GHG emissions, but gives the parties the freedom to choose their preferred policies to achieve these targets. A 'policies approach' emphasises the difficulty of reaching an agreement on targets and favours the adoption of a set of policies to be implemented by all parties.

Timeframe for climate change measures: The Kyoto Protocol has been criticised for being too ambitious in the short term and failing to give long-term guidance on climate stabilisation. Most proposals suggest that commitments should be moderate in the short term and stringent in the long term (the 'policy ramp'), but there is disagreement on how urgent action is to avoid the risk of irreversible large-scale damages. Long-term targets should be indicative in order to preserve the flexibility required to adjust to new knowledge about the time scales and severity of climate change.

'Technology–push' or 'market–pull': The technology–push approach emphasises that fundamental technological innovations will be necessary to achieve deep emission cuts without putting economic development at risk. It focuses on internationally coordinated efforts in research and development. The market–pull approach stresses firstly the need for a price signal in order to avoid locking in carbon-intensive technologies in long-lived capital, and secondly, the need to exploit relatively low-cost abatement possibilities early on, in order to slow down climate change and gain time for deeper cuts. It argues that market signals are necessary to give an economic incentive for the development and use of low-carbon and carbon-free technologies, which in turn induces cost reductions through learning-by-doing and the exploitation of scale economies. Many analysts advocate combining the two approaches.

(continued next page)

Box 2.1 (continued)

Participation: Developing country participation was a major issue in past negotiations. Developing countries argue that industrialised countries are responsible for most current and cumulative emissions and have better financial and technological means to fight climate change. They invoke the principle of 'common but differentiated responsibilities' and demand that rich industrialised nations should take the first steps in cutting GHG emissions. In contrast, some industrialised countries argue that at least the most important developing countries should actively participate in a multilateral climate regime, lest the ecological effectiveness and cost effectiveness of the system be impaired and undue costs be placed on their economies.[9]

Emissions taxes vs trading: Almost all target-based proposals entail, or allow the use of, market-based instruments to enable cost-effectiveness. There is debate as to whether emission taxes or quantity controls are preferable (appendix B). While tradable quotas ensure that the agreed targets will be achieved, emissions taxes avoid uncertainty about carbon prices and potentially high costs to the economy. Many proposals advocate taxes or hybrid systems (that is, quantity control with a safety valve) in order to limit the risk of sharp increases in mitigation costs in the short run (see for example Pizer 2002).

Australia's potential role and interests

International negotiations for a post-2012 multilateral climate framework have barely begun. Negotiations could be prolonged and another multilateral framework may not be in place for several years. At this stage, a wide range of outcomes seems possible (box 2.1). This uncertainty has two consequences for Australia's climate change policy:

1. Australia should be well placed to represent its interests in the upcoming international negotiations.
2. Any decisions about (interim) domestic policy should take into consideration their compatibility with potential multilateral frameworks, particularly where policies might entail substantial sunk costs (such as institutional development or adjustment costs).

[9] In 1997, the US Senate unanimously passed the 'Byrd-Hagel resolution' ('S. Res. 98'), which proclaims that '… the United States should not be a signatory to any protocol … [which mandates] commitments to limit or reduce greenhouse gas emissions for the Annex I parties, unless the protocol … also mandates new specific scheduled commitments … for Developing Country parties within the same compliance period …' (Müller 2005).

This section addresses Australia's interests in international negotiations. The implications for interim domestic policies are discussed in chapter 3.

Potential costs and benefits for Australia

It goes without saying that such far-reaching policy decisions as participation in a multilateral climate change regime should be informed by thorough cost–benefit analysis. Studies of the impacts of climate change are gradually building a stronger case for global action. However, the costs and benefits of climate change for individual countries are likely to diverge from global costs and benefits. This may influence each country's willingness to take on obligations to reduce GHG emissions.

However, estimates of the potential damages of climate change and the benefits of climate change mitigation rely on modelling the regional effects of climate change, a field that is subject to substantial uncertainties. Currently, there is little systematic evidence on either damage or mitigation costs for Australia. The limited research that is available currently suggests that Australia could be more vulnerable to climate change than most other developed countries (box 2.2).

Australia's mitigation costs will be influenced by the extent of Australia's contribution to the global target and the policy measures implemented. Numerous modelling studies of mitigation costs have been undertaken internationally, producing a wide range of results (Fischer and Morgenstern 2005). Studies for Australia and global studies indicate that Australia's mitigation costs are likely to be higher than in most other developed countries (box 2.3) reflecting the economic structures based on the availability of low-cost fossil fuels in Australia.

Systematic assessment of the costs and benefits of different multilateral and domestic climate change policies is an area where further research should be instigated.

Box 2.2 **Assessing relative damage costs in Australia**

A limited range of studies have compared specific climate change impacts in Australia with those in other developed countries. The studies identify factors unique to Australia that suggest it may be more adversely affected than other developed countries:

- Because Australia has a low latitude, energy demand may increase with climate change, as an increase in demand for cooling on warm days outweighs a fall in demand for heating on cool days. In developed countries at higher latitudes (Russia, Europe and North America), the reduction in demand for energy for heating is predicted to outweigh any increase in demand for cooling (Arnell 2006).
- Many agricultural-producing areas in Australia are relatively warm and are in low latitudes. Agricultural productivity in such regions is projected generally to fall even with moderate increases in temperature, while agricultural-producing nations in the northern part of the northern hemisphere — Canada, the United States, Russia, Ukraine and Scandinavia — are expected to benefit (Heyhoe et al. 2007; Samson 2006). Effects on agriculture are likely to have a larger impact on the Australian economy relative to many other OECD countries, because agriculture plays a larger role in Australia's economy and exports (OECD 2005).
- Australia has relatively high rainfall variability, and river flow variation that is well in excess of the world average. Evaporation is therefore relatively high, as large dam storage capacities are necessary (water stored in dams is subject to high rates of evaporation) (Love 2005; Whittington and Liston 2003).

However, there are qualifications. Uncertainty surrounds:

- changes in seasonal temperature across regions for a given global temperature change, and hence changes in heating and cooling requirements. Further, translating heating and cooling requirements into energy demands is highly uncertain, as it depends on energy sources, energy efficiency, and total population (Arnell 2006);
- outcomes for the agriculture sector — some models predict an increase in productivity in Australia (Heyhoe et al. 2007); and
- rainfall predictions in some regions, including Australia (IPCC 2007) and the effects of a rising temperature on evaporation rates — one study suggests evaporation rates will fall with climate change (Roderick and Farquhar 2002).

The Commission is not in a position to assess the relative merits of these studies, nor is it aware of research that systematically and comprehensively compares the costs and benefits of climate change impacts in Australia with those in other developed countries. Uncertainties surrounding firstly, the location, magnitude, timing and severity of changes in climate, and secondly, the subsequent response of natural and human systems, mean that conducting such an assessment would be a formidable task. Nevertheless, consideration of these costs and benefits is important in determining an appropriate policy response.

Box 2.3 Mitigation costs for Australia could be high compared with other developed countries

Economic modelling undertaken in Australia and internationally has addressed the issue of how the costs of action on climate change are likely to vary across regions.

Australian studies have found that under a uniform global scheme, Australian mitigation costs are likely to be higher than those in most other developed countries. Modelling by ABARE found that under a globally harmonised carbon tax, mitigation costs in 2050 are likely to be a greater proportion of GDP in Australia than in Canada, the European Union, Japan and the United States (Ahammad et al. 2006). Similarly, the Productivity Commission's predecessor body estimated mitigation costs to be a larger proportion of GDP in Australia than in the United States, the European Community and Japan (IC 1991).

The findings of these Australian studies are supported by the results from international model comparison work. Stanford University's Energy Modelling Forum is one of the most up-to-date and extensive model comparison projects in the world (Stern 2007). Several of the models in the Energy Modelling Forum's most recent project (EMF-21) report mitigation costs separately for Australia and New Zealand, making EMF-21 a useful tool for validating the Australian modelling results. Based on a scenario that required radiative forcing from GHGs to be stabilised at 4.5 watts per square meter by 2150, all six models[10] in EMF-21 that reported the necessary detail, found that mitigation costs in 2050 are likely to be a greater proportion of GDP in Australia and New Zealand than in the OECD as a whole (Weyant and de la Chesnaye 2006). All but one of the models estimate costs in Australia and New Zealand to be a greater proportion of GDP than in each of Canada, the European Union, Japan and the United States.[11]

Although costs in Australia are expected to be high compared with other developed countries, they are not likely to be as high as in developing countries. Five of the six EMF-21 models with sufficient detail estimated costs in Australia and New Zealand to be a smaller proportion of GDP than in non-OECD countries. As a result, it is unclear whether costs in Australia and New Zealand would be above or below the worldwide average — the six EMF-21 models are split on this point.

10 One of these models is ABARE's Global Trade and Environment (GTEM) model, so it is no surprise that its results are consistent with those in Ahammad et al. (2006) using the same model.

11 There is an important caveat to this result: relative costs across countries depend on whether emissions are constrained using a tax or emissions caps. Total mitigation costs in each country will depend on the quantity of abatement and the cost per tonne of emissions avoided. Under a carbon tax, a country that has many cheap mitigation opportunities will tend to undertake a greater quantity of abatement, so that, all else equal, their total mitigation costs could be higher than those of a country with few cheap mitigation opportunities. On the other hand, under emission caps (as under the Kyoto protocol) a country with many cheap mitigation opportunities may be able to meet its cap more cheaply. Of the models referred to here, only IC (1991) modelled costs under regional emissions caps.

If the costs to Australia of participating in multilateral action were found to be greater than the benefits, it would not necessarily mean that Australia should refuse to participate. Cost–benefit analysis is limited to economic effects, while there may be other relevant aspects that should also be considered:

- The principle of common but differentiated responsibilities has received almost universal acknowledgement in the UNFCCC and other international agreements, and may have gained the status of established international law. Proactive action on Australia's part may be warranted, therefore, to support developing countries which are particularly vulnerable to climate change and less able to undertake effective climate change measures.
- It may be in Australia's interests to support a political process that could lead to a more efficient regime in the longer run, as experience grows and the degree of necessary action becomes clearer.
- Australia will be affected by an international regime even if it chooses not to participate, as commodity prices (particularly those of fossil fuels) will be affected.
- Moreover, the possibility of trade sanctions against non-signatories has been discussed among signatories to the Kyoto Protocol to reduce carbon leakage12 and their economic disadvantage, and to promote participation in the regime.

The development of a global climate change regime is a complex process and is most likely to require a degree of willingness to support an imperfect interim global regime. Even imperfect regimes can have the potential to facilitate development of the required institutions, and to spur technological and structural change. Reducing constraints, such as the ability to monitor GHG emissions or implement mitigation measures (particularly in developing countries), will encourage a broader contribution to future mitigation efforts.

However, the objectives of an interim global regime must be clearly stated in order to achieve them as efficiently as possible.

Preferred options for a multilateral framework

Alternative options for a multilateral framework should be evaluated systematically, using a consistent set of principles and criteria. Box 2.4 lists the most relevant principles from an economic perspective. Additional economic, political or social criteria also may need to be considered.

12 Carbon leakage — defined as the increase in CO_2 emissions by some countries as a result of emission reductions elsewhere — may impair the environmental effectiveness of climate policy.

Box 2.4 **Principles for the evaluation of policy frameworks**

Environmental effectiveness: Ideally, a multilateral framework should allow the concentration of GHGs to be limited to a level where the costs of further reductions equal the benefits from doing so.

Cost effectiveness: A framework is cost-effective if it allows the total costs of achieving an emissions target to be minimised using the cheapest means possible, irrespective of which GHG is reduced or sink strengthened, in which country or sector, or at which point in time. (The possibility to choose least-cost options across these dimensions are called 'what', 'where' and 'when' flexibility.)

Flexibility: In light of the substantial uncertainties surrounding climate change, the flexibility to adjust targets when new information arises is essential to ensure environmental and cost effectiveness of a framework. Moreover, since full global participation is unlikely in the early stages, the flexibility to integrate new participants is required.

Distributional impacts: The political feasibility of a policy depends significantly on the perceived equity of distributional impacts, particularly in the international arena, where sovereign countries have to agree to participate. Several criteria have been used in assessing equity in the international context, including responsibility for the accumulated stock of GHGs, ability to pay, and distribution of benefits (Aldy et al. 2003).

Participation and compliance: Environmental effectiveness and cost effectiveness depend on the number of participants, their share of emissions, their willingness to commit to mitigation efforts and their ability to induce the necessary reductions. Reliable monitoring and enforcement mechanisms are essential to ensure that agreed actions are actually undertaken, particularly when compliance costs rise.

International frameworks should not be judged by examining only the fundamental design decisions described above. Details of a framework's implementation, such as the specific numbers for targets and timetables, must also be assessed. However, several desirable features of a future framework can be identified from an Australian perspective:

- A global price signal is the best way to achieve cost effectiveness. A 'policies approach' generally is not cost-effective, as the same policies can have quite different costs under different circumstances.
  - A price signal can be established by emissions trading or by a system of internationally harmonised taxes. Emissions trading may be preferred at the multilateral level because it interferes less with the participants' sovereignty and gives them the freedom to choose the preferred domestic implementation.
  - A 'safety valve' can be used to contain the mitigation costs (appendix B).

- Participation should be as broad as possible. However, global participation is very unlikely, and in the short term it may not even be possible to establish binding caps for all the major emitters.
  - Australia's adherence to a narrower system could nevertheless be justified on the basis of the principle of common but differentiated responsibilities, and to help break the stalemate in international negotiations.
  - Rules regarding the timeframe for developing country participation should be agreed, for example in the form of a timetable or 'graduation mechanism'.[13] In addition, capacity building in developing countries in areas such as emissions monitoring, institutional and legal prerequisites and technological capabilities should be furthered so that they can respond adequately to future obligations.
- Mechanisms such as the CDM should allow pursuit of low-cost mitigation opportunities in developing countries. Provisions should be made to safeguard environmental integrity.
- Any agreement should cover a longer period than the Kyoto Protocol to allow for efficient long-term policy design. Some elements of the agreement should be flexible and long-term provisions should be only indicative in order to preserve the adaptability to new knowledge about climate change as it arises.
- Market–pull and technology–push approaches are complementary rather than mutually exclusive and should be combined to achieve effective and efficient mitigation. Innovative technologies are necessary to achieve deep emissions cuts without excessive costs in the longer term. Support for R&D can spur technological progress. However, price and demand signals and large-scale technology applications are necessary as well to give an economic incentive to private investors to engage in innovation, to induce learning-by-doing and to realise scale economies.

Australia should participate actively in the design of a new multilateral system to represent its long-term national interests. This requires careful consideration of the interests not only of Australia, but also of other countries.

This chapter focused on some fundamental design options. However, experience has shown that implementation matters crucially to the efficiency, effectiveness and distributional impacts of policies. Also, a small country's prospect to influence the multilateral framework may be greater when contributing constructive solutions

13 In many (smaller) developing countries, emissions are low and likely to remain so for many years. Therefore, it is only important that they become part of a multilateral response once their emission become significant.

based on its own policy experience. Because much will depend on the composition and design of the 'rules', Australia might want to address specific issues of national interest, such as accounting rules (eg for GHG sinks, such as land use and forestry, or for the treatment of fossil fuel exports).

3 Towards an interim national policy

The Australian Government is 'committed to developing a robust and comprehensive global response to climate change' (Department of the Environment and Water Resources 2007). Accordingly, the question arises as to what independent action Australia should take in the period before such a response is negotiated. In answering this question, judgements need to be made about the likely timing and make-up of a global response. The Commission offers some comments on the principles that should underpin the development of an interim policy and the potential gains from addressing the shortcomings of existing policies.

What rationale?

Any interim climate change policy that goes beyond purely 'no regrets' measures will impose costs on the Australian community.[14] As the amount of mitigation increases, total costs tend to increase more than proportionately, as higher cost options need to be undertaken. The types of costs can include:

- funding for government programs — which reduces the resources available for other areas (such as health and education) and/or increases government spending and taxes;
- compliance costs for firms — which are often passed on to customers in higher prices and can reduce the ability of Australian firms to compete internationally; and
- costs to households — in addition to paying higher prices for emissions-intensive goods and services, households may experience non-financial costs, such as lower levels of comfort because they economise on home heating and cooling in response to higher energy costs, or reduced mobility due to higher fuel costs.

Modelling undertaken to date is inconclusive as to whether the costs to Australia would be higher or lower for independent action compared to action under a global

[14] 'No regrets' measures are those that have net benefits (or at least no net cost) in addition to addressing climate change — in other words, actions that would be considered worthwhile even in the absence of concerns about the adverse impacts of climate change.

agreement (box 3.1). It may be that the costs would be about the same, but the direct climate benefits from independent action would be negligible. Accordingly, an interim policy requires a legitimate rationale that justifies its costs. A range of rationales have been suggested and it is important that these are closely examined from a public interest perspective. The main rationales that have been suggested are discussed below.

Avoiding climate change

Notwithstanding that the reason for reducing global GHG emissions is that this could avoid some of the costs and risks of climate change this does not, on its own, provide a valid justification for Australia taking strong independent action now. There are two main reasons for this.

- As noted, if Australia were to make cuts, even very deep cuts, in GHG emissions this would be unlikely to have any discernible climate benefits. This is because, as indicated in chapter 1, Australia only accounts for about 1.4 per cent of global emissions and it is the global outcome that matters.
- Second, abatement efforts generally create a cost or other penalty for firms emitting GHGs. With independent action, Australian firms would incur these penalties while firms in some other countries would not. This could lead to some production moving offshore as Australian firms become internationally less competitive. Accordingly, total global emissions could actually decline by less than the level of reduction achieved in Australia.

For these reasons, interim policy should not be influenced by a false belief that climate change can be avoided by Australia's independent mitigation efforts.

Meeting the Kyoto target

The target negotiated for Australia under the Kyoto Protocol is to limit GHG emissions to 108 per cent of 1990 levels between 2008 and 2012.[15] Recent analysis projects Australia's emissions at 109 per cent over the 2008–12 period (DEH 2006). Australian governments, business and the community have already taken a range of actions that have reduced greenhouse emissions below business-as-usual levels. The majority of these reductions have occurred in the areas of stationary energy (40 per cent) and land use (24 per cent, achieved through controls on land clearing in Queensland and New South Wales) (DEH 2006). It is estimated that without

[15] The Protocol allows for 1995 to be used as the base year for hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride (United Nations 1998).

Box 3.1 Comparing the costs to Australia of independent and global action

Action on climate change is likely to involve costs for Australia, including those associated with:

- moving to more expensive energy sources;
- a decrease in world prices of Australia's fossil fuel commodity exports; and
- a loss of competitiveness in industries with high GHG emissions.

The size of these costs would vary according to whether independent or global action were taken. If Australia were to undertake independent action, and reduce its demand for fossil fuels, its small size would lead to little, if any, decrease in world prices of fossil fuels. On the other hand, global action would result in smaller losses in the international competitiveness of Australian firms, because other countries would have similar measures in place. The Commission is not aware of any modelling that reliably indicates which of these effects would be likely to predominate. In the absence of such modelling, the Industry Commission's conclusion that unilateral action would have similar costs to global action probably remains a reasonable one (IC 1991).

Modelling results from Ahammad et al. (2006) illustrate that the type of action can have a big influence on the effects for particular industries and the impact can vary significantly across industries (table below). These results do not show a direct comparison between independent and global action, but some inferences can be drawn. The reductions in output are higher for each of the three industries when additional independent Australian action is added to global action. The experience of the three industries, however, varies widely. The decrease in output from the coal industry comes mainly from depressed world prices under global action. On the other hand, iron and steel is mainly affected by a loss of competitiveness associated with independent Australian action. A relatively low loss of output for the services sector demonstrates how much the costs of mitigation are likely to vary across industries.

Table **Change in Australian output by selected industries, 2050**

Relative to a reference case with no significant GHG emission reduction policies

Industry	*Global action*[a]	*Global action with additional Australian independent action*[b]
	Per cent	Per cent
Coal	-22	-32
Iron and steel	-5	-53
Services	-1	-6

[a] Scenario 2a: global abatement of 40 per cent of CO_2 relative to the reference case under a globally harmonised carbon tax. [b] Scenario 2d: global action as per scenario 2a, with additional action in Australia to reduce CO_2 equivalent emissions to 50 per cent below 1990 levels. Also, unlike scenario 2a, assumes that nuclear power will be available in Australia.

Source: Ahammad et al. (2006).

these actions Australia's emissions would have reached 125 per cent of 1990 levels by 2010 (DEH 2006).

Although the Australian Government has not ratified the Kyoto Protocol, it has committed itself to meeting the target (Department of the Environment and Water Resources 2007). At face value, the implication is that any changes to current policy settings need to be made in light of the effect this would have on Australia's emissions through to 2012. For example, the removal of a current abatement policy might only be accepted if it did not jeopardise the achievement of the target, or if it could be replaced by a new measure that achieved similar abatement at lower cost.

The Issues Paper canvasses the possibility of introducing a domestic emissions trading scheme as an element of interim policy. This would be a major step that would have significant start-up costs. The National Emissions Trading Taskforce has estimated that such a scheme would take over three and a half years to develop and implement (NETT 2006), suggesting the earliest practical starting date might be late 2010. This is at best only a couple of years before the end of the period for which the Kyoto target applies. Setting up an Australian emissions trading scheme is neither necessary nor the most cost-effective means of meeting the 2008–12 Kyoto target. The introduction of such a scheme would need to be for reasons that lie beyond Kyoto.

Being a good world 'citizen' and influencing others

Many countries are taking some action on climate change even though there is no effectively global regime in place. In this context it can be argued that a country that took little or no action would risk damaging its reputation and reducing its potential to influence negotiations over climate change policy. As noted in chapter 2, it is in Australia's interest to 'have a seat at the table' in negotiations over any emerging multilateral climate change agreement.

There are many actions that a country can take on climate change and these should all be considered in assessing its contribution. As it is, Australia is already making a range of contributions to the global effort on climate change. Examples include:

- supporting technological development and deployment through the Low Emissions Technology Demonstration Fund and other means;
- involvement in the Asia-Pacific Partnership on Clean Development and Climate; and
- implementing a range of policies within different jurisdictions aimed at GHG abatement (for examples, see table 3.1) that have led to Australia being broadly

on track to meet its Kyoto target (in contrast, the GHG emissions of several countries that have ratified the protocol are currently well above their Kyoto targets).

A further argument that is sometimes made is that action by Australia could encourage other countries to do the same, or at least remove an excuse for them not joining a multilateral regime (NETT 2006). Each country's approach to climate change will be influenced by national interest considerations, including perceptions of the: impacts of climate change; costs of reducing GHG emissions; and incentives for participation and/or penalties for not participating in a multilateral agreement. Independent action by Australia may remove one argument that some countries might give for inaction, but it is unlikely to alter fundamental national interest considerations. If any weight is to be given to this rationale, evidence for its likely efficacy should be given, such as past examples of where Australian action was influential in comparable circumstances.

Overall, the Commission's view is that it is unlikely that major new initiatives could be justified solely on the grounds that this would enhance Australia's standing as a good world citizen, or be influential in persuading other countries to take similar measures. It is possible, however, that such considerations could support the case for measures taken primarily for other reasons.

Reducing investment uncertainty

There is uncertainty over how climate change policy will evolve and this may create an additional source of uncertainty for investment, particularly for investment in long-lived capital in the energy sector. Changes to the cost of emissions, for example, can influence the economics of whether coal or gas is used to supply base load power. The National Emissions Trading Taskforce report that the 'current atmosphere of uncertainty may delay investment and result in higher electricity prices and less reliable supply than if the rules were clearly established in advance' (NETT 2006, p. 2).

A new interim climate change policy could reduce investment uncertainty to some extent. For example, the introduction of a domestic emissions trading scheme or an emissions tax could allow investors to make better informed estimates of the cost of emitting GHGs over the short to medium term. Once the policy design was finalised, investors would know the rules under which they would operate and some of the key parameters that would influence the cost of emissions and the resulting price increases for energy.

There is a tension, however, between reducing investment uncertainty and retaining policy flexibility into the future. For example, uncertainty could be reduced by having long-term emission permits and/or caps. This would, however, create problems if the permit allocations turned out to be well in excess of Australia's target under a future international agreement. In such circumstances, the cost to the government of buying back permits could be an impediment to Australian participation in a multilateral agreement.

From an economywide perspective it is likely to be preferable to have uncertainty over the level of GHG emissions over time than to lock in an emissions path. This is mainly because the costs of achieving set emission reductions may be much larger than the benefits from reducing uncertainty. As new information becomes available on the science, economics and international politics of climate change it is vital that Australian policy is able to respond in a flexible way to either tighten or loosen constraints on emissions. Accordingly, reducing uncertainty is not a rationale for taking costly action. Rather, if a rationale for action is established, the potential for reducing uncertainty should become a consideration in deciding how to act.

Two relevant questions therefore are: Are there sensible steps that can be taken that would also reduce uncertainty? And who should bear the remaining risks?

- On the former, it needs to be acknowledged that there is less scope to reduce uncertainty when future international arrangements for responding to climate change are unclear.
- On the latter, there should not be a presumption that governments are best placed to take on risk. The ability and incentive to control risk will vary between the public and private sectors. As such, risk should be borne by whoever is in the best position to control it.

Investors, including those in energy generation, develop expectations about future liabilities for emissions and factor these into investment decisions. One issue on which they are likely to be uncertain is whether governments will take on these liabilities on their behalf (for example, by exempting or compensating those with emission-intensive investments in place at the time a policy measure is introduced). Governments could reduce this source of uncertainty simply by announcing their intentions (although sovereign risk remains a factor over time as governments change). Another source of uncertainty that can be controlled by governments relates to policy 'surprises'. As discussed later in this submission, the Commission advocates the development of a comprehensive national approach to climate change. Such an approach should increase the predictability of policy.

Facilitating the transition to a lower emissions economy

If it were considered likely that Australia would, as part of a global agreement, negotiate new emission targets that were well below business-as-usual levels, there is an argument that taking action now would reduce the future costs and disruption of meeting these targets. It is possible that well designed policy would encourage gradual changes to capital assets and behaviours that would lower the overall cost of meeting future emission targets. Such changes might include firms and households giving more attention to energy efficiency in their purchasing decisions and increased investment in low-emission energy generation.

There are also costs of early action, however. In particular, while early action is likely to reduce total adjustment costs, depending on the discount rate, it may or may not reduce costs in present value terms (IC 1991). It should also be acknowledged that early action could only be successful in these terms if the international processes for setting future emission targets did not effectively penalise countries for taking such action.

A related argument is that early action would provide support for the development of opportunities in areas such as renewable energy and the provision of energy services, that could provide a new source of comparative advantage for Australia (MMA 2006). Some commentators also consider that foreign direct investment in these sectors would increase with early action. In the Commission's view these arguments do not significantly add to the case for early action. Effectively penalising industries that are currently internationally competitive, because this might generate new opportunities, is not a sound strategy.

Another way that the transition to a lower emissions economy might be facilitated is through the development of the public policy, financial and other institutions that may be needed. Appendix A refers to significant teething problems experienced with the EU Emissions Trading Scheme. Australia should seek to gain from this and other international experience (appendix A). However, any new arrangement is likely to have problems initially and so there may be advantages in developing institutions early. The qualifier is that this would only be the case if the institutions and accumulated experience were relevant to future international arrangements.

A further benefit might arise from developing institutions early if approaches developed by Australia were incorporated in international arrangements. For example, there may be advantages to Australia if incentives for preventing deforestation were included in an international agreement. The chances of this occurring might increase if Australia were able to develop a robust mechanism for this purpose that was acceptable to other countries.

Overall, this rationale would appear to have greater potential to justify taking action involving costs than the others considered. Assessing this potential requires, among other things, judgements about the likely timing and make-up of an international regime.

Conclusions

In the Commission's view, the case for Australia adopting an interim policy that goes beyond meeting the Kyoto target depends mainly on the net benefits that could be achieved by smoothing the transition to a lower emissions economy post-Kyoto (2012 onwards). The relevance of this rationale to interim policy is greater the:

- higher the probability of Australia participating in a future agreement;
- sooner such an agreement is likely to be come into force; and
- more is known about what the agreement will contain.

Taking action based primarily on other rationales carries a greater risk that substantial costs will be incurred for little or no environmental benefit. Of course, some Australians may be prepared to accept this risk because they see an ethical imperative to reduce GHG emissions. The Commission's view is that the community would need to be provided with more information on the costs and risks involved before such preferences could be meaningfully formed or assessed.

Some of the rationales that have been put forward have greater legitimacy from a private than a public interest perspective. For example, in some cases reducing investment uncertainty can benefit firms in particular industries without providing net benefits for the community. Climate change policy needs to be developed from a communitywide perspective.

Some policy principles

As the Issues Paper points out, the Australian, State and Territory Governments already have climate change policies that result in some reduction in GHG emissions but also impose costs on the Australian economy. This is the case even though some are voluntary and others appear to be 'no regrets' measures. These policies, however, are fragmented across sectors of the economy and across jurisdictions. Some of them are also poorly targeted, carry high administration and compliance costs, and impose intrusive restrictions on firms and individuals.

This section suggests principles to guide the development of interim climate change policy and is built on the rationale that action beyond 'no regrets' should facilitate the transition to a lower emissions economy.

Take a comprehensive national approach

The current state of climate change policy in Australia is characterised by fragmentation across sectors and jurisdictions. This is out of step with the policy problem, which relates to gases that have the same impact on the environment no matter how or where they are emitted. A national approach needs to be taken and it should be as comprehensive as practicable across sectors and the various GHGs.

The Parer Review considered a range of Australian, State and Territory GHG abatement measures, including the Mandatory Renewable Energy Target (MRET), Generator Efficiency Standards (a component of the Greenhouse Challenge Plus), the NSW Electricity Retailer Greenhouse Benchmarks[16] and the Queensland 13 per cent Gas Scheme. The Parer Review found that these measures were poorly targeted, uncoordinated, competed with each other and created uncertainty for the energy industry and the wider economy (COAG 2002). This situation seems to have been compounded in recent years, including through the adoption of renewable energy targets in New South Wales, South Australia and Victoria. Other jurisdictions are considering similar policies.

The Parer Review dealt solely with the energy sector. In its own work, the Productivity Commission has examined a wide range of measures in various sectors that are designed, partly or solely, to reduce GHG emissions (PC 2006b, 2005a and 2004). Some examples are:

- subsidies for installing solar hot water systems;
- regulations that require the flaring of landfill gas;
- requirements that firms invest in energy efficiency measures;
- mandatory energy efficiency standards for appliances and buildings;
- mandatory disclosure of a building's energy efficiency at the time of lease or sale; and
- subsidies for recycling and levies on landfilling.

Such measures, as well as those considered by Parer, are frequently employed in some states and territories but not others and/or in different ways in different

[16] This scheme was a forerunner to the NSW Greenhouse Gas Reduction Scheme (or GGAS).

jurisdictions. There are costs to governments in developing and administering separate programs, and the differences across jurisdictions can create difficulties for firms that operate nationally. There are some examples of good coordination across jurisdictions, such as for energy performance labelling of appliances and motor vehicles, but they are not typical.

These schemes have resulted in a patchwork of costs and prohibitions relating to GHG emissions in various sectors, but no consistent economywide signal of the social cost of emitting GHGs. The outcome is that average abatement costs are higher than they need to be and many low-cost abatement options are not pursued. This is exacerbated by the fact that some of the current measures are indirect and may lead to little or no reduction in emissions (see for example, PC (2006b) in relation to waste management policies). The Parer Review also made the point that the MRET scheme targets renewable energy generation when the more appropriate objective would be to reduce GHG emissions at least cost (COAG 2002).

It is for these reasons that the Commission recommended, in its review of National Competition Policy reforms, that the 'Australian Government, in consultation with State and Territory Governments, should as a matter of urgency develop a more effective process for achieving a national approach to greenhouse gas abatement' (PC 2005b).

Aim for least-cost abatement

In the popular debate on climate change it is sometimes implied that the problem is so large and urgent that every possible measure that leads to any emissions abatement should be adopted. This mindset would inevitably lead to the uptake of some high cost abatement options. For example, it has been estimated that purchasing petrol/electric hybrid passenger vehicles instead of conventional vehicles, as some governments have done, can achieve abatement at a cost of over $400 per tonne of carbon dioxide (PC 2005a). At the same time there are abatement options costing $10 per tonne and less that are not taken up. Of course, it could be argued that the purchase of hybrid vehicles helps in the development of a low-emissions technology, but the question of whether this is the best way to support technology is rarely asked.

The principle that abatement should be achieved through least-cost means is of fundamental importance. Failure to adhere to it is likely to result in reduced community support for addressing climate change, due to the cost burden. In this sense, the principle is important not only for economic efficiency, but also for sustaining community support for abatement efforts over the long term.

Address international competitiveness issues appropriately

Under an ideal multilateral agreement that established a common emissions price across all countries, some Australian firms would become internationally uncompetitive. For example, a firm producing energy-intensive products may find that it cannot compete with producers in other countries that have access to relatively cheap low-emission energy. While this would cause structural adjustment issues, including job losses in the short term, the resulting change in the global location of production would be consistent with the objectives of the agreement. That is, progress would be made in reducing GHG emissions at least cost. Also, this would work in both directions — some Australian firms would become more internationally competitive as a result of innovation or induced changes to exchange rates.

If Australia were to take independent action, however, some firms may become less competitive because they are penalised for their emissions while firms in some other countries are not. A shift in the location of production in these circumstances could be costly to Australia without necessarily resulting in a net reduction in GHG emissions. There are, however, many factors that influence the location of production and so the likelihood of independent action leading to serious international competitiveness issues in particular industries needs to be examined empirically. Depending on the action taken, the result in many cases could be a relatively small decrease in profitability rather than a serious decline in competitiveness. There would appear to be no strong general case for shielding firms from such impacts, as doing so would either shift the cost burden on to others or reduce the effectiveness of the policy.

Of the firms that might relocate under independent action, a subset might also relocate under a multilateral agreement. There is an argument that protecting the international competitiveness of these firms under interim policy is counterproductive as it hinders the transition to a lower emissions economy. It would in principle seem desirable, therefore, to distinguish these firms from others that would relocate inappropriately and treat them differently. This would, however, be very difficult and may mean that the choice is effectively between protecting the international competitiveness of all energy-intensive trade-exposed firms or protecting none of them.

The effect of interim policy on the international competitiveness of Australian firms can be limited by keeping penalties on emissions modest. In addition, it may be appropriate to introduce special arrangements for reducing negative effects on the competitiveness of energy-intensive industries (such as free permit allocation under an emissions trading scheme). The arrangement should not, however, completely

shield firms or their customers from cost increases. In addition, firms that are operating at below best practice levels of energy intensity for their industry should not be compensated to a greater extent than others.[17] It should also be kept in mind that the rationale for protecting competitiveness disappears once a suitable multilateral regime is in place, for the reasons explained above.

Be forward looking

One of few certainties with climate change policy is that Australia's approach will need to respond to scientific, economic and geo-political developments. Accordingly, interim policy should be designed so as to be reasonably flexible and, where possible, compatible with developments that can be anticipated ahead of time. For example:

- abatement activities should focus on emission reductions that would count towards meeting internationally negotiated targets;
- if some form of emissions pricing is introduced domestically, decisions on its form and design should be informed by assessments of likely international arrangements and what linkages with such arrangements would be desirable; and
- on some issues there may be merit in delaying strong domestic action until international arrangements become clearer.

In addition, assuming there is an objective to reduce the cost of meeting future targets, actions that lead to ongoing emission reductions should be preferred to some extent.

Policy elements

Decisions about the policy instruments to include in climate change policy and how they should be designed should be based primarily on the above principles and the criteria discussed in chapter 2.

[17] Ensuring this principle is achieved in practice is likely to be very difficult, particularly in industries where there is product differentiation. Some firms would claim that, while their energy use appears comparatively high, they are actually at or near best practice for their product mix. Testing the veracity of such claims would be a complex task, as was the case with the EU's Emissions Trading Scheme.

Emissions pricing

If an interim policy that goes significantly beyond 'no regrets' measures were adopted, it is the Commission's view that it should include some form of GHG emissions pricing. This could be achieved through an emissions trading scheme or an emissions tax. As discussed in appendix B, both emissions trading and taxes can lead to least cost abatement. Least-cost abatement is promoted by the creation of incentives to take up all abatement opportunities that have a lower cost than the emissions price. This is the major advantage of such directly targeted market-based mechanisms over other policy instruments.

Australian macroeconomic modelling supports the conclusion that emissions pricing provides lower cost abatement than other measures. Access Economics (2006) and COAG (2002) report results suggesting that replacing some existing measures (such as the MRET scheme, GGAS and Queensland's 13 % Gas Scheme) with an economywide emissions price signal would reduce costs by 50 to 75 per cent. Evidence from CRA (2006) modelling supports this level of cost savings from emissions pricing compared with an extended version of the MRET scheme.

If an emissions price were introduced there are compelling reasons for it to be at a modest level initially and for it to only increase substantially once a new international agreement is in place. These reasons include:

- the lack of significant climate benefits from independent action;
- facilitation of a gradual adjustment of the economy that would tend to reduce structural adjustment costs;
- to keep the impact on the international competitiveness of firms low; and
- to allow learning to occur before the stakes become very high, so as to help limit the cost of policy and other mistakes.

Putting a modest price on emissions would still cause greater uptake of energy efficiency and other low cost abatement opportunities. Investment decisions would also start to be influenced, particularly if a clear statement was issued about future policy intentions that allowed people to develop expectations about future emissions prices. This would be likely to lead to some increase in the energy efficiency of capital stock throughout the economy and a decrease in the emission-intensity of energy.

Appendix B discusses the advantages and disadvantages of an emissions trading scheme compared to an emissions tax. Where independent action is contemplated, key considerations include the likely architecture of a future multilateral framework (emissions trading or harmonised tax) and the preferred domestic policy option

under each design (box 3.2). It is important that the choice made for Australian interim policy is, as far as possible, compatible with the preferred arrangement under a future multilateral regime.

Box 3.2 **Emissions trading or taxes for interim policy?**

The relative merits of emissions trading compared to emissions taxes for domestic policy are considered in appendix B. Additional considerations arise when a choice between these policy instruments is made in advance of a multilateral framework.

If the multilateral framework centres on emissions trading

If a future multilateral framework was in the form of country-based emission targets, with trading between countries, Australia would be able to choose how to meet its targets. Some possible choices are outlined below:

Join a multilateral emissions trading scheme — Just as European countries have joined the EU Emissions Trading Scheme, Australia might want to join an international trading scheme. If this was the case, a domestic emissions trading scheme as part of interim policy would have advantages and disadvantages. The advantages would be that some useful experience might be gained and some of the institutions created might be readily adapted to suit the multilateral scheme. The disadvantages are that at least some of the costs of establishing the domestic scheme would be wasted and changing to the new scheme could present a range of difficulties, particularly if prices for long-term permits were affected. These disadvantages might be significant enough to favour the use of emissions taxes for interim policy.

Have a domestic emissions trading scheme — If having a domestic emissions trading scheme is considered the best option under a multilateral regime, then logically this would also be preferred to emissions taxes for interim policy. Having such a scheme does not preclude international trading, as linking with other schemes may be possible.

Have an emissions tax — It would be possible to meet an emissions target through the use of emissions taxes, although there would be a need to iterate the tax to equilibrate with any national quantity-based target. Under a tax regime, Australia could still avail itself of offsets such as the Kyoto Protocol's Clean Development Mechanism. If a multilateral framework were considered unlikely, or some time away, a tax regime could provide advantages in terms of: simplicity of administration and compliance (for example, be less demanding in terms of institutional arrangements); more flexible dynamic properties (for example, be easier to vary or terminate); reduced incentives for regulatory gaming (for example, lobbying for exemptions or free allocation of permits); and little concern about sovereign risk (for example, permit buybacks).

If the multilateral framework is based on harmonised taxes

If a future multilateral regime were to be in the form of an internationally harmonised tax, this would require Australia to have an emissions tax. It would make little sense for Australia to introduce a domestic emissions trading scheme if it would need to be dismantled some years later to accommodate a multilateral regime.

Trading schemes are sometimes preferred to taxes for reasons that do not relate to the public interest. For example, allocating free permits to incumbent firms can be used to gain their support for a trading scheme. This, however, can result in a transfer of wealth from the community to specific firms in a way that is not transparent. That said, governments may be less enamoured with the transparency provided by a tax (albeit that one could be introduced in a revenue neutral way). In the Commission's view the relative merits of emissions trading and emissions taxes as an interim national strategy need to be given further consideration.

Design issues for a domestic emissions trading scheme

If it were decided to introduce an emissions trading scheme, there would need to be detailed consideration of its design, supported by extensive consultation and modelling. Such analysis is beyond the scope of this submission in the available time. However, the Commission offers the following thoughts on some high level design issues.

- *'Cap-and-trade' schemes preferred over 'baseline-and-credit'*: Cap-and-trade schemes operate under a fixed overall emissions limit with emissions permits allocated, and traded, between parties. Baseline-and-credit schemes require set emission reductions below business-as-usual levels (the baseline) for each participant. Participants can achieve their own emission reductions and/or purchase credits from others that have made emission reductions. Accordingly, cap and trade schemes create a property right for GHG emissions, while baseline and credit schemes create one for emission reductions below business-as-usual. Government created markets addressing environmental issues work best where the nature and extent of the property right is unambiguous and its verifiable use can be measured at reasonable cost (Murtough, Aretino and Matysek 2002). In general, cap and trade schemes rate much better than baseline and credit schemes against these criteria. Baseline and credit schemes rely on measuring emission reductions below hypothetical business-as-usual levels and this is difficult, often costly and potentially open to gaming. For example, credited emission reductions may have occurred for reasons unrelated to the scheme, and assessment methods may overlook other factors that influence decisions (see PC 2005a).
- *Auctioning preferred to grandfathering*: There is a longstanding debate in the literature about the distributional consequences of allocating permits by auction, or providing them free based on past emissions (grandfathering). Grandfathering can involve taxpayers gifting an asset to emitters (and carrying the risk of buying them back if the target changes). It also can reward the most polluting, and potentially inefficient, firms that have avoided making emission reductions in

the past. The prospect of a regime based on grandfathering also could deter firms from taking abatement measures in the expectation of receiving more permits. On the other hand, grandfathering could be based on some industry benchmark. Of course, an auction approach may need to be compatible with a regime that (1) involves multi-period allocations and changing targets (2) essentially caps the price of permits and (3) might seek to shield the trade-exposed sector in the transitional phase before a multilateral consensus emerges (see below).

- *The permit price should be modest*: Given the 'transition' rationale for a domestic emissions trading scheme in advance of a multilateral arrangement, it is important that the permit price initially be kept modest. Substantial increases in the emissions price should be avoided until a multilateral arrangement that includes the major emitters is in place. This could be achieved by capping compliance costs with a relatively low price ceiling — such as a penalty for failing to cover emissions. This is often referred to as a hybrid approach — where quantity is fixed, but with a safety valve on price. To enhance credibility a modest scheme cap with an evolving long-term aspirational target may be appropriate.
- *Consider protecting the international competitiveness of the trade-exposed sector*: Ideally, an emissions price signal should be applied as widely as possible across the economy. However, in the particular case of independent action, it is possible to mount a case for some accommodation to mitigate the impact on producers that are energy-intensive and trade-exposed (see previous section). This could be achieved through the free allocation of permits. If this were done, there would need to be some trigger or review mechanism that could be activated once enough parties joined a multilateral regime for continued protection to be unwarranted.
- *Recognition of competitiveness and equity issues*: Apart from the trade-exposed sector, there may be pressure to provide free permits, or other assistance, to offset the adverse impacts of an emissions trading scheme on incumbent energy generators, particular regions, households, and small businesses. Incumbent energy generators, by virtue of incumbency and the long lead times for new investment have some 'natural' protection. They have also had time to develop expectations about future emissions liabilities. That said, the issue of whether to allocate some free permits to energy generators may require further attention. For others, equity concerns may need be better addressed directly through targeted financial assistance or concessions. There may be a case for regional adjustment packages for any regions severely affected. In any case, equity concerns should be addressed in ways that do not undermine the intent of emissions trading.

- *Coverage should be as wide as practicable*: To minimise domestic resource misallocation, and in particular distortions between emitting activities, an emissions trading scheme should apply to all sectors of the economy and cover all GHGs. Indeed, if the agricultural sector is to take advantage of offsets and carbon sequestration, it should also face appropriate signals in relation to its emissions including methane. In this way the abatement dollar will be directed to its most efficient use. Hence, ultimately the ambition should be for universal coverage. That said, in reality, the transactions costs associated with monitoring, enforcement and verification (particularly for downstream-based schemes) suggest that extensive application may be infeasible in the short term. Moreover, given that the rationale for independent action centres more on facilitating transition than addressing an externality, less than full coverage by a modest (less distortionary) emissions price signal may be manageable. Probably the best that can be achieved is an incremental and iterative approach starting with the key sources and sectors.
- *Activities that can offset GHG emissions should be accommodated*: There are several positive aspects associated with having offsets, not least of which is the creation of an incentive to undertake projects that might not otherwise have occurred as a result of an emissions price. From an efficiency perspective, offsets can have an important role in reducing the overall cost of meeting an emissions cap. Potential areas include forestry and carbon capture and storage. Of course, offsets introduce a further set of monitoring and enforcement issues — for example, tests of additionality and permanence.
- *Design with future integration in mind*: It is likely to be desirable to link an Australian scheme with regional and/or other domestic schemes that may emerge over time. Accordingly, there would be benefits in fungiblility between schemes. This may be especially important in relation to offsets and credits. It would also be important for an Australian scheme to be consistent with a potential future multilateral regime.

Finally, the debate about an emissions trading scheme and its practical application (such as the EU scheme) involves deciding at what point in the production process the scheme should operate. It could be more manageable to operate upstream of the emissions points, for example by having a scheme target the point of production of, say, carbon — oil, gas and coal — with production destined for export being exempt (except for fugitive emissions from this production). This would require monitoring a substantially smaller number of producers. However, as the scheme would relate to the CO_2 content of fossil fuels, rather than to emissions, it might blunt incentives for innovations to reduce emissions in downstream processes. As noted in IC (1991), this could possibly be countered by a rebate scheme for

measures that reduce emissions per unit of fossil fuel use, although this could diminish the advantages of the instrument's narrow coverage.

Other elements

It is sometimes argued that climate change is such a large and complex problem that there can be no 'silver bullet' solution and so a wide range of approaches is needed. This has some validity when applied to the technologies that may be required to reduce emissions. However, the same argument should not be applied to policy. Emissions trading and taxation are efficient policy instruments precisely because they can create incentives for emission reductions across the whole economy and stimulate innovation in a wide range of areas. This is not to say that emissions pricing should be the only policy response, but rather that any complementary policy instruments should be employed for sound reasons of their own. Good practice principles for developing policy instruments, as detailed in the *Best Practice Regulation Handbook* (OBPR 2006), should be applied.

This submission suggests that if emissions pricing is used for interim policy this should be at a modest level, primarily to facilitate the transition to a lower emissions economy. As discussed, there are compelling reasons for emissions prices being reasonably low, so that other policy instruments should not be used simply to try to increase the effective emissions price (for example, by subsidising abatement). Other policy elements will generally only be warranted where they produce net benefits from addressing market failures.

Support for technological development and deployment

If global GHG emissions are to be substantially reduced at a manageable cost, new and improved low-emissions technologies will be needed. Economic modelling illustrates the importance of technological change. The Innovation Modelling Comparison Project, for example, compared results across several models with and without 'induced technological change'. Induced technological change refers to improvements in low-emissions technologies that come about in response to mitigation policies. Based on an average of results from the project, induced technological change is likely to decrease the costs of mitigation by more than 50 per cent by 2030. This effect becomes stronger as abatement increases (Barker et al. 2006). Several Australian studies also show a strong relationship between mitigation costs and rates of technological change (AGL et al. 2006; Ahammad et al. 2006; NETT 2006).

If a common global emissions price were established, this would do much to stimulate innovation in this area. There can, however, be spillover benefits from innovation that reduce the incentives for developing new knowledge. That is, where potential innovators know that they cannot capture all of the benefits they may create, they tend to invest less in innovation than would be socially desirable. Some analysts have concluded that this discrepancy between private and public benefits can be particularly pronounced for the technological change required to mitigate climate change (Montgomery and Smith 2005). Because of this market failure some government support for technological development appears warranted.

In considering a new interim climate change policy for Australia, attention should be given to how to best support technological development and deployment. In doing so it should be recognised that innovation may occur for many different types of low-emission technologies. Focusing on particular areas, such as renewable energy, should not be done without a clear rationale. Strategic interests may provide such a rationale — for example, given its large reserves of coal and gas, Australia has a strategic interest in the development of carbon capture and storage technology.

Addressing barriers to energy efficiency

Individuals and firms do not always take up energy efficiency opportunities that might be cost effective to them. This can cause GHG emissions to be higher than they would otherwise be. The possible reasons for this can be summarised as follows. The individual or firm:

- does not know that the opportunity would be cost effective for them;
- knows the opportunity would be cost effective, but for some reason does not act on that knowledge; or
- knows that the opportunity would not be cost effective for them (for example, due to limited management resources, hidden costs, or inferior performance), even though there is outside 'expert opinion' that believes it would be.

The Commission has previously found that information provision, including mandatory labelling of appliances, can be an appropriate way to address some of the barriers to energy efficiency (PC 2005a). Such information provision would tend to be more effective when emissions pricing is also in place. More intrusive approaches, such as banning particular products that are deemed to be energy inefficient, need to be considered very carefully as they can override informed consumer preferences.

Adaptation policy

Climate change policy should address both mitigation and adaptation. Private agents will seek to adapt to changes in the climate themselves. Government intervention may be warranted where there are market failures, such as information failures and public goods. Areas that may require government strategies include provision of regional climate information and land-use planning. Unlike mitigation, adaptation does not, in the main, require internationally coordinated action and so can be effectively pursued unilaterally.

Other

If the emissions pricing is introduced for some sectors only, there may be a case for policies to address emissions in those sectors not covered. Such policies should be assessed according to the cost per tonne of carbon dioxide equivalent emissions abated. Cost benchmarking should also be applied more generally, including for energy efficiency measures. In estimating costs it is important that administrative and other compliance costs are taken into account.

Finally, there is a role for voluntary schemes that allow individuals or firms to reduce or offset their GHG emissions. Government involvement in such schemes, however, is not necessarily required.

Reviewing existing policies

The Issues Paper poses the question — if an emissions trading scheme were adopted, 'would there be scope to abolish other, more costly interventions without affecting the overall abatement effort?'.

There is considerable scope to improve climate change policy regardless of whether an emissions trading scheme is introduced. Some of the deficiencies of current climate change policies have been mentioned earlier in this submission and these warrant attention. If an emissions trading scheme were adopted it would be essential that all existing policies were reviewed, with a view to discontinuing those that were introduced as temporary (second-best) measures in the absence of an emissions price and those that do not directly address a market failure. Other policies may require modification. Table 3.1 indicates the types of policies that, in the Commission's view, deserve particularly close scrutiny.

Concluding comments

As noted by the United Kingdom's Better Regulation Commission, climate change policy is too important to be undermined by hasty or inadequately informed action (BRC 2007). The problems identified by that body are magnified for a multi-jurisdiction federation such as Australia. For example, an emissions trading system for certain metropolitan Sydney local councils may be trialed this year (Environment Business 2007).

There is a growing awareness in Australia of the need for good quality regulation and to minimise 'red tape'. Governments are moving to more robust regulatory assessment and stronger gate-keeping systems. However, for climate change policy it is also vital that governments operate within a consistent framework. The objective must be to optimise the community's abatement dollar.

Accordingly, apart from the general principles of good regulatory practice:

- there should be a national climate change framework to guide policy development in all jurisdictions;
- policy initiatives should have clearly specified objectives and be based on evidence-based cost–benefit assessment;
- climate change should not be misused to justify other policy goals — if the objective is primarily industry or regional policy, this should be made clear;
- policy initiatives should be ranked according to a consistent abatement benchmark, such as the cost per tonne of carbon dioxide equivalent emissions saved or stored; and
- multiple policy instruments should be avoided unless there is a clear market failure rationale. If a national emissions price signal can do the 'heavy lifting', other directly substitutable measures should be discontinued to enhance efficiency and to avoid counting the same emissions savings twice.

Wider economic reform can also help to make climate change policy more effective in two ways. First, it increases Australia's capacity to meet the costs of climate change policy. Second, it can make the economy more flexible, which is important in minimising the adjustment costs associated with reducing GHG emissions.

As noted in this chapter, climate change policy in Australia is currently a disjointed, fragmented patchwork of measures across sectors and jurisdictions. Adherence to the principles outlined above should improve transparency, increase the likelihood of efficient abatement expenditures, reduce administration and compliance costs and increase public confidence in climate change policy.

Table 3.1 **Existing policies that would require priority review if an emissions price were introduced**

Major abatement measures	*Description*	*Comment*
Greenhouse Gas Reduction Scheme (GGAS) (NSW and ACT Governments)	This scheme establishes annual jurisdiction-wide GHG reduction targets, and requires individual electricity retailers to meet mandatory emissions reductions based on the size of their share of the electricity market. Participants must meet their targets by surrendering the required quantity of Greenhouse Gas Abatement Certificates. These can be traded, and can be earned using: low or zero emission technology to generate electricity; demand-side abatement through energy efficiency and/or fuel switching; and carbon sequestration.	• This is a baseline-and-credit scheme. These are, in general, inferior substitutes for cap-and-trade schemes. They rely on estimating hypothetical business-as-usual baselines and crediting reductions relative to the baseline. It is highly debatable what business-as-usual energy use might be. Energy reductions credited under the scheme may have occurred for reasons unrelated to the scheme, as assessment methods do not take into account several factors (such as other policy measures) that could influence energy efficiency investment decisions (PC 2005a).
Mandatory Renewable Energy Target (MRET) (Australian Government)	MRET was introduced to encourage the development of the renewable energy supply industry, and to achieve GHG reductions. It places a legal liability on wholesale purchasers of electricity to proportionately contribute towards the generation of an additional 9500 gigawatt hours of renewable energy annually by 2010. The target has already been achieved, and the Government has announced that it will not be raising it.	• MRET has been found to be a relatively expensive abatement measure (AGO 2003). Its focus on renewables rather than the emissions intensity of energy more generally is questionable. In addition, targets do not directly address underlying market failures that limit the uptake of emissions abatement opportunities and growth of the relevant industries. • Given these short comings, there would appear to be merit in the Australian Government's decision not to increase the MRET target, instead choosing to target support for renewable energy by addressing technical and regulatory barriers to its uptake, for example, via R&D funding.
Jurisdiction-based renewable energy targets (Vic., NSW and SA Governments)	Targets to increase electricity generated from renewable sources to: 10% by 2016 in Vic.; 10% by 2010 and 15% by 2020 in NSW; and 20% by 2014 in SA. Victoria and NSW have introduced specific policy instruments to ensure these targets are achieved, while SA has not.	• Jurisdiction-based targets are being implemented apparently due to dissatisfaction with the MRET decision (Thwaites 2006). The aforementioned problems with targets aside, jurisdiction-based schemes are less sensible than national schemes, as they lead to policy fragmentation.

13% Gas Scheme (Qld Government)	Requires electricity retailers and other liable parties to source at least 13% of their electricity from gas-fired generation. The scheme is similar in design to MRET and has been implemented to boost the State's gas industry and reduce GHG emissions.	• The 13% Gas Scheme suffers from some of the same deficiencies as MRET, in that it is target-based, technology specific and provides relatively high-cost abatement.
Greenhouse Challenge Plus (Australian Government)	A joint voluntary initiative between the Australian Government and industry. Members of the program report on their GHG emissions, abatement actions, and greenhouse performance indicators, and are encouraged to demonstrate a strong corporate commitment to reducing GHG emissions. The program integrates Generator Efficiency Standards and the Greenhouse Friendly™ initiative.	• This program is not strictly voluntary, as organisations wishing to receive more than $3 million in fuel tax credits in a financial year must become members. This may increase the probability of projects being undertaken that are not privately cost effective. • It is likely that firms are motivated to join voluntary schemes such as this partly as a precaution against the possibility of more costly measures, such as emissions pricing, being adopted. The scheme's effectiveness may be more limited once an emissions price is introduced.
Energy efficiency programs	*Description*	*Comment*
Mandated identification of and investment in cost-effective energy efficiency measures (Australian, Vic. and NSW Gov.)	EPA Victoria Industry Greenhouse Program — requires medium to large energy users to: report their energy use and associated GHG emissions; conduct an energy audit; identify best practice options and determine payback periods; invest in options with a payback of 3 years or less; and report annually to the EPA on implementation of options and annual emissions. NSW Energy Savings Action Plans — high energy users are required to: determine current energy use; undertake a management review; undertake a technical review; and identify energy savings measures. Participants are encouraged to implement savings measures using funding from the NSW Energy Savings Fund. Energy Efficiency Opportunities (Australian Government) — requires businesses to identify, evaluate and report publicly on cost-effective energy savings opportunities. Participation is mandatory for corporations that use more than 0.5 petajoules of energy per year.	• Command and control approaches such as these are generally less effective and efficient than market mechanisms, such as an emissions price. • With an emissions price, incentives to use inputs prudently to minimise costs and maintain competitiveness are enhanced, so mandated investment should not be required. • The benefits from mandatory auditing and reporting are likely to be modest (and possibly eroded by compliance costs). Emissions pricing would tend to make it more likely that firms would actively pursue energy efficiency opportunities (PC 2005a).

Minimum Energy Performance Standards (jointly administered by all jurisdictions)	Prohibits the sale of products (for example refrigerators and electric water heaters) that do not achieve a specified minimum level of energy efficiency.	• Forces consumers and producers to forgo product features that they may value more highly than greater energy efficiency. May also reduce competition and have distributional impacts. Providing information is less intrusive (PC 2005a).
Mandatory energy efficiency design standards for new buildings (jointly administered by all jurisdictions)	Most jurisdictions have adopted the national energy efficiency standards for commercial and residential buildings in the Building Code of Australia. NSW has implemented its own energy efficiency requirements for residential buildings (BASIX).	• The consequences of heterogeneity among individuals and buildings, the loss of building features that individuals value more than energy efficiency, and the potential discouragement of innovation and productivity growth, have been largely overlooked by policy makers in mandating these standards. • There is uncertainty about the extent to which standards reduce energy consumption. Limited available evidence suggests the costs of the standards may be higher than predicted (PC 2005a).
Other programs	*Description*	*Comment*
Solar Water Heater Subsidy (WA, SA and Vic. Governments)	Rebates are available for the installation of solar hot water systems. There are some differences in requirements across jurisdictions.	• Subsidies are a substitute for an emissions price. Therefore, once households face an emissions price, subsidising solar hot water heaters is unlikely to be warranted. • Subsidies such as these tend to cause policy fragmentation and incur high administration costs, particularly when applied differently across jurisdictions.
Recycling subsidies (all state/territory governments)	Kerbside and other forms of recycling are subsidised in a variety of ways, including through state/territory governments providing grants to local governments.	• Reducing GHG emissions is often cited as a reason for providing these subsidies. Once emissions pricing is implemented, downstream interventions predicated on GHG benefits need to be re-examined and, where relevant, removed (PC 2006b).

Sources: AGO (2003, 2005a); COAG (2002); DEUS (2006); DTEI (2006); ESC (2006); Kemp (2004); NETT (2006); PC (2005a, 2006b), Thwaites (2006).

A International policy experiences

The Kyoto Protocol allows countries to meet greenhouse gas (GHG) emission targets by implementing domestic policy of their choosing. Policies employed across and within countries include market-based measures (such as emissions trading and taxes), regulations, grants, support for new technologies, labelling, promoting energy savings and voluntary industry targets.

The advantages of market-based mechanisms are increasingly being recognised. Emissions trading is being trialled in the European Union and Japan and is due to be trialled in the northern United States from 2009. Emissions trading is also being considered in New Zealand, and was to be a central feature of Canada's climate change policy.

European Union

The European Union holds the position that climate change policy requires a broad bundle of common and coordinated policies and measures. Cost effectiveness is a main priority, so emissions trading is a cornerstone of its climate policy.

The European Union emissions trading scheme

At the beginning of 2005, the European Union launched a system of emissions trading, involving the 15 'old' member states and the 12 accession countries that joined the Union in May 2004 and in January 2007. The first trading period — which has been termed the 'warm–up phase' or 'learning phase' — covers three years (2005–07), the second phase corresponds to the Kyoto period (2008–12).

The European Union emissions trading scheme (EU ETS) is implemented in cooperation by the European Union and the member states. The European Union outlines the basic features of the scheme, but leaves substantial scope for member states to decide on important aspects of the implementation.

It is a cap-and-trade system; that is, the absolute quantity of emission rights (rather than relative or specific emissions) is fixed. Only one of the six GHGs of the Kyoto

Protocol, carbon dioxide (CO_2), is subject to the ETS, at least during the first period. The main reason for this is that CO_2 is the easiest to monitor, since the emissions are directly related to the use of fossil fuels.[18] Restricting emissions trading in this way produces some inefficiencies, since differences in avoidance costs between GHGs cannot be exploited systematically within this framework.

The EU ETS is implemented as a downstream system. The users (rather than the producers and importers of fossil fuels) are obliged to hold emission allowances. In order to limit the administrative costs, the scheme is restricted to large installations. Only installations belonging to four broad sectors that exceed a sector-specific threshold are subject to emissions trading. The four sectors are:

- energy activities (such as electric power and direct emissions from oil refineries);
- production and processing of ferrous metals (iron and steel);
- the mineral industry (such as cement, glass, or ceramic production); and
- pulp and paper.

The thresholds refer to the production capacity of the installation, for example, combustion installations with a rated thermal input exceeding 20 megawatt.

The EU ETS covers some 11 500 installations representing about 45 per cent of Europe's CO_2 emissions.[19] The inclusion of other sectors, in particular aviation, is being considered for the period 2008–2012.

- At least 95 per cent of the total quantity of allowances must be issued for free in the first period, at least 90 per cent in the second.
- Allowances are issued by each member state, but trading can take place between all European Union participants.
- The so-called 'Linking Directive' adopts the project-based mechanisms of the Kyoto Protocol (Joint Implementation (JI) and Clean Development Mechanism (CDM)) and allows participants in emissions trading to count credits from such projects in other countries towards their obligations under the European Union ETS.

[18] In order to levy energy taxes, most member states have in place a monitoring system for fossil fuels.

[19] In 2000, the EU-25 emitted about 14 per cent of global GHGs.

Within this framework, the member states have three key tasks:

- Deciding the quantity of allowances that should be allocated to the installations participating in the ETS. This decision is necessary, since the ETS covers only CO_2 and only some of the emitters, whereas targets are set with reference to a country's total emissions. The decision must take into consideration the country's target.[20]
- Drawing up a list of all installations that are subject to emissions trading.[21]
- Deciding how to allocate the total quantity to individual installations. The European Union sets some general rules for the allocation, but there is substantial scope for national priorities to influence the allocation.

These decisions are documented in a National Allocation Plan that must be approved by the European Union. Currently, the allocation plans for the second period (2008–12) are being reviewed by the European Union.

Lessons and likely developments

During its first two years, European emissions trading showed that the EU ETS had the potential for further efficiency-improving development. On 13 November 2006, the European Commission presented a report outlining its first evaluation of the ETS and setting an agenda for a future revision of the scheme (COM 2006). A working group is preparing recommendations for a revision of the ETS and will report by the end of June 2007. Changes could take effect in 2013 at the start of the scheme's third trading period.

The review will focus on the following issues:

- Scope of the scheme — with possible inclusion of additional activities and gases.
- Further harmonisation and increased predictability, including:
  - auctioning of emission allowances;
  - the approach to new entrants and closures; and
  - harmonisation of allocation methodologies.

[20] Under the Kyoto Protocol, the European Union committed itself to reducing its GHG emissions by 8 per cent. This target is shared between the 15 'old' EU member states under the so-called 'Burden Sharing Agreement', which sets individual emissions targets for each state compatible with the EU target. The ten new member states that joined the EU in 2004 have also ratified the Kyoto Protocol, but with their own Kyoto targets. Cyprus and Malta are treated as developing countries in the Kyoto Protocol and do not have emission targets.

[21] This is mainly an administrative act. However, in the beginning, ambiguities in the definition of the installations to be covered made this subject to political considerations.

- Robust compliance and enforcement.
- Involving non-EU countries.

One of the most obvious problems during the first phase was the large fluctuation of allowance prices (between €1 and more than €30). This fluctuation was partly due to the fact that the EU ETS created a new market and there was little information and experience about abatement costs. Moreover, necessary institutions (such as emissions registries and trading platforms) were not in place and information about historic emissions and other market data were not available. This problem was aggravated by the fact that 10 new member states joined the European Union in May 2004 with even fewer institutions in place and less experience about policy making in the European Union. Therefore, many of the NAPs submitted were approved only after emissions trading had started. A major upheaval of the market occurred in April 2006 when information about actual emissions in 2005 became available.

The price of allowances finally collapsed at the beginning of 2007 when it became clear that many member states had granted too many allowances.[22]

Overall, the price volatility can be explained by underdeveloped institutions and the lack of experience, in combination with the short time frame and the lack of the possibility to transfer excess allowances to the next trading period (banking). These factors were due to the novelty of the instrument and the short time before the start of the Kyoto period available to gain experience with emissions trading.

Some of the problems experienced by the ETS resulted from differences in interests of member countries and the European Union's reluctance to regulate more detail than necessary. The experience of the first two years taught that more harmonisation is necessary in order to avoid inconsistencies that could undermine the efficiency of the scheme. The main issues concern the total cap, the initial allocation of allowances and the treatment of new installations. One of the lessons from the first phase was 'how much market design matters to its operation and signalling' (Betz and Sato 2006).

During the first two years, participants made intensive use of the Kyoto Protocol's CDM and are expected to continue to do so. Institutions and rules for CDM projects need to be further developed.

The so-called Linking Directive allows the EU ETS to be linked to other emissions trading schemes, and some US states have expressed their interest in doing so. The

22 However, Ellerman and Buchner (2006) show that substantial emission cuts also contributed to the abundance of allowances.

EU ETS may thus set standards and serve as a nucleus for an international emissions trading scheme at the firm level.

None of the 'teething problems' described above preclude further development of the EU ETS into a more efficient tool for addressing climate change. The scheme provides experience with large-scale emissions trading and may thus be valuable for others to study. It should be considered as 'work in progress'.

New Zealand

New Zealand's 2002 climate change policy package included:

- a capped emissions tax from 2007, to apply to emissions from energy supply and use, process emissions and fugitive energy emissions;[23]
- the option to introduce emissions trading if there was a stable international market with the price reliably below the level of the capped tax; and
- a program to award internationally tradable carbon credits to initiatives that reduce emissions beyond business-as-usual reductions over the first commitment period of the Kyoto Protocol.

GHG emission projections made by the NZ Ministry for the Environment in 2005 indicated that New Zealand was likely to fail to meet its Kyoto target. A subsequent review found that the 2002 climate change policy package should be modified (NZ Ministry for the Environment 2005). The review's major conclusions were:

- in a situation where New Zealand has binding emissions targets, the more closely a domestic carbon tax approximates the international carbon price, the less rationale there is for additional regulatory or supporting measures in those sectors of the economy subject to the tax; and
- the level of domestic reductions that were likely to be achieved prior to 2012 was likely to be small. Given this, it would be prudent to meet the Kyoto commitment by purchasing some Kyoto-compliant units internationally.

A key outcome was that the previously-announced carbon tax would not proceed. A work program on alternatives to the carbon tax has been established, that specifies that emissions trading (including cap-and-trade, baseline-and-credit and offset trading models) be investigated. It is proposed that, initially, any scheme will have

[23] New Zealand firms whose international competitiveness would be affected by the tax were to have been able to negotiate an agreement with the Crown whereby they receive a full or partial exemption from the tax in exchange for agreeing to move towards the world's best practice in emissions management.

links to climate change programs in agriculture, land-use change and forestry, and transport. In the longer term, market-based measures may be applied across all major emitting and sequestering sectors of the NZ economy.

In the interim, a range of regulatory measures have been implemented or are being considered, to prepare key sectors and major emitters to face an emissions price.

Canada

In 2005, Canada's emissions were 24 per cent above the 1990 level, while the Kyoto target is 6 per cent below the 1990 level (Bramley 2005). In an attempt to meet its commitment, the Canadian Government released a national climate change plan that included market-based approaches to emissions reduction (box A.1).

In January 2006, a conservative minority government was elected. The new environment minister announced that Canada had no chance of meeting its Kyoto target. Soon after, funding for GHG abatement was reduced and the government is developing a new long-term plan to address climate change (Struck 2006).

Box A.1 Canada's proposed market-based approaches to emissions reduction

The Large Final Emitters System was to be a mandatory market-based baseline-and-credit scheme to reduce emissions to 45 Mt below business-as-usual levels across the mining, manufacturing, oil, gas and thermal electricity sectors. Entities were to have several options to meet their legal obligations, including procurement from the international market for Kyoto-compliant project-based credits (CDM and JI).

The Offsets System was to encourage domestic reductions, or removals, of GHG emissions in activities that were not covered by the Large Final Emitters system. Individuals, businesses and organizations were to earn offset credits by implementing projects that reduced or removed emissions below business-as-usual. Offset credits could be sold to the Climate Fund (see below), Large Final Emitters, and other domestic buyers.

The Climate Fund was intended to purchase credits on behalf of the Government. It was to purchase credits generated by the Offsets System and purchase international Kyoto units.

The Government had informal discussions with the European Commission on linking to the European Union Emissions Trading Scheme. Also, consideration was given to accommodate trading with non-Parties to the Kyoto Protocol (including domestic systems in the northern United States (the Regional Greenhouse Gas Initiative) and New South Wales (GGAS) (IEA 2005).

Japan

Under the Kyoto Protocol, Japan must reduce emissions to 6 per cent below 1990 levels (Masaki 2007). Its climate change strategy, released in 2002, stipulated more than 100 measures designed to help Japan meet this commitment. The strategy includes:

- regulatory measures to improve energy efficiency;
- technology development and deployment to reduce the emissions intensity of energy in the industrial sector; and
- policies to reduce transport emissions by improving the efficiency of freight services.

Despite its commitment to the Kyoto target, Japan's emissions have risen to around 8 per cent above 1990 levels (Masaki 2007). The government and businesses are increasingly turning to Kyoto flexibility mechanisms to achieve the Kyoto target. The Government started buying GHG emission credits in 2006. In the 2006 budget, 12.2 billion yen was earmarked for purchasing credits — equivalent to about 100 million tonnes of carbon dioxide, or about 1.6 percentage points of Japan's original 6 per cent Kyoto reduction target (Kao and Lies 2007).

Japan Voluntary Emissions Trading Scheme

In 2005, the Japan Voluntary Emissions Trading Scheme pilot was launched. The objectives of the pilot are to accumulate knowledge in and experience of cost-effective emissions reduction measures and emissions trading, including in the areas of emissions monitoring, reporting, and verification, and the accounting and registry system (Sudo 2006). Key features of the scheme are as follows:

- Facilities participate voluntarily by proposing a GHG reduction activity (as an incentive to join the scheme, one third of the cost is subsidised).
- The Government selects target facilities from applicants based on cost-effectiveness of the GHG reduction activity proposed.
- Facilities agree to emissions reduction targets and receive emissions allowances. Target facilities submit the same amount of emissions allowances as their actual GHG emissions. If the stated target is not achieved, the subsidy must be returned.
- Baseline emissions are an average of actual emissions over the past three years. Emission sources monitored and reported include direct emissions (for example, from combustion of fuels), indirect emissions (for example, from the use of grid-

electricity), direct emissions from the combustion of waste materials and direct emissions from the manufacture or processing of chemicals and materials.

- Facilities can buy emissions allowances or credits under the Kyoto Mechanisms in order to comply with their obligations.
- Participants are allowed to transfer excess emissions allowances to the next trading period.
- There are two types of participants. Those with targets and trading participants. The latter open accounts in the registries and operate trading, but are not eligible for subsidies or allocation of emissions allowances.

The first round of the pilot started in April 2005. The second round began in 2006, and a third round has been announced, which will commence in 2007 and end in 2009.

The scale of the pilot is quite small, and there are concerns that additional companies will not participate if the scheme remains voluntary (Sudo 2006). So far there is a lack of participation by major emitting industries (electricity, steel, petrochemicals). Some major emitters, including oil and power companies, are not participating for fear that mandatory emissions restrictions might be imposed on them in the future (Masaki 2007). The feasibility of mandatory emissions trading will be considered taking into account the results of the pilot, trends in GHG emissions, and the international situation (including the potential for linkages with the EU ETS and/or the US Regional Greenhouse Gas Initiative).

United States

The United States has not ratified the Kyoto Protocol. To address emissions, the Federal Government emphasised R&D for new technologies and energy efficiency. However, a number of States are participating in a cooperative effort to develop an emissions trading scheme, the Regional Greenhouse Gas Initiative.

Regional Greenhouse Gas Initiative

The Regional Greenhouse Gas Initiative is being developed by nine north–eastern and mid-Atlantic US states. It is planned to develop a cap-and-trade scheme commencing operation in 2009. The program will permit other states to join and is designed to accommodate the diversity in policies and programs in individual states. Key features of the scheme are as follows:

- It will require electric power generators to reduce CO_2 emissions at approximately current levels between 2009 and 2015. The cap declines 10 per cent by 2019.
- The initial phase will entail the allocation and trading of CO_2 allowances to and by sources in the power sector only. After the scheme for power plants is implemented, the states may consider expanding the program to other kinds of sources.
- Most or all of the allowances are likely to be auctioned, though this is yet to be confirmed. Auction revenue will be used to fund energy efficiency projects. At least 25 per cent of a State's auction revenue is to be dedicated to strategic energy or consumer benefit purposes, such as energy efficiency, new clean energy technologies and ratepayer rebates.
- Unlimited banking of permits will be permitted.
- Offsets will be allowed, with some restrictions.
- Participants will be able to use EU ETS allowances or CDM credits if the price of emissions allowances reaches a set price.
- The scheme will undergo a comprehensive review in 2015 (RGGI 2006).

A consensus is growing that if or when the United States adopts mandatory GHG targets, the most likely approach to international trading would be to first develop a national program and then negotiate trading agreements with other countries.

B Emissions trading compared to emissions taxes

The Task Group has been asked to advise on the nature and design of a workable global emissions trading system. In the national and international literature there is debate as to whether emission taxes are preferable to emissions trading in both a multilateral framework and domestic policy. The Australian Government might be confronted with these alternatives in negotiations about a global framework and should take them into account in domestic policy making.

It is widely agreed that both instruments establish an emissions price and thus give an incentive to mitigate emissions in an efficient way. However, they differ significantly in some ways. This appendix discusses some relevant aspects.

Emissions trading and emissions taxes under uncertainty

While emissions taxes and emissions trading produce very similar results if current and future costs and benefits of mitigation are known, their outcomes may differ substantially if this information is not available.

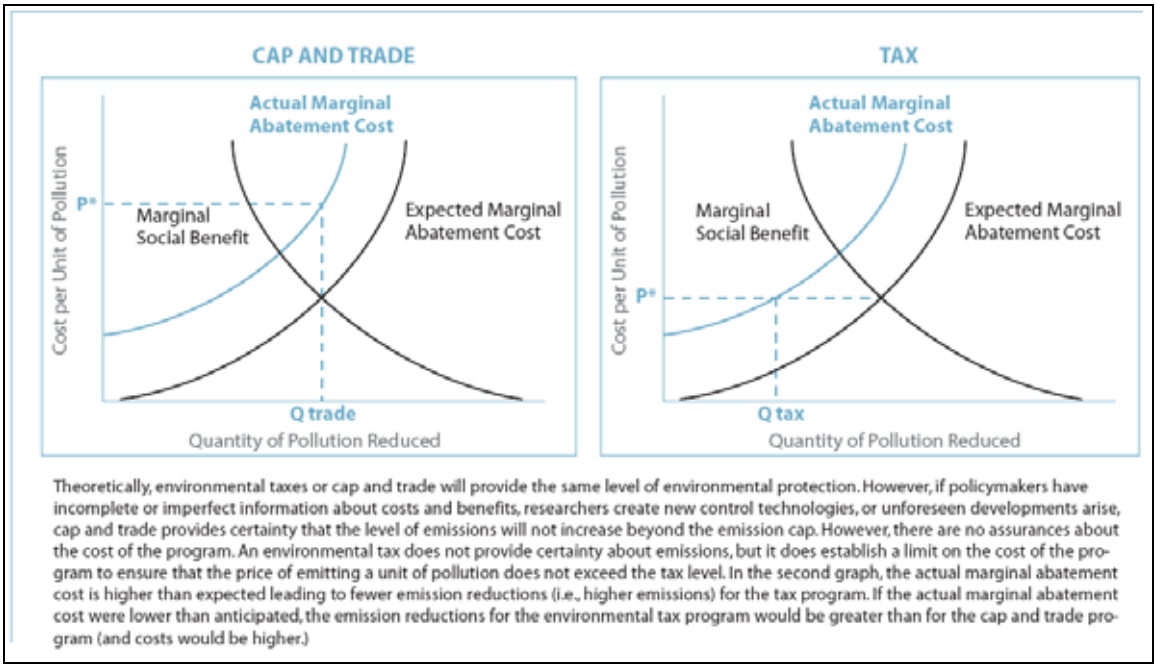
In a cap-and-trade system, the total amount of admissible emissions is limited by the amount of permits issued. If permits can be traded, those emitters that have lower abatement costs than the permit price will reduce their emissions while others will buy the necessary permits. The price of permits is determined by the costs of avoiding a further unit of emissions when the cap is reached. Emissions taxes, on the other hand, fix the price directly and emissions will be reduced up to the point where the costs of abating further emissions exceed the tax rate. In both cases, a price for emissions is established which will affect the price of the emitters' outputs and thus impact on activities throughout the economy.

If the abatement cost curve were known it would be possible to set a tax rate such that a given quantity is reached, or a cap such that the permit price will reach a given level. If the benefits of mitigation were also known, the optimal level of emissions could be determined and implemented by either a tax or a tradable quota. Thus, either instrument could be used to induce the desired emissions reduction.

However, neither benefits nor abatement cost curves are known precisely. Moreover, they change over time, for example, as technologies change or the economy grows.

In the situation where there is uncertainty about both the optimal emissions level and the induced outcomes of taxes or quotas, the equivalence of the instruments breaks down. With an emissions trading system, the amount of emissions is fixed, but the emissions price and thus the costs an emitter is willing to incur to mitigate emissions is uncertain. In contrast, with an emissions tax the tax rate and thus the (marginal) costs to the economy are fixed, but there is uncertainty about the level of emissions reduction that can be achieved (figure B.1).

Figure B.1 **Emissions trading and taxes under uncertainty**



Source: EPA (2003).

If the welfare loss that is likely to result from fixing either the quantity or the costs of emissions was the only criterion on which the choice of instrument was based, the choice would be determined by the curvature of the mitigation cost and benefit curves. If the (marginal) costs of abatement are increasing steeply with the quantity of avoided emissions, fixing the quantity can entail high costs of abatement to the economy. On the other hand, if these (marginal) costs hardly change, then a small deviation of the tax rate from the optimal value could induce large changes in the mitigation effort and thus large changes in environmental damage (Weitzman 1974; Stavins 1996).

In the case of climate change, it is not important to strictly limit emissions in the short run, since the effects of current emissions on GHG concentration and climate change are small. Thus many economists argue that it is more important to control the costs of mitigation through the use of emissions taxes.

Several proposals have been made to install 'hybrid systems' with a 'safety valve' — that is, emissions trading systems which set a ceiling to the permit price. The ceiling can be achieved either by the authorities offering to sell additional emission permits at a fixed price, or by setting a penalty that corresponds to the desired price cap for emitters who do not hold sufficient emission permits. These proposals combine qualities of both emissions trading and emissions taxes (Roberts and Spence 1976; Weitzman 1978; Kopp et al. 1997; McKibbin and Wilcoxen 1997; Jacoby and Ellerman 2002).

Considerations for a multilateral framework

For the following discussion of stylised instrument types, emissions trading within a multilateral framework is interpreted to refer to trade between parties to an agreement, not between individual emitters such as businesses or private households. A tax is assumed to be levied by individual countries at an internationally harmonised level (as discussed by Nordhaus 2006a).

Flexibility in domestic policy implementation

A multilateral system of emissions caps and permit trading between nations gives member countries the freedom to achieve their targets with whatever instruments they deem most appropriate. This allows them to take into account their unique circumstances, values and institutions. A policy package may comprise national or international firm-level emissions trading, emissions taxes, support for research and development, subsidies, command and control measures or any other policy it deems appropriate. (Failure to implement the optimal policy mix will hurt, in the first place, the country itself.)

A system of internationally harmonised taxes does not allow such flexibility. Any additional mitigation measures put in place by a country would increase its costs of climate change policy. In addition, emissions taxes interact with other taxes in the economy in a complex way. In order to equalise the incentive to mitigate CO_2 emissions between sources in different countries, it would be necessary to harmonise large parts of their tax systems. Otherwise, a country could use domestic policies (such as overt or hidden subsidies) to offset the effects of the emissions tax

and thus behave like a free-rider even as a party to a multilateral agreement. Furthermore, an increase in taxes appears to be far less politically acceptable than emissions trading in some countries, which could encumber international negotiations.

Financial transfers

International emissions trading would lead to financial transfers between countries. If a country receives an endowment that is higher than its emissions in the new equilibrium, it will be a net seller of permits and profit from a financial transfer from the buyers. The amount of transfers could be pre-determined by the amount of emission allowances assigned to a country (within limits due to uncertainty).

This induced financial transfer is welcomed by some and deplored by others. It is considered an important potential incentive mechanism to join a multilateral framework with binding emission caps, especially for developing countries. On the other hand, some fear that the implied transfers might make a climate change regime less palatable for 'donor' countries and thus international negotiations more difficult. Another major concern is that the potential transfers would make the system highly susceptible to cheating and corruption, and monitoring problems.

Financial transfers do not occur in this way under emissions taxes because individual governments retain the tax revenue. This avoids the distributional debate associated with permits. Also, this carries the benefit of giving individual governments an incentive to monitor emissions. However, these benefits come at the cost of the incentive for countries that benefit from financial transfers (especially developing countries) to join a multilateral framework. If similar incentives as under emissions trading were to be created, a separate mechanism (and institution) would have to be established, and contributions to or benefits from such a fund would have to be negotiated.

Choice of domestic policy

As mentioned above, a multilateral framework based on national caps with emissions trading among countries leaves individual countries the freedom to choose which instruments they want to use to achieve these targets. Thus, emissions trading between countries may be combined with domestic emissions taxes, but a country could also opt to implement an emissions trading scheme for individual emitters (domestic or international as in the case of the EU ETS).

The following section looks at aspects that should be taken into account when choosing a price instrument at the domestic level. Hereby, it is assumed that emissions trading and emissions taxes cover the same emitters. Technically, both instruments can be implemented upstream — that is, at the source of energy supply (such as mines, well-heads or refineries and importers) — or downstream — that is, at the point of sale to the final user or the final user himself. In the case of CO_2, both taxes and quotas can be linked to either the input of fossil fuels or the emissions of CO_2.[24]

Revenue raising with environmental instruments

In the context of environmental taxes, a debate about a 'double dividend' emerged in the 1980s and 1990s. It was contended that raising environmental taxes could give rise to two kinds of benefits — firstly, a reduction in environmental damages and secondly, a reduction in the excess burden of the tax system, from using the tax revenue to replace or reduce existing distortive taxes.

While the debate established that, in a strict sense, a double dividend is not very likely to arise (Goulder 1995), it showed that it would be beneficial to raise revenue with environmentally motivated taxes, because revenue recycling can reduce distortions of the tax system and thus reduce the net total costs of environmental policy to the economy (Goulder et al. 1997).

In principle, revenue can be raised by selling or auctioning emissions permits too. However, experience has shown that more often than not permits are given away. Indeed, the free allocation of emissions allowances has made emissions trading politically more palatable than taxes, even if this entails higher costs to the economy.

Uncertainty regarding the price of permits creates uncertainty about the revenue that is likely to be raised. A higher priority for the stability of revenue would favour taxes over trading.

Administrative and transaction costs

Taxes are an established instrument in all economies. Therefore, most countries find it easier and administratively less challenging to implement environmental taxes

[24] As long as appropriate provisions are made for carbon capture the two options are equivalent, since the emissions of CO_2 are proportionate to the carbon content of the fuel. Therefore, no distinction is made between tax on or trading of carbon input or CO_2 emissions, unless the difference between the two approaches is considered relevant.

than emissions trading. Very often, some type of energy tax is already in place and can be modified appropriately. In this case, the administrative costs of an emissions tax are likely to be relatively low.

In contrast, emissions trading usually requires new institutions, such as a registry, mechanisms for trading and a body for monitoring and enforcement. Part of these costs are setup costs which will be (partly) sunk if emissions trading is discontinued. In practice, the problem of administrative and transaction costs is aggravated if trading systems are downstream systems involving a large number of emitters. Experience with the EU ETS shows that especially in the case of small emitters, administrative and transaction costs are relatively high.

Allowing for flexible mechanisms (offsets, project-based credits)

Climate change policy should provide an incentive to undertake mitigation efforts wherever the costs are the lowest. However, in practice, both taxes and emissions trading often cover only some GHGs and some emitters. Emissions trading systems often have 'add-on' components which encourage offsets and the earning of project-based credits for emissions reductions not covered by the main scheme. It is difficult to establish equivalent mechanisms within a tax system so that other measures (for example, subsidies) would have to be implemented to create a similar incentive.

Conclusions

No instrument dominates the other in all the aspects discussed above. Ultimately, the choice of instrument will depend on the weighting given to the various aspects, whether it is to be applied domestically or multilaterally, and the specific design features of the tax or trading system.

On the multilateral level, the need to minimise the interference with the participants' sovereignty may be a strong argument for a cap-and-trade system. In domestic policy, different countries have chosen either instrument or a combination of both (appendix A).

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