Garnaut
CLIMATE CHANGE
REVIEW

# EMISSIONS TRADING SCHEME DISCUSSION PAPER

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## Executive Summary

The Garnaut Climate Change Review's approach to mitigation was initially set out in the Interim Report in February 2008. This paper focuses on the key role for an emissions trading scheme (ETS) in those mitigation efforts. It recommends an approach for Governments to consider in developing and delivering an effective ETS. Further consideration, informed by detailed economic modelling, will be given to these issues in the full reports of the Review.

The centrepiece of the ETS is a greenhouse gas emissions market. A price on carbon is needed to address the market failure of unpriced greenhouse gas emissions.

**A Global Challenge:** Climate change is a global issue requiring global solutions. Australia's efforts both internationally and domestically need to be situated in this context. Reducing the risks of dangerous climate change to acceptable levels requires a comprehensive global agreement, which will be difficult to achieve and take time to build. Emissions targets for Australia will eventually be defined through such agreement.

It is not in Australia's interests to free ride, nor to act in isolation. We should set an emissions budget and specific reduction targets prior to the emergence of a comprehensive global agreement, but comparable in adjustment effort to those accepted by other developed countries.

**Target and trajectories:** Australia should declare the ambitious emissions budgets and target trajectories that it would be prepared to accept in the context of an effective, comprehensive global agreement. Along with the design of the ETS we can announce a set of trajectories of permit releases over time, consistent with our emissions budgets. The trajectories should embody rising degrees of constraint. Any shift in trajectory should only be triggered by movement towards stronger effective international mitigation commitments.

To live within our emissions trajectories, Australia can require a permit to be acquitted against any emissions, and can allocate permits for specified amounts of emissions that sum to the budget. Economic efficiency will be maximised and the costs of abatement minimised if there are no constraints on how each permit is used.

**Design of an effective ETS:** An ETS is established to reduce emissions, but the emissions limit is a decision to be made outside of the scheme itself. In developing the ETS design, the singular objective should be to provide a transactional space that enables the transmission of permits to economic agents for whom they represent the greatest economic value.

A number of guiding principles can be applied in order to achieve this objective, including scarcity, tradability, credibility, simplicity and integration. These principles define a solid framework within which an effective market can be designed.

**Intrinsic and extrinsic features:** An ETS has two types of design features: those that are essential to the operational efficiency of the scheme, referred to as intrinsic features, (for example the scheme's coverage, permit allocation rules, compliance rules and governance); and those that are defined outside of the scheme's operation, but still have considerable influence on the scheme's economic impact, referred to as extrinsic features (for example, defining the emissions limits and principles for compensation). Both these design feature types exist within a broader context of factors that affect the operation of the scheme but are beyond the influence of policy decisions on ETS design, known as exogenous factors (for example the evolving global environment agreement as well as the evolving scientific and technological knowledge bases).

**Permit Allocation:** The price of permits, the increase in the price of electricity and other emissions-intensive products, and structural change in the economy in response to the restriction on emissions, will not be affected by the method of permit allocation. Transaction costs will be lowest if they are auctioned; any free allocation of permits will involve elaborate assessment and political processes.

**Trade-exposed emissions-intensive industries (TEEIIs):** Until our major competitors have broadly similar emissions constraints, payments to TEEIIs are justified for reasons of environmental and economic efficiency. Payments should be calibrated in a timely and precise way to the effects on the value of sales of particular commodities.

**International Trade:** The costs of abatement can potentially be substantially reduced, and therefore more ambitious targets achieved, by international trade in permits. However, linking with an economy that has a flawed domestic mitigation system will result in the import of those flaws. Variations in the quality of mitigation arrangements across countries mean that the decision to link with particular markets is a matter for fine judgement, but ultimately global mitigation will only be successful if countries can trade in emission permits. Opportunities for international linkage of the Australian ETS should be sought in a judicious and calibrated manner.

**Governance:** Sound governance arrangements are necessary to issue permits and to ensure that permits are acquitted in line with emissions. In Australia, there is a place for an independent institution playing a central role in administration of the ETS, within policy parameters established by legislation. In this report, we refer to such an institution as the Independent Carbon Bank.

**Market Failures:** Outside the ETS, there is a role for Government action to correct ongoing market failures associated with research, development and commercialisation of low-emissions technology, extended electricity transmission infrastructure, public transport efficiency, and energy efficiency. Effective policies in these areas can reduce the price of permits, the price of emissions-intensive products, and pressures for structural change in production and expenditure.

**Compensation:** This is a difficult reform, and a permit price that is high enough to secure levels of emissions within targets and budgets will have major effects on income distribution. The losers from such changes (households, and low-income households in particular, but in some circumstances domestic and foreign shareholders in highly emissions-intensive businesses) may feel that they can make a case for compensatory payments. The case for substantial measures to reduce the impact of the reform on living standards of low-income households is strong, and will affect political support for and perceptions of stability of an efficient ETS.

Also amongst the income distribution losers will be workers and communities dependent on emissions-intensive industries that may be unable to adjust readily to alternative employment. There is potential for disproportionate burdens to fall on coal-based energy-intensive regions, unless carbon capture and storage (CCS) technologies prove to be commercially viable at an early date. Assistance to established coal-based electricity generators with early testing and deployment of CCS would be a cost-effective, pre-emptive form of structural adjustment assistance.

**Public finance:** Alongside the generation of large amounts of revenue from permit sales, the Government will face large demands for increased expenditure associated with extrinsic features of the ETS.

Governments will need to assess competing priorities within a tight budget constraint. The political acceptability of the introduction of the ETS would be enhanced by government

commitment to transparently return to the community through the mechanisms outlined above or in other ways, all of the revenue generated by the sale of permits.

**Next steps:** The Review is carrying out extensive economic modelling on the impacts of climate change, and the costs and benefits of mitigation and adaptation to climate change. The modelling will inform the full reports of the Review, scheduled for end June and end September. The Review will continue to engage with the public and the community on these issues as it finalises its full reports.

**Summary of Australian ETS model for discussion:**

| **Design decision** | **Proposal** |
|---|---|
| **Setting an emissions limit** | Government should set the emissions limit for Australia. This emissions limit should be expressed as a trajectory of annual emissions targets over time, which define long term budgets.<br>*Trajectories*<br>Four trajectories should be specified upon establishment of the ETS. The first up to 2012 will be based on Australia's Kyoto commitments. The other three for the post-2012 period reflect increasing levels of ambition. Movement between them should be based on determining the comparability of Australia's response to international effort.<br>The Review will provide advice to government on trajectories and interim targets for an Australian ETS. This will be informed by economic modelling currently underway and further analysis, and presented in the full reports. |
| **Changes to the emissions limit** | Deciding to move from one trajectory to another should only be made on the basis of international policy developments and/or agreements (which should allow for new information and developments of an economic or scientific kind).<br>Conditions which would lead to a movement from one trajectory to a more stringent trajectory would be specified in advance.<br>Once on one trajectory, government provides five years notice before movement to another. Any gap between the domestic trajectory and international commitments during this period would be reconciled by the independent authority purchasing international permits. |
| **Coverage** | *Gases:* Six greenhouse gases as defined by the Kyoto protocol.<br>*Sectors:* Stationary energy, industrial processes, fugitives, transport and waste from scheme outset. Agriculture and forestry to be included as soon as practicable. |
| **Domestic offsets** | Domestic offsets should be accepted without limits, but will have a small role, given broad coverage. |
| **Point of obligation** | Set at point of emissions where practical. Where transaction costs are lower than the cost of distortions that may arise, upstream or downstream may be appropriate. |

| Design decision | Proposal |
|---|---|
| **Permit issuance (or release)** | Permits released according to emissions reduction trajectory. All permits auctioned at regular intervals. (Note, some permits may be used in lieu of cash in providing transitional assistance to traded-exposed, emissions-intensive firms at risk.) |
| **International linkages** | Opportunities for international linkage of the Australian ETS should be sought in a judicious and calibrated manner. |
| **Price controls** | Not supported. |
| **Inter-temporality** | Unlimited hoarding allowed. Official lending of permits by the independent authority to the private sector allowed, but may be subject to limits, in terms of quantity and time, determined by the independent authority. |
| **Treatment of TEEIIs** | Some industries rely significantly on emissions-intensive production processes, and are substantially unable to pass costs of emissions through to customers because price of commodity or good is determined on international markets. Transitional financial assistance (possibly in the form of free permits) should be provided to account for distortions arising from major trading competitors not adopting emissions limits (or pricing). |
| **Governance** | Policy framework set directly by government.<br>Scheme administered by independent authority. |
| **Compliance and penalty** | Penalty to be set as a compliance mechanism. Penalty does not replace obligation to acquit permits; a 'make-good' provision would apply. Alternatively, the use of revenue from a financial penalty could be used to purchase abatement. |
| **Use of permit revenue** | Auctioning of all permits will be the source of a substantial amount of government revenue. Governments will need to assess competing priorities for this revenue, which may include:<br>■ Payments to TEEIIs (to correct for market failures);<br>■ Payments to households;<br>■ Structural adjustment to support declining communities;<br>■ Payments to firms to correct market failures in relation to new technologies;<br>■ Support for public infrastructure; and<br>■ Cash reserves to purchase international permits/offsets to reconcile domestic emissions with international commitments.<br>The political acceptability of the introduction of the ETS would be enhanced by government commitment to transparently return to the community through the mechanisms outlined above or in other ways, all of the revenue generated by the sale of permits. |

# 1 Introduction

## 1.1 The Garnaut Climate Change Review

The Garnaut Climate Change Review (herein referred to as "the Review") was commissioned on 30 April 2007 by the then Leader of the Opposition, Kevin Rudd, and the Premiers and Chief Ministers of all States and Territories. The Review is to examine the impacts of climate change on Australia's environment and economy and to recommend medium- to long-term policies and policy frameworks (Terms of Reference in Appendix 1). Following the election of the Rudd Labor Government in November 2007, the Review became a joint Commonwealth-State project.

The Review has held a number of public forums and lectures as opportunities for experts and the public to contribute to the work of the Review. The Review released an Interim Report on 21 February, and several issues papers, and has made a general call for public submissions. The Review will present a draft Report for comment by the end of June 2008, and the Final Report by the end of September 2008. This paper, on an Emissions Trading Scheme (ETS), sets out the Review's current thoughts on ETS design as a basis for public comment and discussion.

## 1.2 The purpose of this paper

Although emissions trading is a complex and technical area of climate change policy, this paper seeks to be accessible to both the informed practitioner and the newcomer looking to participate for the first time in the discussion of these issues.

The purpose of this Paper is to outline the Review's views on the role and design features of an ETS.

All submissions in response to this Paper should be received by Friday 18 April 2008 via email at contactus@garnautreview.org.au with "Submission to ETS Paper" in the subject line.

Hardcopy submissions should be sent to:

Submission to ETS Discussion Paper

Garnaut Climate Change Review Secretariat

Level 2, 1 Treasury Place

East Melbourne, Victoria 3002

Submissions will be made available on the Review website unless marked "Confidential".

For more information on how to make a submission please visit the Garnaut Review website: http://www.garnautreview.org.au. For other queries, please contact the Review Secretariat via email at contactus@garnautreview.org.au.

We look forward to consultations on this paper with electricity generators and other parts of the Australian business sector, and with major elements of Australian civil society, which have expressed strong interest in this paper during its gestation.

## 1.3 Consideration of emissions trading policy in Australia

In recent years, the creation of an ETS has been the subject of much public and government attention. Australia was the home to one of the world's first ETS when the

New South Wales Government introduced the Greenhouse Gas Reduction Scheme (GGAS) in 2003. Australians have observed the first phase of the European Union's ETS in 2005-07, its early design problems, and the recent proposals for post-2012 arrangements that incorporate lessons of experience.

In 2004, Australian State and Territory Governments established the National Emissions Trading Taskforce (NETT) to develop ideas for a multi-jurisdictional ETS as part of a policy response to the challenge of reducing greenhouse gas emissions, and potentially to link Australia to international carbon markets. The NETT played a formative role in building Australian commitment to an ETS. As noted in the Review's Interim Report (Garnaut 2008), many of its design suggestions remain relevant, and stakeholder contributions to the NETT have been considered. The NETT's Final Report (2007) was submitted to the Review, without endorsement by State or Territory Governments, for the Review to consider.

In December 2006, the former Prime Minister, Mr John Howard, established a joint Government-business Task Group on Emissions Trading (TGET). The TGET drew heavily on the NETT's work, and took forward discussion of design issues in some areas. It reported in May 2007.

On 6 February 2008, Senator the Hon Penny Wong, Minister for Climate Change and Water, reiterated the new Federal Government's commitment to implement an Australian ETS by 2010.

The Review is undertaking its work in an Australian intellectual and political environment that has been changed and improved by the discussion around GGAS, international applications of ETS, and the work of the NETT and TGET. The intellectual and political environment has been changed by greatly increased community interest in climate change and its implications. It has been changed by media attention on advances in the science, the work of the Intergovernmental Panel on Climate Change and by the Stern Review. Business and community concern and knowledge about the climate change issue and approaches to its mitigation has also evolved. The environment has been changed over the past year by the focus and policies of the new Australian Government and its Ministry of Climate Change. The public processes of the Review itself have also contributed to the context, and policy debate on, for climate change mitigation policies.

The Review endorses, as the NETT and the TGET did, the creation of an ETS as the most efficient means by which to achieve the mitigation required as compared to other market instruments such as a carbon tax.

An ETS sets the current and future prices directly, without relying on accurate foresight by Government in accurately defining the many relevant and continuously changing influences on the supply and demand side for emissions permits. It has the significant benefit of providing options to link with the global development of markets in a carbon-constrained world.

This is the context for the Review's independent analysis of design features for an Australian ETS. The Review applies first principles in presenting a rigorous policy framework for public discussion, and to guide the design of an ETS in Australia.

## 1.4 The structure of this paper

This paper proceeds as follows. Section 2 provides a framework for guiding the design of various market features when establishing an ETS. Section 3 discusses optimal design features of an ETS. A central objective of Australian mitigation policy is to support the establishment of a favourable version of an effective, comprehensive international

agreement to which Australia is a party. Section 4 notes the implications for ETS design and operations of such an agreement being secured.

Section 5, introduces some aspects of the dynamic effects of the ETS on business and wider economic behaviour and structure. It seeks to provide insight into some of the ways in which the ETS will affect Australia's economy. It introduces some perspectives that will play more central roles in the full Reports.

Section 6 provides a summary of the proposed design for an Australian ETS.

# 2 Framework to guide ETS Design

## 2.1 The objective of an ETS

To mitigate climate change effectively, a limit must be placed on rights to emit greenhouse gases to the atmosphere, and this must be reduced over time to the level that prevents any net accumulation in the atmosphere. Governments, with their coercive powers, are the only bodies able to impose such a restriction.

Under the ETS, this supply-side constraint is imposed by governments creating "permits" that allow the holder of the permit to emit a specified volume of greenhouse gases to the atmosphere. The demand side of the market is established by the government requiring emitters to acquit permits if they wish to release greenhouse gases to the atmosphere. In so doing, the government must have the administrative machinery to enforce such a requirement credibly, as the requirement only exists by virtue of government decree.

A permit represents a tradeable instrument with inherent value that can be exchanged between sellers and buyers in an "emissions market". This enables their movement about the economy to their highest value (or most economically efficient) use, while ensuring the integrity of the volumetric control (the emissions limit) imposed in order to satisfy climate change mitigation policy objectives.

As with any market, an emissions trading scheme (ETS) will involve transaction costs that represent a deadweight loss to the economy. The development of a well designed market in permits lowers transactions costs over time and allows firms to use the market to manage their exposure to risk more efficiently as markets deepen and secondary markets emerge.

Having established the policy objective of reducing emissions and determined that this is most efficiently achieved by the implementation of an ETS, the objective of the scheme should be kept as simple as possible in order to avoid compromising its efficiency. The singular objective of the scheme should be:

> *To provide a transactional space that enables the transmission of permits to economic agents for whom they represent the greatest economic value.*

This objective allows the development of an ETS that is simple in design, efficient in operation, and easily comprehended by market participants and the wider community.

Other policy objectives – be they economic, environmental or social – should be pursued through alternative policy instruments that operate alongside the ETS.

## 2.2 Principles to guide the design of an ETS

The necessary conditions for a smooth operating market for emissions permits are defined by the following five principles:

*Principle 1: Scarcity aligned with the emissions target*

Without a scarcity constraint, a market will not exist as permits will have no value and there will be no demand for those permits.

Where the scarcity of permits is uncertain, market participants will factor in risk premiums (if they suspect that the commodity will become more scarce than currently understood) or risk discounts (if they suspect that the commodity will become more abundant).

*Principle 2: Tradability*

If market participants have no means by which to exchange a good, there can be no market. Tradability requires: clearly defined characteristics for the permit; an unambiguous identification of the benefits a permit bestows on its owner; the mechanism through which trade takes place; and a common understanding of the terms and conditions of trade.

While many platforms exist for trade, the most critical elements in designing a platform are: accessibility for those wanting to participate in the market; ability to secure the exchange quickly and at minimal cost; and transparency of offer and bid prices.

*Principle 3: Credibility*

Credibility, or faith in the enduring nature of the rules and institutions that define the ETS, is essential for its ongoing success. Markets can quickly collapse if their credibility is shaken. This is all the more germane for markets that owe their existence solely to government decree.

As an ETS exists entirely at the behest of government, market participants will be constantly alert for any early signs of shifts in policy, management protocols or operating procedures that potentially undermine the integrity of the market. There will also be incentives to press for change if there appears a chance that the rules of the scheme can be influenced. Arbitrary changes to rules that benefit one party will often come at the expense of other market participants, the community or the environment.

Therefore, reliable, steady and transparent operating rules are a necessary condition for the credibility of the market. Rules can be changed over time but this must be done via similarly reliable, steady and transparent processes.

*Principle 4: Simplicity*

Simplicity requires that rules for the ETS should be easily explained and implemented. Rules should apply consistently and 'special' rules, concessions and exemptions should be avoided. Rules should not be ambiguous or contradictory. Where the creation of one rule necessitates the creation of another rule to ameliorate unwanted consequences, the former rule is probably sub-optimal.

Compromises to the simplicity of the ETS should not be made lightly as they inevitably result in increased uncertainty and transaction costs for market participants.

*Principle 5: Integration with other markets*

An ETS must be able to coexist and integrate with international emissions markets as well as other financial, commodity and product markets in the domestic and international economies. This requires that there be no barriers to the appropriate transmission of information within and between markets.

If the ETS contains distortions that result in an emissions permit price that does not reflect its true scarcity value, this mis-priced market will adversely affect resource allocation decisions by investors in other markets.

The converse is also true. Distortions in other markets may result in mis-priced outcomes in the ETS. However, the integrity of the ETS should not be compromised to compensate for distortions in other markets. Rather, policy-makers should use the

opportunity and insights gained from establishing the ETS to identify and correct distortions in other markets.

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An effective and efficient ETS can be achieved if it is implemented with the singular objective outlined above and according to the five guiding principles of scarcity, tradability, credibility, simplicity and integration.

Successful implementation will result in observable outcomes such as:

- low transaction costs,
- price discoverability,
- emergence of forward markets and other derivatives,
- investor confidence, and
- low cost abatement spread over time in a way that minimises the present value of costs.

Developing an ETS that achieves these outcomes requires careful and detailed consideration of a large array of design features. The following sub-sections (2.3 and 2.4) differentiate between two groups of ETS design features. The first group of features ('intrinsic features') should be designed to maximise the efficiency of the ETS, and should be guided by the five principles articulated above with few or no trade-offs between them. The second group ('extrinsic features') addresses the broader policy environment within which the ETS operates. Design of these features should similarly be guided by these five principles, but will also involve trade-offs amongst a more complex set of policy objectives. Even so, decisions about extrinsic design features should avoid unnecessarily compromising the integrity of the ETS and its consistency with the five guiding principles.

The ability to implement intrinsic and extrinsic design features that achieve this will depend on the broader conditions within which the market is established (section 2.5).

## 2.3 Intrinsic design features of an ETS

Intrinsic features represent aspects of the scheme's design that need not take into account policy objectives other than the efficient operation of the ETS itself.

### Coverage

Coverage refers to the scope of an ETS – in terms of sectors, greenhouse gases and countries. Emitters in covered sectors will have an obligation to acquit permits under the scheme. Depending on the nature of emissions and activities of covered sectors, their points of obligation may be different (see below). Additionally, if a sector is not covered under the ETS, it may (or may not) be desirable for it to be eligible to create offset credits.

### Offsets

A reduction or removal of emissions from activities in one area of the economy can be used to counterbalance ('offset') emissions in other sectors of the economy. Reductions in sectors not covered by the scheme could be eligible to create offset credits. Scheme

coverage has direct implications for the availability of offsets. If more sectors are covered under an ETS, there will be less opportunity for the creation of offset credits, other than those that remove greenhouse gases from the atmosphere — namely, the creation of carbon sinks.

## Point of obligation

The point of obligation is the point in the supply chain – from those who produce goods and services that involve the release of greenhouse gases to the atmosphere, to those who consume those products – at which monitoring and reporting of emissions is required for the purposes of the ETS. Under an ETS, these emissions must be accounted for by acquitting permits equal to those emissions.

A source can be accountable for direct and/or indirect emissions. Direct emissions are those from a source controlled by the participant, from that organisation or facility's processes or actions. Indirect emissions result from the use or purchase of a product from another organisation or facility. For example, the burning of coal to make electricity can be counted as direct emissions at a power station, and as indirect emissions for the end user of the electricity. Depending on whether they were counted in terms of being direct or indirect, emissions could be attributed to different sources, the power station or the end user. Alternatively, emissions from electricity could be counted at the source of the fossil fuel—either the mine or the importer. In developing accounting methodologies for greenhouse gas emissions, it is necessary to avoid double counting by specifying unequivocally the point at which emissions are counted.

## Permit design

The emissions budget or cap for the scheme (see 'The emissions limit', below) will be divided into equal permits. A permit will enable the holder to emit a certain quantity of greenhouse gas. While different greenhouse gas emissions have different global warming potentials, they can be roughly compared when they are translated into carbon-dioxide equivalent ($CO_2$-e). Consequently, in an ETS, permits are generally worth one tonne of $CO_2$-e.

Permits may be available for single use at any time throughout the life of the ETS. Alternatively, they may be restricted in terms of their time of use, and may be marked as such (for example, date-stamped for use in a particular year(s)).

## Permit issuance

Governments can either release permits by allocating them at no cost to a range of potential recipients (e.g. households or businesses) or by selling them through a competitive process (auctioning). Either way, a recipient of a permit fully acquires the economic and financial benefit it bestows, whether it is sold or granted freely. Therefore, the manner of the allocation will not affect the operations of the scheme – the price of permits or the costs of adjustment to the ETS. Who they are allocated to, however, will have large effects on the distribution of income.

It would be possible for the authorities to attach conditions on the use of permits. For example, it could allocate a permit freely to a firm producing some product, on the condition that production of that item continued. Such conditions would reduce the efficiency of the ETS.

## International trade and linkages: Options

Linking internationally is a form of shared sovereignty, which will imply some loss of control over aspects of mitigation policy, but also potential benefits in terms of reduced costs, and increased flexibility. Australia will be a small player in comparison to the EU or emerging US carbon markets or any national market that developed in China. It would therefore be more or less a price taker if linking fully to those markets. Although to date international linking has been limited in scope, it is likely to grow in the future, as more developed countries establish ETSs, and as developing countries become more important players in global climate change mitigation efforts.

There are five main choices to be made in determining the extent and type of international linkages to which emissions markets are subject:

*Links between emissions markets and/or with international offsets.* Linking emissions markets involves the mutual recognition and trading of emissions permits – in different countries or regions, or between different sectoral markets. International offset linking occurs when offsets created in another country can be traded domestically, i.e. exchanged for domestic emissions permits.

*Direct or indirect links.* Direct linking takes place when one market allows trade with another, or recognises the purchase of international offsets to exchange for domestic emission permits. Indirect linking occurs where two markets are individually linked to a third market, effectively linking all three markets through a roughly similar permit price.

*Unilateral or two-way linking.* Two-way linking occurs when both parties allow trade in the other's market. Unilateral linking occurs when one country simply declares permits from another country to be valid for acquittal in its own system. Provided the “linked-to” country does not place restrictions on the sale of permits, this would allow one-way flows of permits.

*Government and/or private trades.* In general, there is a case for both governments and private market agents participating in international trade. However, there may be circumstances in which private participation is infeasible, in which case trade will need to be undertaken through national gateways.

*Limited versus unlimited trading*. Under Kyoto, there are unquantified limits on trade under the “supplementarity” principle. So far it has been left to each country to quantify this limit in its own way.

These are discussed further in Section 3 and Appendix 2.

## Price controls

A government may set a price ceiling, by agreeing to issue as many additional permits as emitters desire. The government would impose a price equal to the price ceiling on additional permits. A government may also set a floor price by reducing the rate at which permits are released, and if necessary entering the market to buy permits, whenever the price falls to the floor price.

## Inter-temporality: banking and borrowing

As noted in permit design, above, permits may allow the user to emit a unit of emissions at any time during the scheme, or for a specified time. Banking allows unused permits to be saved for future use. Borrowing allows parties to use permits from the future to meet current obligations, on the condition that the loan will be later repaid.

If permits can be used at any time, they will be banked and borrowed according to commercial imperatives. However, if permits are valid only for a specified period (for example, date-stamped for a particular year), a decision will need to be made about whether permits dated before or after that period can be used for compliance in that year.

Banking and borrowing between private sector participants contributes naturally to the objective of the ETS. Official lending of permits by the authorities and net hoarding of permits by the private sector have implications for the time path of permit acquittal or use. In this paper, for clarity, we reserve the term 'lending' for transactions between the authorities and the private sector. We reserve the term 'hoarding' for net banking of permits by the private sector.

### Avoiding trade distortions

Trade distortions might arise where competitor countries do not impose similar constraints on emissions. Differences in pricing of emissions have the potential to distort investment and production decisions in trade-exposed, emissions-intensive industries in the country that imposes a carbon price ahead of its competitors. Such distortions are potentially damaging to environmental as well as economy efficiency. Carefully calibrated payments to affected Australian producers can correct the distortion.

### Scheme reviews

Given the high levels of uncertainty inherent in the climate change science and international mitigation efforts, it would not be wise to set an emissions budget or targets without allowing for the possibility of adjustment.

Additionally, it is possible that the intrinsic features of the ETS may need to be changed with developments in international mitigation efforts (for example, the degree of international linking), in the monitoring and verification of emissions (for example, affecting the potential for wider coverage), and experience of the ETS in operation.

### Governance

Scheme governance has large implications for the efficiency, credibility and simplicity of the scheme. Institutions will be required to operate and regulate the ETS. Governments would have a direct role in broad policy decisions, and in establishing the legislative and institutional framework of the scheme. There is a case for an Independent Carbon Bank (ICB) with considerable independence administering the ETS day to day, and for the enforcement of compliance.

### Compliance and penalties

As discussed above, participants at the point of obligation will be required to monitor and report emissions, and surrender permits to the value of those emissions. If a party fails to surrender permits equal to their emissions during a given compliance period, a penalty could apply, but as a punitive measure rather than as an alternative form of compliance.

As an extra compliance incentive that preserves the environmental integrity of the scheme, a make-good provision could apply. This requires parties with emissions in excess of its permit holdings to acquire and surrender an additional quantity of permits sufficient to cover ('make good') these excess emissions.

## 2.4 Extrinsic design features of an ETS addressing multiple policy objectives

Extrinsic features represent aspect of the scheme's design that necessarily require a trade-off between a range of policy objectives — be they economic, social or environmental — as well as the efficient operation of the ETS.

### The emissions limit

The emissions limit has two dimensions:

- A quantitative constraint – the total amount of emissions allowed; and
- The time profile of emissions – the period of time over which the specified amount of $CO_2$-e can be emitted, and the trajectory of the emissions reduction.

The international discussion of climate change has tended to express the emissions limit as targets at a point in time, for example x per cent reductions in emissions in future year y from levels in a base year z. Percentage reductions from a 1990 or 2000 base year by 2050 have been a focus of recent international discussions. An alternative is to express the emissions limit as a trajectory of annual targets over time. The sum of the short term limits (the area under the trajectory when it is described in a graph) defines a "budget", which is the total emissions allowed to be released over a number of years, x Gt over y years.

### Compensating those whose incomes are reduced by the introduction of an ETS

Implementing an ETS is a large reform, involving large changes in the distribution of income.

Individuals and households will be affected by the extent to which firms pass on higher input costs in the form of higher prices, including for consumer products. If governments were to decide to assist households for the impact of this on their disposable income, assistance could be provided through the tax and welfare system or by assistance to household's adjustment to greater efficiency in energy use, or through support for new technologies to reduce dependence on emissions-intensive goods and services.

Beyond the potential for distortions in trade-exposed, emissions-intensive industries (TEEIIs) (the issues associated with the intrinsic operations of the firm and not concerns about income distribution), for firms, the imposition of an emissions limit, and therefore a price on emissions, will affect the profitability of individual firms in many different ways. A firm's place on the spectrum of impacts and profitability will depend on the emissions-intensity of a firm's established production; the firm's ability to pass on higher input costs to users in the form of higher prices; and the firm's emissions intensity, and success in reducing the emissions-intensity of its production, relative to its direct competitors in the relevant market.

Producers in the non-traded sectors will, on average and in general, be able to pass on to households most of the costs associated with their direct and indirect emissions.

In some cases, firms with inflexible production structures could be faced with having to choose between passing on the price (and losing market share) or absorbing the cost of emissions at the expense of profitability.

This potential change in production and the associated loss in profit has led some to argue for compensation from government.

The extent to which real production levels may decline and to which new production techniques are adopted, will determine the structural adjustment challenge facing individual sectors and communities. The impacts on different industries, regions, communities and individuals (with or without particular skills sets) will be uneven and will be influenced by the level of dependence of the workers and communities on the affected industries and the speed at which industries reduce their production runs. Some regionally based workers with highly specialised skills and communities who are disproportionately dependent on particular industries often do not have ready access to other job opportunities near their established places of residence. Under established Australian policy and practice, this can make a case for structural adjustment assistance.

## 2.5 Exogenous factors affecting the implementation of an Australian ETS

Beyond intrinsic and extrinsic features of an ETS, there are exogenous factors influencing the context in which the ETS must be designed. These factors potentially affect the efficiency of the scheme, and therefore the design features government may choose. They are:

- The international and global context – what other countries are doing, and whether there is an international agreement (with narrow or wide participation) on emissions reduction;
- The scientific and technological uncertainties – including, the uncertainties in the relationship between greenhouse gas emissions and changes to natural ecosystems and human settlements; the measurement and verification of emissions; and the timing, cost and mitigative potential of new low-emissions technologies; and
- The credibility of institutions – that is, the faith participants have in the enduring nature of institutional behaviour in relation to the rules established at the outset of the ETS.

These factors, and their impact on the design of an ETS, are discussed in turn below.

### International context for an ETS

The global nature of climate change has, to a large extent, been the biggest barrier to agreeing on a solution. Few countries have the incentive to act alone. In this way, it is a genuine international prisoner's dilemma.

Although this international context is a factor exogenous to the ETS, it is one that can be influenced. Australia, through domestic mitigative action and international diplomacy, can play a role in the emergence of an effective, international agreement.

### Scientific and technological uncertainties

*Scientific uncertainties*

Developments in the science of climate change may lead to changes in assessments of the amount of mitigation that is desirable, and therefore in the targets and budgets that are judged to be appropriate (see the Review's Interim Report, Garnaut 2008).

*Technological uncertainties*

Technological uncertainties that affect the implementation of an ETS fall into two categories: (i) those associated with measurement and verification of emissions

production and reduction; and (ii) those associated with the development of low-emissions technologies.

In determining the point of obligation and the coverage of the ETS, it is important that emissions can be measured and verified at reasonable cost and with reasonable accuracy. An alternative to measuring emissions directly would be to estimate them from using widely accepted proxies such as applying an emissions factor to fossil fuel used as an input to energy production.

New technologies will be needed to reduce emissions. Some of these already exist. Some do not yet exist but have prospects of being developed. Although there is much information about those that currently do exist, there are still uncertainties regarding the cost and timing of some of these, and their effectiveness in reducing emissions. Uncertainties are even greater with those technologies at an earlier stage of development.

To some extent, the technological ability to measure and verify emissions and the timing and cost of new low-emissions technologies must be accepted as a factor exogenous to the design of an ETS. However, like the international context for an ETS, these can be influenced by government action.

## Institutions

The faith participants have in the enduring nature of the institutional behaviour will fundamentally influence all aspects of the ETS. It depends on the ongoing commitment of policy makers

Institutional credibility is often acquired through reputation based on a history of demonstrated commitment to established rules and observed behaviours (especially in crises), and therefore takes time to develop. In the case of climate change policy, it will also be influenced by the actions of other governments and indications of their commitment to reducing emissions. This will be the case regardless of whether it is a domestic or international institution.

Should institutional arrangements lack sufficient credibility, the market agents will factor into their decisions and actions risk premiums or discounts in anticipation of institutional failure. As the price does not reflect the true scarcity value, this behaviour results in sub-optimal resource allocation decisions and a deadweight loss to society.

# 3 An Australian ETS prior to establishment of an International Agreement on Greenhouse Gas Mitigation

## 3.1 Introduction

This section identifies emissions trading scheme (ETS) design features for Australia in the absence of an effective international agreement. This section is appropriate to Australia's current circumstances, in which a domestic ETS is proposed for implementation in 2010. Despite the lack of international agreement, there remain valid reasons for Australia to undertake mitigative action.

The first-best context for Australian mitigation policy would be a comprehensive global agreement. For several reasons, it is desirable to remain as close as possible to the first-best solution in identifying this next-best solution. First, there is no point in undertaking mitigation in Australia unless it moves us towards being a part of an international agreement. Domestic policy, such as the ETS, must therefore support Australia in moving toward this ultimate objective. Second, the less difference there is between the two solutions, the less costly will be the transition for government and for business in progressing from the next-best ETS model to the first-best, if and when international agreement is reached. And third, to establish an ETS as consistent as possible with that which would be optimal under an effective international agreement, signals Australia's commitment to achieving this outcome. Implementing an inconsistent local approach would undermine our advocacy in international negotiations.

Building on the framework established in section 2, this section focuses on the design of an ETS, ahead of an international agreement on greenhouse gas mitigation being reached.

## 3.2 Current context for an Australian ETS: international agreement and Australia's strategy

Australia played an important role in early meetings of the United Nations Framework Convention on Climate Change (UNFCCC). It stood outside the international mainstream discussions from 2001 to 2007, but rejoined the process at the Bali meeting of the UNFCCC, at the time of the Rudd Government's ratification of the Kyoto Protocol.

Australia cannot afford to free ride. If even a small number of developed countries wait for global action before taking domestic action there will never be an effective global response to climate change. But nor should Australia act in isolation. We are a small emitter in absolute terms, and cannot solve the climate change problem on our own. A carefully calibrated response is required at the multilateral, regional and national level.

No domestic decision made by Australia in the area of climate change mitigation will have greater international ramifications than the choice of Australia's emissions budget. Strategic as well as policy considerations argue for more than one emissions budget. One could represent what Australia is prepared to do initially as part of the developed country contribution to keeping open the possibility of effective, comprehensive global agreement. Another budget(s) could represent what Australia would be prepared to do in the context of effective, global action. The more effective and ambitious the agreement(s) reached, the more Australia should be prepared to move towards its full share of a fully effective agreement.

## 3.3 Establishing the emissions limit

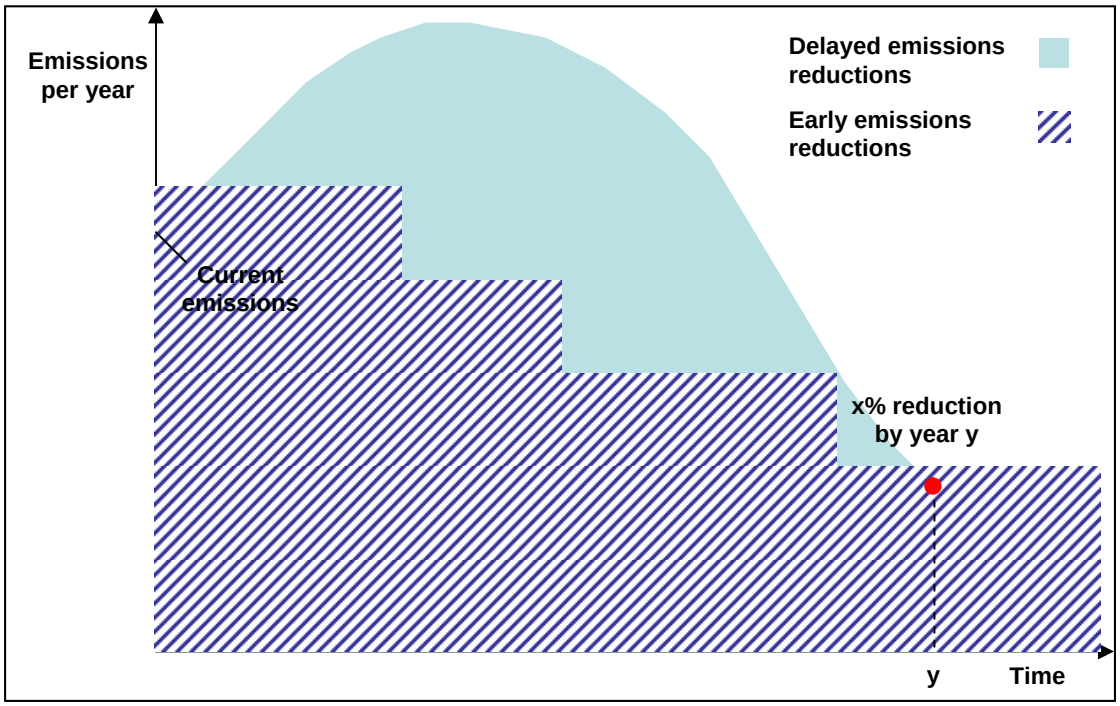
### Expressing the limit

*Targets or a budget*

In a discussion of the best way to express an emissions limit, it is worth keeping in mind that the ultimate objective is to set an emissions limit that achieves stabilisation at a specific concentration. This is done by limiting the world to a quantum of cumulative emissions.

The international discussion of end-year targets has provided a political focus for mitigation, but sits awkwardly alongside this objective. An end-year target alone will not achieve the desired level of cumulative emissions. This is because there are a number of emissions reduction trajectories that could be followed to achieve that target, which will result in different cumulative emissions and therefore stabilisation concentrations (see Figure 3-1). A way to augment the end-year targets to achieve the desired cumulative emissions is to introduce a series of interim targets which sum to the cumulative emissions, and for the end-year target used to be that for the year in which we aim to stabilise emissions. The international debate, with discussion of targets for 2020 and 2050 may – and should – move toward such an approach, but will not alone remove the problem.

**Figure 3-1: Different cumulative emissions from the same end-year target**




An emissions budget achieves the stabilisation concentration explicitly. Such a budget is also defined by the area under the trajectory of annual emissions targets. Use of a budget also enables an explicit discussion of how this budget should be shared between countries to achieve international equity. Acceptance of some reasonable basis for sharing an agreed global emissions budget should be the ultimate outcome of any international agreement and therefore guide the approach adopted by Australia in the lead up to such an agreement.

*Meeting international commitments*

Pending the establishment of an international agreement based on emissions budgets, a country which follows this more environmentally responsible approach may find itself in breach of targets specified in the established way for particular years.

It is desirable for this international commitment to move towards setting binding multi-year emissions budgets in place of targets for particular years. Pending this, the budget approach to setting limits on emissions can be reconciled with year-specific targets for a particular country by specifying a trajectory of annual emissions over time, the annual components of which sum to the budget total.

The trajectories provide the basis for the release of permits over time. Binding annual targets for actual emissions may be extremely costly, as fluctuations in supply and demand for emissions-intensive products would force large short-term structural change. Allowing flexibility in using permits by allowing hoarding and official lending would mean that actual emissions were above or below targets at particular points in time, while staying within the emissions budget. Deviations of actual annual use of permits from the trajectory in years that are important for international accounting can be met by the authorities purchasing permits in the international market.

*Trajectories*

The trajectories, with implications for total emissions, can usefully define time paths for release of emissions permits.

What shape should trajectories take? The European Union has recently opted for linear movement from current levels of emissions to levels in specified future years. This embodies a steadily increasing annual percentage rate of emissions reduction as the level of emissions declines. Some proposed trajectories of permit release over time slope downwards with increasing steepness, embodying a more gradual start than the linear curves, and more rapidly accelerating rates of emissions reduction. Such an approach may embody an expectation that the availability of greatly more efficient, low-emissions technologies will become available in later years.

An alternative assumption, that the rate of improvement in abatement opportunities was similar in the early years (when "low hanging fruit" was available, perhaps in relation to energy efficiency) as in later years (with access to rapidly improving low-emissions technology), would suggest a convex curve of permit release. Taking decisions in advance of the ETS, there is no *a priori* reason to prefer one shape of curve over others. Modelling of minimum cost curves for emissions reduction over time can suggest an optimal shape, but will depend heavily on ultimately arbitrary assumptions about the rate of technological improvement. We could conclude that the European approach for post-2012 targets, the linear curve, is as good as any.[1]

Where there is a credible ETS, in which there is hoarding and lending of permits according to market participants' perceptions of the cost of reduction of emissions at present and in the future, or where international trading is permitted, it matters little whether there is moderate departure of actual emissions from the trajectory of permit release. Significant lending (and, to a lesser extent hoarding) may raise questions about

[1] As this discussion relates to *Australia's* emissions reduction trajectory only, it will not affect the environmental outcome. However, the trajectory of global emissions reductions may affect the environmental outcome. This is being examined further by the Review.

the credibility of the system, so there is an advantage in the gap between the release and use trajectories being of only moderate dimension.

## Emissions limit over time

*Objectives in establishing Australia's emissions limit*

As outlined in section 2 and in the Interim Report (Garnaut 2008), the establishment of Australia's emissions limit will involve trade-offs amongst a more complex set of policy objectives than some other design features of the ETS.

In the absence of an international agreement, Australia must define its own limit with the aim of moving towards international agreement. These should include:

- Being able to respond to developments in international negotiations whether they be the development of a comprehensive agreement or the entry of additional countries taking on emissions limits;
- Ensuring the Australian limit is tight enough to give reassurance and encouragement to others;
- Giving domestic markets a clear understanding of the possible emissions reduction trajectories and the conditions under which one or other is likely to be applied;
- Minimising the costs of Australian adjustment; and
- Being robust in the face of pressures from vested interests.

*Tightening emissions trajectories over time*

Let us keep in mind four stages in the process of defining an Australian emissions budget, each of which is associated with a trajectory of emissions reductions, associated with a schedule for release of permits. Each stage is associated with a different emissions trajectory, A, B, C and D. While Trajectory A is determined by existing Australian commitments under the Kyoto Protocol, Trajectories B, C and D all require assessments of comparable effort, either with other developed countries (Trajectories B and C) or all countries (Trajectory D). A framework for this will be required, such as that proposed in the Interim Report (Garnaut, 2008) which takes into account both national starting points and the need to give a high weight to per capita allocations over the long run.

*Trajectory A*

Trajectory A covers the period from the commencement of the ETS to the end of the Kyoto period in 2012. Trajectory A can be derived from Australia's Kyoto commitments.

*Trajectory B*

Australia's next step—the targets or budgets for its ETS 2013-20—is best premised on making broadly similar effort to the average of other developed countries based on existing commitments. An illustrative path is given as Trajectory B in Figure 3-2.

*Trajectory C*

Australia has committed itself to a 60 per cent reduction in greenhouse gases by 2050 from 2000 levels, but the path or trajectory of reduction between now and then has not

been decided. From Trajectory B, Australia would move to Trajectory C, a path consistent with the Government's objective of reducing emissions by 60 per cent by 2050. Australia would move onto this path when the average of the developed countries has accepted comparable commitments. The move to Trajectory C could occur from 2013, or during or after the 2013-2020 period, or conceivably even later, depending on international developments. It is in Australia's interests that the shift of trajectory to C occurs sooner rather than later.

*Trajectory D*

Putting the Australian economy onto a path consistent with a 60 per cent reduction in greenhouse gases by 2050 will be a major achievement, and send a strong, effective signal that Australia, as a developed country, is ready to play its part in solving the climate change problem. However, more will be needed, by developed and developing countries alike, for an effective response to global climate change.

Trajectory D reflects the Australian emissions budget that emerge from a comprehensive global agreement, aimed at an appropriate level of atmospheric stabilisation. It is this trajectory that is relevant when the world moves to a path that has prospects of removing high risks of dangerous climate change. Again this might happen in time for a 2013 start, between 2013 and 2020, or later.

Stylised versions of these trajectories are presented in Figure 3-2. In this ETS paper, we do not suggest particular points or gradients for these emissions trajectories, and the paths shown are purely illustrative. Definition of an actual 2020 interim target and a surrounding trajectory for Australia requires assessment of costs of realising various ambitions of mitigation, as well as international trading opportunities. This analysis will be discussed, and recommendations made, in the full reports. It also requires knowledge of what other developed countries will do for the period 2008-12, which will emerge over the next three year.

The full reports will suggest numbers for these trajectories, together with estimates of the costs to the Australian economy of adjusting to them. Here we aim merely to describe the general shape of the information upon which permit markets will be able to form expectations.

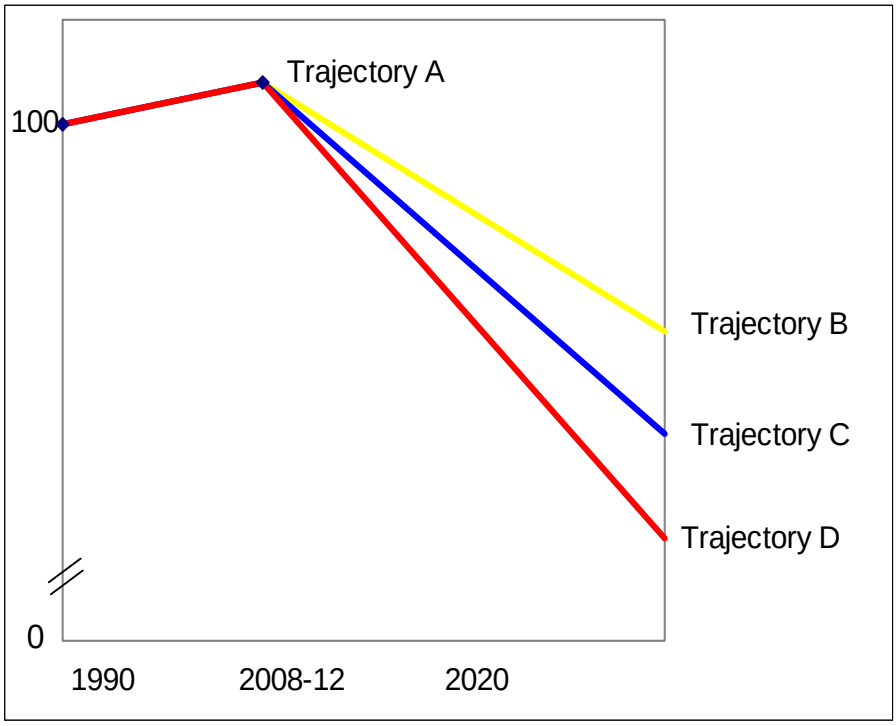
*Australian Trajectories and Budgets*

The Review proposes that the Government announces a number of trajectories at the time of the announcement of the ETS policy.

The least severe trajectory would be the basis for announcing a firm, five-year schedule for release of permits. Each year, the firm trajectory would be rolled forward by one year.

At the beginning of the ETS, the Government would announce the conditions under which it would move from one trajectory to a more constrained trajectory. In any year, it could announce that the conditions had been met for movement to a tighter trajectory. The shift would occur five years after the announcement.

**Figure 3-2: Four stages of trajectories for Australia**




Note: All trajectories illustrative only, and graph not to scale. Trajectory A is Australia's Kyoto target; B is consistent with a partial developed country response; C with a comprehensive developed country response; and D with a global response consistent with stabilisation.

The virtues of this approach to setting and reviewing Australia's emissions limit are that it:

- helps build support for effective global action;
- provides clear guidance to business about the size of the potential changes and the conditions under which they would occur; and
- provides incentives for early action to reduce emissions.

*Changes to the trajectory and conditions under which this might occur*

Because Australian action alone will be of little consequence to climate change impacts, there seems no case for adjusting budgets and trajectories for new information and developments of an economic or scientific kind. The changes from trajectory A to B, B to C and C to D would be triggered by developments in international policy. Changes in the science or the economics would be relevant to the international policy discussion, but would not affect emissions budget decisions directly.

The guiding principle for defining conditions under which Australia would move from one budget to another must be to provide clear benchmarks and visible rewards for other countries to opt for greater ambition. One way to achieve this in relation to Trajectory D would be to assess each country's greenhouse gas commitments in terms of whether they meet that country's national emissions budget, under a clear set of principles for dividing a global emissions budget amongst countries (see Interim Report, Garnaut 2008, for examples of principles that might be applied), for stabilisation at 450 or 550 parts per million (ppm) $CO_2$-e.

Australia could commit to alternative emissions limits in line with its share of, say a 550 ppm global budget, if a significant portion of other emitters made comparable commitments. Similarly, it could commit to emissions limits in line with its share of a 450 ppm budget, with others' commitments as a precondition. These would both be variants of Trajectory D.

Two expedients could be adopted to minimise uncertainty. First, the possible trajectories would be specified upon establishment of the ETS. The conditions which would lead to movement from one to a more stringent (lower) trajectory would also be specified in advance. The trajectories would therefore define the range of rates of release of permits. Second, the Government would announce that once on one trajectory, there would be no change except with five years notice. If new international agreements required the movement to a new trajectory prior to the honouring of the notice period, the five years stability would be honoured by the authorities, and the emissions outcomes reconciled with international commitments through the purchase of international permits.

The structuring of forward commitments in this way would be central to minimising surprises to the market. It would avoid unnecessarily raising uncertainty, and the cost of investment in activities that were sensitive to the emissions price. It would be conducive to establishing conditions under which investors were comfortable about investing in permits and emissions abatement.

Within such a framework, the market would price in some substantial possibility of emissions budget tightening in future. This would be reflected in a higher forward price. It would encourage banking and discourage borrowing, and make it likely that there would be net banking of permits by the private sector until the system was operating on Trajectory D

## 3.4 To whom will the ETS apply?

### Coverage

Coverage of an ETS should be as broad as possible, within practical constraints imposed by measurability and transaction costs. This is desirable in order to provide an incentive for emissions reductions in all sectors, maximise market liquidity, to minimise the costs of an ETS, and to avoid distortions that may result from the exclusion of particular gases or sectors. Coverage so designed will ensure that the ETS is well integrated with other markets, consistent with the design principles outlined in section 2.

The maximum number of anthropogenic greenhouse gases should be covered in the ETS. The UNFCCC Kyoto Protocol covers six key gases that contribute to climate change: carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), sulphur hexafluoride ($SF_6$), perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs). The Review considers this coverage appropriate, given current information, and scientific and technological constraints.

In Australia, emissions are produced by, and already reported for, the following sectors: stationary energy; transport; fugitive emissions from fuels; industrial processes; agriculture; waste; and land use change and forestry.

In order for a sector to be covered by an ETS, there must a reliable and accurate way to monitor, measure or estimate, and verify emissions from that sector. It is easier to do this for some sectors than others, depending on the nature of emissions and activities. Technological constraints mean that this is currently difficult for some activities, including agriculture and forestry.

There is considerable potential for sequestering carbon through change in land and forest management and agricultural practices. It is therefore important that incentives to realise this potential are provided as early as possible. Full inclusion of agriculture and forestry in an ETS will require issues to be resolved regarding measurement and monitoring of greenhouse gases. In the meantime, 'rules of thumb' can sometimes be developed to estimate emissions.

Some activities in the agricultural sector are trade- exposed, and emissions-intensive. The approach should be to include the sector in the scheme and apply to it the principles suggested in this paper for TEEIIs, rather than to exclude if from ETS coverage. Similarly, civil aviation and sea transport should be included, with TEEII principles being applied if appropriate. Input from stakeholders on the possible coverage of agriculture and forestry is being considered in the analysis to be included in the full reports (see Box 3-1).

**Box 3-1: Addressing measurement issues for forestry**

Australian science, combined with American philanthropy, is moving quickly to find solutions to the vexing questions of measurement of emissions and carbon stocks in forests.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO), in combination with the Australian Greenhouse Office, has developed a toolbox known as the National Carbon Accounting System (NCAS). After a global search of forest carbon measurement systems, the Clinton Climate Initiative in February 2008 selected Australia's NCAS as the platform for a global roll out in developing countries. NCAS combines remote sensing from satellites with sophisticated carbon accounting systems and modelling of land use changes to accurately and efficiently measure and monitor emissions from the forests of the world.

Around 20 per cent of global greenhouse gas emissions (six billion tonnes of $CO_2$ per year) come from deforestation and forest degradation. Australia has been at the forefront of efforts to include action on these emission sources in international negotiations. The Bali Road Map included an agreement to help developing countries measure and manage emissions from their forest sectors.

Papua New Guinea and Indonesia will benefit from these initiatives. They will, with appropriate Australian technical and program assistance, be able to ensure the protection of forest sinks, reduce their emissions, and retain the biodiversity and natural capital of their communities. In a global or regional ETS, these forest resources will provide significant opportunities for wealth creating trade in offsets.

The Australian Government has over the past decade invested strongly in building a scientifically advanced system suited for accounting of greenhouse gas emissions and carbon sinks associated with Australian land systems under a national ETS. This NCAS is now well advanced in its ability to account for the emissions and sinks associated with land clearing, forest plantings and soil carbon for each entity (farm or forest estate).

Some tasks remain to prepare the NCAS to serve the agriculture and forestry sectors in the national ETS. These include accounting of nitrous oxide emissions from soil, methane emissions from livestock animals, and forest and savannah fire emissions. They include development of software design that is user friendly for application by farmers and foresters. With continued development effort, the NCAS could have full operational capability within a few years.

Inclusion of forestry emissions in an ETS requires assessment and measurement of carbon sequestered in long-lived timber products. The Review is considering submissions that have been made on this matter by Australian industry.

Emissions from stationary energy, transport, waste and industrial processes can be accurately measured or estimated at reasonable cost and could be covered by an Australian ETS commencing in 2010.

The Review holds that a sector should be included in the ETS if the costs of distortions in abatement allocation decisions associated with its exclusion from the ETS would exceed the costs of measurement and verification. The same principle can be applied to offsets for non-covered sectors.

## Domestic offsets

Where coverage of a particular source of emissions is not considered possible, or viable, such activities may be able to provide offset credits.

The advantages of allowing offsets to be used to meet obligations under an ETS, is that lower cost abatement from offsets can replace higher cost abatement options within the covered sectors.

Several issues need to be considered in relation to offsets. One is the definition of an eligibility date for offset projects. A later date is more likely to ensure that abatement from offset projects is 'additional', while an earlier date will provide an incentive for early action. These objectives are in direct competition. For example, the selection of a later eligibility date for forestry under the ETS (the date from which forestry is eligible to create offset credits for its emissions reductions), may create a perverse incentive to log and replace established forest with new forest that would be eligible to create offset credits.

Secondly, an offset project must provide abatement that is 'additional' to that which would have occurred anyway. This can be tested through several categories of 'additionality'. For example, regulatory additionality would require emissions abatement to be undertaken beyond what is undertaken to comply with existing legal or regulatory requirements. Financial additionality requires a demonstration that an abatement project would not have been economical without the income from offset credits. Such tests are arbitrary, and potentially the source of distortion, with the potential to undermine the credibility and scarcity principles outlined in section 2.

Box 3-2 discusses how eligibility dates and baselines are considered in the rules established for offsets under the Kyoto Protocol, and notes concerns with these mechanisms.

**Box 3-2: International approach to offsets**

The Kyoto Protocol recognises the benefits of using offsets to reduce the cost of meeting emissions targets, through its Clean Development Mechanism (CDM) and Joint Implementation (JI) provisions.

The CDM and JI allow part of a county's obligation to reduce emissions to be met by reducing emissions in another country. Offset credits can be created by undertaking project activities:

- in developing countries, to produce tradable CDM credits known as Certified Emission reduction certificates (CERs) or
- that reduce emissions or create forest sinks in developed countries that have ratified the Kyoto Protocol (Annex B countries). Such projects produce tradable JI credits known as Emission Reduction Units (ERUs).

These offset provisions have been incorporated into the design of several ETSs. The EU ETS Linking Directive allows parties with obligations under the EU ETS to acquit CERs and

ERUs to meet their obligation. These units are also allowed be used for compliance under the New Zealand ETS. The NZ ETS also accepts Removal Units (RMUs) for compliance, which are awarded to Annex B countries on the basis of net greenhouse gas removals by sinks in land use, land-use change and forestry sectors.

Neither the New Zealand nor the EU ETS allows CDM units from forestry to be acquitted to meet obligations. This is largely based on concerns about liability issues resulting from the temporary nature of those credits. EU member states also limit the number of CERs and ERUs that can be used by parties with obligations under the EU ETS, in order to ensure that member states meet the 'supplementarity' requirements of the Kyoto Protocol that domestic action constitute a significant effort to meet its emissions reduction target.

Despite elaborate rules and procedures governing CDM and JI, concerns remain, particularly about the 'environmental additionality' of projects – that is, whether they actually reduce emissions beyond reductions that would have been achieved without the project. A Gold Standard for CDM projects was created outside the UNFCCC framework, largely in response to such concerns, though, even under its tougher criteria, questions remain about whether CDM projects reliably reduce emissions.

Offset credits are generally treated as substitutes for permits, and can be used by parties covered by the ETS to meet their obligations.

If complete coverage were achieved under an ETS, offsets would have almost no role. All emissions mitigation would be encouraged and rewarded under an ETS.

Pending resolution of emissions measurement difficulties and their inclusion under an ETS, agriculture and forestry may be a potential source of domestic offsets. It is likely that some components of these sectors could be included under baseline and credits and debits arrangement ahead of general sectoral inclusion of an ETS. This would provide a transitional incentive to reduce emissions, prior to such activities being covered under the ETS.

The Review recommends unlimited use of domestic offsets.

### Point of obligation

The point of obligation is determined by the ease and accuracy of monitoring and estimating emissions, and the cost of doing so.

There is no need for point of obligation to be the same in ETSs in different countries. Point of obligation should be chosen on the basis of that which is most effective for local conditions in each country.

A natural starting point when considering the point of obligation is the emissions source. However, it makes sense to select another point of obligation when there is evidence that transaction costs are significantly lower at another point, or if coverage and reliability of measurement were higher. As discussed in section 2, simplicity in scheme design is essential to its success.

There is a reasonably strong although not definitive presumption that the source of emissions is the best point of obligation for stationary energy.

Industrial process emissions can generally be measured or estimated at their source. The point of obligation can be set at the facility level for oil and gas production, gas processing and coal mining fugitive emissions. The point of obligation for fugitive emissions from pipeline systems could be placed on pipeline systems as defined by

operational control of the physical infrastructure, such as pipes, valves and compressor stations.

Emissions from waste – primarily methane emissions from organic waste – could also be covered at source, by allowing emissions to be collected or measured with a reasonable degree of accuracy from the landfill facility or treatment plant. It may be appropriate to apply a threshold.

By contrast, emissions from transport are released at a much smaller scale, by tens of millions of individual vehicles. It would only be practical to cover emissions from large commercial transport fleets, if the point of obligation were to be applied to emissions at their source. Therefore, in the case of the transport sector an upstream point of obligation may be a cost-effective way to cover a large number of smaller emitters. Many parties which produce fuel for the Australian market are located overseas, beyond the coverage of an Australian ETS, so for them, the point of import could be the point of obligation.

A complication will arise where there is no constant relationship between fuel and emissions. For example, sometimes petroleum-based fuel is used as an input in manufacturing processes (for example, plastics), resulting in the release of few or no emissions. Where this is the case, such fuels sales would need to be netted out of an upstream party's obligation, or a credit system established so that producers could claim back the permit price passed-through to their liquid fuel purchase.

It should be noted that in some sectors, timing may present some constraint to deciding a point of obligation. For example, some gas producers have suggested it will not be possible to fit necessary emissions measuring and monitoring equipment to gas production facilities, in time for a 2010 ETS start date, without significant disruptions to supply.2 Caltex suggests that applying the point of obligation at the same point as existing excise accounting systems would be relatively simple, but constructing a new emissions measurement and accounting system at a different point in the supply chain would be difficult to implement by 2010.3

In other cases, where practical difficulties interfere with emissions at the source, a downstream point of obligation may be suitable. For example, under the New Zealand emissions trading scheme (NZ ETS), a point of obligation further downstream is being considered for a sub-set of agriculture emissions – such as covering emissions from enteric fermentation and manure management through a point of obligation at the dairy or meat processor.

## 3.5 Releasing permits into the market

### Method of permit release: auction or free allocation

As a scarce commodity, permits will have unambiguous value (though the price will fluctuate). The holder of a permit acquires fully the economic and financial benefit it

[2] Wilson N (2008) Emission deadline 'risk to gas supply', *The Australian,* 1 March 2008

[3] Topham F, *Alternative arrangements for carbon abatement and associated issues from a petroleum company's perspective,* speech to the Australian Environment Business Network, 27 February 2008

bestows. The holder has the choice of using the permit (in order to emit the permissible volume of greenhouse gases to the atmosphere), or selling the permit to another party for whom the permit represents greater value.

In the first instance, policy-makers must decide whether permits should be auctioned, or issued free to emitters.

This is not primarily an issue of economic efficiency. Nobel laureate Ronald Coase (1960) demonstrated that economic efficiency will be achieved as long as property rights are fully defined and that completely free trade of all property rights is possible.

The most important point is that the impact of an ETS on the price of goods and services is *independent* of the approach adopted by governments for allocating permits (see Box 3-3).

It has been suggested that free permits should be allocated to parts of the fossil fuel-based energy supply industry, for example electricity generators, in order to prevent or limit the affects of an ETS on energy prices. As the analysis below indicates, this claim is fallacious. Whether permits are allocated freely or auctioned to existing generators, the price impact on households will be the same. The experience of the European Union, in relation to this issue, is discussed in Box 3-4. The possible impact of an ETS on electricity prices is examined further in 'Impacts on Economic Activity and Income Distribution' (p. 47).

**Box 3-3: Pass through of permit value**

If a manufacturer is emitting as part of its production process and is required to purchase a permit via an auction, the price of the permit will need to be recovered through the price received for the manufactured good.

Alternatively, if the manufacturer is simply granted a free permit, then it must decide whether the permit is of greater value if used or sold. If it is of greater value to use rather than sell the permit, the manufacturer will need to at least recover its opportunity cost. In other words, the recipient will need to attain value from the use of the permit at least as great as if the permit had been sold at the market price.

In such an instance, the manufacturer faces the choice of either (i) continuing to manufacture (thus emitting greenhouse gases) and using its permits to acquit its obligation, or (ii) selling some or all of the freely acquired permits, and reducing its production to a level consistent with its remaining permits. If the manufacturer decides to use rather than sell the permits, then it has foregone income. Therefore, the manufacturer will recover the price of every permit *not* sold by increasing the price of its goods.

It follows that the impact on the price of goods and services of pricing carbon through an emissions trading scheme is *independent* of the approach adopted by governments for determining the allocation of permits.

**Box 3-4: Will free permits to generators help keep electricity prices down?**

It is true that the cost of permits under an ETS is likely to result in higher electricity prices. However, there is no evidence that allocating permits free will prevent this effect. Regardless

of how allowances were distributed, most of the cost of meeting emissions trajectory would be borne by consumers.[4]

During the first two phases of the EU ETS, the great majority of allowances has been allocated free of charge to emitters, including established fossil fuel-fired electricity generators. However, generators have passed on to consumers the opportunity cost of permits that they were given free. A survey undertaken by the European Commission found that 70 per cent of generators "price in" the value of permits into marginal pricing decisions.[5] The outcome has been both higher electricity prices, and windfall profits for electricity generators. It is estimated that free permit allocation to generators helped deliver a £9 billion windfall in the EU ETS, at the expense of energy consumers.[6]

Taking into account the demonstrated ability of generators to pass on the notional cost of emission allowances, the European Commission has recommended that all permits for the power sector be auctioned in the post-2012 arrangements.[7]

Germany's E.ON – the world's biggest utility company –last year expressed its support for a move toward full auctioning of emissions permits in the EU ETS, because "it is likely to increase the efficiency, equity and credibility" of the scheme.[8] This was a remarkable assertion of honesty over self interest.

The design principles of credibility and simplicity and integration identified in section 2 (p. 12) argue for auctioning.

Free allocation would be highly complex, generate high transaction costs, and require value-based judgements. If permits are to be freely allocated in part, or wholly, to existing emitters, a methodology must be developed for doing so. The most important aspect of this methodology is the algorithm applied for distributing permits, which would require a baseline emissions profile against which an emitter's "entitlement" to free permits could be determined. Options include: emissions in a particular base year (say, 2008 to 2012); average emissions per unit of production, based on installed technology in a base year; average emissions per unit of production based on best practice technology; or any combination of these or other approaches. The definition of principles, collection and application of data, and resolution of disputes would be time-consuming, and could have a material effect on the time required for introduction of an ETS. Indeed, it would seem to be impractical for Australia to administer a free allocation scheme prior to introduction of the ETS in 2010. The complexity of the process, and the large amounts of money at stake, encourage pressure on government decision-making processes, and the dissipation of economic value in rent-seeking behaviour.

If there were free allocation, there would be unavoidable arbitrariness in choosing a baseline. An additional set of rules would be required to avoid adversely penalising "early movers". Requiring one set of rules to address the adverse consequences of another set of rules violates the simplicity principle as outlined in section 2, and puts at risk the credibility of the scheme by encouraging rent seeking behaviour.

[4] US Congressional Budget Office, 2007, *Trade-offs in Allocating Allowances for CO2 Emissions,* < http://www.cbo.gov/ftpdocs/89xx/doc8946/04-25-Cap_Trade.pdf>
[5] European Commission, 2007 (check), *Review of the EU Emissions Trading Scheme — survey highlights*, p.5
[6] *The Times,* 21 January 2008
[7] European Commission, 2008, *Questions and Answers on the Commission's proposal to revise the EU Emissions Trading System*, press release, 23 January 2008
[8] E.ON Energy, *Towards Increased Harmonization of European Emissions Trading: Position Paper on the EU Emissions Trading Review,* June 2007

Any case for free allocation to the domestic electricity sector must depend on income distribution, rather than economic considerations. The claims of shareholders in this sector for special consideration on equity grounds should be assessed by government alongside the equity claims of others. The others include households, whose real incomes have been affected by the ETS.

Australia, with its well established legal, regulatory and administrative structure, is in a favourable position for full auctioning of permits. This would maintain government discretion over the disbursement of the rent value of permits within the Australian economy, in the most transparent and accountable manner. By contrast, free allocation of permits obscures the value being transferred to recipients.

Where a case is made for payments to particular firms on efficiency grounds under the TEEII arrangements (see section 3.8), the quantum of the payment is assessed in cash. It would be a matter of no substantive implication if the Government were to make the payment transparently in the form of permits of precisely equivalent value.

The introduction of the ETS will be associated with many valid claims for increased government expenditure, as discussed in section 5. Permit auction revenue is a means of meeting these claims, without placing pressure on public finances. Although the revenues from auctioning all permits would be large, they will turn out to be uncomfortably tight in comparison with the valid claims on increased public expenditure.

### Rate of permit release

How many permits should be released each year? Should there be any limits on the time at which the permits can be used?

The budgets A, B C and D, discussed above, would define for domestic market participants the schedules for release of permits from which they would form expectation about future permit prices.

Auctioning would be made on a fixed schedule—weekly, monthly, quarterly or on any other basis that suited market participants. It is desirable that permits begin to be sold into the market as soon as possible after the full definition of the initial ETS, and in advance of the ETS coming into full operation. In this way, market participants would be provided with a guide to price before price figured directly in domestic market transactions. Emitting firms could ensure that they obtained necessary permits in advance of operation of the scheme. The managers of permit release may form a view in favour of frequent and regular release, one or two or three quarters in advance of the quarter to which their scheduled release under the trajectory. The timing of release of permits could be adjusted by the authorities in the light of experience.

Auctions would be for permits with a first use period in the following year. Once owned, permits can be freely traded and can be acquitted at any time in future, subject only to the constraint on immediate use.

## 3.6 International links

The integration of the ETS through international trade would have several advantages. First, it would reduce global (and Australian) abatement costs by ensuring that the cheapest abatement opportunities were sought out first, wherever they occurred. The reduction in the cost of abatement could allow more ambitious mitigation commitments. Second, it would reduce price volatility by broadening the market and diluting country-specific demand shocks. A country could reduce its net sales (or increase its net purchases) to accommodate the shock. Third, the revenues associated with international

trade would provide financial incentives for developing countries with opportunities for low-cost abatement to take on commitments. Fourth, the possibility of trade would make it easier to agree on and adhere to national emissions entitlements. Fifth, international trade would help provide equal treatment or a level playing field for trade-exposed industries

These advantages are only worth having if the potential trading partner has a mitigation system built around appropriately selected objectives, with sound design features, and which is governed effectively and with probity. The issues involved in choosing with whom and with what restrictions Australia should undertake trade in permits are discussed in Appendix 2.

Despite legitimate reservations about the CDM, completely isolating the Australian ETS from other ETSs because they in turn trade with the CDM market (e.g. the EU ETS) would be too high a price to pay. However, direct links with the CDM should be limited. An option would be to allow CDM credits directly into the Australian ETS only from countries with no reasonable prospects for taking on targets in the foreseeable future (for example, least developed countries).

Linking to other ETSs may be highly desirable, depending on the features of these systems and broader considerations. The extent and timing of linkage would differ between countries.

- New Zealand: given close links and common interests on greenhouse gas mitigation, linking or even deeper integration makes sense.

- PNG and Indonesia: building a regional market that encompasses (in the first instance) PNG, and other Southwest Pacific developing countries, and with greater difficulty, and with Indonesia would also be desirable. PNG and Indonesia have large opportunities to reduce land-use change and forestry emissions and quickly to replace coal (Indonesia) and petroleum by low-emissions fuels. This potential will be harnessed most effectively within an emission target.

- EU: Australia should explore the possibility of trading with the EU ETS. EU views on excluding forestry and agriculture from ETS may be a problem in the early stages, especially given the potential arrangements with Australia's regional neighbours.

- North America and high-income Asia: there are interesting opportunities for linking with these markets, as well as with future international sectoral markets, as binding targets and budgets come to be accepted by them.

For larger markets, such as the EU or the US, Australia will probably have little influence over their market design decisions. Australia should consider deep integration with markets such as New Zealand and possibly PNG, however, deep integration with other markets will be dependant on regular assessment of the quality of mitigation systems.

Allowing both private market participants and governments to trade across emissions markets is desirable. However, trading with countries which lack domestic markets will be restricted to government gateways.

Limits on international purchases of permits and offsets may help to ensure credible domestic action and to contain the risks associated with linking to international markets. Limits on permits and offsets purchased overseas should be defined concurrently with decisions on national targets (tighter targets implying higher limits).

The Government, and the independent authority, will need to make a variety of decisions about linking. Determining limits on international purchases as well as strategic and policy parameters for linking should be a role for the Government. The independent authority could certify individual markets as being of a suitable standard for linking. Australia should seek to strengthen international monitoring and enforcement, and to harmonise standards across markets.

## 3.7 Flexibility in meeting targets

Demand for permits, and therefore the price of permits, will fluctuate over time with economic and seasonal conditions, changes in tastes and technologies. Rigid adherence to annual targets would place large and unnecessary short-term adjustment strains on the economy.

One way of addressing this problem is to set multi-year targets, as the Kyoto Protocol has with its 2008-12 compliance period. This will help, but can leave short-term adjustment stress.

International trade in permits can also provide flexibility in matching permit use with domestic permit release schedules.

In some international and Australian discussion, price ceilings and floors have been seen as means of constraining fluctuations in permit prices. The logic of the approach taken in this paper, of defining a trajectory of emissions reduction and therefore an emissions budget, and allowing flexibility in the timing of use of permits within that budget, is an alternative approach.

### Price ceilings and floors

While a price ceiling will place a limit on the cost of mitigation in a period in which it is effective, it does this by sacrificing the emissions budget. In this way, an ETS with a price ceiling functions as a carbon tax, in the event that the ceiling price is reached. That is, a price is set for emissions, and the volume of emissions is simply the outcome of market decisions at that price.

Setting the levels of price ceilings or floors would be inherently arbitrary. These controls would need to be based on predictions on all of the many variables affecting demand for permits: incomes growth; technologies; consumer preferences; seasonal climatic conditions; and others.

Price ceilings and floors would dampen the incentive for development of secondary markets. The emergence of these markets is important in transferring risk to the parties best able, and most willing, to manage it. There is no reason to think that this risk is better managed by government than by the private sector. In a credible and efficient scheme, the market is capable of assimilating these risks into the price at any point in time (and into the future price curve). There is no prima facie public good associated with the government assuming these risks.

Price ceilings would create a problem for Australia's role and credibility in international mitigation negotiations, since it would not allow firm commitments on levels of emissions.

The presence of price ceilings or floors may present a barrier to international linking. In a global regime, where ETSs were linked, a price ceiling or floor imposed in one country acts as a price ceiling or floor for all linked schemes. Consider two linked schemes, one with a price ceiling and one without. If the permit price in either scheme rises above the price ceiling, firms in the system with the price ceiling would have an incentive to pay the

fee (or buy more permits at the price cap level) and sell permit to firms in the other system. As a result, the ceiling would be exceeded and the overall emissions level in the combined scheme would be greater than if both schemes operated independently. This results in a breach of both countries' emissions limits.

Price floors carry the possibility of higher levels of abatement than anticipated, at a higher total adjustment cost than in the absence of the floor.

The costs of including price ceilings or floors outweigh the benefits.

### Inter-temporality

The approach to setting emissions trajectories and budgets proposed in this paper suggests an alternative and less problematic means of introducing flexibility in the face of fluctuations in demand for permits. Hoarding by the private sector and lending by the authorities, within prudential restriction on lending developed by the authorities, can introduce adequate flexibility, without breaching emissions budgets.

Inter-temporal flexibility provides an incentive for participants to reduce emissions below the limit set by the trajectory in particularly in the early years of the scheme.

The capacity to hoard permits and for the authorities to lend them, allows market participants to use permits at the time when they have greatest value. The intertemporal flexibility would cause market participants to see the issue as one of optimal depletion of a finite resource. Optimisation over time would see the market establish a forward curve rising from the present at the rate of interest, forcing increasingly deep abatement of emissions, in an order that would minimise abatement costs.

The regulatory authorities would undertake prudential monitoring of the level of lending. They would place restrictions in the amount of lending if it became so large as to raise questions about the current or future stability of the market.

In addition to requiring repayment of a permit at what would be expected to be a higher price than at the time of lending, the authorities would apply an interest rate to cover risk and costs. The interest rate would be raised at times when the authorities judged it prudent to reduce the amount of lending.

It has been suggested in recent commentary that intertemporal flexibility in the use of permits, and in particular lending by the authorities, might affect the overall timing of abatement—and in particular delay abatement—in a way that was environmentally disadvantageous; that it might breach international commitments on emissions reduction targets; and that it would lead to breaches of emissions budgets if loans of permits were not repaid.

On the potentially adverse effects of delayed abatement on the environment, it should first be said that in the four stage process proposed by the Review, there would be two strong sources of bias towards hoarding and away from lending. First, the advance release of permits would generate a tendency towards hoarding. If this were not the case, the authorities would consider shortening the gap period. Second, the initial budgets would be looser than the budgets that were expected with positive probability to succeed them. The market would therefore tend to price in some probability of budget tightening, so that future prices were higher than those that would be expected to emerge from confident expectations that budgets would remain at their current severity. Such expectations would be likely to encourage hoarding.

If, despite these pressures for hoarding, there were some net lending, this would need to be covered by international purchase of permits to meet international commitments. This would be associated with hoarding of emissions rights in trading partners. Be that as it may, the Review is examining the materiality of possible environmental effects of inter-temporal flexibility, and will report on the further work in the full reports. This is likely to be a more important and sensitive matter in global emissions stabilisation scenarios that involve overshooting of desired atmospheric concentration levels before stabilisation at those levels (see Interim Report for discussion of overshooting scenarios, Garnaut 2008).

On the suggestion that loans may lead to a blow-out in the emissions budget because they may not be repaid, this is a matter of governance. The authorities would need to ensure that loans of permits were made only to credit-worthy borrowers, that they were backed by security and that contracts were enforced—just as they would have to ensure that emissions were backed by permits.

## 3.8 Avoiding distortion in trade-exposed, emissions-intensive industries (TEEIIs)

In the presence of a global carbon price (and in the absence of other distortions), the overall comparative advantage of regions and nations will dictate global production patterns.

In the absence of an international agreement, the international price of traded goods will not be a true reflection of comparative advantage in a carbon constrained world. This may cause firms to reduce their production and investment in Australia.

Although a loss of profits alone does not make a case for special arrangements following the introduction of an ETS, there is a case for government intervention on economic efficiency grounds if the scheme leads to a material misallocation of resources.

The potential distortion arises if an Australian ETS is introduced in the absence of, and until such time that there is, an international arrangement that results in similar carbon constraints amongst major trade competitors.

The distortion arises because, unlike the non-traded sector, the traded sector is largely a “price taker”. Australia’s trade exposed firms must accept the world price for their commodities, goods and services.

If firms in the traded sector were subject to a higher emissions price in Australia than in other countries (which as price takers they were unable to pass through), there could be sufficient reason for emissions intensive activity to relocate from Australia to countries with lesser constraints on emissions. In the worst case, this could result in so-called “carbon leakage” whereby production moves from Australia to other countries without carbon constraints and with higher emissions intensity. This would result in an economic loss for Australia with no commensurate global environmental benefit.

Therefore, under certain circumstances, there are environmental and economic reasons for establishing transitional arrangements for emissions-intensive industries that are trade-exposed and at risk.

The challenge in implementing an Australian ETS is to identify transitional arrangements for trade-exposed, emissions intensive industries that face a material mis-allocation of resources in the absence of a global carbon agreement. However, in accordance with the principles adopted in ‘Framework to guide ETS Design’ (p. 12), the design of the Australian ETS should not itself be distorted in order to eliminate distortions arising from other markets. Any arrangements put in place must be environmentally and

economically efficient, equitable, and transitional and built on sound governance principles.

The concern arising out of differences in carbon constraints amongst our trading partners is not that some Australian firms may reduce their level of production, but rather that some firms may reduce their levels of production too far. "Too far" means beyond the level that would eventuate if competitor countries were subject to commensurate carbon constraints.

This problem of reducing production too far ("over-shooting" the long-run, sustainable level of production) is represented graphically in Box 6-1 in Appendix 3.

As shown in Box 6-1, over time, it is the shift in the price of goods relative to the increase in production costs that will be the major determinant of a firm's production decisions and therefore, the real impact on the economy.

Clearly, there is a vast array of possible outcomes arising from the introduction of a carbon price in Australia and eventually amongst our major trading partners. Some firms stand to gain from a carbon-constrained economy, while others will find their ability to compete under challenge.

The aim of transitional measures to address the problem of "over-shooting", is to lower firms' production costs so that the level of production does not fall below the level of production that would eventuate if the world price included a carbon constraint that was similar to a price applied in Australia. This is represented graphically in Box 6-2 in Appendix 3. Over time, as firms switched from high to lower emissions intensive production processes, the call on these transitional arrangements would diminish.

In order for these transitional arrangements to achieve the desired outcome, the agency administering these arrangements would need to take into account both the initial and long-run conditions affecting a TEEII firm's production.

To meet Section 2's principles of simplicity and credibility, the conversion of these concepts into payments to firms should be capable of simple assessment by reference to transparently accessible information. Accordingly, we suggest that the Independent Carbon Bank, responsible for administering the payments to TEEII firms, applies the following approach to assessment:

- the materiality to the firm of the impact of the Australian emissions price being higher than that in competitor and potential competitor economies must be demonstrated, in relation to trade exposure and emissions intensity;

- there will be a calculation of the differential between actual international prices of the trade-exposed emissions-intensive product, and the price that would have obtained if all substantial competitor and potential competitor countries applied emissions or energy or carbon prices at similar levels to Australia. The product of this differential and the amount of trade-exposed sales will represent a maximum assessment M;

- the ICB will calculate a reasonable, expected rate of annual improvement in emissions efficiency for well-managed firms in the relevant industry. Let us call that efficiency factor e. The authority may recalculate e from time to time in the light of experience; and

- the firm's entitlement to payments will be M in the first year, and M discounted by the efficiency factor e in the second year, with annual discounts of e continuing to apply in subsequent years.

Assessments made in this way will reward firms with high emissions efficiency at the beginning of the ETS, and for continued improvements in emissions intensity.

Whether affected firms accessed payments in cash or free permits is largely immaterial, so long as the cash-equivalent of permits is calculated precisely at the time of payment. If used as the form of payment, permits would be drawn from the relevant year's release schedule for permits (see section 3.5, p. 30). Under such circumstances, recipients of free permits would have no greater and no lesser incentive to hoard permits for future use than any other market participant.

Good governance and fiscal prudence would suggest that the analysis required to administer such a scheme should be undertaken on the basis of objective contemporary evidence provided to an independent authority with information discovery powers. Assessment would be undertaken at regular intervals (say, yearly). Payments would be made as closely as possible to contemporaneously with the loss of revenue which was the basis of the assessment.

## 3.9 Governance

### Institutional arrangements

Government would be required to undertake a number of functions in relation to operation of an ETS, including to:

- Set the emissions limit, and decide the nature, extent and timing of changes in the budget (for example, in response to international agreements). As noted in the discussion of exogenous factors (p. 19), there is inevitable uncertainty about many influences on future carbon prices, including technological change, and general macro-economic factors such as the level of demand and the interest rate. Investors can cope with market uncertainty. Every effort should be made to reduce uncertainty about the Government-imposed parameters that shape the market. In particular, the supply price of investment and the cost of emissions reduction will be lower, the greater the certainty about future trajectories. It is vital that adjustments to Australia's emissions trajectories are minimised, to ensure market credibility and stability. The possibility of such changes, and the conditions under which a change would be made, should be announced from the time of establishment of an ETS.

- Make the design decisions underpinning the ETS, including matters of coverage and points of obligation.

- Issue permits, and enforce the requirement that all emissions must be accompanied by the surrender of an equal number of permits, and to apply penalties, including make-good provisions, see below.

- Decide to whom permits are allocated, by what means and at what price. If permits are sold, decide on the use of the revenue.

- Make decisions on and administer payments to TEEIIs to avoid trade distortions.

- Specify the rules for and to supervise any lending of permits by the authorities. This would require the supervision of the creditworthiness of borrowers, and more generally the relationship between lending, hoarding and the stability of the market.

- Administer the rules for international trade in permits and engage in trade when it is necessary to cover the gap between international commitments and the rate of

domestic use of permits (for example, meeting a 2020 target, as noted in the discussion of budget and targets on p. 22).

- Exercise a general responsibility for supervision of the market, being particularly mindful of efficiency and stability over time.

Some of these functions are of a kind that are the indelible prerogative of political government. These include the first and second functions in the list above, and the policy as distinct from the administrative dimensions of the remaining functions.

Government would manage directly the extrinsic features of the ETS, including structural adjustment assistance, and redistributive policies. Government will also have a role in addressing directly correction of other market failures, beyond an ETS.

By contrast, the administrative content of several of the governance functions is of a kind that lends itself to independent administration, particularly due to the large amounts of money associated with administrative decisions. Political Government would be put under pressure from vested interests to favour them in administrative decisions. The administration of payments to trade exposed, emissions intensive industries would be a particular challenge. As with the customs and taxation functions, there is advantage in separating the exercise of such administrative judgements into an independent entity. A high degree of professional competence, continuity over time, and insulation from day to day political pressures is important to the credibility of the system, and therefore to perceptions of stability, the supply price of investment and the cost of mitigation.

The Review suggests that the administration of the ETS be made the responsibility of an independent authority (for example, an Independent Carbon Bank, ICB), established with a high degree of executive independence in the exercise of its powers. The closest analogue amongst institutions of Government would be the Reserve Bank of Australia (RBA). As with the RBA, the powers of the independent authority would be defined by legislation and by agreement with the Government. This same legislation would define the way in which the Government would exercise its policy responsibilities in relation to the ETS, and the obligations of private parties in relation to emissions and the need for permits.

The protection of administrative functions with large financial implications from political pressures can help to maintain stability in the face of short-term political conflict and pressure.

A positive division between the direct role of Government and that of the independent authority, is summarised in Table 3-1, below.

**Table 3-1: Governance of an Australian ETS**

| Functions of scheme governance | Policy: Political Government responsibilities | Implementation: Independent Authority Responsibilities |
|---|---|---|
| ETS rules | All, including coverage and compliance (for example, setting the penalty) | |
| Setting emissions limit | All, including timing. | Administer movement from one emissions trajectory to another, when the Government has certified that the conditions of change have been met. |
| Permit issuance and compliance, and use of revenue from permit sales | Set requirements for acquitting permits.<br>Receive revenue for general allocation under formula. | Release permits in line with emissions trajectories established by Government. Purchase permits abroad as required to reconcile domestic emissions in particular years with international agreements or to provide for the honouring of the five year forward commitment after a change in trajectory.<br>Formula would leave ICB sufficient income to cover the costs of its overhead, plus monitoring and enforcement of the system.<br>Enforce compliance<br>The ICB's revenue would come from sale of permits, interest on loans of permits; profits (imposed by the ICB in addition to the basic requirement to repay the lent permit)and profits from stabilisation interventions (losses a sign of counterproductive intervention and to be accounted transparently). |
| Payments to TEEIIs | Policy for eligibility | Assess eligibility and make payments. |
| Use of permits and cost containment | Broad lending policy. | Lending and interest rates decisions, supervision of market participants and stabilisation interventions |
| Hoarding and lending, and supervision | Broad banking and borrowing policy. | Specify the rules for banking, and borrowing from the authorities and across participants in private exchange. This will require supervision of the creditworthiness of borrowers, and more generally the relationship between banking and borrowing and the stability of the market. |

| **Functions of scheme governance** | **Policy: Political Government responsibilities** | **Implementation: Independent Authority Responsibilities** |
|---|---|---|
| Enforcement of Trade Rules | Establishment of international trade agreement and rules for international linking. | Supervision of trade, certification that conditions have been met in particular cases; purchase of international permits to meet and to reconcile domestic and international obligations. |
| Market supervision | | All, including undertaking transactions in the market for stabilisation purposes. |

The challenge in establishing sound governance arrangements is to underwrite stability, continuity, competence and credibility.

Legislation of key features of ETS design, such as the permit release trajectory, can assist stability—particularly in the Australian situation of qualified Government control of the legislative process.

In designing the optimal governance arrangements, a continuing challenge to one aspect of the ETS generates uncertainty about it is as a whole. Questions of income distribution are likely to be the most contentious in relation to a new policy which has large distribution effects. For this reason, distributional matters that are outside of the design of the ETS itself are fundamentally important to the success of the reform – adjustment assistance to low-income households in particular. These are discussed in more detail in section 5.5.

The chances of the ETS providing a framework for a smooth transition to a low-emissions economy would be greater if there were a high degree of support for the arrangements across the Commonwealth Parliament and the Federation at the time of its introduction. Open public discussion of the Review can contribute to building a foundation for widely supported action.

## Penalties and make-good provisions

In a domestic ETS, a penalty is required to drive compliance with the national emissions limit. Compliance would be enforced for:

- Acquitting insufficient permits to match actual emissions; or
- Not repaying lent permits.

In case of non-compliance, a financial penalty would apply. It would need to be high enough to discourage non-compliance and to avoid it becoming merely a price cap.[9]

To ensure the integrity of the emissions limit and credibility of the scheme, financial penalties would need to be accompanied by a make-good provision applying to the non-compliant party, that requires them to rectify any overrun of emissions. Alternatively, revenue from an additional financial penalty could be used by the government (or its agency) to purchase abatement equivalent to the non-compliant party's shortfall. In that case, the additional penalty level would need to sufficient to cover the cost of purchasing equivalent abatement through permits or offset credits on the open market. Such an approach would allow the overall emissions limit to remain intact, despite a party being non-compliant and paying the penalty.

[9] It has been suggested that a penalty should function as a price cap. The Review disagrees, and believes that market participants can be assisted in meeting the supply constraint through other means of cost containment, particularly access to international permits and offset credits, and flexibility in the time of use of permits through hoarding and lending.

# 4 Optimal Design Features of an Emissions Trading Scheme under a Global Agreement

The emergence of a comprehensive global agreement on emissions reduction would realise the central objective of Australian mitigation policy.

The agreement would change the environment for Australian policy fundamentally. Australia would be required to honour its contingent commitment to move to a tighter emissions reduction trajectory.

The tightening targets and budget in themselves would be challenging. However, associated changes in the environment for mitigation policy would be helpful to Australian adjustment.

The realisation of the international agreement would strengthen the credibility of the Australian emissions trading scheme (ETS). Positively, the context of international agreements would bind Australia more closely to policy continuity. The agreement would remove a negative influence on credibility: prior to its realisation, critics of the ETS would no longer be able to claim that the absence of a comprehensive global effort meant that the adjustment costs being borne by Australia were not buying a solution to the climate change problem.

Under the approach suggested in Section 3, the Government would give five years' notice of a change in permit release trajectory. This would provide a cushion against immediate additional adjustment pressures. In any case, the transition to the more constrained permit release trajectory will have been anticipated to some considerable extent in the market. Spot and forward permit prices for some time, and perhaps from the beginning of the ETS, will have embodied a positive probability of the change occurring. The associated higher permit prices will have encouraged hoarding of permits, which will have provided another cushion for the immediate adjustment.

The authorities would need to cover any gap that emerges between permit use and international commitments as a result of the five years' notice of change in trajectory. This could be covered by purchase of international permits through the use of funds accumulated for the purpose. If a large tendency towards hoarding within the private sector had caused earlier permit use to remain below previously internationally committed levels, then this would reduce the immediate international permit purchase requirements.

Distortions associated with low emissions pricing in major competitor countries would become much less important in the context of global agreement. Payments to trade-exposed, emissions-intensive industries, suggested in Section 3, would fall away without explicit change of policy or institutional arrangements.

Opportunities for productive trade in permits are likely to have expanded gradually during the years leading to comprehensive global agreement. Domestic mitigation policy will have been modified and improved in response to earlier lessons from experience – just as the European Union's proposals for post-2012 have been strengthened by learning from earlier false steps. The trade-off between domestic autonomy in the ETS arrangements, with the opportunity to operate within superior design features, and gains from international trade in permits, will have moved strongly towards the latter.

Governance of the ETS will be simplified by international agreement. After the period in which permit release continues on a pre-agreement trajectory and perhaps before the end of that period, the balancing of external commitments against rates of domestic permits release will be undertaken mainly through private international trade. The deeper, more mature international markets for permits are likely to be more stable than

national markets, reducing the need for official stabilising intervention in the market in Australia.

Most importantly of all to the operation of the ETS under the international agreement, the successful operation of an Australian system in more difficult times will provide confidence in the challenging new mitigation environment. Evidence that substantial adjustment to a low-emissions environment had been achieved without economic dislocation, would contribute to confidence in the adjustment challenge that would lie ahead.

# 5 Impacts on Economic Activity and Income Distribution

## 5.1 The carbon price and the economy

The abatement of greenhouse gas emissions, with the emissions trading scheme (ETS) at is centre, will have major impacts on economic activity and income distribution. Most of these will occur relatively smoothly through market processes if allowed to do so. Government measures to blunt or sharpen the structural effects of the ETS would increase uncertainty and raise the costs of mitigation. Government responses on income distribution and maintenance of economic stability, however, can be seen as important extrinsic elements of system design, the effectiveness of which will have substantial effects on the credibility of the ETS and its success over long periods of time.

This paper has described a simple, market-based system, built upon firm government intention to hold emissions to specific limits that may change within clearly specified ranges from time to time.

The permit market will determine the emissions permit price. It will set a spot price, and derivative markets will define a curve for future prices.

If the design of the ETS is well conceived, and the implementation effective, there will be a tendency for the forward permit price to rise over time at the interest rate facing the main holders of permits—probably mostly highly rated financial institutions. A system of market intermediation will develop, with highly rated financial institutions being the focus of any lending from an Independent Carbon Bank, and meeting the requirements of lesser financial intermediaries and final users of permits.

The permit price will tend to rise at the interest rate because investors will be taking decisions on whether it is worthwhile holding permits, or alternative investments including cash, and whether to borrow to make investments in permits.

The price, spot and forward, will represent market participants' average expectations about what would be required to force the amount of emissions-conserving structural change that would be necessary for the economy to live within the announced emissions budget. If the Government announces an emissions release trajectory (and therefore budget) and, as suggested in this discussion paper, alternative, tighter budgets that would be introduced if certain conditions were met, the market would factor in some positive expectation that the price will need to be higher over time than it would be to meet the initial budget. This would encourage some hoarding of permits pending resolution of uncertainty about the contingent tightening.

The whole price curve, spot and forward, would be lower if there were thought to be large opportunities for relatively low cost abatement, whether early (for example, energy efficiency), or in the medium term future (for example, break-throughs in low-emissions technology).

Effective measures to reduce the effects of market failures in adjustment to the carbon price (for example, in relation to the commercialisation of new technology, or the transmission of electricity from new geographical locations, or energy efficiency) will cause the price curve to be lower than it otherwise would be.

Continued technological improvement in low-emissions alternative products and processes would cause the permit price to be lower than it otherwise would be. Unexpectedly high rates of improvement could lower spot and forward prices over time, despite the tendency for the forward price curve to slope upward at any point in time.

The forward markets for permits will provide opportunities for producers and users of emissions-intensive products to hedge their price risks, and so reduce the costs of permit price uncertainty.

Government announcement that the conditions have been met for moving to a tighter permit release trajectory (say, from B to C in Section 3) would turn a positive probability into a certainty. Permit prices, spot and forward, would rise. The rise would not be as large as would have been expected if the possibility of change had not been affecting price already, and leading to hoarding of permits.

The permit price does not measure the cost to the economy. Most of the price will be passed on from the firm that is required to acquit an emissions permit, to the ultimate user of the product. Part is required to cover the higher costs of alternative, low-emissions products and processes. It is only the latter part that is a real cost to the economy.

Market-based adjustments to the rising permit prices will encourage progressively more substitution of low- for high-emissions products and processes. At the limit, in later years, and the more so the later the time, permits will have high prices and will be embodied only in products that are valued highly by users, and for which there are no low-emissions substitutes.

International trade will have a major impact on the price and use of permits. It is likely that more and more countries will introduce well-designed and well-governed domestic mitigation arrangements, that will also generate economically efficient spot and forward permit prices. Links with such systems would reduce market instability and lower overall abatement costs. Whether such linkage lowered or raised the Australian permit price would depend on whether others' prices were higher prior to trade.

Australia, as a high-income country with relatively high emissions, is likely to be a net importer of permits, finding it cheaper at the margin to buy permits than to reduce emissions down to the emissions reduction trajectories.

A significant part of Australia's high per capita emissions are embodied in metals that are processed for export. The TEEII payments suggested in Section 3 of this paper will avoid contraction of these industries to an economically and environmentally efficient extent. However, firms will not be protected by the TEEII provisions if, in the new circumstances, the main competitors have low-emissions sources of energy available to them.

## 5.2 The case of stationary energy

It is worth having a close look at possible adjustment in the stationary energy sector because the sector represents more than 50 per cent of Australia's emissions and an even greater proportion of projected emissions growth. Many of the key adjustment issues facing all sectors are illustrated in the stationary energy sector.

Subject to the efficient scheme design principles described elsewhere in this paper, and in the absence of market failures as described below, the market will respond to a carbon constraint below business-as-usual projections by causing emissions abatement to occur in line with a marginal abatement cost curve for the covered sector(s). Over the last several years, a number of studies have used various views of this abatement curve and economic modelling to describe, by way of postulated scenarios, the possible restructuring of the stationary sector around lower and zero emission technologies and the likely economic impact of such scenarios. These scenarios and associated models depend critically on estimates of near-term abatement costs and forecasts of new technology costs based on best estimates of the nature and timing of technology developments and the impact of deployment on scale economics.

The inherent uncertainty of marginal abatement cost forecasts implies that the design of the ETS should not rely for its success on the accuracy of a particular forecast. Indeed, the strength of a well-designed ETS will be its capacity to drive the delivery of a least-cost outcome to meet the imposed constraint. The Australian experience with related schemes such as MRET and the Queensland Gas Scheme provide examples of markets efficiently delivering a least cost outcome within the design of the scheme, whilst in each of these cases the delivered technology mix would not have been anticipated (or possibly even preferred) by the designers of the schemes.

The industrial manufacturing, resource extraction and power generation sectors that produce stationary energy in Australia are currently characterised by large, capital intensive infrastructure. In the case of power generation, plant has been optimised to operate continuously at very low cost, largely based on low cost fuel, namely coal. Investment in transmission lines has further extended this efficiency. The relatively recent and increasing growth in peak demand has seen the construction of gas-fired plant with lower capital, but higher fuel costs to run in periods of high demand. The introduction of a carbon constraint will drive a mix of responses between changing the way in which existing plants are run and progressively a shift towards lower emission plants. With the emissions intensity of gas plants ranging from a third to half that of current technology coal generators, this shift will, other things being equal, favour gas over coal.

## Existing generation supply

The national electricity market has the concept of a wholesale pool at its core, around which have developed a range of secondary contract and hedging financial arrangements that assist participants in managing their individual risk exposures. In addition, a number of major electricity sector participants have developed "generator/retailer" models. One driver for such models is a variant on risk management strategies. This market structure generally acts to efficiently schedule generation to supply electricity at least cost, whilst also triggering price signals around supply scarcity such as was witnessed in recent dry weather conditions that constrained the availability of some generators. In this system, the marginal supply source as bid sets the pool price for the whole market. The use of a cap (currently $10,000/MWh) and accepted bidding rules act as constraints on gaming of the market or anti-competitive behaviour.

The requirement for generators to acquire permits to cover emissions will add directly to the short run marginal cost (SRMC) for each generator, directly in proportion to the carbon intensity (t $CO_2$/MWh) of the individual plant. With considerable variation in intensity across the current supply mix, this will cause significant changes in the relative SRMC of the generators, altering the bidding sequence in the pool, and such a reordering will continue as the permit price increases in response to a tightening constraint. Whilst all generators will therefore benefit from the price uplift, the impact on gross margin and volume will vary considerably.

In the short term and at relatively low permit prices, three changes are likely: in-plant energy efficiency measures; fuel substitution (gas for coal where technically feasible); and a shift in base load volume from the higher intensity coal generators to existing gas generators that would otherwise be running as peak or intermediate supply. Such a shift in operating mode is likely to increase the variable cost of the coal generators. Whilst there is some expectation that existing coal generators are likely to remain competitive on a SRMC basis for some time, the loss in volume will progressively diminish the contribution to fixed costs, with a corresponding impact on the carrying value of the asset. It is this impact that is at the core of some industry arguments for compensation. The point at which it becomes economic to shut down these generators in favour of lower emitting plant will depend on the intensity and design characteristics of the individual plant and may be at a relatively high permit price.

In terms of replacing existing supply capacity, a range of alternative technologies will progressively become competitive as the permit price rises, including well-understood renewable sources such as wind, prospective renewable sources such as geothermal, coal technologies that will require considerable further development, and $CO_2$ capture and storage.

## Future generation supply

It is generally recognised that the national electricity market (NEM) is rapidly approaching the time at which investment decisions will be required for new base-load generation capacity; indeed the industry has argued for some time that the absence of clarity on carbon policy has been a significant deterrence to such decisions being taken. An immediate impact of the introduction of a carbon constraint, will be to shift the economics of new generation capacity in favour of technology that is both available and at lower emission intensity. On current estimates, this will strongly favour gas plants at modest permit prices. The extent to which existing gas generators supplant coal plant and dominate the requirement for newly built capacity will interact with the dynamics of the Australian gas market. It will be profoundly affected by the potential for large scale LNG export facilities on the east coast, exposing Australian gas prices to the international market, where current prices are already well above domestic levels.

The level of the overall carbon constraint will determine the rate at which other lower emission technologies become competitive for new generation supply. Beyond gas, these will include well-developed renewable technologies such as wind. They will include mixed technologies, such as centralised or distributed solar thermal, again with relatively well-known cost structures. They will include identifiable renewable and fossil-fuel based technologies in which cost structures are not so well known, including geothermal, solar PV and a range of lower emission coal technologies.

Experience with Mandatory Renewable Energy Targets (MRET) provides an indication of the permit price at which some renewable technologies become competitive. A significant uptake in intermittent sources such as wind or solar may require complementary storage or back-up capacity. More remote supply, such as wind and geothermal, will generate a need to review the mechanisms that trigger the construction or upgrading of transmission lines.

## The role of secondary markets

Whilst the ETS will establish a market in tradable emission permits, related secondary markets will emerge to enable market participants to optimise their opportunities and manage their risk exposure. Such developments are desirable as they assist in stabilising the overall market, and such financial arrangements have been seen in both the current national electricity market and the renewable energy credit market that underpins the operation of the Mandated Renewable Energy Target scheme.

## Interaction with the mandatory renewable target (MRET)

The history of the MRET has demonstrated that a market mechanism can drive efficient outcomes in the Australian energy sector, in this case the deployment of lowest-cost renewable energy. The case for the MRET is much stronger prior to the establishment of a credible ETS with a carbon price that is high enough to drive structural change.

With the ETS, the MRET will force a fixed quantum of renewable energy into the supply mix, possibly displacing lower cost non-renewable, but relatively low-emission alternatives. It is also likely that, based on current expectations of renewable energy supply and costs, the expanded MRET will drive the deployment of increasingly expensive technologies. At least in the medium-term, the result is likely to be a higher

cost to achieve the same level of overall carbon constraint than would have been achieved in the absence of the MRET.

A second implication of the co-existence of the MRET with an ETS is that the former will affect the dynamics of the latter, with the potential for depressing the carbon price and thereby diminishing its capacity to drive both demand and supply change across the covered sectors. It will therefore be critical that these interactions are fully understood when the parameters of the ETS are being finalised. These matters are being analysed for discussion in the full reports.

### Interaction with mandated energy efficiency schemes

A number of state governments have, at various stages of development, policy mechanisms to improve energy efficiency. Such measures include appliance standards and rating systems for residential and commercial buildings. More recent moves have been towards mandatory measures, with some, notably Victoria, including a tradable certificate element.

The introduction of an ETS will drive a carbon price that flows through to end use prices, thereby increasing the economic attraction of energy efficiency measures (see above). Whilst it could be argued that the ETS should negate the need of such measures, it is arguable that various market impediments provide a justification for their retention. The challenge is to identify the market failure that warrants intervention, and to develop efficient approaches to the correction of the failure. In the meantime, the various schemes would benefit from harmonisation. As with the MRET, the magnitude of the imposed energy efficiency target in such measures will affect the permit price under the ETS, and this interaction needs to be explicitly recognised as both are being designed.

### Impact of an ETS on electricity prices

The direct and intended consequence of a carbon price will be to shift the relative cost of commodities across the economy in direct proportion to the carbon intensity of the relevant supply chain. Specifically, as occurred in the EU, the wholesale price of electricity will move to incorporate the marginal carbon price, and to have its intended effect this should flow through to end consumers. This will need to occur within the existing regulatory controls still in place for retail energy prices across most of Australia, particularly at the residential level. This challenge is exacerbated by recent double-digit increases in energy prices in several jurisdictions that reflect a range of cost pressures including growth in demand, dry weather restrictions on water-cooled generators and existing climate change polices such as the NSW Greenhouse Gas Abatement Scheme, the Queensland Gas Scheme and the existing MRET.

The eventual percentage impact of a carbon price will be reduced by the proportion of costs in the supply chain that is not affected by pricing carbon, such as transmission and distribution. Whilst this impact will derive directly from the timing and level of the carbon constraint, the overall economic impact will be balanced by the revenue derived from the auctioning of the permits, and the subsequent deployment of this revenue.

The increase in electricity prices would not be affected by whether or not free permits were given to generators (see Box 3-4).

### Impact on the voluntary market

Whilst there a several existing, mandatory schemes in place, there has also been a growing market for measures via which consumers are prepared to voluntarily pay more to reduce the greenhouse gas emissions that would otherwise be associated with their energy consumption. These measures include products that reduce emissions directly

such as solar hot water and photo voltaic systems, indirectly such as Green Power and as offsets such Greenhouse Friendly gas and petrol and air travel offsets. In some cases, these voluntary measures are supported by government-funded schemes such as rebates.

As the ETS develops, both in depth and breadth, it is likely to cannibalise the market for such measures, although the nature and pace of such changes are quite uncertain at this time.

## 5.3 Adjustment in other sectors

### Abatement from energy efficiency

Studies in Australia and elsewhere, consistently identify opportunities to reduce demand through a wide range of efficiency measures as providing substantial, low-cost (in some cases negative cost) abatement opportunities. However, the difficulty in identifying simple mechanisms to realise this potential suggests a range of complexities including hidden costs, differing hurdle rates, imperfect information and structural impediments.

The introduction of a carbon constraint will raise the economic returns on energy efficiency, and they will become progressively more favourable as the carbon price increases. The complexities listed above will mean that the adoption of these opportunities, albeit economically logical, is likely to be both lagged and lumpy. Analysis may identify market failures in adjustment, particularly in relation to the supply of information, that can justify complementary government action.

### Non-electricity stationary energy

Major industrial processes and the petroleum and gas production sectors produce direct emissions and have abatement opportunities that range from relatively inexpensive to very expensive. As with the residential and commercial sectors, many of these opportunities relate to energy efficiency improvements that the carbon price makes economic, whilst others would drive the timing and nature of capital replacement decisions. The nature of the capital replacement cycle and the underlying economics of the particular sector will affect the rate at which abatement occurs in response to the rising carbon price.

As with generation plants, an immediate impact of the ETS will be a shift in the relative economic value of different natural gas sources across Australia, driven by the differing levels of $CO_2$ content in the naturally occurring product.

### Fugitive emissions

Whilst the emissions from stationary energy are largely $CO_2$, fugitive emissions are largely methane. There will be measurement challenges in some sectors such as coal mining, and also areas where abatement opportunities are very limited. As covered sectors, they will respond to a carbon price in a variety of ways. For example, methane flaring (already part of the voluntary market in some cases) will become economically attractive at a relatively low carbon price, and sector-specific CCS may become economic for fugitive emissions from gas processing before it does so in conjunction with new, low-emission, coal-fired generation technologies. Fugitive emissions from gas transmission and distribution systems already represent leakage of an economic resource and a possible, public safety hazard, and a relatively low carbon price is likely to justify accelerating the reduction of such emissions.

## 5.4 Impact on technology development

A carbon constraint will provide some clarity for investment decisions involving deployment of existing, lower-emission technologies. There is less agreement on the extent to which this clarity will facilitate increased expenditure on research, development and commercialisation of new technologies with the potential to deliver the major reductions in emissions that will be necessary in the longer term.

In the oil and gas exploration sector, the prospect of higher long-term fuel prices drives development of technologies with long lead times, high capital investment requirements and economics that work only under substantially higher price scenarios. It is likely that similar activity will be triggered by the prospect of a rising carbon price over a substantial time period. Even in the absence of an ETS, research, development and commercialisation on and of technologies such as CCS, solar PV and geothermal is already being undertaken and will be significantly lifted by the introduction of a long-term carbon constraint.

Beyond this however, the Interim Report (Garnaut 2008) identified arguments that would support the use of public funding for research, development and innovation around low and zero emission technologies, including some that Australia may have comparatively strong reasons for developing.

## 5.5 Compensation for changes in income distribution

### Assistance for households

As a major environmental reform, an ETS is not intended incidentally to have large and arbitrary effects on the distribution of income – and in particular, not to redistribute income away from people on low incomes. The first form of the EU ETS (corrected in the proposals for post-2012), where most permits required by the domestic energy sector were issued free, and yet the price of the permits was passed through to households, demonstrates that the transfer of large amounts of income from ordinary households to increased profits of the energy sector leads to political resistance to environmentally efficient emissions prices.

In the case of households, there is a strong environmental as well as equity rationale for returning the revenue from the rent value of the permits that is passed through to households, in an economically and environmentally efficient way.

It is important for the environmental integrity of the ETS that the distribution of the rent value of permits takes forms that preserve the higher relative prices of emissions-intensive products. Policy instruments for returning rents collected from households could include adjustments to the social security and income tax systems, and assistance through information or capital subsidies to support efficient household adjustment to higher energy prices. This will be discussed more comprehensively when the Review presents its full reports.

### Assisting the structural adjustment for communities

Where the structural adjustment process is focussed in particular regions or communities, there is good reason and well established precedents for governments providing assistance to individuals and communities. Typically, this assistance tries to prepare workers for new employment and communities for new industries through:

- retraining of workers;

- grants to communities to support improvements in infrastructure that would be helpful to the attraction of alternative industries;

- assistance to parts of the industry that have opportunities for survival and expansion in the new, more competitive circumstances.

CCS could be an example of this last form of assistance for areas like the Latrobe and Hunter Valleys. If the technology can be demonstrated to be commercially attractive, the communities that rely on coal-based electricity generation may be secure, and possibly expansive and prosperous.

### Compensation to the non-traded sectors

As in the traded sector, the sustainable production level of individual firms in the non-traded sector will be a function of: a domestic emissions price on production costs, the new equilibrium price of relevant goods and services, and an individual firm's ability to switch from high to low emission production processes.

Unlike the traded sectors, firms in the non-traded sectors will not face the distortion of competing producers selling products in the absence of a carbon price. Consequently, the problem of over-shooting as a result of this distortion will not arise and transitional arrangements to address this overshooting will not be necessary.

As demonstrated above, this is not to say that there won't be "winners" and "losers" in the non-traded sectors but rather, that the adjustment process will not be distorted due to Australia adopting an ETS ahead of other countries committing to reducing their greenhouse gas emissions.

The Review does not recognise the introduction of the ETS as a "sovereign risk" problem, as some affected industries suggest it is.[10] The introduction of an ETS does not involve government exploiting its sovereign status to avoid contractual obligations.

It does, nevertheless, represent a change of policy which is always within the prerogative of government — as is the decision to "compensate" losers from an economic change for loss of capital.

To be clear, there is no economic or environmental reason to provide compensation to existing emitters (whether in the form of free permits or cash). Prices will rise and production levels will fall if they cannot be sustained in the presence of a carbon price, and these realities would not be changed by compensation payments.

Nevertheless, the introduction of the ETS will reduce incomes and wealth of shareholders in firms in the non-trade sector, as it will affect many other Australians. It is within the prerogative of Government to consider payments for compensation for those effects.

The decision to compensate is therefore one for Government judgement on income distribution grounds. There would seem to be a stronger case for structural adjustment assistance to communities facing the risk of stagnation and decline, in the form of

[10] Sovereign risk typically refers to the risk to a lender that a government of a sovereign state may fail to honour its financial obligations. When defined most widely, it is taken to mean all risks arising from the ability to governments (as sovereign bodies) to pass laws and regulations.

support for accelerated deployment of carbon capture and storage by firms generating electricity from coal.

## 5.6 Permit Sales and public finance

Auctioning of all permits will be the source of a substantial amount of government revenue, after the payments to TEEIIs that are required as an intrinsic design feature of the ETS.

There will be many claims on government expenditure as a result of the introduction of the ETS.

Most of the costs of the permits used in the domestic economy, including for electricity generation and automotive fuel, will be passed through to households. This will be the case whether permits are auctioned, or allocated for free. Low income households, in particular, will have strong claims for compensation on equity grounds. Firms seeking compensation on equity grounds would have to establish the priority of their claims on equity grounds against those of households.

The Interim Report (Garnaut, 2008) discusses the case for public intervention to correct several sources of market failure related to the transition to a low-emissions economy: research, development and commercialisation of new, low-emissions technologies; transmission and transportation grids for electricity, natural gas and carbon dioxide for sequestration; and energy efficiency. The Review's Public Forum in Perth on 19 February 2008 established that additional public investment in more efficient public transport systems can be justified on standard public finance grounds in the transition to a carbon-constrained economy.

Successful intervention to correct market failures in these areas will lower the permit price and reduce the costs of adjustment to the ETS.

The ETS will force structural adjustment through the Australian economy. Some communities may face decline, and under established Australian practice can expect structural adjustment assistance. Whether the coal-based electricity generation regions suffer structural stress, or have large, new opportunities for expansion and prosperity, will depend on whether large-scale CCS is commercially successful. The Review sees promising prospects, but this will require considerable public intervention to clear regulatory barriers, and to remove market failures in relation to commercialisation of new technology, and the provision of infrastructure related to the transportation of carbon dioxide to sequestration sites. This public support for commercialisation of CCS, can be seen as efficient, pre-emptive structural adjustment assistance.

The Government is likely to need revenue to buy international permits or to buy back domestic permits in the context of transition to higher emissions reduction trajectories (see p. 24).

Against all of these valid and pressing claims, the substantial receipts from sale of permits will soon seem to be of modest dimension. Any use of these revenues – including as revenue forgone through the issue of free permits – must be rigorously assessed against conflicting claims within what will turn out to be a tight budget constraint.

## 5.7 Macro-economic adjustments associated with introduction of the ETS

The impact of introduction of the ETS is large enough to have implications for macro-economic stability.

The direct price effects will be substantial. As with the introduction of the GST in 2001, the maintenance of low inflation will require accompanying discipline in monetary policy. As with the introduction of the GST, there will be pressures to ease the political pressures arising out of higher consumer prices through changes in the taxation and social security arrangements. As with the GST, there will be good reasons to respond to these claims on the public finances to some extent. The challenge will be to contain these and other claims arising out of the introduction of the ETS within the available resources—as a first approximation, within the revenues generated by sale of permits.

As with the introduction of the GST, the maintenance of moderate inflation through the transition will depend on wage and salary earners accepting that adjustments outside the wage system can compensate for the direct price effects of the ETS. In this way, the price effects can be contained to once-for-all adjustments.

While the forward curve for permit prices will rise over time if the ETS is working well, the average price of what are now emissions-intensive products and activities will not necessarily do so. Investment in new, low-emissions products and processes is likely to bring costs down at a considerable rate for some time. The cost structures of new technologies will continue to fall after their early commercial deployments, so that the average price of the replacements for currently established products and processes do not continue to rise or rise only slowly. The inflationary challenge from direct price effects is transitional.

Smooth operation of a market-oriented ETS, as described in this paper, is likely to be associated with average rates of growth in output and incomes that are only slightly below what might have been expected in the absence of greenhouse gas mitigation—abstracting entirely from the potential for climate change itself substantially to reduce incomes. The risks to prosperity from this major reform lie in the potential for instability and lack of confidence in the arrangements, hesitant approaches to investment in low-emissions products and processes, and large fluctuations in permit prices deriving from disputation about the fairness of the scheme.

The Review seeks to provide a basis in community understanding of the issues for continuity in policy over a period long enough to effect a low-cost transition to a low-emissions economy.

A successful introduction of the ETS would see high incentives to invest in low-emissions goods and services, first of all in electricity-related activities. This will call on many of the skills and resources that have been rendered scarce and increasingly expensive by the current resources boom. The path of adjustment would be easier if, by the time of introduction of the scheme, investment in the conventional resources sector had receded to more normal levels.

# 6 Australian ETS model for discussion: Summary

## Objectives and principles

An ETS is established to reduce emissions, but the emissions limit is a decision to be made outside of the scheme itself. In developing the ETS design, it has a singular objective:

> *To provide a transactional space that enables the transmission of permits to economic agents for whom they represent the greatest economic value.*

One clear objective allows the development of an ETS that is simple in design, efficient in operation, and easily comprehended by market participants and the wider community.

A number of guiding principles should be applied in order to achieve this objective, namely: scarcity, tradability, credibility, simplicity and integration. These principles define a solid framework within which an efficient and effective market can be designed.

## Proposed design features

| **Design decision** | **Proposal** |
|---|---|
| **Setting an emissions limit** | Government should set the emissions limit for Australia. This emissions limit should be expressed as a trajectory of annual emissions targets over time, which define long term budgets.<br>*Trajectories*<br>Four trajectories should be specified upon establishment of the ETS. The first up to 2012 will be based on Australia's Kyoto commitments. The other three for the post-2012 period reflect increasing levels of ambition. Movement between them should be based on determining the comparability of Australia's response to international effort.<br>The Review will provide advice to government on trajectories and interim targets for an Australian ETS. This will be informed by economic modelling currently underway and further analysis, and presented in the full reports. |
| **Changes to the emissions limit** | Deciding to move from one trajectory to another should only be made on the basis of international policy developments and/or agreements (which should allow for new information and developments of an economic or scientific kind).<br>Conditions which would lead to a movement from one trajectory to a more stringent trajectory would be specified in advance.<br>Once on one trajectory, Government provides five years notice before movement to another. Any gap between the domestic trajectory and international commitments during this period would be reconciled by the independent authority purchasing international permits. |
| **Coverage** | *Gases:* Six greenhouse gases as defined by the Kyoto protocol.<br>*Sectors:* Stationary energy, industrial processes, fugitives, transport and waste from scheme outset. Agriculture and forestry to be included as soon as practicable. |

| Design decision | Proposal |
|---|---|
| **Domestic offsets** | Domestic offsets should be accepted without limits, but will have a small role, given broad coverage. |
| **Point of obligation** | Set at point of emissions where practical. Where transaction costs are lower than the cost of distortions that may arise, upstream or downstream may be appropriate. |
| **Permit issuance (or release)** | Permits released according to emissions reduction trajectory. All permits auctioned at regular intervals. (Note, some permits may be used in lieu of cash in providing transitional assistance to traded-exposed, emissions-intensive firms at risk.) |
| **International linkages** | Opportunities for international linkage of the Australian ETS should be sought in a judicious and calibrated manner. |
| **Price controls** | Not supported. |
| **Inter-temporality** | Unlimited haording allowed. Official lending of permits by the independent authority to the private sector allowed, but may be subject to limits, in terms of quantity and time, determined by the independent authority. |
| **Treatment of TEEIIs** | Some industries rely significantly on emissions-intensive production processes, and are substantially unable to pass costs of emissions through to customers because price of commodity or good is determined on international markets. Transitional financial assistance (possibly in the form of free permits) should be provided to account for distortions arising from major trading competitors not adopting emissions limits (or pricing). |
| **Governance** | Policy framework set directly by government.<br>Scheme administered by independent authority. |
| **Compliance and penalty** | Penalty to be set as a compliance mechanism. Penalty does not replace obligation to acquit permits; a 'make-good' provision would apply. Alternatively, the use of revenue from a financial penalty could be used to purchase abatement. |

| Design decision | Proposal |
|---|---|
| **Use of permit revenue** | Auctioning of all permits will be the source of a substantial amount of government revenue. Governments will need to assess competing priorities for this revenue, which may include:<br>■ Payments to TEEIIs (to correct for market failures);<br>■ Payments to households;<br>■ Structural adjustment to support declining communities;<br>■ Payments to firms to correct market failures in relation to new technologies;<br>■ Support for public infrastructure; and<br>■ Cash reserves to purchase international permits/offsets to reconcile domestic emissions with international commitments.<br>The political acceptability of the introduction of the ETS would be enhanced by government commitment to transparently return to the community through the mechanisms outlined above or in other ways, all of the revenue generated by the sale of permits. |

A comparison with the designs proposed by the TGET and the NETT, and those of overseas ETSs, is provided in Appendix 4.

## Glossary

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|---|---|
| **Abatement** | Activity that leads to a reduction in greenhouse gas emissions. |
| **Additionality** | The key aim of an offsets regime is to provide an incentive for abatement that would not otherwise have occurred. That is, offsets should aim to promote 'additional' reductions in emissions compared with 'business as usual' scenario. This is often referred to as the 'additionality' of an offsets project. |
| **Baseline emissions** | The amount of carbon dioxide emissions that would be emitted by a facility under normal operations, without a reduction project being put in place. The baseline refers to the business as usual scenario. |
| **Business as usual** | An estimate of future patterns of energy consumption and greenhouse gas emissions which assumes that there will be no major changes in attitudes and priorities. |
| **Carbon Dioxide Equivalent ($CO_2$-e)** | The universal unit of measurement used to compare the emissiosn from each of the greenhouse gases, based upon their Global Warming Potentials (GWP). It is derived by multiplying the tonnes of greenhouse gas by the associated GWP. |
| **Emissions intensity** | A level or amount of emissions per some unit of economic output, such as GDP, sales revenue, or goods produced. |
| **Emissions limit** | The limit on the number of tonnes of greenhouse gas that can be emitted by covered sectors. |
| **Emissions trading** | An administrative approach used to reduce the cost of emissions control by providing a market-based and tradeable instrument for achieving reductions in emissions. |
| **Extrinsic design features** | Design features that address the broader policy environment within which the ETS operates. They should be guided by the five principles listed above, but will also involve trade-offs amongst a more complex set of policy objectives. |
| **Global warming potential (GWP)** | The index used to translate the level of emissions of various gases into a common measure in order to compare the relative radiative forcing of different gases without directly calculating the changes in atmospheric concentrations. GWPs are calculated as the ration of the radiative forcing that would result from the emission of one kilogram of a greenhouse gas to that from the emissions of one kilogram of carbon dioxide over a period of time (usually 100 years). |
| **Greenhouse gas** | Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapour, carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_20$), hydrochlorofluorocarbons (HCFCs), Ozone ($O_3$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride ($SF_6$). |
| **Hoarding** | Net banking of permits by the private sector (that is, permits purchased in excess of current acquittal liability may be held as an asset on a firm's balance sheet). |
| **Intrinsic design features** | Design features that relate directly to the efficiency and effecitveness of an ETS. These features should not be used to meet a broader range of policy objectives. Design of these features should be guided by the five principles articulated above. |

| | |
|---|---|
| **Kyoto Protocol** | The agreement made under the United Nations Framework Convention on Climate Change. The Protocol entered into force on 16 February 2005. Ratifying countries listed in Annex B of the Protocol have committed to meet targets that reduce their greenhouse gas emissions over the period 2008-12, compared with 1990 levels. |
| **Lending** | Official lending of permits by the authorities to the private sector. The private sector party incurs a liability to repay the permits at a future date. (Note, this differs from the commonly held notion of "borrowing" which allows an obliged party to any use future dated permits that it may hold to acquit its current obligations. The proposed scheme does not entail date stamped permits.) |
| **Parties with obligation** | Firms that have a direct obligaton under the ETS to surrender permits equal to their emissions during the compliance period. |
| **Permit** | A certificate that enables a liable party under the ETS to emit a quantity of greenhouse gas. |
| **Transaction costs** | Costs associated with market transactions (and may include indirect costs of market participation, for example, information gathering). |
| **United Nations Framework Convention on Climate Change (UNFCCC)** | An international treaty that entered into force in 1994. The Convention established an objective of avoiding dangerous anthropogenic climate change, and set out provisions outlining actions to avoid future increases in global warming (including non-binding emissions targets for developed countries) and provisions to cope with whatever temperature increases are inevitable. |
| **Verification** | A process whereby an independently accredited body provides an assuarance that the emissions reductions being claimed have actually occurred. |

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# Appendix 1: Garnaut Review terms of reference

To report to the Governments of the eight States and Territories of Australia, and if invited to do so, to the Prime Minister of Australia, on:

1. The likely effect of human induced climate change on Australia's economy, environment, and water resources in the absence of effective national and international efforts to substantially cut greenhouse gas emissions;

2. The possible ameliorating effects of international policy reform on climate change, and the costs and benefits of various international and Australian policy interventions on Australian economic activity;

3. The role that Australia can play in the development and implementation of effective international policies on climate change; and

4. In the light of 1 to 3, recommend medium to long-term policy options for Australia, and the time path for their implementation which, taking the costs and benefits of domestic and international policies on climate change into account, will produce the best possible outcomes for Australia.

In making these recommendations, the Review will consider policies that: mitigate climate change, reduce the costs of adjustment to climate change (including through the acceleration of technological change in supply and use of energy), and reduce any adverse effects of climate change and mitigating policy responses on Australian incomes.

This Review should take into account the following core factors:

- The regional, sectoral and distributional implications of climate change and policies to mitigate climate change;

- The economic and strategic opportunities for Australia from playing a leading role in our region's shift to a more carbon-efficient economy, including the potential for Australia to become a regional hub for the technologies and industries associated with global movement to low carbon emissions; and

- The costs and benefits of Australia taking significant action to mitigate climate change ahead of competitor nations; and

- The weight of scientific opinion that developed countries need to reduce their greenhouse gas emissions by 60 percent by 2050 against 2000 emission levels, if global greenhouse gas concentrations in the atmosphere are to be stabilised to between 450 and 550 ppm by mid century.

Consult with key stakeholders to understand views and inform analysis. A draft Report is to be distributed for comment by June 30 2008. The final Report is to be completed and published by September 30 2008. Interim draft reports on particular issues may be released before that time for public discussion. The Report will embody the independent judgments of its author.

# Appendix 2: International trade and linkages: issues and options

## Introduction

The integration of Australia's emissions trading market through international trade would have five main advantages. First, it would reduce global (and Australia's) abatement costs by ensuring that the cheapest abatement opportunities were sought out first, wherever they occurred. Such improved cost-effectiveness can make more ambitious commitments possible. Second, it would reduce price volatility, by diluting country-specific shocks: the country concerned would be able to reduce its net sales (or increase its net purchases) to accommodate the shock. Third, the revenues associated with international trade would provide financial incentives for other countries to take on policies to limit emissions, in particular developing countries. Fourth, trade makes viable the possibility of agreeing on national emissions budgets. Countries will never be able to meet pre-specified emissions targets (however complex the formula used to define them) without the option of trading them. The allocation of global greenhouse gas limits among countries is thus critically dependent on the possibility of trade in those limits across countries. Fifth, international trade would help provide equal treatment or a level playing field for trade-exposed industries

But there are also potential downsides. The critics of emissions trading reserve their harshest remarks for international trade, which, they argue, would be impossible to monitor accurately, susceptible to corruption and rent-seeking, and involve the transfers of large funds to poor, corrupt governments (Nordhaus 2007). Even some who support emissions trading argue against international linking. McKibbin and Wilcoxen (2006) argue instead that "compartmentalising" countries by prohibiting international trade will prevent renegade countries imposing shocks on others through ineffective enforcement or treaty withdrawal. More fundamentally, if the national targets and commitments that together determine the international price emerging from a set of interlinked markets are not consistent with efficient mitigation action over time, then there is no guarantee that linked system would result in more efficient mitigation than under closed emissions markets. This could be the case if the international permit price at some point in time is much lower or higher than under an efficient trajectory, or fluctuates greatly.

The importance of international linking should not be underestimated. Linking internationally is a form of shared sovereignty, which will imply some loss of control over aspects of mitigation policy. In particular, the more linked the markets, the greater the extent to which the permit price and therefore the level of domestic abatement action can be determined by other countries' policies. With full linking, the permit price is determined out of the interaction of the effort implicit in emissions targets (permit supply) and the available abatement options (permit demand). Large emitters will play a much greater role than small emitters in setting the price. Australia will be a small player in comparison to the EU or emerging US carbon markets or a future Chinese market, and therefore more or less a price taker if linking fully to those markets.

Although to date international linking has been limited in scope, it is likely to grow in the future. In the EU ETS, the only large-scale trading scheme already operational, permits are fully tradable among emitters in EU countries, but no permit trades outside of the EU have yet taken place. The CDM international offset mechanism plays an important role in several developed countries in fulfilling reduction commitments, but legal limits are placed on the extent to which CDM credits can be used. In the coming years, however, international linkages are likely to grow, as other developed countries establish ETSs, and as developing countries become more important players in global climate change mitigation efforts, and either establish their own markets, or expand CDM-type initiatives.

## International linkage choices

There are five distinct choices in relation to international linkages. Linkages can be with other emissions markets, and/or with international offsets; they can be direct and/or indirect; one-way or two; through governments or between market participants; and in limited or unlimited quantities.

*Links between emissions markets and/or with international offsets.*

*Linking between emissions markets.* The most comprehensive form of linking is through mutual recognition and trading of emissions permits. Where this is done without further restrictions, it amounts to full integration of trading markets. The linked markets could be markets in different countries or regions, or they could be between different sectoral markets (e.g. the possibility of separate international markets for emissions from industries such as aluminium, steel and other energy intensive traded commodities has been mooted).

Linkages to other markets only makes sense if the design of the two markets is compatible. Both markets need to embed mutually acceptable levels of domestic mitigation ambitions (or one market will undermine the other by pushing prices too low). They need to both have adequate monitoring and enforcement mechanisms. And they need to have compatible market rules (on such issues as the unit of emissions, hoarding and lending, and the absence of price ceilings and floors).

*Linking international offsets.* Offsets arise where there is no cap on emissions, but where credit can be gained for taking actions which are deemed relative to a counter-factual to reduce emissions. International offset linking occurs when offsets created in another country can be traded domestically, i.e. exchanged for domestic emissions permits. Offsets can be valued through a market, but the market is in offset credits rather than emission permits.

The Clean Development Mechanism funds the creation of offsets in developing countries. CDM credits (Certified Emissions Reductions, CERs) can be traded in the EU market. The EU allows member states to purchase a certain volume of CDM credits to help achieve their Kyoto targets, and permit market participants can purchase CERs in exchange for domestic emission allowances. The result of this approach is that the prices of CDM credits tend toward the price of EU permits, as both markets influence each other.

Views are sharply divided on the value of international offsets in general, and the CDM in particular. Like any offset, it is difficult to prove additionality, i.e. to demonstrate that the emissions reduction occurred, and occurred because of the payment made. The setting of the baseline against which claimed emissions reductions are compared is contentious. A further problem in assessing creditable emissions reductions is potential leakage: emissions elsewhere increasing as a result of the offset project. The CDM provides a ‘patchy’ rather than an economy-wide carbon price, so developing countries might at the same time use more emissions-intensive energy sources elsewhere in the economy if it becomes economical to do so. As every offset credit reduces the abatement undertaken within the emissions trading scheme, there is a potential watering down of overall effort.

Requiring only that developing countries participate in offset schemes sends the wrong signal. International offsets in effect provide financial support to developing countries without any commitment that will in fact reduce aggregate emissions below a business as usual level. There are proposals to reform the CDM, for example to elevate it from a project mechanism to the program level. This could go some way to broaden its scope,

but will not answer the fundamental objections which can be raised against the offset approach.

Despite these criticisms, others note that the CDM is the only game in town, and argue that it has in fact induced significant mitigation effort in developing countries. Several thousand CDM projects are planned and underway, in a large number of developing countries, with a projected total volume of over 2 billion CERs million tons until 2012, representing a trading value in the tens of billion of dollars. Though small relative to the task in reigning in total emissions, the CDM currently is the largest mechanism for engaging developing countries in greenhouse gas mitigation.

*Direct or indirect links.*

Direct linking takes place when one market allows trade with another, or recognises the purchases of international offsets to exchange for domestic emission permits. Linking can also occur indirectly. For example, were Australia to link with the EU, we would be indirectly linking with the CDM, since the EU trades with the CDM market. Indirect linking leads to a tendency across a broad range of national emissions trading system to converge toward a roughly similar permit price, even without full formal linking. The upshot is that once a decision is made to link to one market, it is difficult not to link to all. When considering whether to link to one market directly, consideration also needs to be given to the market(s) to which that market is linked.

*Unilateral or two-way linking.*

Two-way linking occurs when both parties allow trade in the other's market. Where only one side is prepared or interested to link, unilateral linking is an option. A country could simply declare permits from another country to be valid for acquittal in its own system. Provided the “linked-to” country did not place restrictions on the sale of permits, this would allow one-way flows of permits. The linking country would buy permits if its autarkic permit price is higher, and no trade takes place otherwise. Unilateral linking can thus be used as a ‘safety valve’ for the permit price, as it provides an assurance that the permit price will not rise above that in the linked-to country.

*Government or private trades*

If two emissions markets are directly linked, it would be assumed that the market participants in the different markets can directly trade. In the EU, both the government and market participants are allowed to purchase CDM credits. Governments will purchase them to help them meet their Kyoto targets. Market participants will purchase them to provide them with additional or cheaper emissions entitlements.

In general, it might be thought desirable to keep government intervention in the market to a minimum. However, there may be cases where trading only through national gateways rather than between private sector emitters makes sense. In particular, this can be used to integrate those countries into international systems that do not implement emissions trading domestically and instead opt for different domestic policy instruments, such as emissions taxes or regulation. These alternatives are more likely to be chosen in many developing countries where taxes are more feasible to implement than permit trading.

Trading through national gateways can also be an instrument to influence how the trading revenue is used. For large-scale permit purchases, conditions may be desired around the use of revenue. For example, there might be stipulations that the revenue be used for mitigation or adaptation or development purposes, or that parts of it be used to compensate the losers of mitigation actions (e.g. to substitute for forestry revenue).

*Limited versus unlimited trading.*

Under Kyoto, there are unquantified limits on trade under the "supplementarity" principle. Article 17 of the Kyoto Protocol states that "trading shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments." So far it has been left to each country to quantify this limit in its own way.

The supplementarity principle limits trade not only because of concerns about the quality of third markets, but to send a signal that developed countries are serious about emissions reduction. If a country were to meet its emissions reduction commitments solely by purchasing emissions or offset permits, it might signal that it is prepared to pay for climate change reduction, but that it is not prepared to reduce emissions at home. This in turn could be interpreted as a lack of serious intent, and could affect others' preparedness to make commitments.

The important counterpoint to this, however, is that linking can reduce the cost of commitments, and so allow more ambitious targets to be set. The EU has proposed two targets for 2020 depending on action taken by other countries: a 20% reduction and a 30% reduction. Up to 30% of the effort towards the former target could be met by international offsets, and up to around 40% of the latter. This illustrates that more trading does not have to translate into less domestic mitigation but instead can result in more ambitious targets.

If limits on trading are binding, the domestic price can deviate from the international price. In a permit buying country, firms will first exhaust trading opportunities and then turn to (more costly) domestic mitigation. Rules for allocating trading opportunities have to be devised in this context, depending on whether the government or the private-sector does the international purchasing. National gateways would allow for governments to capture the rent from price differentials, and treat the extra revenue similarly to revenue from the sale of domestic permits.

The other disadvantage of a binding limit is that international trading will not be able to play a smoothing function. In years in which domestic demand for emissions increases, there will be no scope for international purchases to increase.

The above considerations suggest that while a limit on international purchases might be needed for credibility reasons, the limit should be set high enough so that it is expected to be non-binding. High limits on purchases and credible domestic action can both be achieved if targets are set with enough ambition.

## International linkages in the first-best world and in the real world

In the first-best world of effective international action on climate change, Australia would trade fully and without limits with other emissions markets. Every country would participate in international trading, either through linking domestic markets, or through governments buying and selling. Some domestic markets might have domestic offsets, but there would be no need for international trade in offsets, since every country would trade emissions permits. All markets would be linked directly. And there would be no limits on trades, since no government would have to establish its credibility, or would be worried about linking to low-quality markets.

Fully integrating with global markets would lower the costs of an Australian ETS. As we have learnt in the world of trade, so too in the world of emissions reduction, Australia cannot do better than to equate domestic and world prices. Specifically, Australia will not be able to meet its international targets more cheaply than by equating its domestic and international price.

Trading would also allow intertemporal flexibility, without hoarding or lending. If Australia is finding it hard to meet its target one year, Australia could simply buy more permits at the global price.

For some time, however, we will be in a second-best world, where the global price of carbon could be unstable, and/or uneconomically high or low. The current situation is characterised by: emissions markets and other systematic mitigation policies in some countries, but not in others; only one existing emissions market to which Australia could link (the EU), a market in which there is a history of price instability; international offsets (CDM) playing a role in many developing countries, and being accepted for Kyoto compliance especially in Europe; and limits on trading due to the supplementarity principle.

Nevertheless, though far from perfect, it is still a world in which international trading by Australia holds significant promise to reduce Australia's cost of abatement, to provide price stability and cushioning of domestic shocks, to encourage emissions containment in developing countries, and to encourage the development of an international emissions trading system.

*For these reasons Australia should seek international linkages for the ETS, but not in an unlimited or undiscriminating way.*

## Linking decisions for Australia

An Australian ETS will confront a number of linking-related options. As discussed above, these should be assessed on the basis of market quality, as well as strategic considerations. Some initial recommendations follow below.

*(i) CDM offsets*

The first decision is whether to accept CDM offsets. If, due to the reservations about international offsets set out earlier, Australia were to decide not to link with the CDM, even indirectly, then Australia would not be able to link at all because every other emissions market (EU and all currently planned markets) allows or will allow CDM linkages. Despite legitimate reservations about the CDM, this would be too high a price to pay. However, direct links with the CDM should be limited. One option would be to allow CERs (CDM credits) directly into the Australian ETS only from countries that Australia would not yet expect to take on targets (e.g. least developed countries). Note this would still allow Australian businesses to develop CDM projects in any non-Annex B country, for sale into other ETS systems.

*(ii) Linking with the New Zealand ETS*

New Zealand is also establishing an ETS. Given Australia and NZ's close links, the intention to cooperate closely on climate policy, and common interests due to the importance of agriculture and land-use change in both countries' emissions profiles, it would make sense to link the Australian and New Zealand markets. Indeed, there are arguments to seek deep integration, with as common design and regulation of the two markets as possible.

*(iii) Linking with PNG and Indonesia*

Building a regional market encompassing not only New Zealand, but also (in the first instance) PNG and other Southwest Pacific countries, and if possible Indonesia, would also be desirable. Not only do PNG and Indonesia have large volumes of low-cost abatement opportunities, primarily through averting deforestation and improved land and forest management, but their engagement in trading would have a powerful demonstration effect internationally. To be fully engaged, the two countries would need

to accept national-level caps, as project-based mechanisms may not succeed in delivering aggregate reductions in land-based emissions.

The engagement already underway with both PNG and Indonesia towards climate partnerships should continue with a view to building linked markets. Earlier progress is more likely with PNG. Realistically, the market engagement would be at the government-to-government level because neither Indonesia nor PNG is likely to have a domestic emissions market. Their policies are more likely to take the form of regulation or direct financial incentives. Australian engagement in design and operation of the regional markets, especially in accounting procedures, would ensure quality. Trading through a national gateway would also facilitate the management of the uncertainty about the extent of permits that will be available for sale, and avoid destabilising effects on the Australian permit price. A development framework for revenue transfers would be required, to assure the Australian community that Australian permits are put to good use.

*(iv) Linking with EU*

The EU ETS is the only existing ETS at this time, and could become the core of the global market. It appears to have learnt the lessons of the earlier phase of its market, and Phase 3 (post-2012) proposals seem to be well designed. Australia should explore the possibility of trading with Europe. If Australia, at a minimum, allowed EU permits for acquittal in Australia, this form of one-way trading would provide a price ceiling for the Australian market at the European price.

*(v) Linking with emerging North American markets and Asian markets*?

Some American states are planning or considering markets, and Asian countries, such as Japan and possibly South Korea, may follow suit. We should explore opportunities for linking with these markets as they arise, as well as with future international sectoral markets.

*(vi) Aggregate limits on linking*

For reasons related both to the supplementarity principle (the need to show credible domestic action) and to manage the risks associated with linking to international markets, limits on international purchases of permits and offsets may be needed in the early stages. (No corresponding limit on international sales seems to be required.) This limit would be expected to rise over time, as our credibility becomes established, and international market quality improves. The limit could be established annually or over a period, and possibly differentiate between permits and offsets.

Detailed analysis will be required to model different limits. Since linking reduces costs and so makes more ambitious targets possible, decisions on trading limits should be made concurrently with decisions on national targets/budgets.

*(vii) Trading through government gateways*

In general, it would be desirable to allow both market participants and governments to trade across emissions markets. The Government will need to trade either when it needs to make good on international commitments, or when there is no domestic market to trade into. Trading with some countries may usefully be restricted to government gateways, as noted above.

*(viii) Regulatory arrangements to govern linking*

As noted earlier, decisions about aggregate linking limits need to be made at the same time and by the same entity as the decision on aggregate budgets/targets. Hence, determining aggregate linking will be a role for Government. The Government will also need to set out strategic and policy parameters for linking (e.g. deciding whether or not Australia should link with the CDM). Within that framework, the carbon market authority

or regulator could certify individual markets as being of a suitable standard for linking. This certification should not be permanent, as de-linking needs to be an option available if required.

*(ix) International market regulation*

Deep integration might be possible with countries such as New Zealand, and possibly PNG where decisions on market design could be made jointly. But for larger markets, such as the EU or the US, Australia will have little influence over their market design decisions, and will need to keep the option open to de-link in the future should market quality degenerate. Decisions to link should be accompanied by institutional measures such as consultative mechanisms. To promote international integration, Australia should push for the use of international and third-party mechanisms to strengthen monitoring and enforcement, and to harmonise standards across markets.

## Internal design issues with international linking implications

Apart from linking decisions, there are also a number of design decisions for which international linking has implications.

*(i) Coverage*

As discussed earlier, Australia's emissions profile argues for broad coverage, including emissions from land use. This may make it difficult to link fully with the EU market, at least in the short term (because of the latter's reluctance to recognise land-use-related emissions units into trading). On the other hand, it would strengthen the case for Australia's regional integration with countries where land-use change/forestry and agriculture are important (such as NZ, Indonesia, PNG, and other South-East Asian countries). More powerfully, it would make a case for full inclusion of agriculture and forestry in other countries' schemes.

*(ii) Price caps*

Price caps are a bar to international linkages.

*(iii) Domestic lending*

The more trading is allowed, the less demand there will be for lending, since firms or governments will be able to adjust to temporary shocks through increasing or reducing their international purchases. The Independent Carbon Bank may, therefore, choose to reduce its lending with the expansion of international linking. Lending might make other countries reluctant to link with Australia if it seemed possible that it might compromise Australia's adherence to agreed international targets. This is not a necessary problem of lending as exceedance of short-term targets can be made good by international purchases.

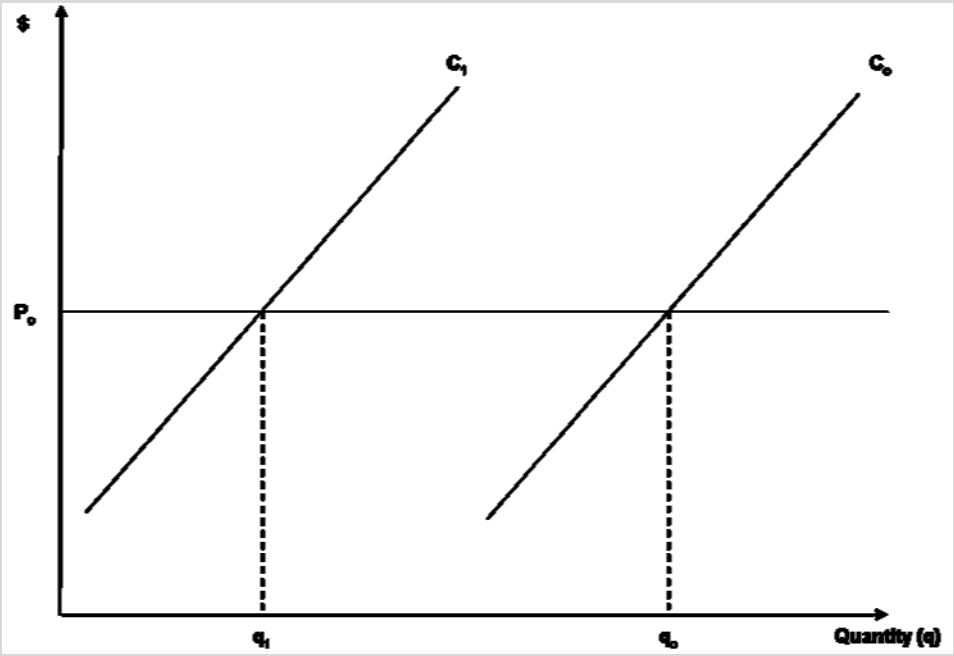
# Appendix 3: Trade-exposed, emissions-intentsive firms

**Box 6-1: The "over-shooting" problem for trade-exposed, emissions-intensive firms**

Firms will seek to produce that level of goods or services that maximises their profits (though in the short term they might deviate from this objective in order to gain or maintain market share). With some factors of production assumed to be fixed in the short term — namely, the firm's capital stock such as plant and machinery — firms will produce at a point where their costs increase with each additional unit of production.

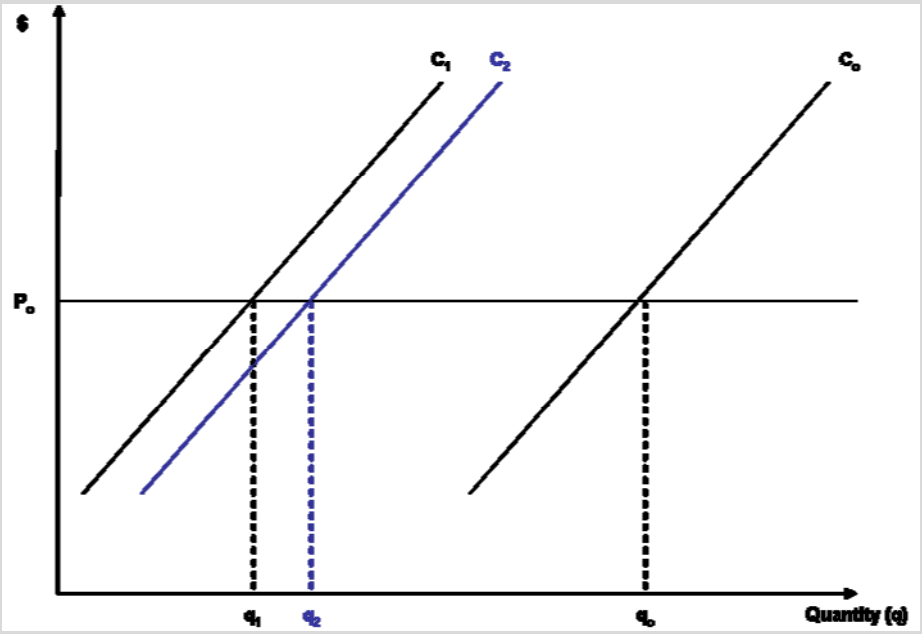
Where these firms compete in global commodity, goods or services markets they are assumed to be "price-takers". Each firm's level of production has no bearing on the world price of the relevant product.

These descriptions of a trade exposed, emissions intensive firm can be usefully represented graphically with an upward sloping (marginal) cost curve ($C_0$) and a flat price curve set at the world price ($P_0$). The firm's resultant profit maximising level of production is given by $q_0$.

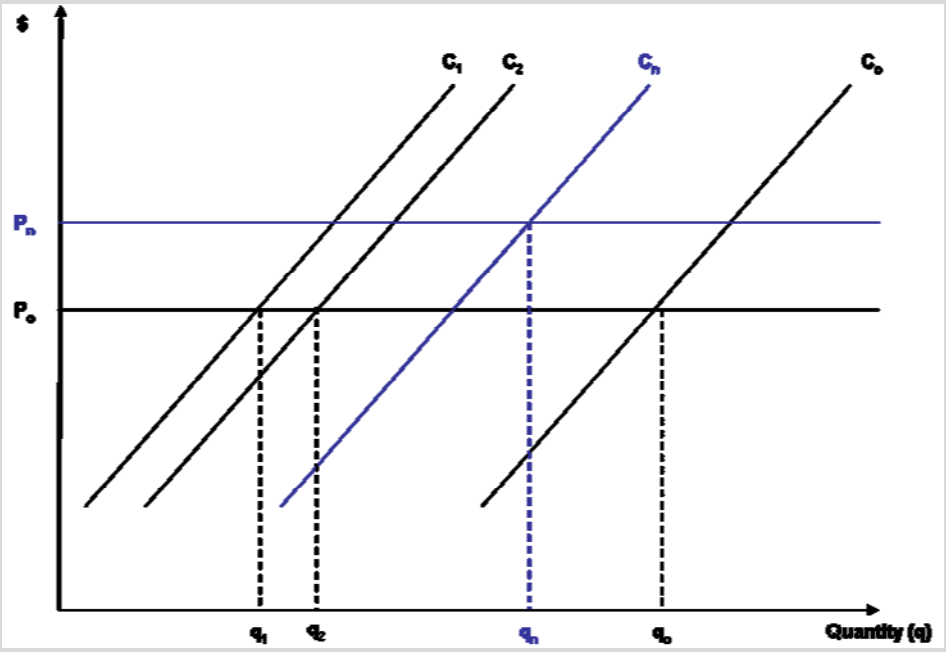



The imposition of a carbon price increases production costs for all levels of production to the extent that firms employ emissions intensive (direct and indirect) production processes. Graphically, a carbon price shifts the cost curve to the left ($C_1$) but has no bearing on the world price for the product ($P_0$). In response, profit maximising firms will reduce their level of production to $q_1$.

Over time, a firm facing a more expensive cost in its production process (namely, greenhouse gas emissions), will look to switch from high to low emissions intensive production processes in terms of both direct and indirect emissions. Graphically, this is represented by a shift of the cost curve to the right ($C_2$). While this has no bearing on the world price for the product ($P_0$), it will result in an increased level of production ($q_2$).




Eventually, as more and more countries adopt a carbon pricing regime, the world price of the relevant commodity, good or service will increase to $P_n$. In Australia, investment in new low emission processes by the relevant firm will continue until no further cost effective improvements can be made to the production process. This is shown by cost curve $C_n$.

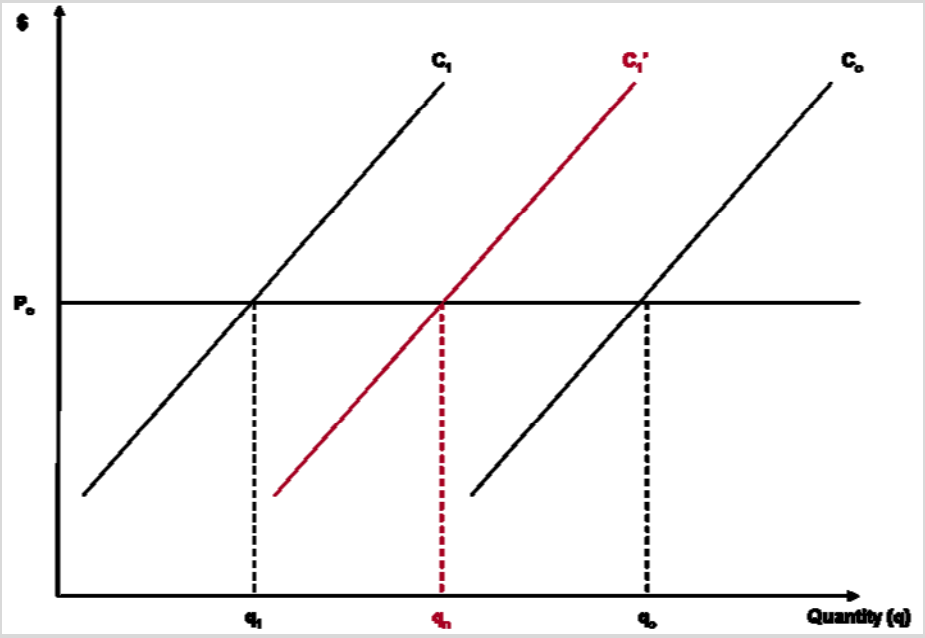



Under these conditions, the sustainable or long-run level of production for a profit maximising firm will be $q_n$. As shown in Box 6-2, $q_n$ may be greater, equal or less than $q_1$ production levels in the absence of a carbon constraint (that is, $q_0$).

The "over-shooting" problem is demonstrated graphically by the difference in production levels between $q_n$ and $q_1$. This gap will reduce to $q_n - q_2$ as the firm undertakes new investment.

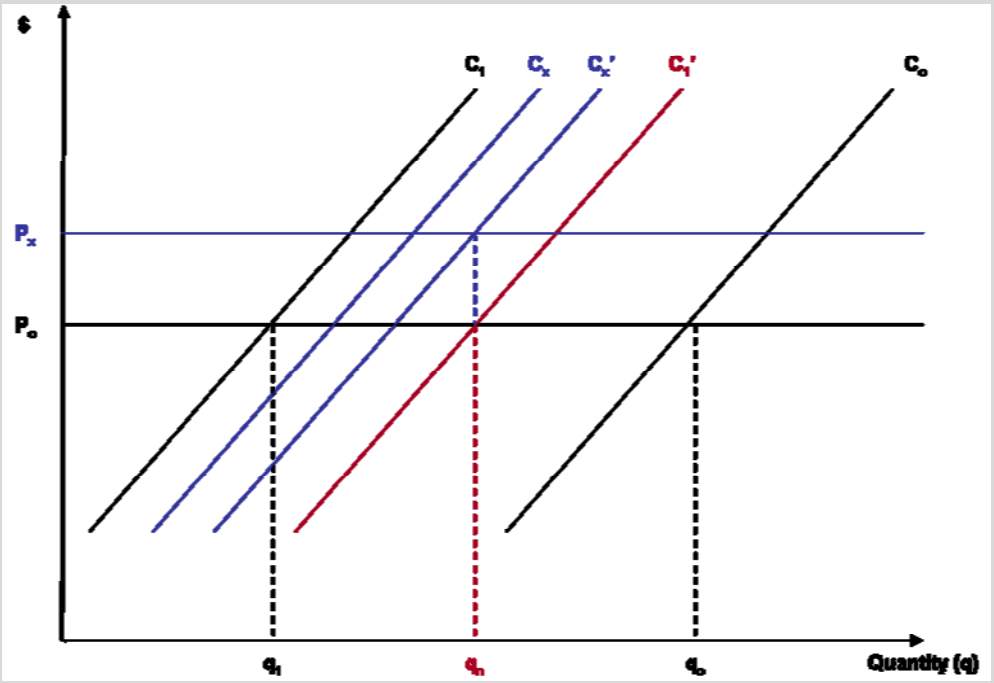
**Box 6-2: Transitional arrangements to address the trade-exposed, emissions-intensive firms**

Transitional arrangements for a trade exposed, emissions intensive firm would seek to correct for the "over-shooting" of the sustainable level of production $q_n$. By countering the effects of the carbon price on the firm's cost of production, the government would be seeking to shift the firm's cost curve in such a way that the profit maximising firm will not reduce production below its sustainable level of production $q_n$. This would be achieved by the government making a payment (in cash or permits) per unit of production so that the firm's cost curve is shifted to the right ($C_1$'). The value of the initial support given to the trade exposed firm given by the vertical distance between $C_1$ and $C_1$'.




With the passage of time, the firm will invest in new production processes (shown as $C_x$). Further, it can be anticipated that with the passage of time an increasing number of countries will adopt some form of emissions constraint leading to the price of the traded commodity or good increasing (to $P_x$) though not all the way to the sustainable world price ($P_n$).

The new level of support is represented by the vertical distance between $C_x$ and $C_x$'. Under such circumstances, the level of transitional support provided to the trade exposed emissions intensive firm will diminish over time — that is: $(C_x - C_x') < (C_1 - C_1')$


$
C1
Cx
Cx'
C1'
Co
Px
Po
q1
qn
qo
Quantity (q)

# Appendix 4: Comparison of proposed ETS design with existing proposals and schemes

## Part I, Australian Designs

| Design feature | Garnaut ETS Discussion Paper | National Emissions Trading Taskforce (NETT) Final Report | Task Group on Emissions trading Report (TGET) |
|---|---|---|---|
| **Status** | Model for discussion (March 2008) | Proposal (December 2007). Submitted to Garnaut Review by officials without Government endorsement. | Proposal (June 2007) |
| **Coverage** | All six Kyoto gases.<br>Stationary energy, industrial processes, fugitives, transport and waste from scheme outset. Agriculture and forestry to be included as soon as practicable. | All six Kyoto gases.<br>Stationary energy, transport, industrial processes and fugitives (possibly excluding open-cut coal mines). Waste and agriculture to be further investigated. | Same broad approach as the NETT. |

| Design feature | Garnaut ETS Discussion Paper | National Emissions Trading Taskforce (NETT) Final Report | Task Group on Emissions trading Report (TGET) |
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| **Points of obligation** | Set at point of emissions where practical. Where transaction costs are lower than the cost of distortions that may arise, upstream or downstream may be appropriate. | Direct emitters above 25 kt CO2-e. Some upstream liability (gas retailers, petroleum refineries and refined petroleum importers). Voluntary opt-out of direct liability for >25 kt CO2-e emitting gas users who purchase all gas from retailers. | Same broad approach. Inclusion of upstream liability on coal, as well as gas and liquid fuels. |
| **Offsets** | Domestic offsets should be accepted without limits, but will have a small role, given broad coverage.<br><br>Offset methodologies and pre-scheme abatement crediting to be considered further in full reports. | Allowed in non-covered sectors, according to rules. Unlimited acceptance of such domestic offset credits. Priority areas include biosequestration and waste (not CCS). Limited acceptance of international offset credits. Consistency with Kyoto Protocol mechanisms (e.g. Joint Implementation and Clean Development Mechanism, CDM) guiding principle.<br>Offset methodologies to be a mix of prescribed rules for some offset types, with proponents also able to submit methodologies for non-prescribed areas. No pre-scheme crediting. Early action recognised in baselines. | Similar approach. TGET proposes CCS be allowed to create offset credits. International consistency in offsets regime not specified. TGET considers there are shortcoming in existing international offset methodologies and proposes Australia influence their evolution.<br>Offset methodologies to be rules-based, not project-by-project. Recognition of early action supported, for activities undertaken after policy announcement.[11] |

[11] Note: former Commonwealth Government developed proposals for forest sinks and new abatement activities accredited to existing standards (e.g. some classes of CDM and Greenhouse Friendly). No credits provided for action undertaken before policy announcements (3 June 2007).

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| **Long-term emissions reduction goal** | Longer-term emissions limit should be expressed as a trajectory, which will define a budget over a number of years.<br>Government will set the emissions limit. Prior to a global agreement, it is important that Australia's emissions limit is ambitious enough to be seen by the international community as a commitment to serious action. With a cooperative global arrangement, the emissions reduction goal should become more ambitious. (See targets and trajectories, below) | All Australian Governments support a 60% reduction in national emissions by 2050. The NETS' long-term target should be consistent with achieving this economy-wide goal. | Long-term 'aspirational' goal to be announced in 2008. TGET criteria for setting the long-term cap do not explicitly refer to environmental considerations. |
| **Short-term targets and trajectories** | Four trajectories should be specified upon establishment of the ETS. The first up to 2012 will be based on Australia's Kyoto commitments. The other three for the post-2012 period reflect increasing levels of ambition. | Annual caps set for the first ten years of the scheme; a range of possible future caps (gateways) set for the subsequent decade. At a minimum, a range of caps to be set in 2008, firmed up as soon as possible thereafter. | Same type and duration of caps, as the NETT. Short- and medium-term caps and gateways to be set in 2010. |
| **Trajectories: reviews and adjustment** | Movement between tracjectories should be based on determining the comparability of Australia's response to international effort.<br>Conditions which would lead to a movement from one to a more stringent trajectory would be specified in advance. Five years notice to be provided by government, before movement to another trajectory. | Every year a firm cap set for an additional year. Every five years gateways would be updated (narrowed for the first five years) and extended for a further five years.<br>Cap to be adjusted in the event of expanding coverage to a new sector, but not for new firms (e.g. new TEEIIs).<br>Exceptional reviews may be triggered, and result in changes to the cap, if a significant international agreement if reached. | Same broad approach. TGET proposes that caps be adjusted to accommodate 'significant' new TEEIIs. |
| **Permit issuance (or release)** | Permits released according to emissions reduction trajectory. All permits auctioned at regular intervals. (Note, some permits may be used in lieu of cash in providing transitional assistance to traded exposed, emissions intensive firms at risk.) | Annual permits. Long dated permits can be issued in advance. Some free allocation (see below), remainder auctioned. | Same broad approach as NETT. |

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| **Eligibility for assistance – electricity generators** | The claims of this sector on equity grounds should be assessed by government alongside the equity claims of others.<br>Free permit allocation not supported as a means of compensation for changes in income distribution (see Permit revenue, below). | Existing electricity generators only. (Existing generators those committed at 3 June 2007.) Exemption considered for a small number of large-scale, low-emissions demonstration projects.<br>Assistance to be for disproportionate loss of asset value (i.e. reduction in asset value less the average losses across the economy.) | Same broad approach – defined as those existing after the date of announcement of intention to proceed with emissions trading (3 June 2007)<br>Assistance to redress disproportionate (that is, significantly larger than average) losses in asset value. |
| **Basis of assistance to TEEIIs** | Some industries rely significantly on emissions-intensive production processes, and are substantially unable to pass costs of emissions through to customers because price of commodity or good is determined on international markets. Transitional financial assistance (possibly in the form of free permits) should be provided to account for distortions arising from major trading competitors not adopting emissions limits (or pricing). | TEEII identification criteria specified. Emissions intensity threshold not defined. A possible emissions intensity threshold of 1200 tonnes of $CO_2$-e per million dollars of revenue suggested for further investigation. A 3.5% threshold (for energy costs as proportion of total operating costs) used as basis for modelling.<br>Free permit allocations made annually based on previous year's output, subject to annual true-up. Linked to output, based on baseline levels on energy-intensity (direct and indirect emissions). Closing firms must hand back permits. | Also not defined. A 3.5% threshold could be used as basis for further consideration.<br>Similar approach to the NETT. TGET propose free allocations be made in advance in five-year blocks. |
| **Auction** | Auctioning would be made on a fixed schedule, for example, weekly, monthly, quarterly. It is desirable that permits be sold into the market as soon as possible, to promote price discovery. | Mix of spot and advance auctions. Further work on frequency and mix.<br>Auction rules: ascending clock auction with iterative sealed bidding in multiple rounds; uniform pricing; aggregated demand revealed in each round; allow TEEIIs and other recipients of free permits to sell permits; allow proxy bids to accommodate small bidders; allow intra-round bidding; use an internet auction platform. | Same broad approach as NETT (i.e. mix of spot and advance auctions). Details and auction rules to be finalised. |

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| **Permit revenue** | Auctioning of all permits will be the source of a substantial amount of government revenue. Governments will need to assess competing priorities for this revenue, which may include:<br>■ Payments to TEEIIs (to correct for market failures);<br>■ Payments to households;<br>■ Structural adjustment to support declining communities;<br>■ Payments to firms to correct market failures in relation to new technologies;<br>■ Support for public infrastructure; and<br>■ Cash reserves to purchase international permits/offsets to reconcile domestic emissions with international commitments.<br>The political acceptability of the introduction of the ETS would be enhanced by government commitment to transparently return to the community through the mechanisms outlined above or in other ways, all of the revenue generated by the sale of permits. | Direct linking of auction revenue to expenditure (hypothecation) not proposed. Priority uses for revenue may be R&D in low-emissions technology or support for groups adversely affected by the NETS. The Council for the Australian Federation (CAF) endorsed the principle that 'permit auction revenue be divided among the State and Territories in a way that produces equitable outcomes'. | Same broad approach. No role suggested for States and Territories in allocation or expenditure of auction revenue.<br>Proposed revenue to be used initially to support the emergence of low emissions technologies and energy efficiency initiatives. As the scheme matures, government may also wish to consider directing part of the increasing auction revenues generated to households and businesses. |
| **Penalty** | Penalty to be set as a compliance mechanism. Penalty does not replace obligation to acquit permits; a 'make-good' provision would apply. Alternatively, the use of revenue from a financial penalty could be used to purchase abatement. | A civil penalty should be set at a level to encourage compliance and cap scheme costs. Level should be fixed (set in light of estimated costs of compliance). Set when firm caps are set. Make-good provision not proposed. | Same broad approach. Propose that 'emissions fee' be set 'relatively low' in early years, and those paying the fee not be allowed to trade/bank permits in that year. A stronger role suggested for the fee as a 'safety valve', relative to the NETT. |

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| **Penalty revenue** | If a financial penalty is applied, without a make-good provision, penalty revenue must be used to purchase abatement. | Fund abatement activities as specified by governments. Where administrative costs of purchasing abatement exceed the value of abatement, then penalty revenue should be aggregated and added to auction revenue. | TGET proposes adding penalty revenue to auction revenue. |
| **Banking** | Unlimited banking supported. | Unlimited banking supported. | Restrict banking in early years when emissions fee is low. Unrestricted banking allowed in the long-term. Also proposes offset credits from sinks should be bankable before scheme start. |
| **Borrowing** | Official lending of permits by the independent authority to the private sector allowed, but may be subject to limits, in terms of quantity and time, determined by the independent authority. | Limited 'administrative flexibility' permitted (1% of a party's liability of permits dated compliance year + 1) for compliance. | Borrowing not supported. |
| **International links** | Opportunities for international linkage of the Australian ETS should be sought in a judicious and calibrated manner. | Bilateral linking with other schemes is supported, but not an immediate priority.<br>Unilateral linking (acceptance of credits generated under Kyoto mechanisms) supported, subject to limits. | |
| **Governance** | Policy framework set directly by government.<br>Scheme administered by independent authority. | Implementation led by the Commonwealth, in consultation with States and Territories.<br>Separation of policy and operational functions (e.g. Scheme Developer and Scheme Regulator). Scheme Developer to be modelled on RBA Board (independent body). Scheme Regulator to manage day-to-day scheme operation. Governments (e.g. COAG) make decisions – e.g. set caps and gateways, based on recommendation from Scheme Developer. | No role for States and Territories suggested. Same broad approach to institutional responsibilities and the separation of policy/regulatory roles. TGET suggests a narrower role for stakeholders than the Taskforce does. |

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| **Other greenhouse measures** | Interaction with abatement schemes (e.g. MRET and mandatory energy efficiency schemes) to be considered in full reports.<br>Some complementary greenhouse gas abatement measures will be necessary, particularly to address market failures (e.g. could include investment in low-emissions technology R&D, public transport and energy efficiency). | Complementary measures (e.g. renewable energy target schemes) continue in parallel. NSW/ACT Greenhouse Gas Reduction Scheme (GGAS) and Queensland Gas Generation Scheme to transition into the NETS; transition arrangements to be developed. NETS to be complemented by other greenhouse gas abatement policies, particularly relating to energy efficiency and low-emissions technology R&D. | Existing and planned State-based greenhouse measures to be streamlined and rationalised. Some complementary greenhouse gas abatement measures will be necessary (e.g. funding for low-emissions technology R&D and energy efficiency). |

## Part II, International Designs

| Design feature | European Union Emissions Trading Scheme (EU ETS), Phases 1 & 2 (2005-2012) | European Union Emissions Trading Scheme (EU ETS), Phase 3 (2013-2020) | Regional Greenhouse Gas Initiative (RGGI) | New Zealand Emissions Trading Scheme (NZ ETS) |
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| **Status** | Established under Directive 2003/87/EC. Entry into force on 25 October 2003. Phase 1: 2005-07 (a trial or learning period), Phase 2: 2008-12 (to coincide with Kyoto commitment period). | A European Commission proposal which must be endorsed by European Council and Parliament to become effective. | Proposed for operation from 2009 to 2018. "Model rule" released by participating states in 2006. | *Climate Change (Emissions Trading and Renewable Preference) Bill* tabled in New Zealand Parliament on 4 December 2007. |
| **Coverage** | 27 EU members plus 3 additional members of European Economic Area (Norway, Iceland, Lichtenstein). CO2 emissions from energy generation, ferrous metals, cement, bricks, glass, pulp and paper included. This accounts for 50% of EU CO2 emissions and 40% of EU GHG emissions. | Country coverage unchanged. GHG coverage expected to rise to 50% of EU GHGs. New gases to be brought in: N2O, PFCs. New sectors: international aviation, ammonia producers, aluminium. Major remaining exclusions: transport, domestic and service sector use of gas, shipping, land use. | Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont; other states encouraged to join. Carbon dioxide only from fossil fuel (coal, oil, gas) fired electricity generators. | All sectors (with staggered entry over five years) and all six GHGs to be covered by 2013. (Note in NZ, half of all greenhouse gas emissions from pastoral agriculture.) Participation voluntary for post-1990 forests. |
| **Size of market (at time of commencement)** ( Australia 540 million T CO2-e if all sectors included) | Approx. 2,300 million CO2-e for Phase 1 cap, and 2,100 million CO2-e for Phase 2 cap. | Approx. 2,000 million T CO2-e (proposed 2013 cap) | Approx. 200 million T CO2 | Approx. 75 million T CO2-e |

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| **Points of liability** | At the point where emissions occur with exemption for emitters with aggregate capacity of at least 20 MW. The result is about 10,000 power plants and industrial facilities are covered, including a large number of small emitters: 59% of the registered emitters only 2.5% emissions. | An increased opt-out exemption limit basically to 25 MW, which would exclude about 4,200 installations, but which account collectively for only around 0.7% of total ETS emissions | Electricity generators of > 25MW name plate capacity and burning > 50% fossil fuel. New (post 1 Jan. 05) plant will be liable if burning > 5% fossil fuel. Some exemptions, eg. burn biomass as majority fuel, sell < 10% of the electricity they generate to the grid | Upstream wherever possible, except in agriculture where processor/company rather than farm level will be included. About 200 participants expected, excluding forestry. |
| **Long-term emissions reduction goal** | Kyoto Protocol emission reduction commitment for European Community members. | European Union has committed to a 60-80% reduction by 2050 over 1990 levels, and for 20 to 30% reduction by 2020.[12] Proposal is for only one EU-wide cap rather than separate national caps as in previous Phases. Allocation of EU cap will be based on 2005 levels, and will favour low-income EU states. | Stabilise power sector emissions at approx. current levels (~121 million tons p.a) from 2009-15, then reduce by annual increments to achieve a 10% reduction from 2015-19. | As per the Kyoto Protocol, and its successor, with national/regional targets if no successor to Kyoto emerges. Government has announced national carbon neutrality goal for 2020. |

[12] The 20% reduction is described as an “independent commitment” by the EU. The 30% reduction will be adopted “in the context of a satisfactory global agreement to combat climate change post-2012.” See Questions and Answers on the Commission's proposal to revise the EU Emissions Trading System, MEMO/08/35, Brussels, 23 January 2008. This implies that “other developed countries commit themselves to comparable emission reductions and economically more advanced developing countries commit themselves to contributing adequately according to their responsibilities and capabilities.” (See the 2008 “Proposal for a Decision of the European Parliament and of the Council on the effort of Member States to reduce their greenhouse gas emissions to meet the Community’s greenhouse gas emission reduction commitments up to 2020”

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| **Short-term and medium-term caps and gateways** | Targets proposed by member states through National Allocation Plans (NAPs), reviewed and approved by Commission. Phase 1 targets close to actual emissions leading to price collapse. Phase 2 targets tougher (all but 2 NAPs rejected by Commission) and reduced to on average 6.5% below 2005 to help meet Kyoto Protocol target. | Annual cap will decrease by a constant absolute amount every year (1.7% of the Phase 2 cap assuming 2020 target is 20% reduction). Linear reduction path will continue to apply for fourth phase (2021-2028) and beyond. | Three year compliance periods. | As per international commitments |
| **Nature of permits** | Annual. | Annual. | Annual. | Annual. |
| **Allocation of permits** | Auctioning limited to a maximum of 5% in Phase 1 and 10% in Phase 2. Most member states issued free permits on the basis of historical emissions (with rules for new entrants). In practice, only 0.2% of all allowances auctioned in Phase 1. In Phase 2, some states have made greater use of auctioning (UK 7%, Germany 8%). | 60% of allowances to be auctioned by 2013; this figure to increase over time. Power generation to face full auctioning in 2013. In other sectors, allocations for free will be phased out progressively from 2013, resulting in no free allocation in 2020, except perhaps for trade-exposed industries (see below). (In interim, 5% allowance retained for new entrants). | Each state will determine mix of allocation and auction. Stable allocation of permits for years 2009-2014, with annual allocation for years 2015-2018.States comprising majority of regional emissions committed to 100% auction. | Substantial free allocation of NZ units to the owners of pre-1990 forest land, agriculture and trade-exposed industries (see below) Other NZ units to be sold by public auction. No allowance of free permits for new entrants. |

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| **Auction revenue** | N/A (Auctioning very limited) | Auction revenues will be redistributed from EU member states with high per capita income to those with low per capita income in order to strengthen the financial capacity of the latter to invest in climate friendly technologies. | Revenue from the sale/auction of at least 25% of permits will fund "consumer benefit or strategic energy" initiatives (eg. energy efficiency, renewable energy, energy technologies, consumer rebates). This total regional revenue is estimated to be between $50-185 million through 2020, and is proposed to be managed and administered cooperatively by RGGI states. | Not specified. |
| **Banking** | Most member states have prevented the banking of allowances between the two phases, but banking between years within each of the two phases has been allowed. | Unlimited banking from Phase 2 to 3; unlimited year to year banking allowed. | Allowed indefinitely | Not permitted. International trade to be used to provide flexibility. |
| **Borrowing** | As for banking | Year to year borrowing of 2% allowed. | Allowed within but not between three-year compliance periods. | Limited borrowing allowed by releasing some of the next years permits before acquittal time. These can be used for acquittal as soon as they are released. |
| **Eligibility for compensation – non-traded industries** | None (since most permits free, issue did not arise) | None (though most permits auctioned) | States can decide whether permits are auctioned or given away. May use auction revenue or free permits to compensate. | None. |

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| **Eligibility for compensation – new and existing trade-exposed, emissions intensive industries (TEEIIs)** | N/A, either excluded or received free permits. | To be determined by 2011, with the possibility of affected sectors receiving up to 100% of their allowances for free, depending on the extent to which the industries are covered by global agreement, and with the possibility that tariffs will be used to neutralise any distorting effects from imports, | As for non-traded industries. | Assistance will be provided to industry and agriculture, at 90% of their 2005 emissions. Gradual phase out of assistance, with complete withdrawal by 2025. |
| **Price cap** | None | None | Three year compliance period extended by 1 year at a time if the permit price exceeds $10 for a sustained period. If, after 2yrs of the compliance period extension, prices are still >$10, sources can cover up to 20% of their reported emissions with offsets in the $4^{th}$, $5^{th}$, and $6^{th}$ years of the extended compliance period. | None |
| **Institutional arrangements** | Member states propose with EU setting up framework and approval role. | Commission role much stronger than in earlier Phases. Member states will carry out auctions. | Design based on interstate agreement. Actual implementation will be by individual states. | An administering agency (the "chief executive") with audit and inspection powers will verify that participants have correctly complied with their obligations. It is envisaged that the ETS implementation will be coordinated by the Ministry of Economic Development. |

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| **Domestic offsets** | No domestic offsets. | Domestic offset credits allowed for excluded sectors, and to be tradable throughout the system. Commission to develop guidelines. | Verified reduction projects anywhere in the US, in areas such as energy efficiency, landfill, agricultural-related methane, afforestation, SF6 reductions, fugitive emission reductions. Offsets in RGGI states receive allowances on a 1 to 1 basis. Offsets from non-participating states to be awarded a 1 ton credit for each 2 tons of verified reductions. A source will be permitted to cover up to 3.3% of its emissions with offsets (approx. 50% of the projected average emission reduction obligation under the program). If permit price is >$7 for a sustained period, sources can cover up to 5% of their emissions with offsets allowances. Any North American offsets will be valued on a 1 to 1 basis. if average price >$10 for a sustained period, sources can cover up to 10% of their emissions with offsets allowances and offsets from international trading schemes will also be allowed. | The Bill makes provision for 'participants' in the scheme to include those who do activities to remove GHGs from the atmosphere but are not obliged to. These participants can receive one emission unit for each tonne of emissions removed. |

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| **International links with other emission markets** | Linking permitted to other emissions trading schemes in countries listed in Annex B of the Kyoto Protocol which have ratified the Protocol (basically other developed countries). | Any trading scheme developed by any country or administrative entity (e.g. a state or grouping of states within a country) could be linked provided that the other trading scheme is a cap-and-trade system with design features that would not undermine the integrity of the EU scheme. | International Kyoto-approved offsets or trades with other emission markets allowed if average price above $10 for sustained period as part of overall offset limit of up to 10% of emissions. | International linking considered to be critical to reduce costs and provide flexibility. No limits proposed. |
| **International offsets** | Kyoto-approved international offsets (CDM and JI credits (credits can be used in either phase of the scheme. National authorities determine limits. On average, limit set at about 13% of target. | In case of 20% reduction target, Kyoto-approved international offsets (CDMs or JIs) can be used up to a limit of 3% of 2005 emissions (one-third of reduction effort); in case of higher reduction target, up to 50% of additional reduction effort can be met by international offsets. No credits accepted from land use, land use change and forestry projects, and no nuclear-related credits. | See above. | No restrictions on the use of Kyoto-approved international offsets, except that nuclear and forestry related credits will not be accepted. |

**Sources for EU:**
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Memo on the Renewable Energy and Climate Change Package, MEMO/08/33 Brussels, 23 January 2008

**Sources for NZ**

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Explanatory documents from www.climatechange.govt.nz
Speech by Minister for Climate Change, David Parker, “A New Zealand Emissions Trading Scheme”, Wellington 20 September 2007.

**Sources for RGII**

www.rggi.org
http://www.dec.ny.gov/energy/39276.html (for CO2 coverage)