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The European Emissions Trading System—lessons for Australia

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Executive summary

- The European Union's Emissions Trading Scheme (EU ETS) is the world's largest current cap and trade emissions trading scheme. Its first trading period (2005 to 2007) provides lessons for the design of an Australian cap and trade scheme.
- Europe has learnt valuable lessons from the EU ETS's operations between 2005 and 2007, the principal one being that the relative scarcity of emission permits in a cap and trade system must be maintained if an emissions market is to meet its overall objectives. The same lesson applies to any Australian emissions trading scheme.
- There are other lessons to be learnt from the EU ETS first trading period, such as:
  - the EU's adoption of the cap and trade approach to emissions control makes it the preferred approach for other countries wishing to eventually trade emission permits beyond their own borders
  - adequate preparation time is essential to implement a well designed emissions trading scheme. Australia appears to have heeded this lesson
  - a well informed trading market requires verifiable emissions data being available before emissions trading commences. Again, Australia appears to have heeded that lesson, and
  - maintaining the relative scarcity of emission permits requires unlimited banking of unused permits together with no forfeiture of those permits should a particular emitting facility close down.
- The initial allocation of emission permits is also vital to maintain the relative scarcity of emission permits. The main lesson from the European experience is that this decision should be separate from either sectoral or state influence.
- Europe's experiences suggest that the best can be the enemy of the good. Worthwhile reductions in emissions were achieved and valuable experience gained from the operation of what could be argued to be a deeply flawed EU ETS during its first trading period. If Australia waits for a perfect scheme to be designed it will potentially forego similar worthwhile outcomes.

Contents

Introduction

The increased awareness of the impact of climate change has moved governments in many countries to consider an appropriate policy response. Australia is no exception to this trend and there has been considerable discussion to identify the appropriate economic mechanism for restricting greenhouse gas emissions, and eventually, reducing them. There are two main categories of economic instruments useful for controlling these emissions:

- those that create property rights based on emissions made that can be traded via an open market (sometimes known as emissions trading schemes), and/or
- those that directly act on prices (e.g. carbon taxes).

The carbon tax approach is not the favoured way of dealing with emissions control in Australia. Emissions trading is perceived to have better prospects of achieving the required changes in greenhouse gas emissions at the least cost. Further, such regimes are considered more flexible in there reaction to unforseen developments and offer better prospects for linking Australian emissions control policies to those of other countries or any evolving international scheme.[1]

Types of emissions trading schemes

Generally, there are two types of emissions trading schemes; the 'cap and trade' and 'the base line and credit' schemes.

With the cap and trade approach, an aggregate cap or limit on emissions made within a particular area is established by the relevant government, usually through a specific emissions trading scheme regulator. Often, this overall cap is progressively reduced over time. Individual emitters are assigned a limit within this overall cap and receive the requited number of emission permits. Alternatively, individual emitters bid for their required number of permits in an auction. The total number of permits issued corresponds to their permitted level of emissions during that period. These permits must be surrendered to the regulator (i.e. acquitted) once the emissions have taken place. Each permit represents a discreet unit of emissions (in the European Union Emissions Trading Scheme (EU ETS) each permit represented a tonne of carbon dioxide (CO_2))

Emitters then trade their emission permits amongst themselves to either purchase additional permits to cover their emissions above their individual limits, or to sell their surplus emission permits. Third parties, such as financial institutions, may buy surplus emission permits to sell

1. Prime Ministerial Task Group on Emissions Trading, *Report of the Task Group on Emissions Trading*, 31 May 2007 p. 43 and following.

at a later date. Once a permit for a particular period is sold it can be used by another emitter to acquit their own emissions.

If the seller of the permits finds that they need additional permits at a later date they must buy those permits. The permits cease to have any value once they are acquitted or the period for which they are valid expires.

Emissions are reduced when the market regulator reduces the overall cap on emissions in a given area and individual firms respond by lowering their own emissions, or when individual firms reduce their own emissions in response to price signals provided by the price of the emission permits.

An alternative approach, but with important differences, is a baseline and credit system. With this approach emitters are not under an aggregate emissions cap. Rather, they are required to purchase offsetting emission credits. These credits are created by firms or development projects that either reduce the amount of overall emissions or destroy/absorb existing emissions. Many of the criticisms of emissions trading are aimed at baseline and credit programs and there is only one such operating scheme (the New South Wales Greenhouse Gas Reduction Scheme).

In a baseline and credit scheme, emissions are not formally reduced, so much as increasingly offset. The cost of offsetting the emissions, if it is high enough, may lead firms to reduce the relevant emissions. To date, the New South Wales scheme has created a large number of emissions credits. But their price appears not to have been sufficiently high enough to force a wholesale reduction in emissions.[2] This scheme is currently under review and is due to cease operation once a national emissions trading scheme commences operation in Australia.[3]

Which approach for Australia?

To date, Australian discussion and policy has favoured a cap and trade style solution. Australia was a participant in the initial meetings of the United Nations Framework Convention on Climate Change and the Kyoto Protocol to that Convention. A feature of this Protocol is the enabling of the eventual international trade in emission permits and credits. The Rudd Government formally ratified the Kyoto Protocol in late 2007 and later participated in discussions regarding an agreement to take effect after the first Kyoto protocol commitment period (2008–2012) in 2013.[4]

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2. Marian Wilkinson, ‘Going global, crashing locally’, *Sydney Morning Herald*, 11 September 2007, p. 2.

3. New South Wales Department of Water and Energy, HGreenhouse gas reduction schemeH, http://www.greenhousegas.nsw.gov.au/ (accessed 2 July 2008).

4. The Hon. Kevin Rudd MP, Prime Minister, ‘Ratifying the Kyoto Protocol’, media release, Parliament House, Canberra, 3 December 2007; Senator the Hon. Penny Wong, Minister for

In 2004, state and territory governments established the National Emissions Trading Taskforce to formulate and design a national emissions trading scheme, which recommend a cap and trade approach. The Garnaut Climate Change Review notes that this taskforce's activity was very influential in promoting a cap and trade approach to emissions control in Australia.[5] The Prime Minister's Task Group on Emissions Trading recommended in 2006 that Australia adopt a cap and trade scheme as its preferred approach to emissions control,[6] as did the interim report of the Garnaut Climate Change Review.[7] The recent government Carbon Pollution Reduction Scheme Green Paper also adopted a cap and trade approach.[8]

Australia is very firmly committed to a cap and trade approach for controlling its greenhouse gas emissions. However, despite the release of the above mentioned green paper the details of any national emissions trading scheme are still being worked out. The eventual design of any new scheme can be informed by observing how existing cap and trade schemes are operating. The EU ETS is the largest current cap and trade scheme now operating covering the emissions of a large number of sovereign states. As such, the EU ETS is a relevant scheme from which Australia might draw some lessons. The following paper considers the lessons to be drawn from the design and operation of the EU ETS during its first trading period (2005–2007).

The EU ETS

The European Union members have agreed to jointly fulfil their commitments to reduce greenhouse gas emissions caused by human activity under the Kyoto Protocol. On 13 October 2003, the European Parliament and Council published a directive establishing a scheme for greenhouse gas emission trading between the member states.[9] The EU ETS was launched on

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Climate Change and Water, 'Its official–Australia is now part of the Kyoto Protocol', media release, PW 30/08, Parliament House, Canberra, 11 March 2008; and United Nations, Framework Convention on Climate Change Secretariat, 'UN breakthrough on climate change reached in Bali', media release, Bali, 15 December 2007.

5. Garnaut Climate Change Review, H*Emissions Trading Scheme Discussion Paper*H, March 2008, p.10.

6. Prime Ministerial Task Group on Emissions Trading, H*Report of the Task Group on Emissions Trading*H, 31 May 2007.

7. Garnaut Climate Change Review, H*Interim Report to the Commonwealth State and Territory Governments of Australia*H, February 2008.

8. Senator the Hon. Penny Wong, Minister for Climate Change and Water, *Carbon Pollution Reduction Scheme Green Paper*, Canberra, 16 July 2008.

9. HDirective 2003/87/ECH of the European Parliament and of the Council of 13 October 2003, establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC. Official Journal of the European Union, L 275/32, 25 October 2003, hereafter known as 'the *Directive*'.

1 January 2005. From this date, certain installations needed a greenhouse gas emissions permit to operate. It is the largest cap and trade scheme in the world. The second stage of this scheme commenced on 1 January 2008.

Scheme objectives

The overall aim of the EU ETS is to reduce greenhouse gas emissions in an economically efficient manner. However, the design of the first trading period was driven by the wish to create the critical mass for a liquid and well-functioning carbon market. The first trading period was always intended to be a 'learning by doing' phase for all the parties involved.[10]

Scheme design

Between 2005 and 2007 the EU ETS had the following features:

- each participating country produced a national emission permits allocation plan
- the total EU emissions cap was an amalgamation of the separate national plans as approved by the European Commission[11]
- once a national emissions plan had been decided upon individual facilities within each county were allocated a number of emission permits
- generally, permits issued during the first trading period could not be held over and used in the second and subsequent trading periods[12]
- most countries required the owners of emitting facilities that closed during the first trading period to forfeit those facilities' emission permits
  - some countries allowed the owners of closed facilities to retain their permits, but only to the end of the first trading period[13]

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10. Commission of the European Communities, H*Impact Assessment*H, Commission staff working document, Accompanying document to the proposal of a directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emission allowance trading system, COM(2008 16 Final), 23 January 2008, pp. 12 and 14, hereafter known as '*Impact Assessment*'.
11. ibid, p. 10.
12. *Directive*, particularly Article 11 and Article 13.
13. Sweden and the Netherlands allowed the owners of closed facilities to retain their allowances till the end of the first trading period. See A. Denny Ellerman and Barbara K. Buchner, 'The European Union Emissions Trading Scheme; Origins, Allocations and Early Results', *Review of Environmental Economics and Policy*, Vol. 1, No. 1, Oxford, 2007, p. 76.

- the national allocation plans for some countries were approved after the start of the first trading period (2005)[14]
- individual countries reserved a number of emission permits to give to new countries entering the scheme[15]
- at least 95 per cent of the emission allowances were distributed free of charge. Individual countries allocated their emission permits using very different criteria[16]
- five per cent of permits may have been auctioned[17]
- as emissions occurred the emitter was required to surrender the relevant number of emission permits each December to cover those emissions[18]
- a fine of €40 per tonne of carbon dioxide (CO_2) made over the prescribed limits was payable to the Commission
- reporting, enforcement and compliance were undertaken by participating states[19]
- a central administrator verified the operation of the EU ETS[20]
- initially, the scheme covered only about 50 per cent of the projected CO_2 emissions only
  - *the directive* establishing the scheme clearly includes the six main greenhouse gases and contemplates the addition of other gases as the scheme develops[21]

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14. Larry Parker, , Congressional Research Service, US Library of Congress, 'H*Climate Change: The European Unions Emissions Trading System H*', Washington D.C., 31 July 2006, pp. 4 & 9.
15. A. Denny Ellerman and Barbara K. Buchner, 'HOver-Allocation or AbatementH? – A preliminary analysis of the EU Emissions trading scheme based on the 2006 emission data', MIT Joint Program on Science and Policy of Global Change, *Report No. 141*, Cambridge MA, December 2006, p. 3.
16. *Impact Assessment*, op. cit., p. 14.
17. Joseph Kruger and William A. Pizer, 'HThe EU Emissions Trading Directive: Opportunities and potential pitfallsH', *Resources for the Future – Discussion Paper*, Washington DC, April 2004, p. 4. Apparently, Denmark, Hungary, Ireland and Lithuania auctioned this amount of their permits. F. J. Convery and L. Redmond, Market Developments in the European Union Trading System, *Review of Environmental Economics and Policy*, Vol. 1, No. 1, Oxford, 2007, p. 96.
18. *Directive*, op. cit., Article 12(3).
19. Joseph Kruger et al, op cit., p. 5, *Directive*, op. cit., Article 14, 15, 21.
20. *Directive* op. cit., Article 20.

- a country could meet its emissions targets by the limited use of offsets[22] (but not from forestry)
- there was limited acceptance of emissions credits generated by the Kyoto Protocol Clean Development and Joint Implementation Mechanisms,[23] and
- the scheme covered a wide range of power generation and metals/minerals processing facilities, but did not cover the transport, construction, waste processing and farm sectors or some industrial plants.

Comment

These arrangements were, perhaps, implemented with indecent haste. The EU ETS participants had to submit their national emission allocation plans by the end of March 2004, only a short time after the final EU Directive outlining the plan took effect on 25 October 2003. Not only was this task taken with limited (if any) current emissions data available to participating governments, but they were also unclear over the precise type of emitting facilities to be covered by their separate country plans.[24]

Outcomes

As noted above, the first phase of the EU ETS stretched from 2005 to 2007. What were the outcomes over this period?

Over-allocation of permits

A number of participating countries' allocation plans had permitted emissions some 25 per cent above their recent emissions levels. Other countries' allocation plans featured increases in permitted emissions. Further, the methods each country used to estimate its emissions

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21. *Directive* Articles 2, 3, 30 and Annex II include the six main human produced greenhouse gases in the scope of the EU ETS. These greenhouse gases are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. These are also the 6 human produced greenhouse gases noted in Annex A to the Kyoto Protocol.
22. Joseph Kruger et al, op. cit., p. 5.
23. A. Denny Elleman and Paul L. Joskow, Massachusetts Institute of Technology, 'the European Union's Emissions Trading System in perspective', *Report for the Pew Centre on Global Climate Change*, May 2008, p. 4.
24. Frank Convery, Denny Ellerman and Christian De Perthuis, op. cit., pp. 9–10.

differed from those of other countries. Only Germany and Slovenia submitted plans that had emissions targets lower than their emissions before 2005.[25]

The collective result was an overall allocation target of 3 to 9 per cent above emissions levels prior to 2005.[26]

There were other factors in the scheme's design that contributed to this over-supply:

- forfeited allowances from closed facilities had to be disposed of by the end of 2007, thus adding to the general over-supply of emission permits, and
- as noted above, several countries' emission permits allocation plans were approved after the start of the first trading period. The addition of countries' emission permits to the overall pool of permits also contributed to their over-supply.

While the scheme's design was not the only factor creating an over-supply of permits compared to actual emissions (other factors are discussed below) it was a necessary condition for this to over-supply to occur.

Emissions reduction?

Based on an analysis of the emissions data from the first year of operation, emissions reported under the EU ETS were about 4 per cent lower than the amount of emissions covered by the number of emission permits distributed to various installations and facilities for 2005.[27] One estimate suggests that, in the first year of the EU ETS operation, European CO_2 emissions were between 2 and 5 per cent less than they might otherwise have been. The group making these estimates was careful to note that this outcome was based on an uncertain estimate of what 'business as usual' emissions may have been in 2005, and other uncertainties about the data used, in coming to this tentative conclusion.[28]

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25. It is interesting to note that Germany achieved significant reduction of all greenhouse gas emissions between 1990 and 2001. See Axel Michaelowa, 'HGermany – a pioneer on earthen feetH? International Climate Policy Program, Hamburg Institute of International Economics, 2003, p. 1. It may be that the German Government expected such reductions to continue and was confident that a lower level of permits than expected emissions reflected its own progress in reducing emissions.
26. Michael Grubb, Christian Azar, U. Martin Perrson, 'HAllowance allocation in the European emissions trading system–a commentaryH', *Climate Policy*, Vol. 5, 2005, p. 130.
27. A. Denny Ellerman and Barbara Buchner, 'HOver-Allocation or AbatementH?' op. cit., p. 1.
28. ibid, p. 21; also Commission of the European Communities, Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, 'HBuilding a global carbon marketH'–Report pursuant to Article 30 of Directive 2003/87/EC, Brussels, 13 September 2006, p. 3.

The uncertainty of these conclusions was confirmed by the apparently small rise in CO_2 emissions during 2007 following a further small decline in emissions in 2006, based on an analysis of most of the emissions data for these two years.[29] This rise was an expected outcome in view of the very low prices for emission permits in 2007 (see below) as well as the greater than anticipated rate of economic growth in the European Union.

Unexpected reductions?

A pleasing if unexpected benefit of the EU ETS' first trading period was that emissions reductions occurred in unexpected places. Initially, it was expected there would be increased use of natural gas for power generation. This did not occur to the extent expected in the first two years. However, a degree of fuel substitution was observed in Germany away from brown coal to the comparatively less polluting hard black coal. Further, the CO_2 efficiency of the UK power generation sector increased (i.e. it produced less CO_2 than expected for the same amount of power generated).[30]

Effect on emitters

An important outcome is the effect the EU ETS appears to have had on corporate behaviour:

- based on this scheme, the emission of CO_2 was given a real cost. About half the companies surveyed on this issue already 'price in' the value of CO_2 allowances and over 70 per cent intend to do so in the future
- for half of the corporate participants in the survey, the EU ETS is one of the key issues in long-term decisions; for the other half, it is only one among many issues, and
- about half of the companies surveyed claim that the EU ETS has a strong or medium impact on decisions to develop innovative technology.[31]

The importance of emissions trading in business decisions continues to be a significant factor in the operating and investment decisions of companies.[32] Put another way, emissions are no longer considered a 'free right' in Europe and there is apparently wide acceptance amongst

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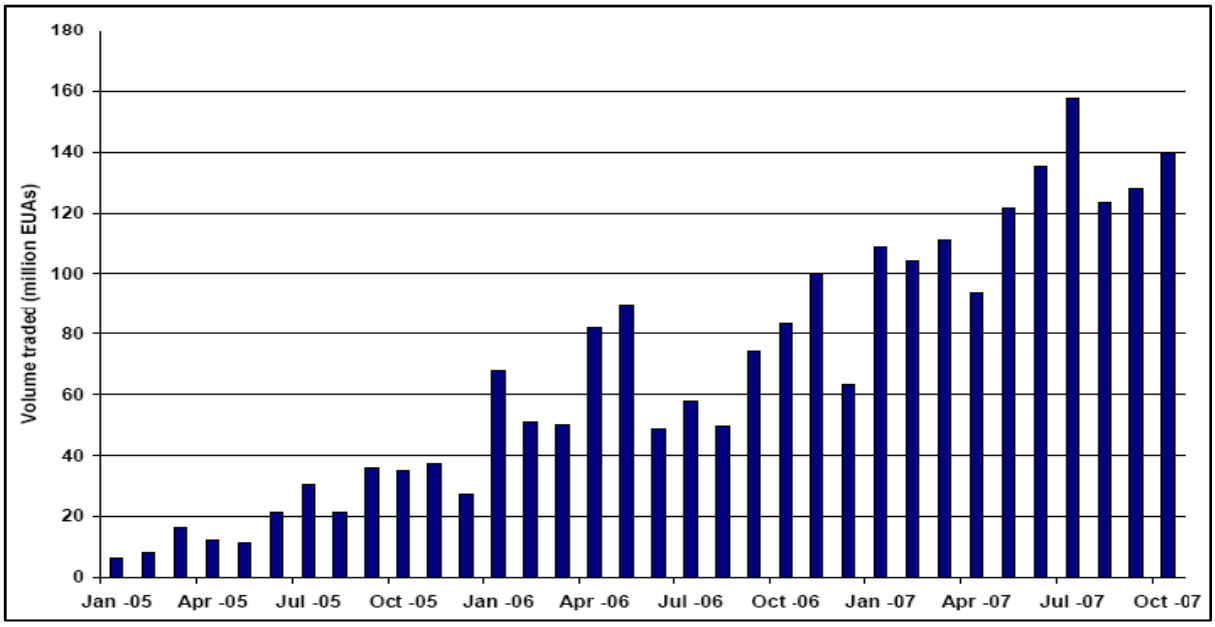
29. European Commission, Environment, Climate Change, HCommunity Transaction LogH, 2 April 2007 (accessed 12 May 2008) and Mark Kinver, 'HEU industry sees emissions riseH', BBC News, 2 April 2008 (accessed 12 May 2008).
30. Frank Convery et al., op. cit., p. 17.
31. McKinsey and Co, H*Review of the EU Emissions Trading Scheme–Survey Highlights*H, November 2005 for period 2005 & 2006, p. 3.
32. Point Carbon, 'Largest survey ever conducted into the world's carbon market released today, Point Carbon Report Carbon 2008, highlights growth and interest in carbon trading', media release, Washington D.C. and Copenhagen, 11 March 2008.

the business and industry groups that emissions trading is a permanent feature of their environment.

Market established

By any measure, the EU ETS established a viable carbon market for the European Union, as indicated in the growth of total trading volumes and values. The following graph shows the growth in permit trading volumes.

Figure 1: Growth in trading Volumes EU ETS emission permits–Jan 2005 to Oct 2007



Source: Point Carbon[33]

Carbon prices

The price of emission permits is crucial in the operation of the EU ETS. Too high a price and emitters will not use this market to buy additional emission permits. Too low a price and those with spare emission permits will not offer them for sale. The right range of prices will encourage both buyers and sellers to trade. Those who can reduce their emissions at the lowest cost are given the extra incentive to do so by the extra income gains from selling their surplus emission permits. Those who need to buy additional emission permits are able to do so without going out of business and innovation in emissions-saving technology is encouraged. How has the EU ETS fared in this area?

33. Originally in *Impact Assessment*, op. cit., p. 14.

The following graph (Figure 2) shows the price of carbon emission permits between January 2006 and March 2007 for both spot emission permits (the lower line) and forward contracts (the upper line) for emission permits for acquittal in December 2008.

Figure 2: Spot and forward EU ETS emission permit prices (January 2006–March 2007)

Source: World Bank: State and Trends of the Carbon Market[34]

A spot price is the price for an emission permit that can be used immediately. In the first trading period emission permits were surrendered to the scheme regulator each December. So, the spot price is the price for EU ETS emission permits that could be surrendered to the regulator in each December from 2005 to 2007. The forward price is the price for an emissions permit that could be surrendered in December 2008–after the close of the first trading period.

After having increased to over €30 at its peak in April 2006, the EU ETS permits for the first trading period lost two thirds of their value following the uncoordinated leak and later official release of verified emissions data for 2005.[35] By the end of 2006, and into early 2007, the

34. Karan Capoor and Philippe Ambrosi, op. cit., p. 12.

35. Capoor and Ambrosi (ibid, p.12) note that prices for EU ETS permits experienced a major correction through late April– early May 2006 as the expectations of market participants changed almost overnight from being about 50 million tones of CO_2 (estimated)($MtCO_2e$) short (i.e. not enough permits) to long (i.e. a surplus of permits over emissions). Spot prices (on Powernext, an emissions trading market) dropped from almost €30 to €10 within five working days. Final data indicate an overall surplus greater than 70 $MtCO_2e$, although some individual Member States were marginally short (European Environmental Agency (EEA), 2006. Greenhouse gas emission trends and projections in Europe 2006, EEA Report No. 9/2006). Prices showed some volatility at the time – with significant volumes transacted in reaction to all kind of rumours, first about

market for the emission permits for the first trading period (2005–2007) had slid even further to levels at or under €1–as emitter utilities had hedged their position for the whole of the first period. The inability to carry forward (or 'bank') unused emission permits from the first to the second trading period (2008–2012) contributed to making the first trading period's emission permits almost worthless at the end of 2007, as market participants put all their unused (and un-bankable) emission permits on the market in 2007. This produced a sharp fall in permit prices for that year.[36]

There were other factors acting on the permit market in 2006 and 2007. Mild winter weather across Europe in 2007 resulted in lower power demand, while the gas price fell as coal prices stayed steady. As the price of gas fell, power companies increasingly switched to gas, and in so doing needed fewer emission permits because burning gas produces substantially fewer carbon dioxide emissions than burning coal. This further increased the oversupply of emission permits in this year. This is the reverse of market conditions in the early days of 2006 where a cold snap across the continent and a decision by Russia to turn off its gas export pipelines saw gas prices soar.[37] This was a significant factor in explaining the higher permit prices in that particular year.

The initial regulation of the market was also influential. In 2006, it was revealed that more emission permits were probably issued for the first trading period than were needed by industry to cover emissions.[38] Further, as noted above, national allocation plans for a number of participants were approved after the scheme's commencement, some in 2006. This added to the supply of emission permits in the trading market at precisely the wrong time and moved the overall perception of the market from one of scarcity (i.e. the market was short of

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various emissions reports and subsequently about proposals to amend the scheme (e.g. to adjust ex-post the volume of allowances circulating or the proposal to create a Central Bank for carbon, etc.).

36. Capoor & Ambrosi, ibid, p. 13.

37. Another example of the impact of the weather on the demand for emission permits was the interplay between the Danish coal-fired power generation and Scandinavian hydroelectric systems. Danish emissions vary greatly, depending on demand in the rest of Scandinavia for Denmark's large coal-fired generating capacity. Demand for Denmark's coal-fired capacity is high when hydroelectric conditions in Sweden and Norway are poor. Because hydroelectric conditions were very good in Scandinavia in 2005, the demand for Danish power was considerably below the long-run average upon which the allowance totals were calculated. Thus the Danes ended up needing fewer allowances than was first thought. The surplus allowances were placed on the trading system adding to the general over-supply. A. Denny Ellerman and Barbara K. Buchner, 'The European Union Emissions Trading Scheme', op. cit., p. 80.

38. Carbon Positive, 'HEU carbon prices in New Year slumpH', accessed 27 March 2008 and comments by Ken Edwards, Director Nextgen (an Australian energy trader) on ABC TV program, *Inside Business*, 25 February 2007.

emission permits compared to demand for the same) to one of abundance (i.e. there were more emission permits issued than there were emissions against which they could be used).

Further, the EU ETS is a maturing, but still narrow, market. As Figure 1 above illustrates monthly volumes have increased. However, to the end of 2006 trading volumes did not exceed 1.6 per cent of all allocated emission permits for the first trading period.[39] Volatile prices are a normal feature of such markets and individual small volume trades can have a large impact on the prices.

There are several implications arising from this price pattern. One study has suggested that the overall low price has stifled technical innovation in emissions reduction technologies.[40] This conclusion receives more support the lower the permit price is against the penalties mentioned above (i.e. €40/tonne CO_2 emitted). When permit prices are low it makes more sense to buy the required emission permits rather than invest in additional emissions control equipment. On the other hand, the benefit of a low permit price is the establishment of a viable market for at least CO_2 emissions trading.

It is interesting to note that the forward price for emission permits that could be surrendered after the end of the first trading period did not decline so much. This may be confirmation that emission trading that the price of carbon dioxide in Europe had rapidly become an important part of business planing, as business sought to ensure their position beyond the end of the first trading period by buying these permits

Industrial competitiveness and impact on consumers

One of the aims of a cap and trade system is to reduce emissions at the least possible cost. In terms of industrial sector competitiveness, the impact of the EU ETS has produced winners and losers. Economic modelling, pricing carbon at an average of €20/tonne of CO_2, and an increase of €10 per megawatt/hour, has shown the following changes in costs.

39. Larry Parker op. cit., p. 9. Some of the late approval countries were Greece, Poland and other new EU entrants and Italy.

40. Christian Egenhofer, Noriko Fujiwara, Markus Ahan and Lars Zetterberg, 'HThe EU Emissions Trading Scheme: Taking stock and looking aheadH', European Climate Platform (a joint initiative of the Centre for European Policy Studies and the Climate Research Program of the Swedish Foundation for Strategic Environmental Research, July 2006, pp. i and ii.

Table 1: EU ETS projected cost increases by industry and likely increase in consumer costs

Industry	Cost increase of production	Likely increase in consumer cost
Power Generation Coal	Increase by €10 per MWh	Increase of less than €10?
Power Generation Nuclear	Increased profitability	Increase of less than €10?
Steel Basic Oxygen Furnace	Increase by 17.3%	Increase by 6%
Industry	Cost increase of production	Likely increase in consumer cost
Steel Electric Arc Furnace	Increase by 2.9%	66% of costs may be passed to consumer
Chemical Paper Pulp Processing	Increase by 0.3 to 1.0%	50% additional costs passed to consumer
Recovered Fibre Paper Pulp Processing	Increase by 1.9%	Unknown
Mechanical Paper Pulp Processing	Increase by 3 to 6%	Unknown
Cement Production	Increase by 36.5%	Uncertain due to import competition
Petroleum Refining	Increase by 20.5%	Increase by 1%
Primary Aluminium	Increase by 11.4%	Uncertain due to import competition
Secondary Aluminium	Increase by 0.5%	Uncertain due to import competition

Source: Stewart Smith, NSW Parliamentary Research Service, Greenhouse Gas Emissions Trading and Ecofys/McKinsey & Co.[41]

As can be seen from the above table, most of the above industry sectors appear to be unable to pass on the full cost of the EU ETS to their customers.[42] This reduces the profitability of these industries.

The bulk of these costs appear to stem from increased power costs. However, not all increases in power costs stem from the introduction of the EU ETS. Rather, a variety of influences, all interacting at the same time, also contribute to increases (and decreases) in power costs. These influences include fuel prices (gas, coal and uranium), available generation capacity, euro/US dollar exchange rates, investment costs, power imports, weather conditions, heat demand, the flexibility of gas contracts as well as market expectations, principally the spread between the coal and gas price for power generation. Even the extent to which CO_2 prices are passed through to power prices varies by market, load factor and the power market in question. It would be an overreaction to attribute what competitive disadvantages the European industries may have experienced during the first trading period to the operation of the EU ETS alone.

According to some early economic modelling, the impact of the EU ETS's first trading period on the competitiveness of European industry was minimal, though sectors most

41. This part of the paper is also based on Ecofys, McKinsey & Co, *EU ETS Review, HReport on International CompetitivenessH*, December 2006. This report was commissioned by the European Commission Directorate General for Environment.

42. Frank Convery et al., op. cit., p. 12.

exposed to international competition (such as the aluminium sector) may fair badly during the second and subsequent trading periods.[43]

These conclusions appear to be supported by a recent empirical study of affected industries, though the authors of this study note that these results occurred during a period in which there were more emission permits than there were emissions, and the average emission price was relative modest.[44] It should also be kept in mind that during most of the first trading period world economic growth was robust and demand for metals, processed minerals, power and petrochemicals was quite strong. Robust economic conditions have a way of hiding any competitive problems.

Lessons for Australia

What has Europe learned?

If the first trading period was a 'learning by doing' exercise as much as an effort to reduce emissions, what in fact was learnt? The European Commission has recently noted some lessons arising from the first trading period.

Emissions trading can only be effective in reducing emissions if scarcity of the allowance market is maintained. That is, the supply of emission permits must always be less than the emissions they are meant to cover.

Ensuring this scarcity requires verified emissions information. Regulators and market participants must know what emissions are, and are likely to be, preferably from the beginning of any trading period and extending a reasonable time into the future.

Market regulators must ensure a level playing field in the allocation of emission permits. Many EU states supported their own industries by an over optimistic projection of required emissions and the allocation of more emission permits than would be required. This did not help to maintain the relative scarcity of tradable emission permits and gave rise to perceptions of unfairness in the EU ETS. In turn this eroded political support for the system.

Some sectors that did not require emission permits (e.g. the. nuclear power industry) were able to increase prices where there was no need to do so as their costs did not increase. This decreased the economic efficiency of the EU ETS as the disposal of these unneeded permits may have increased the overall costs of the scheme.

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43. Julia Reinaud, 'Industrial Competitiveness under the European Union Emissions Trading Scheme', *International Energy Agency Information Paper*, Geneva, February 2005, pp. 9 and 10.

44. Frank Convery et al., op. cit., p. 21, also Ulrich Oberndorfer & Klaus Rennings, *The impacts of the European Union emissions trading scheme on competitiveness in Europe*, Centre for European Economic Research, Discussion Paper No. 06–051, July 2006.

The initial approval of the national allocation plans was too cumbersome and drawn out. This created market uncertainty and, as noted above, led to the additional supply of emission permits possibly at a time when it was least useful to do so for the purposes of the smooth and effective functioning of the system. The lesson here is to centralise the initial allocation of permits , harmonise the method by which the required number of permits is calculated and remove all such decisions from areas where excessive interest group pressure could be brought to bear on the decision maker.[45]

These points do not mean that the EU ETS was a failure during its first trading period. Far from it, for as pointed out above, a viable carbon market was established and valuable lessons were learnt (and apparently accepted) for the commencement of the second trading period.

Europe's response

While the EU ETS second trading period has commenced the European Commission intends to continue to alter the schemes' design over the long-term, as follows:

- there will be one EU-wide cap on the number of emission allowances instead of 27 national caps. The annual cap will decrease along a linear trend line, which will continue beyond the end of the third trading period (2013–2020)
  - in the second trading period the EU ETS cap on CO_2 emissions increased from 2057.8 million tonnes ($MtCO_2$) in the first trading period to 2083 $MtCO_2$. This increase is due to both new industries and new countries being included in the scheme
- national allocation plans have been drawn up for the second trading period, but from the commencement of the third trading period (2013) the allocation of permits will be determined by the European Commission
- a much larger share of allowances will be auctioned instead of being allocated free of charge
  - in the second trading period about 10 per cent of emission permits will be auctioned. This percentage will increase over time
- there will be unlimited banking of phase two allowances into phase three (2013–2020)
- part of the rights to auction allowances will be redistributed from those 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

45. *Impact Assessment*, op. cit., p. 14.

- a number of new industries (e.g. aluminium and ammonia producers) will be included in the scheme; so will two further gases (nitrous oxide and perfluorocarbons)
- the aviation sector will be included in the scheme with ongoing consideration to including the general transport sector
- Norway, Iceland and Liechtenstein will join the scheme
- member states will be allowed to exclude small installations from the scope of the system, provided they are subject to equivalent emission reduction measures
  - during the first trading period some smaller emitting installations could opt out of the scheme. The capacity to opt out will be wound back
- free emission permits will continue to be given to trade-exposed export competing industries. As other countries implement their own trading schemes this free allocation will be reviewed
- the use of emissions credits generated by the United Nations Clean Development and Joint Implementation Mechanisms will be increased
  - limited use of the emissions credits was permitted during the first trading period, and
- the European Commission will consider linking the EU ETS to other emissions trading schemes.[46]

Some lessons for Australia?

The EU ETS outcomes discussed above also point to other desirable features of any Australian emissions trading scheme. If the main lesson arising from the EU ETS's first trading period is accepted as the need to maintain relative scarcity of emission permits, the following suggests what some desirable features of any Australian scheme may be.

Required emission levels must be known from the commencement of any trading scheme, both at a national level and on a facility-by-facility basis. These emission levels must be based on accurate, defensible measurements of previous emission levels. Put another way, a viable, efficient market in emission permits can only exist where that market is well-informed. Arguably the EU ETS was not well-informed up to 2006 and the release of the first

46. European Commission, 'Questions and Answers on the Commission's proposal to revise the EU Emissions Trading Scheme', MEMO/08/35, 23 January 2008.

verified emissions data for 2005.[47] Again, the importance of accurate verifiable measurement of emissions on a facility-by-facility basis cannot be underestimated.

The allocation of emission permits must be made on a consistent basis to all emitters on a facility-by-facility basis. Allocation of emission permits should not be done on a state-by - state, or industry-by-industry basis. Leaving it to each state or industry to allocate emission permits within their own territory or sphere of activity leaves room for bias in decision making.

Emission permits must maintain their intrinsic value. This means that allocated emission permits must be able to be 'banked' or 'saved' and traded far into the future. The ability to save emission permits has, in another emissions control schemes, arguably provided incentives for emitters to include the price of emission permits in their long- term plans.[48] This may be an added incentive to invest in the long-term development and installation of emissions abatement technology, such as the widely publicised CO_2 geosequestration schemes.

The market regulator should be able to both withdraw unused emission permits from the market to maintain their relative scarcity and add emission permits to the market, should a combination of circumstances require it. Such circumstances may be the combination of an unusually mild winter in southern Australia (beyond that expected due to climate change) in combination with a colder than expected summer.

If the Australian emissions trading system were linked to, say, the EU ETS, and high demand in Europe for permits forced the Australian price to unsustainable levels, it may be prudent for the regulator to create additional emission permits to maintain the smooth functioning of the Australian trading market. Such withdrawals may require compensation for the existing owners of these permits.

This suggestion would create a 'reserve' power for the market regulator to cope with unforeseen circumstances. As noted above, Europe experienced some unforeseen circumstances, such as the unexpected cut in natural gas supplies from the Commonwealth of Independent States, and an unusually warm winter.

Windfall profits to renewable power generators

There are some sectors that will benefit from any Australian emissions trading scheme. In particular, if the price of electricity rises due to the implementation of a trading scheme the renewable power generation sector will benefit, as its costs will not increase as much as, say,

47. Frank Convery et al., op. cit., p. 15.

48. The scheme is the United States Sulphur Dioxide trading scheme, see Frank Convery et al., op. cit., p. 16.

a coal-fired power station. As noted above, the EU ETS resulted in windfall profits flowing to nuclear and perhaps renewable power generators.[49] Should this be allowed to occur in Australia?

On the one hand, the additional revenue gathered by renewable generators would, hopefully, enable these companies to expand their operations, perhaps at the expense of emissions intensive power generators. On the other hand, a comparatively lower price for renewable power would increase demand for power from these sources. Increased demand for renewable power will not expand its supply if it is not accompanied by increased profits. It would be appropriate to allow these windfall returns to occur. However, it may also be appropriate to have these windfall profits accompanied by undertakings to expand renewable energy production rather than simply increase shareholder dividends, should such supply expansions not otherwise occur as a result of market incentives.

Free allocation vs emission permits at a price

There is some evidence that the extensive free allocation of emission permits to emitters in the first and subsequent EU ETS trading periods is strongly supported by the majority of EU ETS industrial participants.[50] Does this mean that an Australian system should, in general, freely distribute allocation emission permits, or should they be auctioned?

In theory, the method by which emission permits are allocated should have no effect on the prices charged by power producers and others. This is due to the theoretical recovery of the opportunity cost of such freely distributed emission permits by their holder.

In theory, an emissions permit given free of charge to a firm or a facility does not lack value. The value of a freely allocated permit is the cost incurred, or the profit foregone, of not using it. This cost is called the opportunity cost and is the cost of not taking an opportunity to do a certain action (in this case use a freely allocated emissions permit either by selling it or surrendering it to the scheme regulator). So, a firm receiving an emissions permit free of charge receives the value of either its price on any emissions trading market or the fine that the firm may be subject to if it does not use the permit to acquit the emissions it makes.[51] So, a firm will have a strong incentive to use a freely allocated emissions permit if it wants to take advantage of the value of that permit. After all, no profit making organisation ever passed up a free gift from a government!

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49. Windfall profits did also flow to other European power generators, but this was due to a complex set of market-related factors and not solely due to the operation of the EU ETS (though it was a contributing factor during 2005 and some of 2006) see Frank Convery et al., op. cit., p. 19.

50. McKinsey and Co, H*Review of the EU Emissions Trading Scheme–Survey Highlights*H, op. cit., p. 16.

51. See Garnaut Climate Change Review, *Emissions Trading Scheme Discussion Paper*, March 2008, p. 32 and following for additional discussion of these points.

However, this argument depends on the actual opportunity cost of such emission permits. If the opportunity cost of these emission permits is defined by their prevailing price in a freely traded market then the experience of the EU ETS would suggest that this price is in danger of being unduly low. A low opportunity cost renders the above argument invalid.

While this point reinforces the importance of ensuring the relative scarcity of emission permits in any market, it also supports an argument for putting a price on any emission permits issued via an open transparent auction. It is much harder for a business to write off an actual cost incurred than an opportunity cost that did not result in an actual outgoing! In this way a permit's cost would underwrite the maintenance of the price of emission permits in a traded market and help prevent such prices falling to a ridiculously low level.

Further, as noted in a recent discussion paper issued by the Garnaut Climate Change Review, auctioning emission permits would be simple, transparent and altogether remove the allocation decision from governments.[52]

Forfeiting the permits

One commentator has suggested that the rules requiring the forfeiture of emission permits if an emitting facility closed (thereby potentially incurring an 'opportunity loss') kept inefficient emitters operating and provided a hidden subsidy for their continued operation.[53] The existence of these rules was attributed to political demands from member states.[54]

One potential way to avoid this problem may be to allow the operators of any emitting facility or business that closes to keep the emission permits they have acquired. Indeed, if emission permits were initially allocated by auction, equity considerations would require this in any case.

Coverage, measurement and administrative capacity

The EU ETS could be criticised for dealing with only one greenhouse gas (albeit the most important gas, CO_2), and then not all of the EU's emissions of that gas. In view of the initial objectives of the scheme for the first trading period noted above, it was probably appropriate that only CO_2 was included. Should any Australian scheme follow the same path?[55]

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52. op. cit., p. 33 and following.

53. Frank Convery et al., op. cit., p. 12.

54. A. Denny Ellerman and Barbara K. Buchner, 'The European Union Emissions Trading Scheme', op. cit., p. 75.

55. For example the Garnaut Climate Change Review has recommended that Australia adopt an emission trading scheme covering all six major green house gases and a wider range of industries

Establishing a trading scheme covering the six major greenhouse gases, and all emitting sectors, is a complex and difficult task, testing the administrative capacity of any government. Some capacity for the accurate measurement of CO_2 exists. Further, the Commonwealth Government has been active in developing methodologies for the reporting and measurement of the other greenhouse gases.[56] Further, with the passing of the *National Greenhouse and Energy Reporting Act 2007*, a national framework has been put in place for the reporting of emissions of all six main greenhouse gases by major emitting facilities. In addition, there are a number of Australian companies that specialise in auditing emissions, though it is not clear how many greenhouse gases these companies cover.[57] As at the date of writing there is evidence that Australian companies have not yet started to plan for the introduction of an EU ETS.[58] However, with the scheme's likely commencement in 2010 and its final details not yet established there is time for such planning to occur. Overall, there is every reason to be confident that, come the commencement of any Australian trading scheme, the capacity to measure the emission of all six main greenhouse gases with reasonable accuracy will exist.

Continuing with the cap and trade approach

A significant component of any emissions abatement scheme is the provision of continued incentives for technical innovation and investment in emissions abatement and control technology. As noted above, the EU ETS's emissions trading price at the close of the first trading period was too low to achieve this aim. However, the experience of the EU ETS throughout the entire first trading period suggests that a cap and trade approach will allow this to occur if the permit price is sufficiently high. Further, the possibility of unexpected sources of emissions reductions can be seen as a potential bonus available through this approach.

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than the EU ETS. See Garnaut, op. cit., p. 6 and 27. The recent Government Carbon Pollution Reduction Scheme Green Paper adopted a similar approach.

56. Australian Government, Department of Climate Change, 'HAustralian Methodology for the Estimation of Greenhouse Gas Emissions and SinksH', webpage, (accessed 24 April 2008)

57. Kath Walters, 'Out of the ashes', *Business Review Weekly*, 17–23 April 2008, pp. 34–40. An example of such a company is HPacific Environment LtdH. It is listed on the ASX and specialises in monitoring a wide range of emissions.

58. Australian Institute of Management (Vic/Tas), H*The Introduction of Australia's Emissions Trading Scheme – levels of understanding amongst CEOs/Senior executives*H, St Kilda, 1 July 2008.

Preparation time

As noted above, the design of the EU ETS suffered from insufficient preparation time. This point has not been lost on groups planning an Australian emissions trading scheme.[59] As noted in the introduction, an emissions trading scheme for Australia has been the subject of several reviews, the latest (Garnaut) building on previous discussions. The Government has now issued a green paper indicating its preferred options on a number of emissions trading scheme design issues and invited comment on these matters from interested parties by 10 September 2008.[60] Further, the government appears to have been laying the necessary groundwork for the introduction of an emissions trading scheme with the introduction of the emission measuring arrangements noted above. Australia appears to have heeded the lesson from the EU ETS that careful preparation is necessary for the introduction of a successful scheme (i.e. one that actually reduces emissions).

Australian advantages in setting up an emissions trading scheme

Australia also has several advantages, not available to the European Union, (EU) in their introduction of the EU ETS. The EU is a loose federation of over 20 sovereign states, many of which are at markedly different stages of economic development. The Commonwealth is a much tighter federation and while its states are sovereign in their respective spheres, the Australian Constitution gives the Commonwealth the power over specific areas. The implementation of a national emissions trading scheme falls to the Commonwealth under the Constitution and while it would be better to secure the co-operation of the states, the Commonwealth is in a position to impose such a scheme.

The best is the enemy of the good

Though Australia appears to be in a better position than the EU to set up an emissions trading scheme does this mean that every detail has to be finalised before an Australian scheme gets underway?

As noted above, European CO_2 emissions fell in 2006 and perhaps 2005 when the emission permits prices were sufficiently high, despite the recognised failings of the EU ETS. For the European scheme, waiting for the perfect scheme to emerge was the enemy of the good outcomes achieved.[61] This suggests that an emissions trading scheme need not be perfect to

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59. National Emissions Trading Taskforce, *Possible design of a national greenhouse gas emissions trading scheme: final framework report on scheme design,* Appendix B – Lessons from the EU EU ETS, December 2007, p. 247.

60. Senator the Hon. Penny Wong, *Carbon Pollution Reduction Scheme Green Paper*, Canberra, 16 July 2008.

61. A. Denny Elleman and Paul L. Joskow, Massachusetts Institute of Technology, op. cit. p. 46.

achieve a positive outcome. Thus waiting for the best of all possible designs for an Australian emissions trading scheme to emerge may prevent good outcomes being achieved.

In any event, it is almost certain that no matter what the final design of any Australian scheme may be, it will be modified in the light of further operational experience. Thus delaying the start of any Australian scheme also delays its improvement based on experience.

Australia, the EU ETS and international emissions trading

It is a well and often-made point that meaningful reductions in emissions take place on a global scale, not on a unilateral, or even continental scale. The Kyoto Protocol to the United Nations Framework Convention on Climate Change allows countries to make agreements to provide mutual recognition of 'allowances' (read emission permits and credits) traded in their respective emissions trading schemes.

An Australian emissions trading scheme may gain many advantages by being integrated with overseas cap and trade schemes:

- any surplus Australian emission permits may be sold in overseas markets to obtain a better price. Conversely, overseas surplus emission permits (or credits) can be sold in an Australian market thereby potentially lowering the overall cost of emission control
- potentially the liquidity of the emission permits market is enhanced
- emission credits arising from the Kyoto Protocol's Clean Development and Joint Implementation Mechanisms may be tradable, again further enhancing the proposed market's liquidity, and
- overseas technical innovations for controlling or reducing emissions may be quickly adopted in Australia, if their effectiveness is already recognised in a complementary overseas trading scheme. Likewise, any Australian innovations may find a wider market because their effectiveness is already recognised by overseas emissions trading schemes.

However, linking an Australian emissions trading scheme to overseas schemes may have some significant disadvantages:

- linkage with a poorly designed overseas scheme that does not maintain the scarcity of its emission permits may result in too many emission permits being traded on an Australian market. As argued above, if there are too many emission permits and the resulting price of these emission permits is too low, then emitters have fewer incentives to progressively reduce their emissions
- a prolonged and significantly higher price in the other market(s) may result in the price of Australian emission permits being far too high for cost-effective emission reduction

- unequal allocation rules between schemes may increase/decrease competitive status between similar industries in each system. For example, if emission permits are allocated free of charge in one system, but auctioned in another, a competitive advantage may be unintentionally given to industry/firms operating under one of these systems, and

- overly complex rules for recognising each scheme's emission permits may impose undue transaction costs on the operation of the larger emissions market.

While the provisions of the Kyoto Protocol (or successor agreement) may require Australia to recognise the emission permits traded under the EU ETS, great care should be taken in ensuring that it and any proposed Australian emissions trading scheme are compatible before formally linking the two schemes.

Conclusions

The foregoing discussion is not, and never could be, a complete guide to the desirable elements of any Australian emissions trading system. Rather, if experience is a guide, the initial trading period of the EU ETS has some lessons for Australia. The main lesson is that the relative scarcity of emission permits must be maintained if an emissions trading market is to have any chance of reducing emissions in a cost-effective manner. Another significant lesson is that Australia may lose valuable and necessary experience in operating such a scheme by delaying its introduction.

Based on the experience of the EU ETS during its first trading period, desirable elements of any Australian emissions trading scheme would include:

- continuing with the 'cap and trade' approach to emissions trading

- unlimited borrowing and banking of emission permits

- no forfeiture of emission permits if an emitting facility closes down

- as wide a coverage as possible, both in terms of sectors of the economy and the number of greenhouse gases

- accurate and comprehensive measurement of greenhouse gas emissions is essential for a well-informed market to operate

- consistent allocation of emission permits across all participants

- the permit allocation decision removed from the possibility of either state or interest group bias. It appears that the safest way to achieve this outcome is for the permits to be auctioned, and

- as mentioned above, the maintenance of the relative scarcity of emission permits at all times. This may require a market regulator to have the capacity to either remove, or add, emission permits to the Australian market, should circumstances require it and the normal functioning of the market does not produce the required outcome.

Finally, despite the potential loss in economic efficiency, windfall profits to renewable energy generators should be allowed, but only if there is some commitment to increase the supply of power from these sources.