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# **The Evolution of the Global Market for Greenhouse Gas Emissions Allowances**

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## 1. Emission trading under the Kyoto Protocol

Under the Kyoto Protocol to the Framework Convention on Climate Change signed in December 1998, the developed countries of the world agreed to limit emissions of greenhouse gas emissions to an average of 5.2% below 1990 levels by the commitment period 2008-2012. The Protocol specified for each Annex B Party an ‘assigned amount’ of emissions which they are legally bound not to exceed. The European Union nations agreed to reduce their emissions by 8% below 1990 levels, the USA by 7% and Japan by 6% with other Parties agreeing to various targets ranging from 92% to 110% of 1990 levels. Total emissions over the five year commitment period must not exceed five times the assigned amount for each Party.

The Protocol also authorised the establishment of an international system of emissions trading. It allows for the transfer and acquisition of ‘assigned amounts’ among Annex B parties for the purposes of meeting their obligations by the commitment period 2008-2012.

While the Kyoto Protocol endorsed emissions trading in principle, many fundamental structural issues of the international system are yet to be resolved. Until these are resolved it is not possible to carry out any definitive analysis of the future of the market for emission allowances. Nevertheless, it is possible at this stage to explore some

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possible scenarios for the evolution of the market by examining the pressures likely to drive the price of emission allowances.

The Protocol permits emission trading between signatory parties, i.e. national governments. It is conceivable that participating governments could establish emission trading agencies to trade emission surpluses and shortfalls between countries for the purpose of meeting their obligations. However, the system will work much more effectively if individual polluters (electricity plants, steel plants etc.) are given the flexibility that trading allows, and the Protocol is understood to permit trading between 'legal entities' in Annex B countries.

Thus the development of effective international emissions trading is dependent on national governments imposing legally binding constraints on emitting activities within their national boundaries and providing the legal framework in which emitters have the option to meet these emission obligations through emission trading. In other words, the legal obligations agreed to by nations at Kyoto now need to be transferred to domestic polluters through domestic legislation establishing emission caps and the rights and institutions that a system of domestic emissions trading requires.

Domestic and international institutions will need to be established to administer the trading system. In Australia's case, where there is an obligation to limit emissions growth to 108% of 1990 levels by the 2008-2012 commitment period, a Commonwealth Emissions Regulatory Office might assign an emissions target to the electricity industry (and possibly to each plant) of 108% of 1990 levels. If it believes it will meet its obligation and have surplus allowances then a firm in the electricity industry would be able to sell its surplus allowances to other polluters with emissions limits at home or abroad with the transactions recorded by the regulatory office in Australia, and the equivalent agency abroad if sold overseas.

While there remain some ambiguities about the structure of trading permitted under the protocol, the key provisions are as follows.

1. Each Annex B Party agrees that its aggregate net emissions do not exceed its 'assigned amounts' (AAs) in the commitment period 2008-2012 (Article 3.1).
2. Annex B Parties 'may participate in emissions trading for the purposes of fulfilling their commitments' under Article 3 of the Protocol. 'Any such trading shall be supplemental to domestic actions' for the purposes of meeting emission reduction obligations (Article 17).
3. In addition to trading in assigned amounts, any Party (or authorised legal entity) may trade emission reduction units (ERUs) with another Party but these ERUs must result from approved projects designed to reduce emissions from sources or enhance removals by sinks (Article 6.1)
4. In the commitment period, 'any part of an assigned amount' or any ERU traded shall be added to or subtracted from the assigned amounts of relevant Parties (Article 3.10-11).

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Although this represents something of a tangled web, it seems that the following appears to be the accepted interpretation of emission trading under the Protocol.

The basic unit of trade is parts of assigned amounts. The reference to trade in ERUs generated by approved projects in Annex B countries has little importance. Trading in ERUs was a fall-back position for those Parties that believed that trading in assigned amounts would not be agreed but was left in after the latter was agreed.<sup>1</sup>

Bearing in mind that these issues are still to be negotiated, for the purposes of this paper we will adopt the following interpretations of the Protocol:

Parties (or legal entities authorised by Parties) may trade in parts of their assigned amounts, which we will refer to as emission allowances. The volume of allowances may exceed the 'assigned amounts' as explained in the next section.

## **2. Defining the commodity to be traded**

The assumption that Annex B Parties will be able to trade in parts of their assigned amounts essentially defines the commodity to be traded i.e. assigned amounts allocated to major emitters by national governments.<sup>2</sup> We will assume that an allowance refers to the right to emit one tonne of carbon or CO<sub>2</sub> in the commitment period 2008-2012.<sup>3</sup>

However, the picture is complicated by the addition of two other sources of tradable emission allowances.

1. The Protocol adopts a net approach to emissions obligations, one that allows for the establishment of new carbon sinks which offset emission sources. These sinks will take the form of reforestation and afforestation defined as being new forest plantations established after 1990 on land cleared before 1990<sup>4</sup>. Under certain conditions (still to be determined) the establishment of these sinks will attract

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<sup>1</sup> Others have interpreted the provision for the generation of ERUs as a mechanism for permitting the reallocation among Parties of the assigned amounts under a system of 'baseline shifting' (Helps 1998). Thus firms in one Annex B Party can invest in emission reduction activities in another and to allow both countries to benefit from the emission reductions. For example, if a Japanese steel maker wants to close a steel plant in Japan and build a new, more energy-efficient plant in Australia then Australia will want to increase its allowable emissions to allow for the emissions from the new plant while Japan will want the credits for the emission savings from closing the old one. Others dispute the permissibility of baseline shifting.

<sup>2</sup> A number of nations, including Australia, presented a paper on emissions trading to the June meeting of the Parties in Bonn proposing that a unit to be traded be 'assigned amount units' (AAUs). The units would be tonnes of CO<sub>2</sub> equivalents that would be redeemed in the commitment period 2008-2012.

<sup>3</sup> The Protocol also requires Annex B Parties to ensure that 'demonstrable progress' is made by 2005, but a numerical target is not implied by this provision.

<sup>4</sup> Debate continues on definitions of forestry activities permissible under the Protocol for the purposes of meeting obligations (see Noble 1998)

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additional emission allowances that can be used to meet domestic (and international) emission reduction obligations.

2. Article 12 of the Protocol establishes the Clean Development Mechanism (CDM) which allows Annex B Parties and private entities within them to acquire certified emission reductions (CERs) by investing in projects that reduce emissions in developing countries. These CERs can be used by Annex B Parties<sup>5</sup> to meet their emission obligations under the Protocol.

Emission allowances are unlike normal goods and services in that they are, for the most part, not produced but are rights conferred by a legal authority (although if the initial allocation adopts grandfathering the volume of rights is initially tied to the volume of production). However, as we have seen there are methods of generating allowances *de novo*. The generation process can thus take two forms:

- allowances are created by the legal authority and transferred to emitting parties by sale or for free; and
- allowances can be ‘produced’ through the enhancement of sinks or, in the case of CDM projects, the limitation of sources, and then certified by the legal authority as tradable.

### **3. Who will participate in the market?**

Who will be the players in the market for emission allowances? At a minimum, the buyers of allowances will be firms in those industries that have emission limits legislatively imposed by their governments. In the first instance, the sellers will be those who have acquired allowances from the initial allocations by national governments that establish domestic trading systems. It is possible that in most countries which participate in the trading scheme, governments will allocate the initial allowances to specified industries free of charge on the basis of historical emission levels. Alternatively, allowances to cover a proportion of those levels may be issued free while the balance would need to be purchased by existing polluters and new entrants into the industries in question.

There may be three other categories of players:

- firms involved in generating new allowances through sequestration projects in Annex B countries or through CDM projects in developing countries;
- intermediaries who trade in allowances with a view to facilitating trading for others or making speculative profits; and

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<sup>5</sup> Strictly speaking Article 12 applies to Annex 1 Parties rather than Annex B Parties. Annex 1 Parties are those inscribed in Annex 1 of the Framework Convention. They differ from Annex B only by the exclusion of Turkey from the latter.

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- governments and non-commercial organisations that may buy allowances in order to retire them early.

Changes in the price and volume of emission allowances over time will be influenced by a range of complex factors. In order to sort them out it will be useful to employ a simple supply-demand analysis. The market conditions will be evolving over time, and so we will attempt to pin them down by assessing the conditions of the market in major stages, corresponding to the early years of the market, the period leading up to the start of the commitment period and the conditions likely to apply in subsequent protocols (in which developing countries are assumed also to have binding targets and OECD countries have more stringent targets).

#### **4. Factors influencing the price of emission allowances**

##### *Sources of supply*

As we have seen, there are three sources of supply of emission allowances – the assigned amounts that impose emission caps on Annex B countries, additional allowances generated through new carbon sinks in Annex B countries and allowances generated through CDM activities in developing countries. We examine them in turn.

Firstly, the assigned amounts for Annex B countries have been determined by the Kyoto Protocol for the commitment period (providing an effective target year of 2012). The supply of assigned amounts is thus fixed and will not vary with changes in the price of emission allowances. As the Protocol allows for the ‘banking’ of surplus emission allowances at the end of the first commitment period (Article 3.13), investors in the emission allowances market will need to take into account any future limits on emission allowances that might arise from subsequent protocols which fix initial targets for developing countries and more stringent targets for Annex B countries. In that case, allowances left over from the initial commitment period in 2008-2012 may increase in value, *ceteris paribus*.

The second source of emission allowances is certified and audited projects that establish carbon sinks in Annex B countries. These will take the forms of new plantations on previously cleared land. Their supply will therefore depend on the economics of plantation establishment. Some polluters will undoubtedly find it cheaper to invest in these ‘emission offsets’ rather than reduce their emissions. Since the supply of suitable land is limited and new plantations will increasingly be forced onto land of lower productivity, the cost of each additional hectare of plantation, and therefore of emission allowances, will be increasing.

Emission allowances generated by new sinks will require an elaborate system of certification and monitoring before they can be traded.

The third source of allowances is certified emission reductions (CERs) from Clean Development Mechanism projects in developing countries. Subject to the important

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requirement to demonstrate ‘additionality’ (i.e. the project would not have happened anyway or would not have happened in the same way), these may take the forms of plantation establishment, methane capture from landfill, and investment projects designed to make major improvements in industrial processes and gas pipelines. Dedication of forests due for clearing to national parks are unlikely to qualify because of the impossibility of demonstrating additionality.<sup>6</sup> The costs of CDM-generated allowances will also increase over time as the cheaper projects will be exploited first and the more marginal ones only if the international price of allowances is high.

We can draw supply curves for each of these sources and then, assuming allowances based on AAs, carbon sinks and CERs are fully fungible, add them to get the total supply of allowances.<sup>7</sup> We have assumed, somewhat arbitrarily, that sinks and CERs will not be permitted to exceed 20% of the assigned amounts of Annex B Parties. The supply curve is drawn in Figure 1. The lower part shows the fixed supply of AAs, defined by the Protocol at a level 5.2% below 1990 baseline emissions, i.e. at 4.6 GtC for Annex B countries.

### *Demand factors*

What factors will influence the demand for emission allowances? The demand for allowances will be created by legal restrictions on emission levels by polluters (assuming that national governments pass on their obligations to domestic polluters). Not all polluters will be required to own allowances in order to emit. The largest class of polluters thus exempted may be private motorists, who would then face measures such as carbon taxes and emissions standards to induce them to cut their emissions. As a result, governments will in practice will withhold a large portion of AAs to accommodate emissions from sectors excluded from the trading system.

For firms that must meet legislated emission targets, buying allowances will be only one means of meeting these corporate objectives. The other methods of reducing their emissions are slowing growth of emissions intensive production, pursuing energy efficiency and adopting new technologies. Each of these is a substitute for the purchase of additional emission allowances and may result in surplus allowances that may be sold.

The demand for emission allowances is a derived demand as allowances, along with substitutes such as energy efficient technology, are an input into production. What factors then will influence the demand for allowances from firms with emission targets?

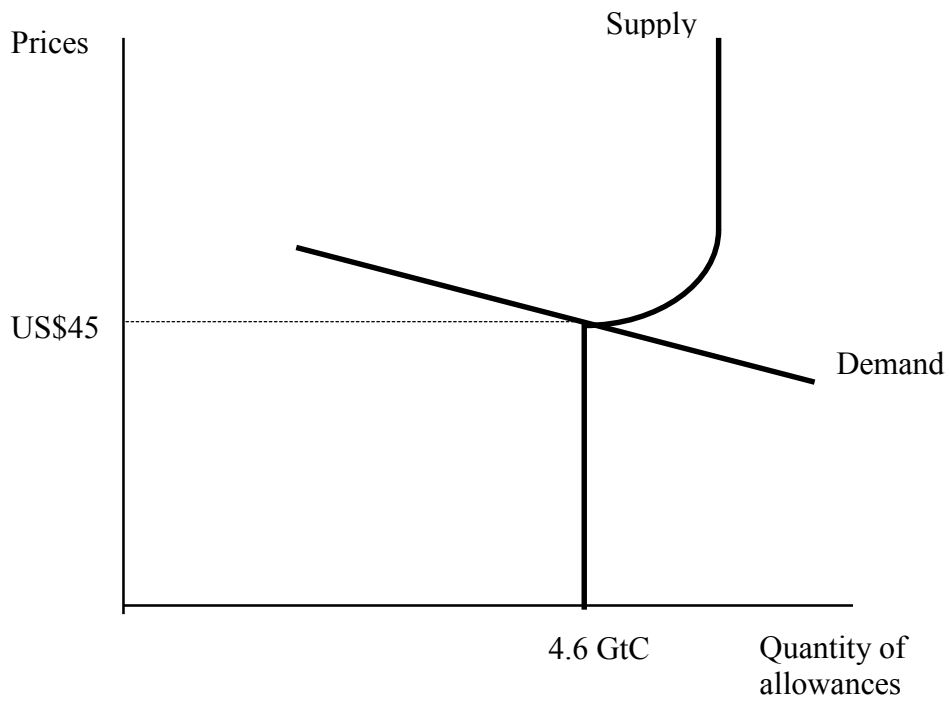
Firstly, for given technologies in use, demand for allowances will be strongly influenced by growth in emitting activity. Other things being equal, a firm whose output is growing will demand more allowances to emit.

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<sup>6</sup> The rules governing additionality will not be agreed until the first meeting of the Conference of the Parties serving as the meeting of the Parties (COP/MOP), probably in the year 2000.

<sup>7</sup> In drawing these illustrative diagrams, the industry supply curve is the long run marginal cost curve where we assume that allowances are produced only when the international price is above the average cost of producing allowances.

**Figure 1 Illustration of the market for allowances**





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Secondly, demand will depend on the level of emissions per unit of output produced, which is a function of the technologies in use.

Thirdly, the demand for allowances will be affected by the current costs of substitutes for allowances. These substitutes are the alternative methods of meeting targets, low-emissions forms of energy (including nuclear power) and emission abatement through energy efficiency.

Finally, over time demand for allowances will depend on changing technologies for emissions abatement. As technological development reduces the cost of renewable energy and energy efficiency, buying allowances will become less attractive.

For given technologies determining the costs of emission abatement, we would expect the demand for allowances to fall as the price of them rises as it will become cheaper to abate rather than buy additional allowances to accommodate emissions growth. For given technology and expected growth in emissions, we can draw a downward-sloping demand curve for allowances. Since there are close substitutes, the demand for allowances will be quite sensitive to their price, so the demand curve will be quite 'flat'. The demand curve is represented in Figure 1.

While Figure 1 is not intended to capture the actual market with any degree of accuracy, the two curves have been drawn to intersect at the current market price of allowances of around \$US45 per tonne of carbon (or US\$12 per tonne of CO<sub>2</sub>). In anticipation of trading, there has been considerable commercial activity around the world. A Canadian firm, Vision Quest Windelectric Inc. of Alberta, offers certifiable and auditable 'carbon offsets' from wind farms at C\$35 per tonne CO<sub>2</sub> (C\$130 a tonne of carbon). US electricity utilities are developing a shadow market to test the system and the Chicago Board of Trade has taken a keen interest. Various economic modelling studies have suggested that emission credits may sell in the vicinity of US\$25 for each tonne of CO<sub>2</sub>. (although economic models tend to seriously overstate the costs of emission reductions, often by an order of magnitude – see Hamilton and Quiggin 1997)

While private firms are already trading in greenhouse gas emission credits, until a legally established international system of trading is begun these trades will remain speculative. Their value will evaporate if the system cannot be developed.

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## 5. Dynamics of the market for emission allowances

In order to make an assessment of the likely evolution of the market for allowances over the next few years, each of the influences on the demand for and supply of allowances must be considered. This would require an extensive modelling exercise, one that is beyond the scope of this paper. However, we can identify some of the more important trends.

The key influence on the evolution of the price of allowances over the next decade will be the extent of technological progress in renewable energy and energy efficiency technologies. With respect to energy efficiency, a range of studies suggest large savings are available. Wilkenfeld (1996) reviews a range of Australian studies and concludes that one group estimates that the potential for cost-effective energy reductions is in the range 20-30% and another group estimates reductions in the range 40-48%. The largest savings are in the residential sector, but the industrial, commercial and transport sectors all have substantial potential reductions. Cost-effective energy savings of these magnitudes are more likely to be found in Australia, Canada and the USA than in Japan and Europe. These savings in industrial sectors will be exploited first before firms enter the market for additional allowances. If cost-effective energy reductions amounted to around 30% of 1990 emissions, and they applied across industry sectors, then they would be sufficient for many countries to reduce their expected emissions growth to their Kyoto target levels by 2008-2012 and there would be no need to buy additional emission allowances.

More rapid technological progress will simultaneously increase the supply of surplus allowances and reduce demand for them. The Kyoto Protocol will give a major boost to investment in development of improved energy technologies. A scan of the international press since Kyoto indicates that a number of major corporations are embarking on investment programs in new energy technologies (see Hamilton 1998c).

How big will the abatement cost savings be from this technological boom? No-one knows the answer to this question, but some indications can be obtained from previous agreements to eliminate ozone-depleting substances and limits on SO<sub>2</sub> emissions in the USA. In both cases, the cost of reducing emissions was much lower than initially anticipated and certainly much lower than predicted by industry. For example, it was initially estimated that the average cost of reducing SO<sub>2</sub> emissions using scrubbers would be around US\$450-500 per ton, but in 1995 the actual price was around US\$270. While industry estimated in 1990 that the price of SO<sub>2</sub> allowances would be US\$700-1000, the actual price started at around US\$275 in 1992 and fell steadily to around US\$150 in 1994 and US\$100 in early 1998 (Joshua 1998, McLean 1998).

On the supply side, a further factor influencing the market will be the cost of investments in sink projects in Annex B countries and CDM projects in developing countries, assuming that there is full fungibility between CERs, carbon offsets from new sinks and allowances based on assigned amounts.

On the other hand, if the supply of allowances is too generous this will diminish the pressure for technological solutions to greenhouse gas emissions. This is where the

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problem of Russian ‘hot air’ is important and why the negotiations over the next year or are vital to the emerging market for emission allowances. Various commentators have suggested that the 0% target allocated to Russia and the Ukraine in the Kyoto Protocol will see them with surplus allowances amounting to around 15% of their 1990 emissions totalling approximately 153 million tonnes of carbon or around 3.3% of total Annex B emissions (GPI 1998:16).

Putting these various influences together we can obtain a sense of how the market for emission allowances might evolve. Over the next few years, through to around 2003, we would expect demand for allowances to grow strongly as firms hedge against the possibility that they will not be able to meet their domestically imposed emission limits. At the same time there is a good deal of slack in energy systems at present, and firms in many industries will find it quite easy to cut emissions by 10-20% using existing methods of energy saving. There may be a sharp increase in demand for allowances in 2004 as firms attempt to meet the requirement of the Kyoto that significant progress be made by 2005. Together these influences are represented in Figure 2 by the upward shift of the demand curve to  $D_1$ .

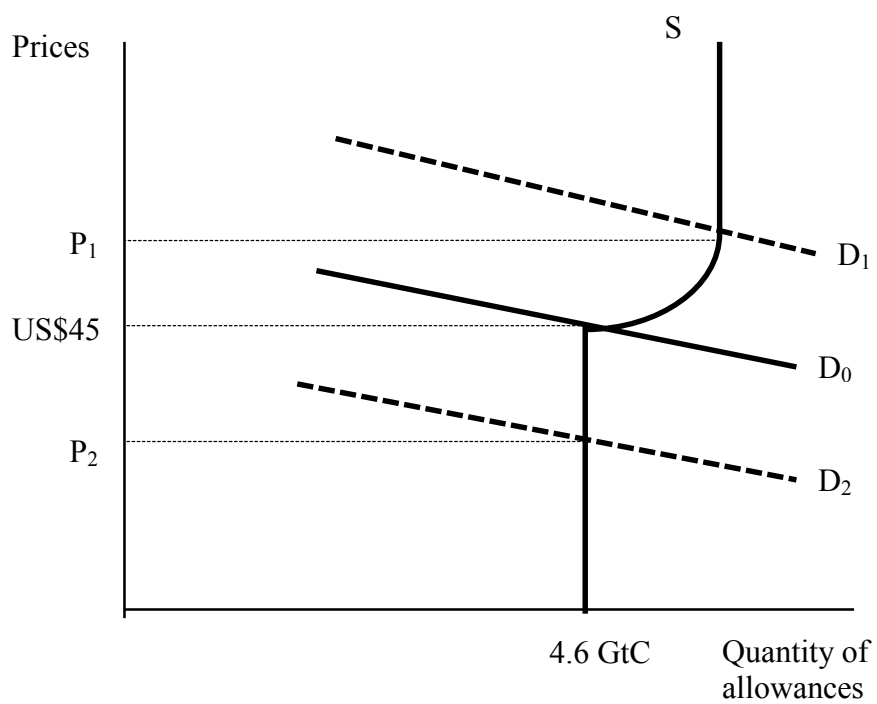
The next phase, 2005-2010, will probably see new technological developments providing opportunities for large reductions in emissions and this will drive down the price of allowances. The more technological progress that is made in renewable energy and energy efficiency, the lower will be the price of allowances. This likelihood is represented in Figure 2 by the downward shift in the demand curve to  $D_2$  and a concomitant fall in price. The price of emission allowances will be an excellent indicator of just how expensive or cheap cutting emissions turns out to be.

As we approach the commitment period beginning in 2008, the political economy of the next round of negotiations will become vital. If the cost of emission cutting turns out to be much cheaper than anticipated – which is very likely – then this will make much sharper cuts in emissions (from both developed and developing countries) possible. Moreover, there will be new powerful commercial forces that will be pushing for deeper cuts. These forces will include holders of surplus emission allowances<sup>8</sup> for whom more stringent emission targets mean increasing the value of their assets. The deeper emission cuts likely from the next protocol are represented in Figure 3 by the leftward shift of the supply curve from  $S_0$  to  $S_1$ . As a result we might anticipate that the world price of emission allowances to rise again beyond 2009 or 2010 (and there may be a sharp upward surge in prices as firms that have miscalculated seek to meet their commitments in 2012). Graphically, these trends in world price for emission allowances are summarised in Figure 4.

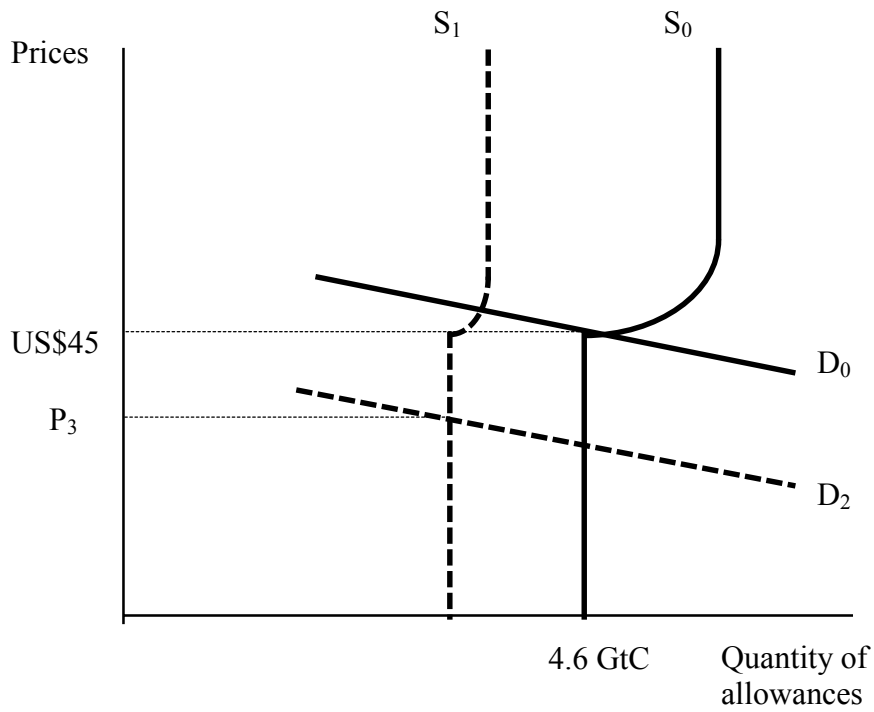
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<sup>8</sup> Although this depends in part on the rules agreed at the next round of negotiations for carrying over allowances from the 2008-2012 commitment period.

**Figure 2 Changes in the market for allowances: 1999-2008**

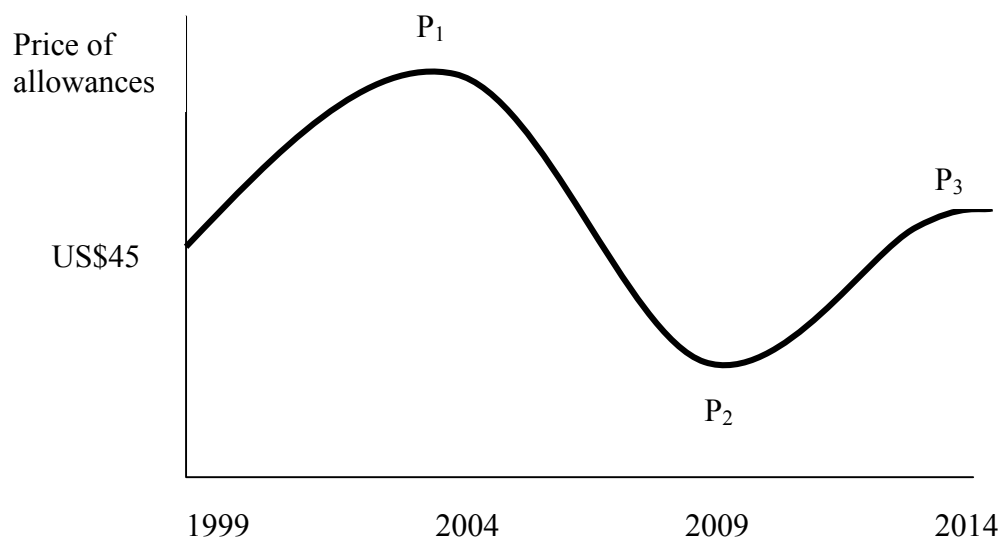


**Figure 3 Changes in the market for allowances: 2009 and beyond**



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**Figure 4 Possible trends in the world price of emission allowances**



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## 6. Some complicating factors

The details of several significant aspects of the Kyoto Protocol are still to be agreed at negotiations at and leading up to the Conference of the Parties in Buenos Aires in November 1998. These decisions will influence the available supply of allowances and the conditions under which they may be bought and sold. The context in which many of these issues are to be negotiated is the clearly stated intention of the Protocol that emissions trading, along with the other flexibility mechanisms permitted by the Protocol, 'shall be supplemental to domestic actions for the purpose of meeting' emission targets (Article 17).

The issues to be negotiated are the following.

1. A proposed limit on the ability of nations in surplus to sell parts of their assigned amounts to deficit nations. Greenpeace International, an important player in the negotiations, has proposed that surplus nations should not be permitted to sell more than 3% of their assigned amounts (GPI 1998:33). The Parties most likely to be affected by this are Russia, Ukraine and Australia.
2. In the spirit of the 'supplementary' requirement, it has been proposed that an upper limit also be placed on the ability of Parties to purchase allowances. Greenpeace has suggested a limit of 10% of base year emissions (GPI 1998:33).
3. To the extent that Article 6 has validity, a tight interpretation of the requirement that emission reductions from projects in Annex B countries that generate emission reduction units be '*additional* to any that that would otherwise occur' (Article 6.1).
4. The exclusion of sinks as eligible projects for generating ERUs.
5. Exclusion of trading in surplus allowances generated by changes in land use.
6. Stringent limits on the ability of countries to meet their obligations through emission credits generated by CDM projects. A limit of 1% on the credits that Annex B countries could obtain from CDM projects has been proposed along with exclusion of land use change and forestry projects and the discounting of project emission reductions for generating CDM credits(GPI 1998:45).
7. Introduction of a system that imposes some liability on buyers of allowances from Parties that sell some of their allowances and subsequently fail to comply with their emission limits under the Protocol.
8. Any measures that strengthen compliance with the Protocol including enforcement mechanisms and penalties.

Some of these provisions, singly or collectively, could have a major impact on the extent of the market for allowances. Some will increase the prices of allowances for those who hold them and some will reduce their value. Any measure that restricts the volume available for sale will increase their value. Table 1 summarises the potential impacts of

each of these measures on allowance supply, demand and price. Perhaps the most important of these constraints are those that would limit the availability of allowances arising from Russian and Ukrainian hot air, notably the first two.

**Table 1 Impacts of various possible constraints on the market for allowances**

<i>Potential constraint</i>	<i>Impact on quantity</i>	<i>Impact on prices of allowances</i>
Limit on sales by surplus Parties	Reduces supply	Increase
Limit in purchases by deficit nations	Reduces demand	Decrease
Stringent additionality on ERUs	Reduces supply	Increase
Exclusion of sinks from ERUs	Reduces supply	Increase
Exclusion of land use change	Reduces supply	Increase
Limits on CDM credits	Reduces supply	Increase
Joint buyer and seller liability	Reduces demand	Decrease
Stronger compliance provisions	Increases demand	Increase

## 7. Some problems with emissions trading

While we have so far focused on the impact of changes in energy technologies on the price of allowances, we should also consider the potential impact of the availability of allowances on the incentives for technological change. If some of the more significant constraints described above are not introduced (especially those that would limit the availability of allowances from hot air), then the flood of surplus emissions onto the world market will significantly reduce pressures to find cheaper ways to cut emissions.

There are several significant concerns about the effectiveness of emissions trading in tackling the environmental problem of climate change. There are at least three significant issues of equity that emission trading gives rise to. None of them has received adequate attention. It should be noted, however, that the great attraction of emissions trading is that by, reducing the costs of greenhouse gas mitigation, it should permit more rapid reduction in global emissions.

*Displacement of non-greenhouse environmental benefits*



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Firstly, emissions trading allows more flexibility than other policy measures because the emissions reductions have the same effect on climate change no matter where they occur in the world. This fact, however, is the source of a significant potential problem. Emission trading essentially allows polluters to displace the reduction of emissions to other regions or other countries. Cutting pollution from fossil fuels carries major environmental benefits other than reducing the risks of climate change. These other benefits occur in areas around the pollution source. Trading allows pollution reduction to be transferred to other regions where the other benefits may be diminished. The option of growing trees may absorb global carbon, but it will not cut urban air pollution.

Trading in CERs from CDM projects also allows the displacement of pollution reduction activities from Annex B countries to developing countries. In this case the displacement may result in a net benefit with respect to other environmental effects.

### *International wealth allocation*

While the Kyoto Protocol has been seen as establishing limits on the right to emit greenhouse gases, it also confers rights to emit up to the assigned amounts. These rights are valuable and their allocation at Kyoto was an allocation of wealth among Annex B Parties. From one point of view, Kyoto was a giant exercise in grandfathering since the rights were given away. The wealth transfer implied by capping emissions and allowing trade was the undertone to much of the negotiations leading up to and at Kyoto. The main focus has been on the gift to Russia and the Ukraine in the form of their hot air allowances and the opportunity for the USA in particular to indulge in ‘off-shore compliance’.<sup>9</sup> It is only now beginning to dawn on the international community just what a large wealth transfer was made to Australia at Kyoto. These loopholes will be the source of anguish in subsequent negotiations.

### *Trading versus carbon taxes*

One of the most important debates over policies to reduce greenhouse gas emissions has been over the equity impacts of carbon taxes. The welfare sector has argued that raising the prices of petrol and electricity will affect poor households disproportionately. This has given rise to various proposals from environmentalists and others for compensation mechanisms.<sup>10</sup>

Governments will soon find it necessary to allocate allowances based on national assigned amounts to domestic polluters. If this is done by grandfathering, that is, giving the allowances to polluters on the basis of historical emissions, then no revenue will be generated with which to compensate poorer households for the price rises that will follow from emission caps. This is a strong argument for auctioning allowances, or at least selling them at a fixed price.

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<sup>9</sup> As one commentator put it: ‘American Cadillacs will be fuelled by Russian depression. It might be noted that at the Bonn meeting in June 1998, Russia argued that its ‘hot air’ had come at great cost to the Russian people, the implication being that the opportunity to win something back through selling the surplus allowances should not be restricted.

<sup>10</sup> See for example the proposals for ecological tax reform in Hamilton, Hundloe and Quiggin (1997)

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### *Fear of global entitlements*

At the meeting of the Parties in Bonn in June 1998 an interesting discussion took place over the use of the words 'rights' and 'entitlements' in debates over emission trading. The USA opposed the use of these words, arguing that the Protocol does not refer to these concepts but simply to 'assigned amounts' that may be traded. The use of the notion of rights clearly implies an allocation of control over a common property resource, namely, the Earth's atmosphere. We can imagine the uneasiness of a wealthy and powerful nation such as the USA in the face of the assertion of rights over the atmosphere by some of the world's poorest people. The next step to flow from the assertion of rights is the principle of equal per capita entitlements for every citizen of the world. This proposal for 'global justice' is already forcing itself onto the international agenda. Known as 'contraction and convergence', this would mean that if a rich country wanted to pollute at higher than the global average level then it would need to purchase the rights to do so from those in poor countries that own them. We can anticipate some convoluted arguments from the west to discredit this proposition.

## **8. Implications for Australia**

Australia duped the rest of the world into granting it an 8% increase as well as including emissions from land use change in the 1990 base year. Because of the rapid decline of emissions from land clearing since 1990, and the expectation that it will continue to do so, Australia will be able to increase its fossil emissions by at least 25% over 1990 levels by the commitment period (Noble 1998; Australia Institute 1998). As a percentage of baseline emissions, the extent of Australia's 'hot air' is substantially higher than that of Russia.

As a result Australia will become by far the highest per capita emitter. By 2010 Australians will be responsible for emissions of around 26 tonnes of CO<sub>2</sub> per head while the next highest country, the USA, will see its emissions fall to around 17 or 18 tonnes per head (Australia Institute 1998).

The Kyoto Protocol represents a substantial wealth transfer to Australia. As a net exporter of allowances, Australia will benefit from a higher price of allowances. From a commercial point of view, the following factors will increase the price of allowances and increase the value of Australia's net wealth.

1. The size and salability of allowances arising from East European 'hot air'. It would be strongly in Australia's interests to attempt to limit the opportunities for Japan and the USA to buy their way out of emission cuts using surplus allowances arising from the Russian and Ukrainian industrial shut-down since the early 1990s.
2. Tight limits on the rules governing allowances generated by CDM projects, especially with respect to definition and enforcement of the 'additionality' requirement.
3. A strong compliance regime.

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4. Signals to the markets that more stringent emission reduction targets should be factored in for the period after the first commitment period.

Ironically, in all of these respects the interests of the Australian Government overlap with those of environmentalists calling for stringent interpretation and application of the various mechanisms of the Protocol and the closing of loopholes. However, the Australian Government appears to be well behind in its understanding of the issues.

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