

# The Practicalities of Emissions Trading

Submission to the Garnaut Climate Change Review on the Emissions Trading Scheme Discussion Paper

Author: **Professor Joshua Gans and Professor John Quiggin**

Date: 16th April, 2008

Joshua Gans is Professor of Management (Information Economics) at the Melbourne Business School, University of Melbourne. John Quiggin is an Australian Research Council Federation Fellow in economics and political science and the University of Queensland.

## Table of Contents

<b>Introduction</b>	<b>1</b>
<b>Implementing emissions trading</b>	<b>1</b>
How does emissions trading deal with uncertainty?	<b>2</b>
How does emissions trading deal with commitment?	<b>3</b>
The need for learning	<b>4</b>
Free issue of permits	<b>6</b>
Contraction, convergence, compensation	<b>7</b>
Borrowing and banking	<b>8</b>
<b>Conclusions</b>	<b>9</b>

## Introduction

In the past year, climate change has moved from political controversy to political consensus; at least, in relation for price-based policies the need to limit emissions. Uncertainties remain but with both major parties proposing to develop an emissions trading regime, it is timely to highlight some important practical issues that will face them on that path.

In writing this, we take the case for action as given. There is a scientific consensus that global warming is taking place and that it is, in large part, due to the actions of humans on the planet.

Australia's long-overdue ratification of the Kyoto protocol and commitment to a post-Kyoto agreement implies the need for substantial changes in public policy. The policy prescription is to limit net emissions although the precise technologies that will likely carry the load have yet to be developed. Consequently, in the short-term, behavioural responses are required and to engage in that appropriately a price must be set.

Economists disagree as to the way in which a carbon price might be generated. One set of economists (including the Pigou Club led by Greg Mankiw) support a carbon tax. This would fix the price for emissions, leaving the quantity to be determined by the market. Concern has been expressed that reliance on national carbon taxes may forgo opportunities for international cooperation. Other economists favour emissions trading, which involves the quantity being set by governments and the price by markets.

The issue with emissions trading is that it is largely unknown how it will operate on national and international scales covering a broad range of activity. As with the design of market mechanisms, some caution needs to be applied. It is that need and the trade-offs inherent in it that we address here.

## Implementing emissions trading

Policymaking under uncertainty involves balancing considerations of flexibility and commitment. On the one hand, it is important to respond flexibly to new information. On the other hand, it is necessary to give investors and consumers clear signals on the direction of future policy, and in particular to commit to a price path for carbon emissions consistent with the substantial reductions needed to stabilise the climate. The appropriate response is one that combines a firm commitment to a broad set of policy principles with a willingness to adjust particular policy parameters and instruments in the light of new information.

This encapsulates the two facets of the policy problem we face that need to be emphasised. First, any policy response to climate change needs to accommodate uncertainty. While there is a scientific consensus that global warming and other greenhouse related climate change is as a result of human

activity, there is a wide range of uncertainty concerning the rate at which warming will take place under various projections, and the extent and distribution of effects on human activity and natural ecosystems.

There is also considerable uncertainty on the economic side. Specifically, it is not clear what the best means for reducing the amount of carbon in the atmosphere is. There are many options ranging from direct abatement (restrictions on emissions regardless of source) to technological mandates (that eliminate the most harmful emitters) to mitigation (that offsets the carbon being put into the atmosphere). This means that, from an economic perspective, we are not certain of the most efficient way forward and are unlikely to be able to become certain through scientific investigation.

Second, there are issues of commitment. Policy-makers have no trouble putting in policies that have an immediate benefit that outweighs immediate costs. For those policies, commitment isn't a problem. Where it becomes an issue is where the costs of a policy are front-loaded and the benefits follow later or worse do not accrue to those incurring the cost. It is for those policies that commitment is a challenge.

The problem we face is that the policy options we are evaluating today need to take into account uncertainty and the commitment challenge. They need to take into account uncertainty by allowing for flexible readjustment should efficient ways of dealing with emissions present themselves. At the same time, commitment is needed because much of what needs to be done to deal with emissions and reduce carbon involve investments today for which a stable policy response will guarantee a return for tomorrow. Absent commitment, those investing today, will not be guaranteed that return and so there is a real risk that the investments will not take place.

### **How does emissions trading deal with uncertainty?**

The first question we need to ask about emissions trading (or any scheme that may be part of it) is how it deals with uncertainty. One of the main benefits to having emissions trading as opposed to mandated behaviour or a tax on emissions is that it provides more opportunities to respond flexibly to uncertainty. For example, many studies point to coal-fired power as being a prime source of carbon emissions. That suggests that a move away from that power might be appropriate and warranted. A tax that resulted in electricity consumers substituting away from coal-fired power or a mandate that restricted consumption of that power would reduce emissions from those sources.

Emissions permits do the same thing since the requirement to purchase a permit increases the cost of coal-fired electricity. But they provide another option. It may be the case that while coal-fired power is a prime source of emissions it may be a more efficient use of carbon than other options. Emissions trading allows those options to bid for the right to abate. And if it turns out that those options can abate more efficiently (for instance, by curtailing less valuable consumption), the price of a permit will adjust accordingly. The coal-fired plant may then decide to purchase permits rather than abate and not have to hold them. In the end, the same emissions occur but in a more efficient manner.

But the options that emissions trading allows need not be purely on the type of use. It can also be on

the location of use. In an international context, it is plausible that in Australia where we have established coal-fired power, it is conceivably less efficient to abate or scrap those options and reduce emissions than it would be for a new plant in China or India to be built that either uses an alternative fuel or is built in a manner that it will store carbon rather than emit it. If we chose a policy that simply mandated or taxed coal-fire in Australia, then there would be no opportunity to impact upon decisions made elsewhere. Emissions trading provides that opportunity.

The potential that emissions trading has to deal with uncertainty should not be over-stated. There are challenges. Some forms of emissions, and the associated abatement opportunities are relatively easy to monitor, but others are not. Absent measurement, there are fewer short-term trading opportunities. Nonetheless, if activities do arise that can perform this function, then investments in measurement can be made and they can become part of the system. The point is, however, that it cannot be taken for granted that all activities can be suitably measured and, given the very uncertainty that generates the benefits from emission trading, some regulatory oversight is still required.

When we evaluate the type of emissions trading scheme that should be adopted, we need to also evaluate the potential for such a scheme to deal with uncertainty in an efficient manner. We will return to this later but it suggests two things. First, within industry impacts and opportunities are more likely to be exploited via emissions trading the inter-industry ones. Second, given this, it is locational opportunities for trading -- nationally and internationally -- that are likely to be most important.

### **How does emissions trading deal with commitment?**

The issue of commitment is a fundamental one for any policy response to climate change. Much of the economic changes require investments or habitual adjustments each of which has short-term pain before even the environmental benefits are realised over the long-term. Moreover, the distribution of the benefits is diffuse. By the very definition of an externality, the main beneficiaries of abatement measures are not those who are asked to abate. Moreover, to the extent that the beneficiaries are extra-jurisdictional, our usual governmental means of internalising those externalities are absent. Thus, commitment to policy measures that will encourage abatement today and here is a difficult challenge.

Emissions trading assists in the commitment challenge over other policies in several respects. First, by allowing firms to trade emissions, you allow them to manage their own adjustment while not compromising the overall level of abatement. Put simply, emissions trading targets the policy outcome directly -- capping total emissions -- while allowing the market to decide precisely how that policy goal is met. It puts the government in on the variable of concern and leaves them out of others. Consequently, it results in a less painful adjustment.

Second, emissions trading comes with the possibility of resolving distributional issues upfront. The rights to permits initially allocated can be held in many different ways. One possibility is that they are sold for a fixed price by governments. Another is that they are allocated to households. Finally, they could be allocated to firms or to firms in selected industries. This allows policy-makers to impact on behaviour -- by causing decisions at the margin to adjust for environmental harm -- while smoothing resistance based on financial impact. Thus, emissions trading allows a constituency to be built in

ways that other policy measures cannot as they do not offer the same flexibility with regard to sharing the pain.

On the other hand, it might be argued that a carbon tax also has an air of fairness -- taxing those doing the harm. Emissions trading could mimic this but in a less transparent measure. Technological mandates, while costly are easily observable and transparent. A judgment is rendered and action is taken.

In addition, many other issues of commitment are not resolved by emissions trading. For one, there is an on-going issue of what the emissions targets are and how to stick to them. If targets are the subject of deliberation and negotiation every few years there may be a temptation to restrict permit allocations to those based on emissions at that time. Realising that there may be diminished incentives to abate today. Certainly, one of the criticisms of international negotiations on emissions is that this type of ratcheting could arise.

To be successful these issues need to be resolved. Once again, technological mandates are potentially easier to commit to and taxes, once established, can be hard to change. Thus, while emissions trading may allow a flexible adjustment and the building of a constituency for change, to be successful, some measure of independent regulation and review will be required. That said, the same issues were overcome in order to build our institutional management of monetary and competition policy. There is no reason why it cannot be done for environmental management too. The point here is that the challenge cannot be ignored as we develop those institutions.

## The need for learning

The practical issues associated with uncertainty and commitment demonstrates the need for learning to occur in developing an effective emissions trading scheme. While there are examples of these around the world, the circumstances of the Australian economy dictate that is more to be done. We simply do not know how onerous it will be to measure emissions, allocate permits, manage the yearly flow of permits, establish on-going targets and to commit to all this once we have done it. We do not know what subtly rules and regulations might distort behaviour or prove too costly. We do not know how liquid the markets for emissions might be. And we do not know how necessary international engage will be to generate an effective regime.

That said, the need for learning has a clear implication for us -- we cannot afford to wait. It is simply foolish to suggest that we wait and see if the high end of environmental harm (or international pressure) will arise before deciding to establish an emissions trading scheme. Our ability to respond quickly on this dimension is unlikely to be high. Already we have squandered a decade not considering the viability of alternative environmental policies. We cannot afford another decade of wait and see.

Put simply, setting up an emissions trading scheme and institutions for the economic management of the environment gives us an option value. It will mean that as uncertainty is resolved regarding the right policy targets, we will be in a position to adjust our expectations to meet them. Without

knowledge of how to conduct policy we may be left with painful decisions in much the same way as economies that fail to handle inflation or managed debt have had to engage in austerity programs with real short-term pain. We can minimise the prospects for this by having in place the knowledge, expertise and laws to react when the need arises.

There are several routes by which this learning could be conducted. First of all, it is unlikely to mean impose a weak but national emissions target. While that would allow some learning it would not allow us to experience environmental management with tough constraints. Second, that means that it may be appropriate to target industries where emissions can be reliably measured first and put in emissions trading regimes there. That will minimise initial compliance costs on the economy. Finally, it also means that the best industries to target would be those for which the environmental and economic benefits of curtailing emissions were but one product of abatement.

As examples of such industries and activities, two stand out. First, electricity is an industry that now operates a clear market for generation that enables competition between different fuels with regard to producing the same end-product, electricity. In addition, that industry is sophisticated in its use of financial instruments to manage risk. Moreover, generating plants could be inspected and rated each year for their emissions content. Then the emissions would be a function of output and that too would be easily observable with little in the way of audit costs. Indeed, this is perhaps we minimum mandates have already been established there. All of these reasons make it a good first target for establishing an emissions trading regime.

The second industry that would make a good target would be automotive transportation. The age and make of a motor vehicle is the information required to measure its emissions. In addition, the fuel used is directly proportional to emissions generated. Permits could be distributed to owners directly along with annual registration and then presented when purchasing fuel. If permits were not required, they could be traded. Third party brokers could ensure that high users can purchase options while those who choose to forgo such transportation can earn the value from that. This activity would have the sense of bring most citizens into the emissions trading arena and thereby build up understanding for any future expansion in its scope. Alternatively, and more simply, producers of motor fuel could be required to buy permits.

It is also desirable to promote trade in mitigation and offsets in the early stages of any scheme. Markets for carbon offsets through forestry activities already exist, and any national scheme should support these markets. But these can be broader? For example, a tree planted in NSW does the same as a tree planted in Indonesia to offset carbon emissions. Promotion of such schemes should promote those broader options.

At a broad level, it is important to promote international trade in emissions, and to encourage the development of internationally agreed standards for the achievement of genuine and sustainable offsets. This would set us on an evolutionary path ensuring our environmental management policies matched those elsewhere.

A staged progressive introduction of emissions trading leaves open the room for other environmental policies. Carbon taxes could be introduced to cover other industries or technological mandates could

continue to be evaluated. The point here is that those policies should be complements to emissions trading. They should be targeted in areas where dealing with uncertainty is not a large issue or where committing to an emissions target is difficult.

### Free issue of permits

An important issue in the design of an emissions trading scheme is whether permits should be issued freely, or on favorable terms, to firms covered by the scheme. As noted in the interim report, the issue of large numbers of free permits undermined the credibility of the round of emissions trading in the EU that ended in 2008. Many of the same issues arise in the case of a carbon tax. As a partial or complete alternative to a tax, it would be possible to subsidise existing emitters to reduce their emissions

Under certain assumptions (a permanent and comprehensive scheme, unanticipated and introduced with certainty) the allocation of permits matters only for income distribution. As noted in the Preliminary report, an approach based purely on income distribution would normally be taken to require compensation of low-income households affected by the necessary increase in prices of carbon-based energy. The need to fund this compensation precludes the free issue of permits on a scale comparable to the EU scheme.

The question of whether some compensation for energy producers would nonetheless be justified on equity grounds is one on which opinions will differ, and economists can contribute little. Relevant issues include the ultimate incidence of such compensation and the anticipation of restrictions on CO<sub>2</sub> emissions at the time past investment decisions were made.

Once the process of developing an emissions trading scheme is taken into account, political economy considerations must be taken into account. As shown in the Preliminary report, excessive grants of emissions permits lead to a redistribution of wealth from households to emitters which generates political resistance to extension of the scheme.

On the other hand, it might be argued that political economy problems also arise with a policy of providing no free permits, or other compensation to emitters. Since all emitters in a covered sector must be worse off as a result of a policy in which all permits are auctioned, sectors will have an incentive to lobby for delays in the extension of coverage. Thus, the achievement of general political support for a given plan may require some free issue of permits.

It is useful, therefore, to consider the implications of economic policy analysis for the duration, quantity and allocation of free emissions permits if such a policy were adopted. A number of conclusions emerge.

First, any free allocation of permits should be temporary, and should end when the emissions trading scheme provides comprehensive coverage of all sources and offsets. After this point, it seems reasonable to regard the purchase of permits as a normal cost of doing business, rather than a sector-specific burden



Second, the volume of permits issued should not be so large as to make emitters better off, after taking cost-effective mitigation action. A policy that benefitted emitters would create generic incentives to increase pollution prior to imminent regulation in the hope of attracting overgenerous compensation. On standard economic analysis the immediate impact of the cost of emissions permits will be shared between producers and consumers, with the proportion borne by consumers increasing over time. This analysis suggests that any allocation of free permits should be well below 50 per cent of the total volume of permits, and should decrease over time.

Third, within a sector, allocations should be based on historical output of the good or service concerned (electricity or transport fuel) not on historical emissions. Given the anticipation of emissions trading, firms that invested in CO<sub>2</sub>-efficient technology in advance of the introduction of trading should be rewarded relative to those that did not.

### **Contraction, convergence, compensation**

Until recently, much discussion of longer-term international agreements on climate change mitigation has implicitly assumed that historical starting points such as 1990 will continue indefinitely to play a role in the setting of emissions targets. Broadly speaking, the assumption has been that countries with high 1990 emissions levels will accept cuts relative to those levels. On the other hand, countries with low 1990 emissions levels will accept constraints that allow some growth relative to their existing emissions but not enough to equal emissions from historical high emitters.

The growth of China (and some other fast-growing developing countries) since the negotiation of the Kyoto protocol in 1997, along with new evidence on the sensitivity of global systems to climate change, has rendered these assumptions collectively untenable. China has already surpassed, or will soon surpass, emissions levels consistent with a CO<sub>2</sub> equivalent concentrations target of 450 ppm or 550 ppm. It follows that any sustainable post-Kyoto agreement must eventually require cuts in Chinese emissions. It is obviously unreasonable to expect China to cut emissions when it is still far below levels prevailing in developed countries unless the principle of permanent differentiation on the basis of historical emissions is abandoned.

That is, the only reasonable basis for proposing cuts in existing emissions from China and other fast-growing developing countries is an agreement on eventual (say by 2050) convergence on a common emissions level.

One concern that has been raised is that an emissions right expressed on a per person basis will encourage countries to increase their population. Analytically, this is only correct for countries with current and projected emissions well below the common target, since otherwise an increase in population only increases the cost of reducing emissions. On the other hand, it is precisely for these countries that small economic incentives might make a substantial difference to population growth.

Within climate change negotiations, it might be possible to negate these concerns by making emissions rights proportional to, say, UN medium population projections, rather than actual population in 2050. This would have the benefit of specifying an actual emissions target.

A 'contraction and convergence' approach still implies substantial differences in favour of historical high-emitters between now and 2050. This has raised the question of compensation. However, it seems more appropriate to focus on notions of bargained consensus. What is required from developed countries is sufficient encouragement, including technology transfers and expansion of the Clean Development Mechanism, to make participation in a contraction and convergence agreement an optimal choice for developed countries. In practice, it is likely that the agreement of a few large countries (China, India, Brazil) will make holding out by smaller developing countries an unattractive option.

## **Borrowing and banking**

The interim report suggests allowing 'borrowing' and 'banking' of emissions. Provided the initial target is not too high, and free allocations are not too great, there seems to be little problem with allowing emitters to make more than the required reduction in emissions in early periods and bank the resulting credit.

There are however, strong arguments against allowing borrowing from future allocations of permits, at least in the initial stage of emissions trading

First, the social cost of the warming effect of CO<sub>2</sub> is greater the earlier emissions take place. Correcting for this would require a system of exchange rates similar to that applying when irrigation rights are transferred from low-salinity to high-salinity areas. However, as noted in the Interim Report, the relevant effects are not well understood.

Second, the feasibility of borrowing depends on having firmly established policies regarding markets in the future. But, in the current preliminary state of development of emissions trading markets, this condition is not satisfied. Governments may need to revise the design of trading systems and the allowable volume of rights over time, drawing on experience.

As an illustration, suppose that borrowing and banking had been allowed in the European market from 2006 to 2008. Companies could have borrowed against their future allowances and then banked the excess, effectively locking in the mistakes of the first round.

Third, there is a commitment risk that if companies meet their initial requirement by borrowing, there will be pressure to allow more borrowing, or some similar escape hatch when they are faced with even more stringent commitments in future periods.

As an approach to increasing flexibility and minimising cost, it seems more appropriate to push ahead rapidly with measures to expand the tradeability of emissions rights and verifiable offsets across national boundaries. Planning for future emissions could be done on a purely financial basis with the encouragement of an active futures market in emission rights but without the existence of durable emissions permits.

## Conclusions

Our argument here can be summarised as follows:

- The need for early action to mitigate global warming is now well established
- The most efficient method of achieving this goal, in the long run, is through an internationally agreed system of trade in emissions permits and offsets
- Some steps towards this goal have been taken with the Clean Development Mechanism under the Kyoto Protocol
- In the short-run, Australia needs to develop institutions to handle the economic management of the environment. This will place us in a position to deal with new information and adjustments that might arise.
- As a first step, emissions trading should target a few sectors -- most notably electricity generation and automotive transportation. This is reduce compliance costs, increase understanding of the operation of these markets and target sectors responsible for the greatest level of emissions.
- Once established markets in those sectors could be integrated with each other, markets for offsets and international markets in related industries.