

# **Designing a Realistic Climate Change Policy that includes Developing Countries\***

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### ABSTRACT

In earlier papers we have argued that the Kyoto Protocol is not sustainable as a global climate change policy and have proposed an alternative policy regime based on a coordinated but decentralized system of national permit trading systems with a fixed internationally negotiated price for permits. In this paper we extend this earlier proposal to include an explicit mechanism for participation by developing countries. The idea is to give incentives for carbon abatement in developing countries through price signals without imposing short or medium term costs in these economies. This new system is based on the creation of two types of assets in each participating country – emission endowments and emission permits. We argue that this new system is an effective and realistic way to move forward on a sustainable regime for climate change policy.

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## 1. Introduction

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) which was negotiated in Kyoto in December 1997 is yet to be ratified. There are still many unresolved problems with implementing this convention, not least is the problem that as we have argued elsewhere<sup>1</sup>, the Kyoto Protocol is fundamentally unsustainable. Little progress in implementation of this Protocol was achieved at COP4 in Buenos Aires, nor is there any likelihood of progress at the upcoming COP5 meetings in Bonn in 1999.

A sustainable climate change policy should meet a number of basic criteria. First, the policy should slow down carbon dioxide emissions where it is cost-effective to do so. Second, the policy should involve some mechanism for compensating those who will be hurt economically without requiring massive transfers of wealth that could undermine economic stability. Third, since climate change is a global problem, any solution will require a high degree of consensus both domestically and internationally. A system that does not ultimately include developing countries will do little to achieve the goals of the UNFCCC. However, consensus is the operative word: it is not realistic to think that a rigid global centralized regulatory regime for greenhouse policy can ever be implemented. Few countries want to relinquish sovereignty over setting their own policies especially when the policies in question can have large economic effects. Fourth, the regime must allow new countries to enter with minimum disruption and also allow a core group of countries to continue to participate even if countries exit the system at certain times. A system involving many countries that doesn't survive changing composition over time is destined to fail since the reality is that a country's commitment to that regime is a function of the commitment of political incumbents at any point of time.

Economic theory and empirical economics embodied in a global simulation model we developed<sup>2</sup> have pointed to the potential flaws in the Kyoto Protocol and also the potential problems in a global permit trading system that is the core flexibility mechanism for minimizing the costs of the Protocol. Some simple economic principles can also help us design a more effective and sustainable approach to climate change policy. This will be demonstrated below.

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<sup>1</sup> See McKibbin and Wilcoxon (1997a, 1997b, 1999b)

<sup>2</sup> See McKibbin and Wilcoxon (1999a) for documentation of the G-Cubed model and McKibbin et al (1999) for an analysis of the Kyoto Protocol.

We have proposed elsewhere a decentralized but coordinated system of national actions for dealing with climate change policy. In that earlier work we only focussed on a system designed for Annex I countries assuming that these countries would implement climate change mitigation strategies in the short run. In this paper we extend the original proposal (called the McKibbin Wilcoxon Proposal) to deal explicitly with a mechanism for involving developing economies in climate change policy in a way that leads to climate change action in all countries at low cost but where no costs are incurred by developing countries until they are in a better position to share in future cost sharing. We do this by designing a global system with a well defined system of property rights designed to credibly commit governments to low cost climate change policies as well as providing economic signals for decision makers to change the carbon intensities of future energy use trajectories.

In the next section we summarize our previous arguments against a centralized “targets and timetables” approach to climate change policy at the global level. In section 3 we present our extended proposal and draw out some implications. The specifics of how this would work for developing countries is outlined in section 4. Finally we conclude in section 5.

## **2. What is wrong with the Kyoto Protocol?**

The objective of the Kyoto Protocol is to impose binding greenhouse gas (GHG) emission targets for the world’s industrial economies and former communist economies of Europe (“Annex I” countries) to be achieved by the period 2008-2012. By directly binding emissions, policymakers presumably believed that they could achieve the goals of the UNFCCC through political commitment. Clearly this was perceived to be the easiest approach to follow because explicit targets can be negotiated and can be monitored. Given that fixed targets for emissions by Annex I countries have been agreed, although not yet ratified in key countries<sup>3</sup>, the main issues currently being debated are how to minimize the costs of the Kyoto Protocol and how to bring developing countries into the agreement.

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<sup>3</sup> As of October 5, 1999, 84 countries have signed but only 15 have ratified.

The issues of cost minimization and developing country participation are clearly recognized in the Kyoto Protocol. Costs are addressed through provision for international trading of emission allowances among the countries that accept binding targets. In addition, the Protocol provides for a Clean Development Mechanism, under which agents from industrial countries can earn emission credits for certified reductions from investments in “clean development” projects in developing countries that have not taken on binding targets.

The first problem with the Kyoto Protocol is the focus on achieving rigid “targets and timetables” for emissions reductions at any cost, rather than substantial reductions in emissions at reasonable cost. The problem with fixed targets was understood by some negotiators at Kyoto and thus flexibility mechanisms, such as permit trading were included in the Protocol. A crucial but mostly ignored issue is that any fixed targets, for the world or for a group of countries, **even differentiated targets**, are likely to be inefficient because we really don’t know what these will cost over the long period of time being discussed<sup>4</sup>. If the actual costs of abatement turn out to be much larger than estimated it is unlikely that countries will continue to voluntarily adhere to the Kyoto Protocol. Some form of extreme enforcement mechanism needs to be designed to hold the Protocol together. Imposing arbitrary but binding targets on developing countries is even more problematic because there is even greater uncertainty about what the appropriate targets should be. An overly tight target will cause countries to depart from the agreement and an overly loose target will mean that low cost opportunities will have been lost.

Permit trading within the Kyoto Protocol is essential to minimize (but not eliminate) these problems. However even a permit trading system could be problematic. In a series of papers (McKibbin and Wilcoxon (1997a,1997b)) we have pointed out that under some plausible scenarios for the future evolution of the global economy, the economic pressures caused by the large transfers of wealth internationally that underlie the claims over permits, could cause severe fluctuations in real exchange rates and international capital and trade flows. Whether this actually emerges as a future problem will depend on a number of factors but especially the ultimate price

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<sup>4</sup>See McKibbin and Wilcoxon (1997a) and Kopp et al (1997) for arguments about the difference between price and quantity caps under uncertainty.

of permits and the initial allocation of permits. In particular this may be a problem if permit allocations are used excessively as a way of persuading countries to participate in an agreement. Although there is uncertainty about whether this effect is large or small, the main point is that we can't be sure that the economic problems we highlight will not emerge in the future.

Another problem with permit trading under the Kyoto Protocol is that the price of permits for all countries depends on the demand and supply of permits by all countries. If one participating country cheats then the value of permits for all countries will be affected. If a large country cheats then the value of permits will be debased and the system will likely collapse. There is currently no international rule of law that can prevent this from happening nor is it easy to see what credible penalties could be imposed to prevent this from happening under all possible scenarios. It is also hard to imagine why developing countries would want to participate in a centralized system like the Kyoto Protocol especially once the enforcement mechanisms are made explicit and without knowing the possible costs of accepting a binding emissions target.

Overall it seems that both politically and economically there may be potential problems with the Kyoto Protocol involving the possibly large wealth transfers between economies. More fundamentally the incentives of key players are not clearly consistent with the protocol under extreme developments, without some, as yet to be identified, enforcement (and monitoring) mechanism.

### **3. The McKibbin Wilcoxon Proposal (Mark II)**

Our proposal is an attempt to design a decentralized but coordinated system that gives participating countries the incentive to participate as well as giving appropriate incentives to households and firms to change the amount of carbon emissions where it is cost effective to do so. We also propose a mechanism for including developing country participation.

We propose the creation of two new assets (in each economy) as a part of establishing a clear system of property rights with respect to carbon emissions. The two assets are *emission permits* and *emission endowments*. An emission permit is an asset that is required every year to be held by a carbon emitter in order to emit a single unit of carbon. The number of permits must

be acquitted every year against the actual emissions of carbon during that year. An emission endowment gives the owner an emission permit that can be used in a given country every year forever. There would be markets created domestically for both permits and endowments. The price of the permit will be determined by demand and supply of permits every year whereas the price of endowments will be determined by the expected demand and supply of permits from the current year into the long distant future. The holder of an emission endowment can either decide to claim an emission permit and use for current activities or to sell that permit on the current market or to sell the endowment depending on the price they currently see versus the price they expect in future years.

As under the earlier forms of our proposal, in Annex I countries, rather than setting targets for emissions we propose setting targets for the marginal abatement costs – we make the cost certain and the environmental outcome uncertain. Specifically the domestic price of permits is guaranteed within each country for a period of 10 years at a maximum of \$US10 per ton of carbon<sup>5</sup>. Developing countries would likely face a zero permit price as outlined below but Annex I countries would face a price of \$US10 per ton of carbon. This fixed price is achieved by each government in each Annex 1 market selling as many emission permits as required to keep the price from rising above \$US10 per ton. There is no cap on permits and therefore no cap on emissions but the marginal cost of abatement is known for a fixed period. Many studies estimate that the permit price in 2010 associated with the Kyoto targets, range from \$US65 to many hundreds of dollars. Thus in Annex I countries there is likely to be an initial excess demand for permits and the permit price will be \$US10 per ton. The price of emission endowments would also be the present value of \$US10 per ton for 10 years and then after that the expected value of future permits. Thus the endowment market acts exactly like a futures market.

A key issue is how the system begins initially and a key aspect of this is how emission endowments are allocated. We believe that national sovereignty should be respected and it is up to each government how the emission endowments are allocated within their national borders.

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<sup>5</sup> In practice both the period between negotiations and the price would be the subject of negotiation

They could be auctioned or they could be given out based on some compensation criteria or based on what is necessary to achieve a political consensus on participating . They could be given to firms based on expected costs of greenhouse policy or they could be allocated to the entire population within a country to then either trade or destroyed for environmental reasons. This choice is up to individual governments. The choice of any government will not affect any other country because there is no global market in either asset. The number of emission endowments that a government can create is given by international negotiation. Given the existence of the Kyoto Protocol, a natural rule would be to use the current Kyoto targets for Annex I countries as the emission endowments. Endowments are only created in this first period and once created are a sign of the credible commitments of current governments to climate change. The value of the endowments will reflect the market's perception of this commitment as well as the information on climate change and its likely importance. Because the credibility of governments is being priced and there is now a large constituency (i.e. those with emission endowments) that have a role in making the governments stick to their climate change policies. The asset value in a sense also binds future governments.

Once the endowments are created the system then evolves over time with the price of permits annually being set every ten years by international agreement. There is no need for international trade in emission permits because the price is the same in all markets by construction. There is no reason for a Japanese firm to buy an emission permit from Russia when they can get a permit from the Japanese government for the same price. There is no trade allowed in emission endowments even though the values of these may differ across countries.

The net effect of this policy would be to raise the current and expected future price of emitting carbon in Annex I countries. This would discourage increases in emissions, and encourage reductions in emissions where they are cost-effective, but without levying a sudden multi-billion dollar burden on fuel users. We also allow a mechanism for banking and renting of emission rights that is internally consistent and credible. To temporarily raise emissions above an initial endowment holding, a firm can buy a short term emission permit from the permit market. To bank emission reductions for future use a firm can sell permits in the permit market (just like

renting the emission endowments annually) but hold the emission endowment for future emission increases. No special institutional constructions are required outside the creation of the two assets and a domestic mechanism that ensures the value of these assets through monitoring and enforcement mechanisms and a rule of law that exists *within* each economy. It is true that techniques of monitoring and enforcement will likely will differ across countries, but this difference does not directly harm the effectiveness of a given outcome in any given country.

The key to our system is that, rather than allow permit trading to set the market price as in the Kyoto Protocol, it is the price of permits within the domestically managed permit scheme that would be fixed by international agreement. The market trading would then determine where abatement occurs, but at a fixed known cost (i.e. the permit price). We propose a fixed permit price of US\$10 a ton of carbon, because this is well below the price that most models estimate a stabilizing permit price would be. With a low fixed price there would be an excess demand for permits. Once a firm receives an initial allocation of permits from its government, the firm will have to decide whether to buy additional permits, sell some of its allocation, or stay with exactly the number it was given. If it does not buy or sell permits, it can continue with its existing practices at no additional cost (although there is a significant opportunity cost from not selling permits). If it needs to increase its carbon-emitting activities, however, it will have to buy additional permits at a price of US\$10 a ton, giving it a clear incentive to avoid increases in emissions. At the same time, if the firm could reduce its emissions, the permit system would give it a strong incentive to do so: avoided emissions could be sold on the permit market at a price of \$10 a ton. Indeed, many firms have claimed they are willing to undertake low-cost carbon abatement. The permit system we propose will reward firms for these endeavors. The more effort a firm puts into reducing carbon emitting activities at low cost, the higher its profits will be. Any additional permits that are required would yield additional revenue to the domestic government. This would be a significant, realistic step toward controlling climate change.

A key feature of the policy is that it is flexible. The user fee could be adjusted by international negotiation at a regular interval (we propose every decade) or as needed when better information becomes available on the seriousness of climate change and the cost of reducing

emissions. Equally important, it would be easy to add countries to the system over time: those interested in joining would only have to adopt the policy domestically and no international negotiations would be required. This flexibility is crucial because it is clear from current negotiations that only a small subset of countries would agree to be initial participants in a climate change treaty. Also countries can defect from the scheme without debasing the value of the permits for those countries staying in. Although the defection of a country would be undesirable, the system is sustainable although the emission outcomes will likely fluctuate over time.

Since the policy does not focus on achieving a specified target at any cost (indeed the cost is known with certainty), such a system would be far more likely to be ratified, and by more countries. The political attractiveness of our proposal lays in the fact that it is a decentralized coordinated system implemented by individual countries, rather than a centralized system which can ultimately only be sustained with some form of 'yet to be specified' enforcement mechanism.

Our proposal is not simply a uniform carbon tax as it is often portrayed. If endowments are given to existing emitters, only marginal emissions above the target are subject to a direct charge (the price of permits) but most of this is a transfer within industry rather than between industry and government. Indeed existing emitters are implicitly given subsidies to change their behavior because of the opportunity cost of continuing with their activities is the permit price. If firms do nothing they are not subject to any direct cost increase but are awarded profit in proportion to their success at reducing emissions. Although at first sight it appears that existing and new industry are treated differently, in fact this is not the case. Existing emitters receive lump sum compensation for the change in the value of existing capital stock that the permit system would cause. This compensation is proportional to how much abatement they achieve. A unit of carbon emitted will cost both new and existing firms the same because new firms must buy the permit but existing firms must decide whether to keep the permit and give up the permit price or reduce emissions. Either way the permit price will affect the costs of both types of firms in exactly the same way. The initial allocation is purely a compensation mechanism for capital losses embedded in old technology as well as a way to get political support for action on climate policy.

This proposal has a number of advantages:

- The same price will be charged for each new permit in each Annex I country as well as for any permits that are traded in domestic permit markets. Thus, the marginal cost of reducing carbon emissions will be equalized within and across all countries that participate. This makes the system efficient because the cheapest emissions reductions will be undertaken first. Environmentalists and engineers often argue that many low-cost options are available for reducing energy demand. If so, these low-cost options will be exploited under this policy, and without needing to be specifically identified in advance by the government. On the household side, for example, the increase in energy prices will encourage households to demand more energy-efficient vehicles and appliances.
- The policy contains built-in mechanisms to encourage enforcement. Governments will have an incentive to monitor the system because they will be able to collect revenue from selling additional permits. Firms will have an incentive to monitor each other because any cheating by one firm would put its competitors at a disadvantage and would also affect the value of permits held by other firms. Owners of endowments will have an incentive to pressure governments to stick to their greenhouse policy because the degree of commitment will be reflected in the value of endowments.
- The system is flexible and decentralized. New countries can join by setting up their own permit system and agreeing to charge the stipulated world price for additional permits..
- Transfers associated with the permit system are largely between firms or between firms and households, rather than between the private sector and the government. It also minimizes transfers across borders, avoiding potentially serious economic and political problems. Unlike the experience of the 1970s, increases in energy prices under this policy would not lead to massive transfers of wealth between countries.
- The policy also could be revised easily as more information becomes available. After setting

up the system and agreeing on the price of permits, participating countries could meet every ten years to evaluate the extent to which carbon emissions have been abated as well as to re-evaluate the extent of climate change and its consequences. If it becomes clear that more action is required, the permit price could be raised. If climate change turns out to be less serious than it appears today, the permit price could be lowered. The cost of changing permit prices can be minimized through the existence of the emission endowment market which acts like a futures market so that risks are effectively shared.

#### **4. Including Developing Countries**

The dilemma facing developing countries is that they are yet to emit the substantial amounts of carbon that have been essential to the development strategies of Annex I countries. Yet to go down the high carbon path of Annex I countries implies possibly very large future costs for developing countries if climate change becomes as fundamentally important as some scenarios would imply. Most of the costs of climate change abatement occur because existing economic structures have to be changed to be less carbon intensive. Most of this cost is a capital loss given that physical capital which is largely fixed, is expensive to change quickly. Changing economic structures is far less expensive to do before the capital stock is in place rather than after it is in place. Just as there are different costs of carbon abatement across countries there are also different costs across time. It is clear that a low cost options for abatement over future years will be found in changing the future energy intensity of developing economies.

This issue is recognized in our proposal by the use of endowments versus permits in developing countries in a different way to that in Annex I countries. A developing country would be included in our regime by negotiating an initial endowment allocation that allows for the fact that rapid growth is likely during development. For example an endowment of  $(100+X)\%$  for China would allow a large expansion in fossil fuel use before the constraint becoming binding. If the Chinese government was to distribute all this endowment the price of permits would be zero in the first year because there would be an excess supply of permits (indeed the initial price of

permits in China would be in the hands of the Chinese government). However, the price of endowments would be non zero because the future expected price of permits would be expected to rise as the constraint becomes binding. We have introduced a price signal to current firms and households within China that future carbon emissions will be priced. Thus they have the incentive to begin investing in low carbon emitting technology so that they can sell their future permits or their endowments and make a future profit from planning low cost abatement over time. There are no direct costs introduced into the economy in the short term because the annual price of permits will initially be zero. However there is a price signal through the price of endowments. Thus decisions about future energy use can incorporate the cost of carbon emissions without imposing short run costs. Of course the price of the emission endowments in any economy will reflect the credibility of that government's commitment as well as the expected future growth prospects of the economy.

Another important aspect of this approach, is that economies that grow slowly will hit a binding emissions constraint much later than rapidly growing economies. Thus countries begin to contribute to the global reduction of carbon emissions when a country's capacity to pay is higher.

In the long run, all countries are paying the same price for carbon whereas we have allowed a transition path with differential abatement between Annex I and non-Annex I economies.

## **5. Conclusion**

We have proposed a system of property rights and market mechanisms for beginning the process of responding to the possible adverse consequences of emitting carbon through burning of fossil fuels. The key to this approach is a decentralized regime of permit trading systems in which the national autonomy of countries is maintained but the goals of the UNFCCC of reducing future emissions of carbon dioxide are achieved. In particular the system we advocate is flexible enough to adapt to changing political, economic and climate circumstances.

Most importantly we believe that the system we have designed although simple in concept, solves many of the insurmountable problems of the Kyoto Protocol and delivers an outcome in which global emissions will be lower than otherwise would be the case.

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