Policy Design For International Greenhouse Gas Control

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September 1997, Revised July 2000 •
Climate Change Issues Brief No. 6

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Climate Issues Briefs are short reports produced as part of RFF's Climate Economics and Policy Program to provide topical, timely information and analysis to a broad nontechnical audience. The preparation of these briefs is funded in part by The G. Unger Vetlesen Foundation.

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Introduction

Making international climate policy is difficult. The issues are complex, the impacts of policies are large and unevenly distributed, and the costs of erring in any direction are high. International climate negotiators must address, among many tough topics, the costs and benefits of reducing greenhouse gas (GHG) emissions; the distribution of these costs and benefits across countries; the incentives for countries to participate in reducing global emissions; and the innovation and diffusion of low-emissions technology, especially for use in developing countries.

How do we get from here to there? Whatever overall goal we set for climate policy, our success in achieving that goal effectively and efficiently will depend on the policy instrument we choose. No single instrument is universally best for all environmental problems; all policy instruments have strengths and weaknesses, and the choice among them is a pragmatic and contextual matter. For global climate policy, five major options for policy instruments have been suggested: (i) technology standards, such energy efficiency standards for vehicles and appliances, or fuel types for electric power generators; (ii) taxes on GHG emissions; (iii) subsidies or other carrots for GHG emissions abatement; (iv) quantitative limits on each nation's GHG emissions; and (v) quantitative national limits with a market in tradable GHG emissions allowances.

A growing number of countries (including the United States, in both the Bush and Clinton administrations) and experts have championed the last of these options – the creation of an international market in tradable GHG allowances. The U.S. government enacted this approach in 1990 to curb domestic sulfur dioxide (SO_2) emissions that yield acid rain, and it floated this concept in the same year as a potential remedy for global GHG emissions. But at that time the White House opposed quantitative "targets and timetables" on GHG emissions. Without such aggregate quantitative constraints or "caps," a formal system of tradable allowances (or "cap and trade") could not function. So the 1992 United Nations Framework Convention on Climate Change (FCCC) adopted at the Rio Earth Summit imposed no quantitative target on aggregate emissions, and asked countries only to undertake "policies and measures" to reduce emissions – with the proviso that such abatement actions may be

"implemented jointly" by countries. This idea of "Joint Implementation" (JI) represented a window for "informal" emissions trading through project-by-project collaborations, but not a formal market in tradable allowances.

Negotiations soon began on a protocol to implement the FCCC. The European Union had long advocated fixed national quantitative emissions limits (option iv), while expressing doubts about international emissions trading. In 1993 President Clinton announced that the U.S. would also endorse quantitative targets and timetables on GHG emissions; and the Clinton/Gore climate change action plan advocated international allowance trading (option v) as a way to meet that goal. In 1997 over 2000 economists, including several Nobel laureates, signed a statement endorsing formal allowance trading to control global GHG emissions. After intense negotiations, the Kyoto Protocol to the FCCC was signed in December 1997 (though as of 2000 it had not yet been ratified by many countries, including the United States). The Kyoto Protocol included differentiated quantitative targets on GHG emissions of industrialized countries, with aggregate emissions by these countries to be cut to about 5 percent below 1990 levels by 2008-2012. No quantitative emissions limit was applied to developing countries. And the Kyoto Protocol authorized three different versions of emissions trading to help accomplish this goal: "Joint Implementation" of abatement projects among industrialized countries (Article 6); a system for developing countries to sell emissions reduction credits to buyers in industrialized countries, called the Clean Development Mechanism or CDM (Article 12); and a formal system of tradable allowances among industrialized countries (Article 17).

If the Kyoto Protocol enters into force, the stage will be set for international markets in GHG abatement. Both economic theory and actual experience suggest that creating such GHG emissions markets offers great promise for lowering the cost of GHG control, enhancing the spread of lower-emissions technology, and broadening participation in the international agreement to limit GHG emissions.

Designing such a market is not simple. Concerns have frequently been expressed that international emissions trading could be difficult to initiate, monitor and manage. There are concerns about negotiating allowance allocations, ensuring participation, deterring free riding, reducing cross-national "leakage," measuring emissions, and enforcing compliance. These concerns are important, but they pertain to *any* GHG emissions control policy, using *any* policy instrument. They are "generic" concerns about global climate policy. Indeed, a market-based approach could actually *ease* these challenges. A second set of concerns, less frequently discussed, does relate uniquely to a market-based instrument: concerns about transaction costs,

the behavior of national governments, and market power. These “specific” concerns will need to be confronted in the design details of a GHG trading system.

The Case for International Emissions Trading

An international climate agreement could in theory employ any of the five policy instruments outlined above. The advantages of emissions trading can be seen most clearly by comparing national caps with and without emissions trading; these are also the two options on which the actual treaty negotiations have focused. Without trading, a treaty would simply require every participating country, acting on its own, to limit its emissions to a certain level (its "target" or "cap") by a certain date. (Different countries could have different caps implying different degrees of stringency; for example, the caps on industrialized countries could require absolute reductions in projected emissions, whereas developing countries in the future could be afforded substantial “headroom” to increase their emissions as they develop economically.) By contrast, under a market-based emissions trading approach, countries would achieve the same aggregate cap but with the flexibility to trade (reallocate by mutual agreement) their emissions abatement efforts across countries. (Again, different countries could initially receive allowances equivalent to national caps of different degrees of stringency.)

Two basic kinds of international markets for GHG emissions abatement can be envisioned. One is a “formal” emissions trading market -- a system of “tradable allowances” often called “cap and trade.” In this market, the international agreement sets a cap on aggregate emissions for some period, and the agreement also allocates GHG emissions allowances among the participating countries for that period. The national governments then allocate these allowances to businesses within their countries. Emitters must hold allowances to cover every unit they emit; they can control emissions, buy additional allowances if their abatement costs are high, and sell allowances if their abatement costs are low. (In practice, carbon dioxide emissions could be regulated “upstream” by associating allowances with the carbon content of fossil fuels.) Organized exchanges are established to facilitate trading. To ensure compliance with the allowance cap, at the end of each period, each country’s report of its actual emissions (subject to monitoring and verification) is compared to the allowances held for that period by its emitters; if national emissions exceed total allowances held, then the country is out of compliance with the treaty and subject to whatever penalties for noncompliance the international agreement stipulates. (The penalties under the Kyoto Protocol were left for future negotiation.)

The allowances in this system could be fully fungible -- each one representing a unit of GHG emission, without reference to the country from which the allowance originated -- so that buyers could rely on the value of the allowance without investigating the seller's behavior; in that case, seller compliance would be ensured in the same ways as under a national cap without trading. Or allowances could be denominated by the seller country, with the provision that a selling country's violation of its national abatement commitments would devalue the seller's allowances, thereby giving buyers an incentive to purchase from the sellers most likely to comply with the treaty (and sellers an incentive to ensure compliance if they hope to sell additional allowances).

In an "informal" emissions trading market, on the other hand, the international agreement does not allocate formal allowances. Instead, each country may meet its abatement commitment through contracts for project-by-project "abatement services" (GHG reductions or sequestration) obtained both within and outside its territory. Thus, emitters seeking to invest in abatement services may do so at home, and they may also purchase "credits" for emissions reductions generated in other countries, including countries not subject to an overall emissions cap. These are the project-based trading systems envisioned by Article 6 (JI among capped industrialized countries) and Article 12 (CDM credits from uncapped developing countries) of the Kyoto Protocol. The value of such credits will depend on the actual abatement undertaken at the specific site; the investor or a certifying entity must closely monitor the ongoing performance of the project. Abatement is measured against a "baseline" forecast of emissions from that project in the absence of the JI or CDM investment. Investor countries' compliance with emissions caps is determined by comparing the country's cap to the country's actual national emissions, minus the abatement achieved at the specific overseas project sites credited to the country's investors. This approach is similar to the system of "pollution offsets" and "emissions reductions credits" adopted by the U.S. prior to the acid rain program to control other air pollutants. It is also essentially the system of JI launched in the Framework Convention on Climate Change (FCCC) signed at Rio in 1992. That "pilot phase" of JI, however, did not allow official quantified "credits" to be earned by JI activities, and investment in JI was predictably muted. Under Articles 6 and 12 of the KP, official credits could be earned by JI and CDM investments, presumably encouraging a more vigorous market in such project-based trading than had been the case under the FCCC pilot phase.

It bears emphasizing that in both of these approaches to emissions trading, all transactions would be voluntary. The motivation for trading is the desire to find more advantageous ways to comply with GHG limits. The operative principle is mutual benefit:

sellers and buyers will only enter into transactions when the terms of the deal, including financial and non-financial rewards, make them better off.

One of the major advantages of a market-based approach to global climate policy is its *cost-effectiveness.* Because the cost of GHG emissions abatement varies significantly from place to place, and because the global environmental benefit of GHG reduction is independent of where the emissions are reduced, allowing any agreed level of total GHG abatement to be undertaken where it is least costly will minimize the overall cost of achieving the policy goal. Emissions trading allows that least-cost strategy to be identified and pursued; fixed national caps (or worse, technology standards) do not.

Numerous studies indicate that allowing global flexibility in the location of GHG emissions abatement through emissions trading would cut the estimated total cost of emissions controls considerably. For example, the models used in a recent study of Kyoto compliance costs by the Energy Modeling Forum suggest that the cost savings from emissions trading within the Annex I group (including Russia and Ukraine, with their likely surplus of emission allowances) are on the order of 30-50 percent, compared to a similar emissions reduction treaty with efficient domestic policies but without international trading (see the paper by Weyant and Hill in *Further Readings*). Even greater cost savings could be reaped from global trading, on the order of 65-85 percent. The cost savings also would be higher when compared to technology standards, because both tradable and nontradable national quotas allow important flexibility in the choice of abatement method. And these figures may understate the cost savings, since many of the models already assume some degree of cost-minimizing coordination of abatement among members of the European Union.

To put these figures in context, consider the Energy Modeling Forum results reported by Weyant and Hill on the costs of meeting the Kyoto targets (measured in GDP loss) without flexible international policy design. Weyant and Hill report these figures for the U.S., Japan, the European Union, Canada, Australia, and New Zealand. The annual costs summed over all these countries in the year 2010 range from just under $100 billion to almost $500 billion. The cost of maintaining or reducing emissions further beyond the initial commitment period would be larger still. Thus, a 50 percent cost saving offered by a flexible market-based policy would mean a considerable saving in absolute terms.

Of course, real-world cost savings may be different from these model estimates. The degree of cost savings associated with flexibility will depend on the stringency of the emissions target, the cost of meeting that target without flexibility, the particular countries that participate

in the treaty, and other factors. Real-world cost savings might be greater if emissions trading induces innovation that further lowers abatement costs, if trading is allowed over time as well as across countries, or if controlling GHG emissions in industrialized countries turns out to be even more expensive (relative to developing countries) than predicted. But real-world cost savings from flexibility might be lower if arranging allowance transactions proves costly, or if it turns out that industrialized countries can control GHG emissions at home at a much lower cost (relative to developing countries) than predicted.

Allowance trading markets have demonstrated substantial cost savings in practice when applied to several national pollution problems. The United States has used market-based approaches to phase out lead in gasoline, to cut emissions of sulfur dioxide (SO_2) as a means to reduce acid rain, and to control urban air pollutants in Los Angeles. The cost savings in the lead and SO_2 cases were substantial, as much as 50 percent or more compared to a control policy in which no trades were allowed. (GHGs seem to be an even better prospect for trading than did lead and SO_2, because the variation in global abatement costs is even wider, and because there are no local "hotspot" problems for most major GHGs.) The SO_2 trading policy also stimulated energy efficiency investments and the use of new abatement technologies. And the SO_2 experience suggests that the more cost-effective market-based policy enabled Congress to "buy" more pollution control than it would have if control were more expensive. Similarly, reducing the cost of GHG abatement could well lead countries to undertake more abatement than they otherwise would.

GHG allowance trading could also mobilize substantial resource flows to developing countries, assuming that abatement costs are lower in developing countries and that the treaty allocates GHG emissions control obligations to constrain industrialized countries while giving developing countries some headroom to grow. These resource flows would help poorer countries shift to a more prosperous but lower-emissions development path, invest in local health and environmental needs, and pursue other social priorities. Resource flows to poorer countries under a climate treaty employing emissions trading could grow to exceed *all* official international development assistance (ODA). Some studies suggest that, compared to no treaty at all, developing countries would be net *losers* under a no-trading policy in which industrialized countries cut their own emissions (and, in the process, cut their product imports from developing countries); but that developing countries would be net *winners* under a global allowance trading system in which the cost of abatement is reduced and the developing countries can profit from allowance sales. The prospect of such gains from allowance sales could, in turn, attract developing countries to participate in the GHG abatement regime. (One caveat to these

conclusions is that large resource inflows to developing countries could create adverse terms of trade that crimp the growth of the developing countries' regular exports, as distinct from their exports of allowances.

Participation is a fundamental issue in an international climate agreement. Under international law, no country is bound by a treaty unless it consents to participate. (This is quite different from national law, under which majority rule or perhaps fiat can impose constraints on emitters without the emitters' consent.) Thus, under international law, countries must find treaty participation to be in their interest. Without developing country participation in particular, industrialized countries' GHG emission controls could be futile: developing economies are increasing emissions rapidly and will soon account for over half of global emissions. Controls on emissions imposed only in industrialized countries could wind up missing the larger share of global emissions, and, worse, could induce emissions-related activities to shift to unconstrained developing countries (both as world fuel prices fall and as emitting industries relocate), thereby exacerbating the growth in developing country emissions. Such "leakage" of emissions from constrained to unconstrained countries could offset much of the climate protection sought by a treaty. Moreover, legislators in industrialized countries will be loath to vote to ratify less-than-global emissions constraints that drive emissions-related jobs out of their electoral districts; this appeared to be part of the predicament with ratification of the Kyoto Protocol in the U.S. after it was negotiated. Thus, some way of getting developing countries to participate in the global GHG treaty on terms they find attractive seems crucial in order to ensure environmental effectiveness, reduce global abatement costs, direct needed resource flows to poorer countries, and encourage industrialized countries to ratify. Major developing countries such as China may see global climate change as a low priority (or even a benefit to their farmers), and hence may resist joining an emissions abatement treaty. Emissions trading offers a built-in feature -- the resource flows to developing countries in return for their abatement efforts and associated allowance sales -- that could accomplish broad participation. This also implies that assignments of "headroom" allowances (such as those to Russia in the Kyoto Protocol) are not a mistake but rather constitute an essential mechanism for securing participation by otherwise reluctant countries.

GHG taxes could, in principle, generate cost-effectiveness gains equal to those of an allowance trading market. Theoretically, a tax imposed to achieve a given level of emissions would exactly equal the market price for the allowances issued to achieve that same quantity of emissions. A tax would offer more certainty about overall costs, since the tax would be fixed in advance, while the price of emissions allowances could vary. But a tax would offer less certainty

about environmental results, since the tax by its nature does not constrain the quantity of emissions (and tradable allowances do). Depending on the relative importance of cost escalations vs. emissions escalations, this factor could be important. Moreover, a tax would raise revenue that could be used to offset other distortionary taxes; tradable allowances could raise revenue only if they were initially sold or auctioned, not issued for free. Meanwhile, a tax would not involve the "transaction costs" of structuring and operating allowance trading, but it would involve the administrative costs of tax collection.

More problematic is that an internationally agreed emissions tax (whether administered globally or nationally) could be circumvented by national subsidies and other tax code changes targeted to buffer high-emitting industries. This problem of "fiscal cushioning" is very difficult to monitor from outside, is worsened by national tax administration, and undermines the ability of the tax to constrain actual emissions.

Furthermore, a GHG tax would not create an automatic mechanism for resource transfers to developing countries, which are crucial to getting developing countries engaged. Politically difficult side payments to developing countries would have to accompany the tax in order to secure these countries' participation in the tax regime. Such side payments could claim much of the tax revenue that might have been put to offsetting other distortionary taxes. Moreover, if poorly designed, these side payments could undermine the incentive effect of the tax by reducing the net price paid for emitting. This will be the case if the revenue redistributions are in proportion to economic activity or emissions abatement, rather than being decoupled from emissions. And to attract countries' participation, the side payments would have to be in proportion to the actual economic burden imposed by the emissions tax (net of environmental benefits to that country), or else countries will not agree to the tax. Thus it seems hard to escape the prospect that participation-attracting side payments would undermine the incentive effect of an emissions tax. Side payments delivered through developing countries' sales of tradable allowances, by contrast, would not undermine the incentive effect of the emissions trading system, because the quantity constraint on aggregate emissions would still be binding.

Subsidies for abatement are often proposed either in domestic programs or in the guise of official development assistance targeted at emissions-abating activities in developing countries. Developing countries tend to resist such conditionality, unless it is truly additional aid money. Industrialized countries sometimes resist making larger taxpayer-financed budget outlays for foreign aid. From an environmental point of view, a serious concern with subsidies for abatement is their potential to yield perverse consequences. Although the subsidy for abatement (like a tax on emissions, or tradable allowances) can reduce emissions at the margin by each

subsidy-earning firm, the subsidy also could reduce the cost of doing business in the emitting industry if it is poorly designed – in particular, if it is a subsidy per unit of output or emissions versus a lump-sum transfer. A subsidy for abatement can attract entry or investment into the emitting industry and perversely increase net emissions. Side payments delivered through developing countries' sales of tradable allowances, by contrast, would not yield perverse impacts on emissions, because the quantity constraint on aggregate emissions would still be binding.

Generic Concerns About Emissions Policy

Emissions trading therefore has several salient advantages over the other options for international GHG policy, such as technology standards, taxes, subsidies, and fixed national caps. But despite the apparent advantages of an emissions trading system, many countries and commentators continue to express concerns about using this approach to control GHG emissions -- concerns about negotiating allowance allocations, ensuring participation, deterring free riding, enforcing compliance, reducing cross-national "leakage," and measuring emissions. These concerns, however, apply generically to *any* emissions control regime, and allowing trading could actually *ease* these concerns.

Critics worry that it will be difficult to *negotiate initial allowance allocations* among countries. But the problem of allocating control and cost responsibilities is *unavoidable* in any climate agreement, with or without trading, and trading actually could *ease* this problem, in two ways. First, trading makes the cost allocation transparent. Technology standards and national caps implicitly impose cost burdens that vary across countries. The use of formal emissions trading just makes this allocation explicit rather than disguised, and this transparency can facilitate a bargain. Second, allowance trading enables post-allocation flexibility. Countries facing potentially high cost burdens will know that they can purchase abatement in lower-cost countries, and countries with low-cost abatement opportunities will know that they can earn substantial resource flows by selling allowances. This post-treaty flexibility for reallocation would significantly relax the pressure on negotiators to devise ideal, once-and-for all allocations in the treaty itself. As Nobel-Prize winning economist Ronald Coase pointed out, the lower the obstacles to reallocation of entitlements, the less the initial assignment matters. Thus, without the opportunity for trading, initial GHG policy targets would be *harder* to negotiate.

Some argue that a cap and trade system is a political "non-starter" because developing countries will refuse to accept caps, and industrialized countries will refuse to make large resource transfers. But any control regime with binding targets will have to face this problem because under international law, countries must be attracted to participate. Again, a cap and

trade system has important advantages. The opportunity to earn significant resource transfers via allowance sales can make accepting phased-in caps (with future growth headroom) more attractive to developing countries. And wealthy countries would undertake these transfers because they yield significant cost savings compared to a treaty without such trading. Moreover, the myriad private transactions involved in formal emissions trading would not raise the political specter of increasing taxpayer-financed official foreign aid. The other possibility, a set of domestic GHG taxes imposed separately by individual countries, likely would founder on the lack of transparency of fiscal systems and the apparent unwillingness of developing countries to substantially increase their own energy tax burdens.

A fundamental problem for any international treaty is *engaging participation* and *deterring free riders* (i.e., countries that benefit from the treaty group's efforts without participating). Treaty restrictions can only be imposed on consenting countries, making any kind of international collective action difficult. As noted above, however, formal emissions trading has signal advantages over other policy options in securing participation while limiting the perverse consequences of side payments. Reluctant countries can be assigned headroom allowances (an in-kind side payment) which they can then sell, while the aggregate cap maintains the environmental effectiveness of the regime. If free riding is not deterred, the entire collective regime may unravel. Employing allowance trading in a GHG treaty can reduce free riding: it dramatically lowers the cost of participation to industrialized countries, and it raises the profits from participation for developing countries. Since noncompliance is just a form of free riding, these incentives for participation in an emissions trading regime can also enhance compliance.

Emissions *"leakage"* -- the problem that emissions abatement achieved in one location may be offset by increased emissions in unregulated locations -- will afflict any subglobal treaty, whether it employs trading or not. Leakage can arise in the short term as emissions abaters reduce energy demand or timber supply, influencing world prices for these commodities and increasing the quantity emitted elsewhere; and it can arise in the longer term as industries relocate to avoid controls. Both informal and formal allowance trading would reduce such leakage by reducing abatement cost (thereby reducing the incentive for industry to relocate) and by expanding participation and inhibiting free riding (thereby enlarging the group of countries agreeing to constrain emissions).

An informal market in JI or CDM credits from abatement projects in uncapped host countries may raise a special concern about local (within-country) leakage from these projects to other emissions sources in the same host country. However, the question is whether such local

leakage within the project host country would be greater than the leakage from capped to uncapped countries that would have occurred if the same amount of abatement had been undertaken only within the project investor country. Meanwhile, local leakage would not be a problem in a formal allowance trading market with national caps, because all emissions of all participating countries would be counted in the national inventories used to assess compliance.

Another generic concern regards the ability to *measure* the magnitude of abatement efforts. Any treaty, with trading or not, requires forecasts of baseline emissions and subsequent monitoring in order to evaluate the likely cost of limitation options, the effectiveness of abatement efforts, and the extent of emissions leakage. A formal cap and trade system would not complicate these tasks; it would measure results using the same national inventories as under an agreement without trading. The CDM may add some uncertainty about what the emissions would otherwise have been in the uncapped project host country. But prohibiting CDM credits because of such uncertainty would forfeit both the opportunity to engage countries without national emissions caps in early GHG control efforts, and the opportunity to obtain low-cost abatement services in those countries. A better approach might be to allow both cap and trade and the CDM, but to exercise caution by adjusting the credit for all abatement efforts (not just the CDM) in proportion to the projects' measurement credibility, and inviting investors to augment the credit calculation by showing more reliable emissions accounting -- thus providing incentives for investors to improve measurement capabilities.

Specific Concerns About Emissions Trading

Other concerns do apply with special force to international market-based emissions trading regimes. Yet these specific concerns often have tended to receive less attention in the debate over different international GHG control strategies.

Transaction costs include the costs of searching for trading partners, negotiating deals, securing regulatory approval, monitoring and enforcing deals, and insuring against the risk of failure. High transaction costs in the emissions abatement market would impede trades and raise total costs. Evidence from previous U.S. "environmental markets" such as the lead phasedown, the Los Angeles smog control program, and an experiment with water pollution trading on the Fox River in Wisconsin suggests that transaction costs can determine the success or failure of the trading system.

The transaction costs of JI and the CDM, as currently structured, appear to be very high. Partners are hard to identify, each negotiation is novel, each project must be approved by the host

and investor governments (and potentially by the CDM governance system), and each investor must monitor its own projects. Moreover, if JI and the CDM require investors to support entire projects, each investor bears a large risk of project failure. The transaction costs of JI and the CDM could be reduced through brokers (many of which are emerging), information exchanges, streamlined approval processes, accredited monitoring agents (including environmental NGOs), mutual funds and other means of risk diversification, and official credit.

The transaction costs of a formal allowance trading market would be much lower, especially if fungible allowances are traded on organized exchanges. Indeed, reducing transaction costs would be a central goal of such a formal system. Lower transaction costs would improve cost-effectiveness, and would also promise easier opportunities to reallocate control burdens, thereby helping to facilitate the initial allocation negotiations. (A GHG tax would avoid inter-firm transaction costs, but would involve the significant administrative costs of collecting the tax.)

A second concern is the *role of national governments* in the market. National governments might try to influence the market to their advantage, obstruct allowance trades, or otherwise depart from the conditions of well-functioning abatement markets assumed in the estimates of cost savings. Governments might pursue such strategies to favor domestic interests against foreign rivals, to redistribute wealth within a country, or for other purposes that in practice conflict with the operation of the international climate treaty regime. In the U.S. SO_2 trading system, for example, several states have attempted to intervene in the national market (such as by trying to prevent electric power companies from switching to lower-sulfur out-of-state fuels, or by trying to prevent sales of allowances to upwind sources), but these efforts have so far been blunted by the limits on states' power to restrict interstate trade under the U.S. Constitution. National interpositions in a global GHG market could be limited by international trade law, but this depends on untested legal questions about whether and how GATT/WTO law applies to trade in GHG allowances.

For trading to be fully cost-effective, moreover, national governments must let the trading be conducted by the entities actually responsible for GHG abatement and sequestration. Assigning allowances and credits to these entities will mobilize decentralized competition, creativity and flexibility. This seems likely in the U.S., but it might not occur so well (or at all) in countries where the state is a more active supervisor or owner of industry. (A GHG tax would also be vulnerable to national government manipulation, chiefly via subsidies and changes in the domestic tax code to buffer the impact of the GHG tax on domestic industries. Such "fiscal cushioning" would be exceedingly difficult for outsiders to monitor and penalize.)

A third specific concern is *international market power*. Concentrated power over allowance or credit prices could arise on the sellers' side (e.g. a GHG "OPEC"), or on the buyers' side (e.g. a central sole purchasing agent for industrialized countries). While there should be a plethora of competitors in an international GHG allowance market, market power could be enhanced by large state-run energy or forestry companies, and by countries' efforts to prevent additional countries from entering the market. Many trading models show Russia as the main seller of allowances in an Annex I (industrialized country) trading system, and China as another main seller in a global system. And unlike domestic antitrust (competition) law, international law has no basic framework to combat market power; and even if it did, enforcing such rules against nations (or cartels of nations) could be quite difficult. A successful international emissions trading system could require the evolution of new international antitrust remedies, either in general or specific to the climate treaty. "Thickening" the market is probably the best tonic for fears of market power, again underscoring the importance of broadening participation in the treaty noted above.

Further, centralized purchasing or sales agents advocated to reduce search and approval costs (e.g., the CDM governing board, or proposals to route project investments through a few multilateral institutions like the World Bank) could also invite market power. A better way to reduce transaction costs is through organized exchanges and fungible allowances.

The Internation Political Economy of Policy Design

Given the advantages of international emissions trading -- lower cost, valuable resource flows, greater participation -- what is one to make of the opposition to it? Several speculative hypotheses are worth exploring.

Opponents may misunderstand or genuinely doubt the advantages of international emissions trading. For example, developing countries' fears of "carbon colonialism" may reflect a view that the market power and trading savvy of wealthy investors would depress allowance and credit prices, leading poorer countries to sell out their future at a loss. This concern may be legitimate, and it warrants efforts to combat market power and build the capacity of developing countries to bargain effectively in an allowance trading market.

Opponents may also have non-climate agendas. Some may favor a high-cost regime because their objective is moral condemnation or broader social change in industrialized countries, not cost-effective climate protection. Some may worry that fairness requires industrialized countries to take the lead -- but allowance trading does require wealthy countries

to foot the bill for global abatement efforts; and as noted above, global allowance trading makes developing countries net winners instead of net losers, which seems far more fair.

Strategic behavior may also be at work. First, some government decisionmakers, in both developing and industrialized countries, may prefer official government aid to private market transactions because they believe they can control the former more effectively. Indeed some developing country government officials may oppose trading because they see the market sector, which would gain from allowance trading, as a domestic political rival -- a replay of similar struggles in the transition from feudal and state-run societies to market capitalism. Second, some industrialized countries may prefer a less flexible control regime because it limits access by their trade rivals to lower-cost abatement opportunities. This may explain the European Union's preference for an EU "bubble" (trading region) under the climate treaty, but its opposition to unrestricted global allowance trading and its embrace of cumbersome "supplementarity" restrictions on trading volumes.

Opposition might also be a move to gain leverage over the goal (target or cap). Advocates of aggressive climate protection may withhold support for trading until it is paired with a more stringent cap -- risking a costly treaty, or no agreement at all. Meanwhile, skeptics of aggressive climate policy may fear that cost-effective policy tools are an all-too-enticing "fast train to the wrong station," inducing premature adoption of an overly stringent cap. Of course, the goal of climate policy should be chosen with great care. Yet the skeptics' gambit of urging a higher-cost "slow train" (in the hopes that it will derail any GHG limitations agreement) may just invite "Murder on the Orient Express" -- an unholy alliance behind a treaty that is both higher-cost and less environmentally effective -- a "lose-lose" luxury train to the wrong station.

Toward Successful International Emissions Trading

Efficient policy design, such as emissions trading, has enormous advantages to offer global climate policy -- in climate protection, cost saving, innovation, and resource flows to developing countries. GHGs offer an even more attractive case for application of emissions trading than have many local and regional pollution problems already well handled with emissions trading.

But designing efficient global climate policy also presents several novel challenges. One of these is the challenge of translating to the *international* context the accumulated national experience with flexible market-based policy designs such as allowance trading. The U.S. acid rain trading system cannot just be transplanted to global climate policy. The legal and

institutional terrain is different at the international level, and international environmental markets need to be designed with that terrain in mind. In particular, the requirement of consent to international treaty law puts extra emphasis on securing participation, which in turn makes emissions trading even more attractive at the international level than it is at the national level, but also requires the use of headroom allowance allocations to engage otherwise reluctant emitting countries. To be environmentally effective and economically efficient, the Kyoto Protocol needs to be expanded upon to engage developing countries in a global emissions trading regime.

Another challenge is bridging from normatively desirable policy design to *actually adopted* policy design. The economics of climate policy may not match the politics of climate policy. Even if smart policy designers address the generic and specific concerns surrounding international emissions trading and thereby deliver an efficient policy design to global climate negotiators, such a policy design will still confront the political marketplace in which efficiency may be viewed with indifference or even antipathy. Empirical research is warranted to explore and reveal the positive politics of international climate policy design. Without such inquiry, designing the most efficient global climate policy may be for naught.

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Further Reading

Baumol, William J. and Wallace E. Oates. 1988. The Theory of Environmental Policy, 2nd ed. New York: Cambridge University Press.

Bohm, Peter. 1997. Joint Implementation as Emission Quota Trade: An Experiment among Four Nordic Countries. Nord 1997:4. Copenhagen: Nordic Council of Ministers.

Cooper, Richard. 1998. Toward a Real Global Warming Treaty. Foreign Affairs 77(2, March/April):66-79.

Dudek, Daniel J., and Jonathan Baert Wiener. 1996. Joint Implementation, Transaction Costs and Climate Change. OCDE/GD (96)173. Paris: OECD.

Hahn, Robert W., and Robert N. Stavins. 1999. What Has Kyoto Wrought? The Real Architecture of International Tradeable Permit Markets. March. RFF Discussion Paper 99-30. Washington, DC: Resources for the Future.

Intergovernmental Panel on Climate Change. 1996. Climate Change 1995: Economic and Social Dimensions of Climate Change. New York: Cambridge University Press.

Jacoby, Henry, Ronald Prinn, and Richard Schmalensee. 1998. Kyoto's Unfinished Business. Foreign Affairs 774(4, July/August):54-66.

Jepma, Cristinus J., and others. 1996. A Generic Assessment of Response Options. In Climate Change 1995: Economic and Social Dimensions of Climate Change, edited by James P. Bruce, Horsang Lee, and Erik F. Haites. Contribution of Working Group III to the Second Assessment Report of the Intergovernmental Panel on Climate Change. New York: University of Cambridge Press, 225-62.

Manne, Alan and Richard Richels. 1996. The Berlin Mandate: The Costs of Meeting Post-2000 Targets and Timetables. Energy Policy 24:205-210.

Stavins, Robert N. 1997. Policy Instruments for Climate Change: How Can National Governments Address a Global Problem? University of Chicago Legal Forum 1997:293-329.

Stewart, Richard B., Jonathan B. Wiener, and Phillippe Sands. 1996. Legal Issues Presented by a Pilot International Greenhouse Gas Trading System. Geneva: UNCTAD.

Tietenberg, Thomas. 2000. Environmental and Natural Resource Economics, 5th edition. Reading Mass.: Addison-Wesley, chapters 15-19.

Tietenberg, Thomas, Michael Grubb, Axel Michaelowa, Byron Swift, and Zhongxiang Zhang. 1999. International Rules for Greenhouse Gas Emissions Trading. UNCTAD/GDS/GFSB/Misc.6. New York: UNCTAD.

UNCTAD. 1992. Combating Global Warming: Study on a Global System of Tradeable Carbon Emission Entitlements. Geneva: UNCTAD.

Weyant, John P., and J. Hill. 1999. Introduction and Overview. The Energy Journal Special Issue: vii-xiiv.

Wiener, Jonathan Baert. 1995. Protecting the Global Environment. Chapter 10. In Risk vs. Risk: Tradeoffs in Protecting Health and the Environment, edited by John D. Graham and Jonathan B. Wiener. Cambridge: Harvard University Press.

Wiener, Jonathan Baert. 1999. On the Political Economy of Global Environmental Regulation. Georgetown Law Journal 87:749-794.

Wiener, Jonathan B. 1999. Global Environmental Regulation: Instrument Choice in Legal Context. Yale Law Journal 108:677-800.