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Overview of Domestic Greenhouse Gas Emissions Trading Programs

I. Introduction

Under the current U.S. proposal for limiting greenhouse gases, the Kyoto agreement would provide greenhouse gas "emissions budgets" for the U.S. and other developed ("Annex I") countries. Domestic implementation of the agreement would be left to each of the Parties to the accord. One possible method of implementation in the United States would involve the establishment of a market for permits to emit greenhouse gasses. This paper examines issues related to the establishment of such a market.

In addressing this set of issues, we can draw on the substantial U.S. experience with domestic emissions trading programs. But it is important to recognize at the outset that a carbon permit program necessary to achieve the emissions reductions envisioned by the Kyoto agreement would be significantly larger, both in scale and scope, than any of our existing emissions trading programs. This analysis is therefore tentative, and involves extrapolating beyond our existing experiences with approaches of this nature.

The remainder of the paper is organized in five sections: The next section briefly reviews the experience of the United States with the trading of permits under the sulfur dioxide program. Section III describes three different methods for allocating emissions permits: by auction, by administrative mechanism (possibly related to historical emissions), and by performance relative to a standard. For each of these methods, we provide "pros" and "cons." Section IV addresses a number of issues that arise regardless of the method of initial distribution, including (but not limited to) banking, borrowing, monitoring and verification, and leakage. Section V discusses issues related to where in the production and distribution chain emissions permits must be held and used, and Section VI discusses incorporating all greenhouse gases and sinks into a trading system. In Appendix A, we describe the experience of the United States with other forms of emissions trading aside from SO_2 permits. Appendix B discusses issues related to a sectoral approach to emissions trading.

II. U.S. Experience with Trading of SO_2 Emissions Permits

The United States has had more experience than any other country with emissions trading. The most important example of such trading is the *sulfur dioxide (SO_2) allowance trading* program. This program evolved out of the Clean Air Act Amendments of 1990, which required a 50 percent reduction in SO_2 emissions from electric-utility boilers. To accomplish this goal, a fixed number of emission allowances were allocated to electric utilities based on historical fuel use. In addition, a small number of allowances are auctioned every year. Allowances may be traded to any party anywhere, and may be "banked" for use in future years. Participants must regularly monitor emissions and make an annual accounting of their emissions. Penalties are imposed if emissions exceed the number of allowances held by a source. A functioning market in SO_2 allowances now exists, involving both bilateral exchanges between companies, and brokered exchanges through third parties.

Around the time that the 1990 Amendments were enacted, a commonly held view was that attaining a 50 percent reduction (10 million tons) in SO_2 would require permit prices between $400 and $800 per ton. Those predictions have proven too pessimistic. Currently, the price of SO_2 allowances ranges between $90 and $120. Because a substantial number of permits are being "banked" rather than consumed immediately, today's prices can be interpreted as the present discounted value of the prices that are expected to obtain under Phase II of the program. Those implicit price expectations for 2010, the year in which the constraint is now projected to bind, appear to be in the neighborhood of $300 per ton to $400 per ton. Clearly, the SO_2 allowance program has been very successful. Part of that success, however, appears to be accounted for by factors that arguably were induced by the introduction of the SO_2 program (e.g., the development of cheaper scrubbers), while part appears to be accounted for by factors that arguably had nothing to do with the SO_2 program (such as the deregulation of the freight-carrying railroads), but whose cost savings the trading program could capture. There is no evidence available at present, however, that the impressive performance of the SO_2 program will be replicated in this regard.

Appendix A describes the U.S. experience with trading in other emissions permits.

While the U.S. experience with emissions trading has been fairly extensive, a greenhouse gas program poses unique issues that will distinguish it from other programs:

Program size: The aggregate value of the permits issued under a greenhouse gas program will be significantly larger than under any other program implemented to date. The annual stock of permits under the SO_2 program is worth less than $1 billion; the annual stock of permits under a carbon trading program might be worth between $30 billion and $150 billion. The vastly greater size of the program implies that distributional issues (i.e., the method of allocating permits) will be much more important under a GHG program than they are under the SO_2 program.

In part, the greater aggregate value of permits under a GHG program reflects the more fundamental change in the economy required to reduce carbon emissions, compared with the challenge of reducing SO_2 emissions. For example, it will likely prove more difficult to move away from combustion of petroleum-based fuels in the transportation, utility, and manufacturing sectors than it was to switch from high-sulfur coal to low-sulfur coal in the utility sector in furtherance of the SO_2 program.

Administrative feasibility: A meaningful GHG control program will be a great deal more complicated to administer than the current SO_2 program. The sulfur dioxide trading program currently covers approximately 2,000 utility sources; a GHG trading program will cover significantly more sources. In general, the further "downstream" the permit requirement is placed, the greater the number of sources for which emissions must be tracked, monitored, and verified. Even if the permit requirement were placed as far upstream as possible—that is, at the primary fossil fuel producer level—the number of sources could range from 3,000 to just under

one million.[1]

International Scope: A ton of CO_2 has the same environmental impact regardless of where it is emitted. Therefore, an efficient policy for the control of CO_2 will involve trading of emissions rights across national borders. By contrast, location matters for emissions of SO_2, so a reasonable policy for that source of pollution could be constructed on a within-country basis. Securing the cooperation of other countries (especially developing countries) will be a difficult task, and one that was not required as part of the SO_2 process. Even so, the challenge of securing such cooperation will be worth taking up; available analysis suggests that international trading would make a substantial contribution toward reducing the overall burden of the program on the U.S. economy. (Separate papers are being prepared on international permit trading and integrating international and domestic trading programs.)

Leakage: If some countries are omitted from an international control regime, there will be an incentive to shift emissions-intensive activities from participating countries to non-participating countries. One widely discussed partial remedy for this possibility would involve requiring permits on imports, based on their carbon content. However, determining the carbon content of imports would be difficult, and some less-than-perfect approximation would probably have to be adopted. Additional work is under way to determine the potential for international leakage and options for addressing this issue.[2]

III. Allocating permits

The first step in the implementation of any emission trading program will be to determine a method for allocating permits. This section considers three possible methods: an auction-based approach, an administrative approach, and a performance-standard-based approach.

A. An auction-based approach

The United States and most other countries have long used auctions to sell government securities. Governments have only recently begun to use auctions to allocate other resources. New Zealand began to auction spectrum for radio, TV, and cellular phone use in 1990. The United States carried out its first auction of spectrum in 1994. This was one of the largest and most complicated auctions in history, with thousands of licenses for sale, and $10 billion raised.

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1. Data for all fossil fuel producers are already collected on a source-by-source basis. In addition, EPA already regulates many of the sources that might be required to hold permits if the permit-holding requirement were placed further downstream. Nonetheless, important administrative challenges would remain; for example, data would have to be collected to support any effort to control international "leakage" by measuring the energy content of imports (see further discussion below).

2 About two-thirds of U.S. emissions result from activities which cannot be "shifted" to other countries, i.e., transportation and buildings, and our concern is with possible leakage of some portion of the remaining one-third.

Under the Acid Rain title of the Clean Air Act Amendments of 1990, the United States in 1993 held the first auction of rights to emit sulfur. In principle, the structure of an auction of GHG-related permits could be relatively simple—certainly by comparison with the spectrum auctions—provided the permits pertain to a homogeneous commodity (that is, provided they confer the right to emit a given quantity of carbon-equivalent on any holder anywhere in the country).

Several factors influence the ease or difficulty of an auction, and the likelihood of success.

Substitutability: The more homogeneous the commodity, the simpler the auction, and the greater the benefits from an auction. Spectrum auctions offer limited scope for substitution because the FCC divides the country geographically, and divides the spectrum by wavelength. A license for one wavelength in one area does not substitute for a license on a different wavelength or in a different area. By contrast, carbon dioxide is a single homogeneous compound, and emissions anywhere in the world have the same effect on the atmosphere. Even moderate differences of a few years one way or the other in the timing of emissions have little effect on the atmospheric concentration of greenhouse gases, which is what counts. Thus a carbon auction would be easier to conduct than a spectrum auction, because with carbon, differences in source and location are immaterial, while moderate differences in timing have at most political implications.

Number and quality of bidders: Auctions produce the greatest gains when they have many bidders. New Zealand's spectrum auction faltered in part because many licenses attracted few bidders; the U.S. spectrum auction did not have this problem, and a carbon auction would have no trouble attracting large numbers of bidders, in part because of the ease of substitution. In New Zealand's spectrum auction, many unqualified firms won licenses and later defaulted on their license payments. Such an outcome could substantially reduce the economic gain from conducting the auction in the first place. Defaults can be avoided by requiring bidders to post collateral or pay in cash immediately, either in part or in full. Upfront payments will be less onerous if the term of each permit is relatively short (e.g., one year).

Support for Auctions: Since auctions do not confer wealth to existing emitters, there is a clear force against pursuing this approach. Successfully pursuing the auction approach requires that countervailing support be assembled beforehand. One way to advance this objective would be to create a clear understanding that the proceeds of auctions will be recycled into the economy in the form of, for example, lower income or payroll taxes.

Other issues that will arise in the design of a carbon auction include but are not limited to:

> *Open or sealed bids*. New Zealand chose sealed bids for its spectrum auction. The U.S. FCC chose open bids. Which raises more money is an open theoretical question.
>
> *Reserve (minimum) price*. In a thin market, a reserve price takes the place of absent bidders; in its spectrum auction, New Zealand made the mistake of not specifying a reserve price. Although the large number of likely bidders in a U.S. carbon auction could reduce the need to specify a reserve price, there would seem to be little harm in setting a

relatively low reserve price.

Pros and cons. An auction would have at two main advantages over alternative allocation schemes:

- First, an auction would ensure that, as of the date of the auction, the permits would be held by the persons and firms that value them most highly. Other allocation schemes could achieve this outcome eventually, but only as a result of trading in a secondary market. Of course, an auction is not a substitute for trading in a secondary market; auction or not, the distribution of permits will not remain efficient unless the relevant players have access to a secondary market.

- Second, instead of giving away valuable rights—and thereby conferring wealth on the recipients of permits—an auction would sell these rights. The revenue raised from auctions could be used to reduce other taxes and thus reduce distortions in the economy. Available evidence suggests that the cost to society of GHG emission reduction will be much lower (though still substantial) if permits are auctioned and the proceeds are used to reduce distortions elsewhere. It is rare that revenue can be raised in a way that improves rather than distorts incentives; it would be unfortunate to miss such an opportunity. Auction revenues could also be used to ease the transition for those industries, workers, or consumers who experience a grossly disproportional share of the costs of reductions in GHG emissions.

An auction would have the following main difficulty:

- Auctions are not fool-proof, and we have never before conducted an auction of this scale for emissions rights. The track record of auctions in the United States is checkered. For example, a number of the participants in the recent auctions of the spectrum now appear unwilling or unable to meet the financial obligations they agreed to. We are not predestined to repeat the mistakes of the past, but history suggests that running a flawless auction process will not be an easy task.

- Recycling the revenues from an auction in an economically efficient manner would represent a significant challenge for the political system, and the history of meeting such challenges is not perfect.

B. An administrative approach

Rather than using an auction, permits could be allocated administratively based on a pre-determined formula. Annual emission allowances would be distributed for no cost, and would be transferable. There are many possible allocation criteria. One widely discussed option would be to allocate permits to existing emitters on the basis of historical or baseline fuel use or emissions. For example, in the SO_2 trading program, facilities subject to emissions restrictions receive permits based on fuel use in the baseline period (1985-87). Other possibilities include allocations that are based not only on past levels of emissions, but also on past and projected

levels of efficiency.[3] A mechanism of this type could result in a substantially different distribution of permit "wealth" than an auction-based approach.

Determining an historical baseline for primary fuel producers will be relatively easy given that production data at the firm level are reliable and are tracked by the Energy Information Administration (EIA). For electric utilities, the establishment of an historical baseline should also be relatively straightforward, as historical fuel consumption is well documented. In addition, those sources included in the SO_2 allowance program are legally required to report their CO_2 emissions.

Pros and cons. An administrative system for allocating permits would have the following main advantages:

- Allocating permits directly to emitters or other affected groups avoids large revenue streams (potentially $50-$150 billion annually) flowing through the government. As noted above, this precludes using these revenues to reduce the cost of curtailing GHG emissions, but it also reduces government overhead and precludes redirecting the revenues to socially unproductive uses.

- The most relevant experience in permit trading programs of this type comes from the Acid Rain program; in that program, permits were allocated based on historical fuel use. This offers some evidence that this approach could be carried out in the context of carbon, although the carbon example is vastly more complicated

But an administrative system would have the following main drawbacks:

- Unlike an auction-based system, an administrative system confers a substantial amount of wealth on those to whom the permits are awarded. This could result in an unappealing distribution of "permit wealth." For example, if permits were distributed according to historical emissions, the biggest polluters might be inappropriately rewarded, while more efficient, clean producers could be (relatively) penalized.

- Another concern with an allocation scheme is that the decision about to whom permits should be allocated could influence the decision about who should have to hold permits. For example, for political reasons it might be decided to allocate permits to end users of fossil fuels. In order to reduce cash transactions in permits and make the permit-wealth transfer implicit rather than explicit, there might also be pressure to require end users to hold permits, even if it is more efficient to require primary energy producers to perform this function (see Section V). In other words, a particular allocation scheme could create political pressure to adopt an administratively inefficient permit-holding requirement.

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3 With any approach, not just an administrative allocation scheme, it might be desirable to allow credit for early emissions reductions (those achieved prior to the start of the program, but after the baseline period), in particular for those that took such GHG emission reduction steps as part of government-sponsored voluntary programs.

C. Tradable credits: an approach based on performance standards

While the first two methods for allocating permits focus directly on emissions, a "credit program" would establish a set of regulatory performance criteria for emissions sources. Sources that exceed a standard would earn credits that could be sold to sources that fail to meet a standard. For instance, rather than require permits for the production (or use) of gasoline, a standard could be set for the fuel efficiency of cars that would be consistent with a total emissions level. Under this approach, a manufacturer that exceeded this performance standard could be rewarded with tradable credits, which could be sold to manufacturers that are unable to achieve the standard. This approach would not directly set a quantity cap on emissions; presumably, the regulatory standards would have to be adjusted over time to ensure that they produce the desired emissions outcome.

A credit-based program requires that a regulatory standard be established against which performance is measured. Regulatory requirements for sources would depend on the nature of their emissions, measurement, administrative and baseline issues. Credits would be generated by sources with emissions below the regulatory requirement. Under a credit program, the set of performance standards for all sectors must be consistent with the national target. Since total GHG emissions are not directly limited, such compliance would have to be projected based on an analysis of the performance standards. For example, for the automobile industry it would be necessary to determine if changing the fleet vehicle performance standards would achieve the level of reductions expected from automobile manufacturers. This requires an assessment of fleet mix, sales levels, vehicle miles traveled, and vehicle lifetimes.[4]

Pros and cons. A system based on a performance standard would have the following main advantage:

- Such a program would address sources for which it is difficult to establish baseline emissions, allowing a larger number of source types to be included than may be feasible under an emission permit program, especially if permits are allocated and traded on a sectoral basis. For example, allocating permits to the automobile manufacturing sector for the total emissions associated with the fleet may be technically difficult. However, establishing fleet efficiency standards and calculating emissions reductions that result from beating the standard may be somewhat more feasible. Appliance and heavy equipment manufacturers could also be subject to a credit program based on efficiency standards.

On the other hand, a performance-standard-based approach would have the following disadvantages:

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4 In order to verify a tradable performance credit, the creator of the credit would need to estimate total emissions reductions. Monitoring or estimation methods would have to be approved by the regulatory system. A credit program would likely require protocols for calculating emissions reductions and associated credits for each type of source. The authenticity of the reduction would have to be approved by the regulator authority during the emissions reduction certification process and during a trade. Under existing credit programs, an emissions reduction must meet several standards to receive certification.

- It would not focus directly on emissions. For example, a system of this type might reward the purchaser of a high-mileage vehicle who drove that vehicle 24 hours per day, while penalizing a collector of low-mileage vehicles who only rarely drove his/her vehicles. A permit-based approach would (appropriately) penalize the first more heavily than the second.

- The legislative and regulatory process to establish standards for many sources could be substantial. A more elaborate structure for monitoring and enforcement would have to be established, and *indirect* procedures would have to be developed to ensure that emissions targets were met. Since this system is indirect, it would allow more scope for the private sector to find ways to avoid restrictions through product substitution (such as occurred with the development of Sport Utility Vehicles, which qualified as trucks and not cars, under auto CAFE standards).

- A separate set of procedures would have to be established if credits were to be traded across sectors, and in order to have a clear idea of the implications of any given performance standard for carbon emissions. In essence, performance against standards would have to be translated into the equivalent of emissions standards. The regulatory framework for fully tradable credits would be comparable to the framework required for setting emissions rather than performance standards.

IV. Implementation issues relevant for any tradeable-permits system

A number of important design issues would have to be confronted in any program of tradeable permits regardless of the method used to distribute permits.

A. Permit Lifetimes, Banking and Borrowing

One such issue is the time period to which the permits pertain, and the extent to which permit banking and borrowing will be allowed. Banking and borrowing provide flexibility to companies when making operating and investment decisions. Options include:

Issue permits for a fixed time period of one to ten years; allow banking, but not borrowing outside the time period. Under a regime of this type, firms could bank any permits for later use, regardless of stated expiration date. Permits could also be sold forward for use in future periods. However, firms could not exceed the emission levels specified in their permits, even if they promised to "repay" their permit deficit with interest in the future. The ability to bank GHG permits may encourage early reductions. However, participants might not bank if they are uncertain over such issues as the banking period or the future value of a permit.

Allow borrowing. Firms could be allowed to exceed their permitted emission levels provided they restore their excess emissions in the future, possibly with interest. While potentially reducing costs, this system raises questions concerning enforcement and the level of emissions during the borrowing period. Some mechanism would have to be

devised for ensuring compatibility with the national targets.

B. Market Structures

Permits could be traded either through bilateral transactions, brokers, or a central exchange. Bilateral markets require only a buyer and a seller. Brokers, acting as aggregators in a third-party role between buyers and sellers, can reduce transaction costs. A central exchange, such as New York Mercantile Exchange or the Chicago Board of Trade, would introduce overhead costs, but would also eliminate search costs for buyers and sellers, establish trading procedures, reduce credit and trade failure risks, and serve as a means of broadcasting information about current prices. The central exchange would act as the ultimate guarantor of trades and hold all clearing members accountable for their transactions.

C. Monitoring and Enforcement

If the permit-holding requirement were imposed at any stage in the distribution chain prior to final consumption (for example, at the refinery level in the case of petroleum products), it would not be possible literally to measure $_{GHG}$ emissions because the emissions would not yet have taken place. However, emissions *potential* could be monitored on the basis of production (as measured by volume or mass) and carbon content. Emissions potential could be verified in periodic audits, where, for example, receipts could be examined for fuel volumes sold, and emissions factors applied to determine if reported emissions potentials are reasonable. Measurement of the emissions and global warming potential of other greenhouse gases present more difficult monitoring problems (see below).

Permit trades could be tracked and recorded in a system similar to the SO_2 Allowance Tracking System under Title IV of the CAAA.

A permit system would also require penalties and incentives to ensure compliance. Compliance could be most easily verified if all emissions sources were directly monitored. Utilities must track CO_2 emissions at units affected by Title IV (using continuous emissions monitors (CEMs) or other means). Therefore, directly ensuring compliance for these sources will be relatively easy. Monitoring emissions for small industrial and utility sources would be very costly; as a practical matter, compliance would have to judged based on emissions potential, *i.e.*, fuel inputs and carbon emissions factors. Under a program in which primary fuel producers are required to hold allowances, permits would be required for the carbon dioxide (CO_2) emission potential contained in fuel extracted and sold, a relatively easy basis for ensuring compliance. .

D. Administrative Costs

The administrative costs associated with program implementation vary depending on where the emissions trading program is targeted, and on how many sources are included in the program. Regulated entities would be required to keep records of fuel production or emissions and to report this information to the government. The government's administrative costs would consist of processing this information, reviewing it for completeness and accuracy, and maintaining

records. There could also be detailed audits of selected submissions.

Under the SO_2 allowance program, approximately 75 percent of staff resources at the Federal and State level are associated with the measurement, processing, and tracking of emissions data. An even larger percentage of industry administrative costs for the SO_2 program go towards these activities. A small amount of resources go towards processing information about trades.

Administrative costs could be substantially higher if the emission trading programs were to be based on the "tradable credits" approach. Under a program of this type, standards would have to be set and government certification would typically be required when quantifying the amount of credit to be given to any source performing at a level superior to the standards.

E. Leakage

Leakage occurs when regulated sources (such as the electric utilities, heavy manufacturers, and transportation manufacturers) shift production to sources that are not regulated (e.g., due to their size) or when carbon-intensive production is shifted overseas. The latter problem is clearly more serious in terms of its effect on the U.S. economy. For example, energy-intensive industrial sectors (*e.g.*, steel or chemical production) could relocate outside the United States. As the international control regime may initially cover only Annex I countries, the prospect of production shifting overseas is real. The issues of international leakage will need to be addressed and negotiated within the context of a global treaty as well as within the context of various trade agreements (such as NAFTA) and jurisdictional bodies (such as the World Trade Organization).

F. Setting Limits on Total Costs

One characteristic of emissions trading is that while the total quantity of emissions is fixed, the costs of compliance are uncertain. While analysts may attempt to predict what the resulting permit price and program costs might be if greenhouse gas emissions are constrained, the actual path of economic growth, energy prices, and technological advance may differ from assumed levels, resulting in actual costs being higher or lower than expected. The government could take actions to limit the extent of uncertainty about cost both on the upside and on the downside.

For example, there are a number of actions that the government could take to ensure that total costs do not rise above an acceptable level:

> *Issue more permits:* If the permit price exceeds certain pre-specified levels, the government could issue more permits and make them available to the permit market either through auctioning or some other allocation mechanism.
>
> *Establish "excess emissions fees":* The government could establish noncompliance fees that would be levied on any emissions not backed by permits. Thus, firms could either buy permits for their emissions or pay the excess emissions fees, effectively limiting total program costs.

Either of these options could cause the U.S. to exceed its targeted emissions budget. Thus, it may be desirable to pursue them only after all reasonable alternatives (such as joint implementation and purchase of permits on the international market) are exhausted. The government could compensate for increases in emissions by issuing additional emission or energy efficiency standards, pursing other programs to reduce net emissions (e.g., carbon sequestration), or officially borrowing on its international account (currently permitted under the U.S. international proposal).

To mitigate the risk of exceeding emissions targets, and because interim emissions reduction goals are insufficient to meet longer-run atmospheric concentration goals, it might be reasonable to set a floor on total costs. Under this approach, if the price of a permit was below a threshold, signaling a low-cost of reducing emissions, the number of permits could be further reduced, either moving the economy more rapidly toward its ultimate goal.

V. Imposing the Permit-Holding Requirement

Determining who must hold permits is a separate, though related, decision from deciding how permits should be allocated. A number of factors should be considered in determining where to impose the permit-holding requirement:

Coverage: While it may not be necessary to ensure that every ton of greenhouse gas is accounted for within an emission trading regime, the scope of coverage of the trading program should be broad enough to ensure compliance with targets set in accordance with an international agreement. In general, imposing the permit-holding requirement earlier in the distribution chain rather than later tends to give the program a broader scope.

Administrative and compliance feasibility: The number of sources involved in the trading program should be small enough to be administratively feasible. In addition, monitoring and verification of permit compliance must be possible for those included in the program. Imposing the permit-holding requirement earlier rather than later tends to advance this objective as well.

Market Impacts: The permit program should be designed to avoid inefficient and counterproductive decisions to exclude some sources of GHG emissions from permit requirements. For example, exempting certain sizes or categories of sources from permit requirements because of administrative or equity concerns (*e.g.*, small boilers or home-heating oil) would have competitive implications within the energy market, and would lead to important leakage problems. This consideration suggests that the program should be as broadly applied as possible. Once again, imposing the requirement earlier, on major carbon sources, advances this objective.

Public Acceptance: The program must consider the ease or difficulty with which the public would accept various allocation approaches. In general, the public will be more likely to accept a program that is designed to achieve an efficient outcome with minimum

compliance burden.

Consistency with the international trading system: The domestic program should be consistent with any international prescriptions concerning the coverage of sources and gases.

A. Requiring Primary Fuel Producers To Hold Permits

Under a program in which primary fuel producers are required to hold allowances, permits would be required for the carbon dioxide (CO_2) emission potential contained in fuel extracted and sold. Oil, gas and coal producers would have to hold allowances at either the point of extraction, point of first inter- or intra-company transaction, or at the distributor level. Primary fuel and refined product imports and exports would also need to be accounted for in such a system.

Who Is Required To Hold Permits There are various levels within the primary fuel-producing sector—extraction, processing, refining, and distribution—where a permit program could be implemented. Alternative methods of implementing a primary fuel permit program include:

Requiring permits upon extraction. Approximately 600,000 oil wells, 260,000 gas wells and 3,600 coal mines would require permits at this level. The total number of companies involved would be 2000 oil and natural gas producers and 3600 coal companies. The administrative complexity of the system would be magnified considerably if the decision were made to monitor and verify at the source level rather than at the company level.

Requiring transporters or distributors to hold permits. A distribution-level system would target natural gas distributors, and gasoline and other petroleum product distributors (e.g., commercial, industrial and home heating oil distributors). Advantages of this approach include reliable data quality and monitoring feasibility. However, the number of potential sources is extremely large. *[Can we supply a number? Why do we think that data quality would be more reliable here, or that monitoring would be more feasible?]*

Requiring permits at the processing level. Permits could also be issued to processors -- natural gas processors, coal blending/cleaning facilities, and refiners. At the processing level, there are 200 oil refineries, 3,600 coal blending/cleaning facilities and 623 natural gas processing facilities (responsible for processing approximately 89 percent of total gas processed in the US). Coal processors are typically affiliated with mines. Therefore there is little practical difference between requiring permits at the point of extraction or processing for coal. For refineries, permits could be required for crude oil input. This would have the effect of capturing imports and excluding exports of domestic crude products *(does this have international trade implications vis-a-vis the alternatives?)*. Requiring permits for product output (e.g., gasoline, resid, distillate) would have the benefits of allowing non-combustion products to be excluded from the system (if desired). However, it would not capture the carbon associated with the fuel used in the refinery process *(how big a deal is this? What share of carbon?)*

Requiring permits at the point of first sale (a permit is surrendered with the first inter-or intra-company transaction). Such a system would include transactions between a coal company and an electric utility, between a natural gas producer and its marketing arm, between a natural gas producer and a broker, or between an oil extraction company and its refinery operations. It would thus target under 5000 points in the energy chain. Fuel importers would also require permits to import fuel. This would capture carbon from fuel consumed in the refining process.

Pros and cons. Require primary fuel producers to hold and use permits would have the following main advantage:

- The number of primary fuel producers is small relative to the number of emitters. It would be much easier to attain comprehensive and direct emissions coverage with this approach.

On the other hand, this approach would have the following disadvantage:

- Administrative allocation schemes that are focused further down the distribution system will be difficult to integrate with this approach. This is not a problem with an auction mechanism.

B. Imposing Permit-Holding Requirements by Sector

An alternative approach, which might be adopted if permits are administratively allocated by sector, would be to require the participants each sector to hold and use permits. Although this system would be most comparable to the current SO_2 emissions allowance trading system, it would be fundamentally more difficult to implement because of the number of emitters. As indicated, utilities account for about one-third of total CO_2 emissions. Transportation-related emissions account for one-third and the residential, commercial and industrial (less electricity generation) sectors combined account for one-third.

Including the six largest industrial CO_2 emitting sectors (including electric utilities, but excluding the transportation sector) in a sectoral trading program would encompass about 20,000 market participants and 90 percent of industrial CO_2 emissions (representing about 51 percent of total US CO_2 emissions). Given their large number of sources, the residential, commercial and transportation sectors pose administrative problems in a program where permits are required for actual emission. Mobile source emissions could be indirectly included in the system by including refiners in the program. Residential and commercial emissions could be similarly addressed by focusing upstream in the energy system.

It is reasonable to conclude that a sectoral emission allocation could work only for large emitters. For the literally millions of small emitters, permit requirements would have to be shifted upstream in a manner that would mimic the permit requirements for primary fuel producers discussed in the previous section. In other words, permits could be allocated to electric utilities or large industrial emitters, but it would be inefficient to require that these permits be required

for emissions at this stage in the production chain. Regardless of who gets the permits, requiring the permits at an early stage of this chain offers administrative advantages and the ability to comprehensively cover all emissions. Appendix B provides additional background on sectoral issues.

Pros and cons. A system based on imposing permit-holding requirements by sector would have the following main advantage:

- If permits are allocated on a sectoral basis, it might be easier to require permits to be held and used at this level as well. It is important to emphasize that this is purely a distributional issue: with an auction, for example, there would be no strong argument for imposing these requirements by sector.

On the other hand, imposing permit-holding requirements by sector would have the following disadvantage:

- The number of emitters in each sector can be very large. Even if permits are allocated by sector, it might be simpler to require their use at a primary production level. Alternatively, tradable credits might be considered in some sectors where holding and using emissions permits would not be feasible.

VI. Incorporating Other Greenhouse Gases and Sinks into a Trading System

The latest U.S. protocol (as of June 1997) for the Kyoto agreement provides for a comprehensive target including all greenhouse gases, their sources and sinks, and references the IPCC's 100-year global warming potentials (to be updated periodically to reflect evolving scientific knowledge). U.S. emissions are 85 percent carbon dioxide (CO_2) and 15 percent other greenhouse gases. Gases differ both in their atmospheric lifetimes and in their ability to trap heat in the atmosphere. In addition, carbon is not only emitted through the combustion of fossil fuels, but is also absorbed by "sinks" such as trees and soils. At least in principle, sinks can be netted against emissions, and the other greenhouse gases can be readily converted to carbon-equivalent emissions based on their "global warming potential" (a measure of their heat trapping potential).

A. Other Greenhouse Gases

Several other gasses aside from carbon dioxide contribute to the greenhouse problem, including methane, nitrous oxides, and HFCs/PFCs/SF_6 (hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, collectively sometimes referred to as "high GWP gases"). In order to compare the "potency" of different greenhouse gases, climate researchers estimate "global warming potentials" (GWPs). The GWP relates the amount of heat trapped in the atmosphere by one unit of a particular greenhouse gas to one unit of carbon over a specified period of time. For example, the 100-year GWP for methane is 21, which means that over a 100 year period, one metric ton of methane will trap the same amount of heat in the atmosphere as 21 metric tons of carbon. The high GWP gases (HFCs/PFCs/SF_6) have 100-year GWPs ranging from 140 to 23,900. Other greenhouse gases are generally expressed in units of "carbon equivalent" to allow

for consistent reporting across all gases.

Greenhouse gases also differ in the amount of time they persist in the atmosphere. The atmospheric lifetime of carbon dioxide ranges from 50-200 years. Methane emissions have an atmospheric lifetime of 12 years, while nitrous oxides persist for 120 years. The high GWP gases have lifetimes ranging from 2 to 50,000 years.

In order to include other greenhouse gases in a permit-trading scheme, a trading ratio must be established to convert all gases into common units. The current international greenhouse gas inventory methodology uses a 100-year GWP to convert all gases to carbon equivalents. It is clear from the above discussion, however, that measurements over only 100 years will inadequately reflect the relative long-term effect of different greenhouse gases on global warming.

Several, although not all, of the many sources of non-carbon greenhouse gases could likely be included in a trading system. For example, methane-emitting coal mines, landfills, livestock manure management facilities and potentially natural gas distribution systems meet the criteria described above for inclusion in a greenhouse gas trading program. These sources account for 7 percent of national greenhouse gas emissions. Similarly, emissions of some sources of other gases could potentially be included (e.g., magnesium production). Of the remaining sources, some (such as livestock) could be handled using best management practices, while others could be left out because they are minor and/or stable in terms of emissions growth. Opportunities for unregulated sources to opt-in might also arise.

B. Sinks

Sinks play an important role in the carbon cycle. Forests, the most significant sink category in the United States, are estimated to remove 115 to 120 million metric tons of carbon from the atmosphere annually *[is this worldwide or in the US?]*. This represents more than 8 percent of the total greenhouse gas emissions in 1995. Their inclusion in the trading program would theoretically enhance the system's flexibility. Translating the potential of sinks into monitorable, verifiable, and cost effective emission reductions would require the development of a comprehensive *[Inter?]*national accounting system for sinks. Such a system would be needed to ensure that the planting of trees and preservation of forests in a given area would not result in offsetting losses elsewhere.

References

Alan Carlin, The United States Experience with Economic Incentives to Control Environmental Pollution, Office of Policy, Planning and Evaluation, US EPA, July 1992.

Decision Focus, Incorporated, *CO_2 Trading Issues, Volume 1: Emissions from Industry*, May 1992.

Decision Focus, Incorporated, *CO_2 Trading Issues. Volume 2: Choosing the Market Level for Trading*, May 1992.

Nikhil Desai and Juanita Haydel, *Carbon Emissions Potential of U.S. Fossil Fuel Production - Preliminary Data, Draft Memorandum*, ICF Resources, *Inc. to T. Terry, US EPA.*, October 7, 1996.

Daniel J. Dudek, *Emission Budgets: Creating Rewards, Lowering Costs and Ensuring Results*, presented at Climate Change Analysis Workshop, Springfield, Virginia, June 6-7, 1996.

Energy Information Administration, U.S. Department of Energy. *Emissions of Greenhouse Gases in the United States, 1987-1994*, October 1995.

Energy Information Administration, U.S. Department of Energy, *Manufacturing Energy Consumption*, 1994.

Kevin J. Fay, *Establishment of Long Term Climate Change Goals: The Need to Provide a Realistic Framework*, presented to The Climate Change Analysis Workshop, Springfield, Virginia, June 7, 1996.

ICF Resources, Inc. *A Marketable Permit System for Greenhouse Gas Emissions for the U.S. Electric Utility Sector, Review Draft*, Prepared for B. Schillo, EPA/OPPE, August 17, 1992.

R.F. Kosobud, T.A. Daly, D.W. South and K.G. Quinn, "Tradable Cumulative CO_2 Permits and Global Warming Control", The Energy Journal, 1994.

R.F. Kosobud, D.W. South, T.A. Daly and K.G. Quinn, *Tradable CO_2 Emission Permits for Cost-Effective Control of Global Warming*, Argonne National Laboratory, no date.

Paul Koutstaal and Andries Nentjes, *Tradable Carbon Permits in Europe: Feasibility in Comparison with Taxes*, June 1995.

Reinier Lock and Dennis P. Harkawik, eds., *The New Clean Air Act. Compliance and Opportunity*, Public Utilities Reports, Inc., 1991.

Gary E. Marchant, *Freezing Carbon Dioxide Emissions: An Offset Policy for Slowing Global Warming*, Environmental Law, Vol. 22, 1992.

John Palmisano, *Air Permit Trading Paradigms for Greenhouse Gases: Why Allowances Won't Work and Credits Will*, no date.

D.W. South, R.F. Kosobud and K.G. Quinn, *Greenhouse Gas Emissions Control by Economic Incentives: Survey and Analysis*, Argonne National Laboratory, no date.

United Nations Conference on Trade and Development, *Controlling Carbon Dioxide Emissions: the Tradable Permit System*, no date.

Appendix A
U.S. Experience with Emissions Trading

The United States has had experience with a number of emissions trading schemes other the SO_2 trading.

Water Effluent Trading: The US generally has regulated surface water quality through a system of discharge limits for large sources of water pollution. In addition, states have standards for ambient water quality that are often not attained even after large dischargers apply "best technology." The reason is that small ("nonpoint") sources (such as runoff from farms) contribute significantly to water pollution. A number of state and local governments are employing trading systems for watersheds that either permit trading among large dischargers, or allow large dischargers to fulfill their requirements by controlling non-point sources. These include the Fox River in Wisconsin, the Dillon Reservoir in Colorado, and the Tar-Pamlico River in North Carolina. The latter two programs are designed to manage future economic growth. Thus, the quantity of effluent allowances allocated exceeds current discharge levels. Once growth consumes this excess, trading is expected to reduce compliance costs.

Inter-refinery Lead Trading: EPA operated a lead trading program from 1983 to 1987 as it phased out lead from gasoline. Lead trading allowed refiners and importers to trade lead reduction credits in order to meet limits for the lead content of gasoline. The quantity of allowances to which a firm was entitled was determined by the amount of leaded fuel produced by the firm and the contemporaneous EPA standard. Those who bettered the standard could sell their credits to others. Some 10 billion grams of lead were traded during the course of the program at prices ranging from 0.75 to 5 cents per gram. Allowing the trading of lead credits reduced the costs of the program by approximately 20 percent.

Criteria Air Pollutant Trading: EPA first began incorporating aspects of emissions trading in its air program in 1974, when it allowed a modified source to use "credits" earned by another source within the same plant to avoid additional regulatory requirements. Since then, emission trading has substantially expanded. Trades have numbered in the thousands and have been estimated by Hahn and Hester (1986) to have saved between $525 million and $12 billion.

Market Mechanisms for Chlorofluorocarbon (CFC) Phaseout: Under the 1987 Montreal Protocol to limit stratospheric ozone depletion, the U.S. required the phase out of the production of CFCs by 1996. As part of its program, the U.S. adopted a tradable permit regime covering CFC manufacturers and importers. These allowances were allocated based on each firm's 1986 market share. As the market for CFCs declined, the system allowed firms to allocate production among different facilities according to the least-cost pattern of supply. It also gave CFC users the flexibility to switch between different CFC compounds, within the overall limit on allowances. This program helped reduce the costs of the phaseout. In 1988, EPA estimated that the cost to *halve* CFC use would be $3.55 per kilogram. By 1993, it became clear that all uses could be *eliminated* by 1996 at a cost of $2.45 per kilogram.

Appendix B
Sectoral Emissions Trading Issues

Requiring manufacturers to hold permits to emit would greatly increase the complexity of a trading system, compared with the system of requiring primary fuel producers to hold permits described in Section IV.

1. Electric Utilities

The electric utility sector emits about one-third of the CO_2 in the US totaling 495 MMTC in 1994. The number of utility point sources is limited and well defined, totaling about 2,115 generating units in 1995. As a result of the SO_2 program, the electric utility sector is one of the few in the US that is familiar with emissions limit and allowance trading programs, although only ?? generating units are currently allocated SO_2 permits. The scope of a trading program potentially impacts the comprehensiveness and manageability of the system. Key issues include the basis for control (e.g., unit specific, plant specific or company specific), the fuel coverage, the source size, and ownership issues. These are summarized below.

Allocation Basis—Entity, Facility or Source. The definition of what constitutes a "source" has an influence on coverage, the degree of leakage, and the administrative and monitoring costs. A source could be defined as a combustion unit, a plant, or a corporate entity (which may own multiple units and plants). Units covered by the acid rain program are already required to report carbon emissions data to the EPA. It is also possible to target a trading program at the company level based on total fuel inputs. This type of company level allocation could also be applied to independent power producers (IPPs), many of whom own several facilities. Smaller entities (e.g., municipals, IPPs owning one or a few small generators) could be excluded based on annual emissions levels.

Fuel Input. Covered sources could be limited to those fired by coal, natural gas, and fuel oil. Alternative-fuel fired units, such as those burning municipal solid waste, refuse derived fuels, or waste fuels (such as wood chips) may or may not be included as well. This depends on whether one considers them net emitters of carbon on a life cycle basis. Some sources co-fire with some of these fuels.

Cogeneration. Emissions permits could be granted based on utility's generation levels. Consistent with this rule, industrial cogeneration and self-generation units would be accounted for within an industrial plant's energy use.

2. Heavy Manufacturing Industries

The industrial sector emitted approximately 293 million metric tons of carbon in 1994 from the combustion of fossil fuels and industrial processes. There is no single industry sector (excluding the electric utility sector) that generates the majority of CO_2 emissions. Paper and allied products is the largest sector (including direct emissions from by-products), followed by chemical and allied products, primary metals, and petroleum refining. Cement manufacturers are the fourth

largest source category among the manufacturing sector. In 1994, calcining cement manufacture (a non-combustion process by which limestone materials are converted to lime) accounted for 9.5 million metric tons of carbon emissions, while fuel combustion accounted for another 6 million MMTC.

The industry sectors listed above represent about 58 percent of industrial emissions. These five sectors account for about 12 percent of U.S. CO_2 emissions. Individually, each represents less than five percent of total US emissions. A CO_2 regulatory program including electric utilities and the 17,000 industrial sources in the sectors listed above would thus capture about 90 percent of total industrial emissions (including utilities) and about 51 percent of total US CO_2 emissions.

The scope and effectiveness of a manufacturing sector program would depend on what level emission caps were placed, and the types of sources and fuels included. These issues parallel those in the utility sector and are discussed below.

Allocation Basis. An emissions trading program could be implemented at the corporate or facility level, or for specific sources (e.g., boilers). Corporate level fuel consumption data may be more comprehensive than industrial source data, which may not currently be tracked.

Coverage. A manufacturing trading program could be limited to specific sources, including industrial boilers, on-site electricity generation and cogeneration, and carbon (or other greenhouse gas emissions) from industrial processes (such as cement manufacture).

Source Size. Within a source category (e.g., boilers), exemptions may be granted based on size (e.g., industrial boilers smaller than 25 MMBtu/hour). Exempting small units may involve a certain amount of leakage, as utilization may be shifted from affected boilers to unaffected ones. Regulations could be designed to address this issue.
Data quality could determine the scope of a manufacturing program. Most large industrial companies probably maintain data on purchases of natural gas, coal and fuel oil at the facility or corporate level. It would be difficult to verify the accuracy of these reports and emissions monitoring may be impractical for all but the largest sources. Boiler level data would be easier to verify. However, boiler-level fuel input data is typically currently maintained by only the largest industrial sources.

3. Transportation

Motor vehicle manufacturers consumed only 0.5 percent of US manufacturing energy consumption (netting-out emissions associated with the sector's electricity use). This sector's direct combustion may be captured in a trading regime, depending on the program's scope. Much more important are the carbon emissions associated with the fleet of private, commercial, and other transportation sector equipment (such as off-road vehicles, buses, trains and planes) manufactured. The transportation sector is responsible for approximately 32 percent of US CO_2 emissions.

Unlike utility or heavy industrial sources however, the transportation sector is comprised of

millions of individual sources. Effective control of transportation emissions could involve alternative approaches directed at the equipment manufacturer, final [illegible]

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millions of individual sources. Effective control of transportation emissions could involve alternative approaches directed at the equipment manufacturers, fuel producers or end-user. Manufacturers could be required to hold permits covering the CO_2 emissions associated with the automobile fleet (and other equipment). The level of allowances required could be determined based on several factors, including:

Average fuel consumption (miles per gallon) for the vehicle fleet, weighted by sales of each vehicle or equipment type

Estimated annual average vehicle miles traveled (VMT) per car in the fleet, for each fuel type

Estimated average lifetime of a car in the fleet

CO_2 emission rates for gasoline, diesel, and other fuels.

The problem with this approach is that it does not focus on emissions, but rather fuel efficiency. An automobile that gets 10 miles to the gallon but is driven only 1,000 miles a year would bear greater cost than a 40 mile per gallon automobile that is driven 40,000 miles, despite the fact that the latter emits 10 times as much CO_2.

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Relationship Between a Domestic Emissions Trading Program and an International Emissions Trading System: International Trading by Domestic Companies

(Draft August 12, 1997)

Introduction

The Berlin Mandate calls for emissions limits for greenhouse gases (GHG) that will be binding on developed nations. The U.S. has proposed for discussion in Kyoto an agreement whereby those countries subject to binding emissions limits can trade emissions allowances among themselves. The U.S. has emphasized that any agreement should not constrain how a Party would meet its commitments, and that such a trading system is only one of the ways that countries may comply. Other Parties have supported both the trading proposal and the need for flexibility in meeting international emissions targets. If these elements are agreed to by the parties in Kyoto, each Party subject to emissions limits would be free to make several choices:

a) to participate or not in international trades of allowances;

b) to adopt domestic laws to meet the internationally-binding limits through domestic emissions trading and/or other mechanisms; and

c) if a Party both wishes to participate in international trades and adopts domestic trading, whether and how to tie domestic trading into the international trading system.

This paper explores connections between domestic and international trading schemes if the Kyoto agreement provides for international trading and if one or more Parties choose domestic trading as a means of meeting international limits. Specifically, it will discuss how a Party might consider whether to authorize a domestic company to engage in international emissions trading.

Brief Overview of U.S. Proposal for International Trading for GHG

The U.S. has proposed an international trading system based on caps, or legally binding budgets established for participating countries.[1/] Each country would agree to a budget of greenhouse gas emissions, established as a uniform percentage of those countries' emissions from 1990. The U.S. proposes a multi-year "budget" approach to smooth out annual variability in energy demand caused by

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1/ The binding emissions limits would apply to developed countries listed in Annex A of the proposed instrument, which would be composed of countries listed under Annex I of the Framework Convention on Climate Change. The limits will also apply to those developing countries which voluntarily commit to budgets under Annex B.

weather, economic cycles, or other factors. Budget periods ranging from 3 to 10 years currently are being considered.

Parties may buy or sell GHG emission allowances (the U.S. recommends tonnes of carbon equivalent emissions allowances, or "tonnes allowed") in order to meet their emissions limits. In order to participate in international emissions trading, however, a Party would have to meet certain minimum requirements. A Party would need to 1) establish an accurate and verifiable emissions measurement and reporting system, 2) create a national mechanism to certify and verify trades, and 3) have a credible domestic compliance and enforcement program. Non-complying Parties would be restricted from selling or buying allowances. Further, a Party cannot sell any of its allowances in a given budget period if it has exceeded its emissions budget for that period. Moreover, where a question of noncompliance has been raised against a Party, any allowances traded thereafter cannot be used to meet budget obligations until the question is resolved.

The U.S. proposal also would allow private entities to take actions leading to international trades of tonnes-allowed, if authorized by the Parties involved. Such authorization would be necessary because each Party is responsible for meeting its commitments, and transfers would modify those commitments.

Domestic Trading as a Way of Implementing International Obligations

The Assistant Secretary-level working group has reached a preliminary consensus that domestic emissions trading should be an important part of the U.S. effort to comply with international GHG emission limits. Domestic trading of GHG emissions -- perhaps in combination with other policies such as technology enhancement and standards or regulations -- is attractive because it may allow less-costly reductions in emissions. Moreover, GHG emissions seem to be a problem well-suited to a trading solution because the effects of the emissions are not toxic, are felt globally, and do not depend on the season or year of the emissions. On the other hand, the working group has acknowledged that designing and implementing a domestic trading system will be daunting because emissions trading has thus far been tried in situations much smaller in scale and scope than a nation-wide GHG emissions trading system.

The U.S. proposal is that countries be allowed to trade emissions allowances and that countries are ultimately responsible for meeting emissions limits. The proposal envisions that country A may trade some of its emissions allowances to country B for any reason, including to facilitate a deal negotiated between companies Y and Z in the two countries. In such an event, country A might reasonably expect company Y to decrease its emissions as part of the deal in order to help make up the loss of international emissions allowances traded by country A. Conversely, country B -- whose international emissions allowances has been increased by the trade -- would presumably allow company Z to increase its emissions. If either country A or B has a domestic trading system, that country could effectuate the increase or decrease in its company's emissions limits by allotting or canceling domestic emissions allowances. If both countries A and B have domestic trading, the question arises whether and under what conditions these transactions together might constitute the functional equivalent of a company-to-company international trade.

It is worth noting that the international community has no precedent in establishing or enforcing an emissions trading system as proposed by the U.S. This fact, considered in light of the new scale involved in domestic emissions trading systems, counsels for caution and for identifying and resolving in advance potential difficulties in combining international and domestic trading. There has been some discussion of establishing more-or-less self-initiated international markets, where brokers would make international company-to-company trades and national accounts would be automatically "cleared" at specified periods. The first step, however, is to consider what mechanisms a country might need in deciding whether to approve a single transaction with another nation to facilitate the equivalent of a company-to-company trade, and what factors should be considered in authorizing a trade.

Mechanisms for Approving International Trades by Domestic Companies

A Party is ultimately responsible for meeting its emissions limitations. Since international trading by domestic companies may effect a Party's commitments, i.e., by increasing or decreasing that Party's allowances, a Party may wish to develop a number of mechanisms to regulate trades between its domestic companies and other Parties or foreign companies,[2/] including:

- Authorizing Entity. A Party may seek to review and authorize international trading by domestic companies. If so, a governmental entity may be needed to coordinate and authorize this trading. This may be the same entity that administers the domestic trading scheme, or a separate entity with specific foreign commerce expertise, and can be created as a new institution or part of an existing federal agency. A separate authorizing entity would need to coordinate closely with the agency administering and enforcing the domestic trading scheme. One agency responsible for authorization, administration and enforcement would need to be adequately funded and have sufficient infrastructure to conduct the myriad tasks involved.

- Approval Procedures. Procedures may need to be developed for when and how international trades by domestic companies are approved. For example, domestic companies may be required to apply for preauthorization for all international trades, at least for an initial period of time, to ensure the integrity of the system. At a later stage, reporting by companies may be sufficient, particularly if certain countries are preapproved for trading (see below). Procedures would also be necessary detailing how a company would apply for approval and what information it should provide in the application. This process must be sufficiently informative and transparent to ensure the integrity of the trades. Finally, there need to be procedures developed on how applications are reviewed, on what criteria (see factors below), and the rights of applicants or others to challenge final agency decisions. Note that the decision to deny a trade with a particular country or companies within that country may raise foreign trade issues.

2/ The analysis would be the same for multinational corporations. A company in one country that wishes to engage in trades with an operation or an affiliate in another would presumably need the authorization of both countries.

- Domestic Compliance Mechanisms. To meet international requirements for trading, a Party would need to know if its own company was making a valid trade based on real reductions. Hence, a Party would need to develop domestic compliance mechanisms such as monitoring, reporting, auditing and inspections to verify its own companies' trades. At a minimum, domestic compliance mechanisms should be designed to (1) detect shortfalls between emission levels and tradeable allowances, (2) detect fraud or misreporting, (3) ensure the integrity of allowances being traded, (4) authorize inspection or monitoring, (5) enable prosecution of responsible entities or individuals, including ensuring that an appropriate administrative or judicial forum exists and will be used, and (6) impose appropriate penalties or sanctions to deter violations. Domestic compliance mechanisms should also ensure that violations are addressed as they occur or at some reasonable interval in the budget period.

- International Compliance Mechanisms. Before authorizing an international trade by a domestic company, a Party would also need to know whether a foreign country was in compliance with international rules, including the quality and effectiveness of the foreign country's domestic compliance and enforcement scheme. Otherwise, the foreign country may be prohibited from trading or the allowances traded may be deficient or unusable. Moreover, there may be situations when a Party would seek information concerning a foreign company, such as when it receives information that the company is engaging in fraudulent behavior. Thus, a Party would need the ability to assess another Party's compliance with international requirements and to develop cooperative enforcement mechanisms, such as mutual legal assistance agreements.

- Conditions and Limits on Trading. A Party may place limits or conditions on company-to-company trading. For example, if allowances were only allocated to certain sectors or the allowances were specific to those sectors, a Party may not want those allowances traded with companies in countries without similar conditions.

- Liability Rules. A Party should consider whether additional rules need to be developed regarding liability for improper or deficient trades. For example, domestic companies may sue foreign companies or even the Party that authorized the trade for damages arising from deficient trades. Similarly, since Parties are ultimately responsible for meeting their own budgets, a Party may seek to hold another liable for deficient trades between companies. Parties may also require compensation from their companies to meet any national liability.

- Brokers and Third-Parties. Parties need to consider how to apply the above mechanisms to trades initiated by brokers or other third parties that are not actually making emissions reductions or initially allocated allowances. For example, a Party may wish to look beyond the broker to the emissions reduction to determine the integrity of the allowance traded.

Factors to Consider in Authorizing International Trades by Domestic Companies

For the sake of discussion, assume that mechanisms are in place and the U.S. is asked to

approve a trade with another country or a company in another country. These are some of the factors that the U.S. may wish to consider:

- International compliance. As noted above, the U.S. proposal is that international trades may be made only with a country that is in compliance with specified measures of the Kyoto agreement that are specifically designed to ensure the integrity of such trades, such as adequate domestic monitoring, verification and enforcement programs. Thus, the United States would presumably want to know that the other country is indeed in compliance with these provisions, and would not authorize international trades with countries or companies within countries not meeting these standards. The United States could be put in a difficult position if the other country's compliance is not determined internationally until after the trade is made. If the other country were later determined to be out of compliance, the international trade would presumably be invalidated, which may have some consequences for domestic emissions limits.

  Similarly, under the U.S. proposal, where questions of compliance are raised, trading may occur, but allowances traded thereafter may not be used to meet emissions limits until the question is resolved. Again, even the temporary suspension of use of allowances may have consequences for domestic emissions limits. Conceivably, the U.S. may wish to withhold its agreement to engage in trades with other nations whose compliance with the agreement has been questioned.

  These concerns indicate the importance of immediate determinations of international compliance and resolution of questions of noncompliance. Without prompt and certain imposition of sanctions for noncompliance, Parties could be tempted to misreport emissions, ignore or fail to investigate fraud, or generally under-enforce at a domestic level.

- Domestic Compliance and Enforcement. Company-to-company international trading could complicate compliance monitoring as well as detection and prosecution of violations and fraud. For adequate compliance monitoring, the market for company-to-company trades must be transparent so that the United States can obtain timely and complete information from the other country to the transaction and from the relevant private parties.

  The market for international company-to-company transactions could be an opportunity for fraud. The U.S. would presumably want to know that the other country is cooperating in preventing, detecting, and prosecuting fraud in such transactions. Moreover, the United States would want assurances that the other country would cooperate with any domestic investigation and prosecution of such fraud by providing access to information and by extraditing persons accused of U.S. crimes in connection with such transactions.

- Implementation. The U.S. may consider how easy the other country has made it to authorize company-to-company trades. For example, assuming that the U.S. creates an entity that can authorize as well monitor, track and verify trades, it is important to determine if the other country have an equivalent central point of contact and whether it would be willing to share relevant information.

- Reciprocity. The U.S. may consider whether the other would reciprocate by engaging in similar trades proposed by U.S. firms. If the U.S. approved of a domestic facility buying certain emissions allowances from a certain country, would that country reciprocate in the future by buying emissions allowances from the U.S.? (This issue may not be that significant, as we anticipate that the U.S. will be a net purchaser of emissions allowances.)

- Trade agreements and competitiveness. Authorizing or rejecting a trade may result in anti-competitive effects or violate international trade or investment agreements. Presumably, the U.S. may decide that its companies should not trade with a particular country because of concerns with the integrity of that country's trading system, and this may raise issues under international trade and investment agreements. This issue should be analyzed in more detail in other papers.

- Scope of emissions sources and sinks. The U.S. should consider whether other countries' trading systems encompass the same sources and sinks that are covered by the international protocol. The U.S. would not be able to authorize buying an allowance that was generated by a non-covered source.

- Budget periods and time frames. The U.S. should consider whether the other countries measure or report their allowances in the same time frames as the U.S. The U.S. proposes a budget period from 3 to 10 years (to be negotiated), with annual submittals of accounting of allowances. It is possible that a domestic system could have a smaller budget period. For example, if the international budget period is ten years, the U.S. could divide up its allowances temporally and set shorter time frames for domestic trades to encourage reductions in early years. It is also possible that a domestic system could require more frequent reporting and allowance accounting. If the U.S. were to require more frequent reporting for domestic enforcement purposes, it would be important to ensure that international trades involve countries with similar compliance periods.

- Respecting domestic limitations. The U.S. should consider whether trade with another country might undermine domestic trading limitations. For example, if the U.S. were to limit trading domestically (such as limits on who accrues allowances and how and where they are traded), the U.S. would need to make sure that international emissions trades (or even trades from other domestic sectors) do not evade those restrictions, such as by allowing a restricted allowance to be exchanged or laundered for an unrestricted one.

- Differing Domestic or Regional Trading Schemes. There may be other differences between domestic trading schemes that need to be addressed prior to authorizing a company-to-company trade, such as internal procedures or limitations. Conceivably, other nations may impose restrictions or conditions on trading which differ substantially from U.S. policy or practice. Trading with a regional scheme (e.g. EU bubble) may also present different or more complex concerns such as determining the adequacy of regional compliance and enforcement and working with several sets of authorities.

The U.S. could review all these factors on a transaction-by-transaction basis. This approach, however, could be burdensome if there were a large number of transactions. The decision to authorize transactions could be simplified and possibly made ministerial if the U.S. could make determinations from time-to-time that trades from certain countries meet minimum criteria. Such determinations might be made easier by bilateral or multilateral agreements about some of these matters. If the agreements were sufficiently binding, the U.S. might agree to give consent in advance to company-to-company trades from certain countries, subject to trades being "cleared" by a notification and verification process.

Conclusion

Hence, the U.S. needs to give thought as to what mechanisms it would need to allow its companies to engage in international trading. Moreover, before authorizing an international company-to-company trade, the U.S. would need to consider a number of factors that could affect the integrity and advisability of the trade. This would suggest that any domestic trading scheme should contain sufficient procedures to allow the U.S. to make such considerations in a timely and effective manner.