Policy

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 [illegible] exists, involving both bilateral exchanges between companies, and brokered [illegible] 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 for 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 building [illegible] emissions can be the basis of some portion [illegible]).

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 obviate 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.

[illegible] desirable to allow credit for early [illegible] (baseline period) in particular for [illegible] 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 advantages:

- 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 emissions reductions would have to be approved by the regulator authority during the emissions [illegible] programs, an emissions reduction must [illegible]

- 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 [illegible] 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

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 [illegible] of 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 3000 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? Why [illegible])*

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 and large industrial emitters, but at wholesale [illegible] permits would be allocated

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).

1. 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 [illegible]. 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 U.S.?]*. 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. 23, 1992.

John Palm, and *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.

[illegible] however, the transportation sector is comprised of

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.

THE PRESIDENT HAS SEEN
10-6-97

Policy

THE WHITE HOUSE

WASHINGTON

October 5, 1997

MR. PRESIDENT:

This is a decision memo on climate change. I am forwarding it to you now because you may want to look it over before the White House Conference on Monday. ***However, you should under no circumstances actually check off a decision before the White House Conference is held, since that Conference is intended to be a forum that is still able to inform your policy thinking.*** In addition, since the memo was just finished late tonight, other relevant White House staff, like Erskine, Rahm, John Podesta and John Hilley, haven't had a chance to comment on it yet. I also expect that you may want to have one more meeting on this subject before reaching a final decision. Because of the late hour at which it was finished, and the fact that it is not yet ripe for decision, Phil hasn't done a summary of it yet.

Todd Stern

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THE PRESIDENT HAS SEEN
10-6-97

THE WHITE HOUSE

WASHINGTON

October 4, 1997

MEMORANDUM FOR THE PRESIDENT

FROM: **GENE SPERLING**
KATHLEEN McGINTY
DANIEL TARULLO
JIM STEINBERG
TODD STERN

SUBJECT: **Climate Change Recommendations**

Together with principals, we have worked hard over the past several weeks to put together options for you on climate change. As we note below, we have reached consensus in many areas -- such as our general stance towards developing countries, and a preliminary package of policies that we could embrace independently of the international negotiations. But reflecting the magnitudes of the tradeoffs involved in this issue, we have not been able to reach full Cabinet consensus on some fundamental aspects of our policy stance. This memorandum therefore presents three different plans, with their supporters and their pros and cons.

The memorandum is organized into four sections:

I. Summary of difficulties we face
II. Developing country policy
III. Common components of all three options
IV. The three options

I. SUMMARY OF DIFFICULTIES

As we have emphasized in previous memos and meetings, the complexity of the issue is reflected in four different constraints:

- Environmental. This issue is the premier environmental challenge of our generation. The environmental community is pushing for strong, early action to reduce greenhouse gas emissions.

- Diplomatic. Much of the world is calling for deep, early emissions reductions. The European Union is proposing 10-15 percent cuts from 1990 emissions levels by 2010; Japan is proposing 0-5 percent cuts in the same period.

- Economic. Costs are substantially higher the earlier emissions reductions are required. The cost of deep, early emissions reductions could be very large.

- Business/Labor/Hill. Aggressive approaches would expose us to well-financed campaigns -- by major corporations and labor unions -- that demagogue our policies as excessively costly and as a large energy tax increase.

In essence, the three different plans represent different views about the importance of the first two constraints relative to the second two constraints:

- The first plan moves away from the 1990 target and substitutes a lower-cost approach for achieving emissions reductions. This strategy emphasizes the third and fourth constraints by allowing a more gradual adjustment period.

- The second plan commits the nation to 1990 by 2015 or 2020 -- while capping the economic cost. It tries to address all four constraints, but could be viewed as not meeting any of them adequately.

- The third plan, which involves a commitment to 1990 levels by 2010 or 2015 while capping the cost at a higher level than under the second plan, emphasizes the importance of our environmental responsibilities and maximizes our chances for (but does not in any way guarantee) a successful agreement at Kyoto.

II. DEVELOPING COUNTRY POLICY

Given domestic political realities and the underlying environmental imperative, your advisers favor a tougher line on developing countries than we have taken to date. It is important to emphasize that developing countries are unlikely to agree to even our current demands, let alone tougher ones, in the foreseeable future. Furthermore, we will get little (if any) support from other developed countries for our position. *The position recommended by your advisers on this issue could very well endanger an agreement being signed this December in Kyoto.*

In particular, your advisers favor pushing for a "Kyoto Mandate" this December. The mandate would set the terms for a new round of negotiations with respect to:

- Binding emissions targets for key developing countries (China, India, etc.); and

- A "graduation mechanism," under which countries automatically assume additional obligations as they develop.

Developing country targets would be less stringent than those for developed countries, and might include a ceiling on costs.

There is some disagreement among your advisers on exactly how to proceed as we seek greater commitments from developing countries.

- Under the "two-step approach," which is favored by the State Department, Energy Department and your environmental team, we would try to reach agreement among developed countries in Kyoto, but not seek to implement that agreement until negotiations with respect to developing country commitments are complete (several years, at a minimum). One possibility would be for you to issue an authoritative statement that we would not submit a treaty for ratification until the Kyoto Mandate was met. Another possibility would be to take a formal reservation to any agreement in Kyoto for the same purpose.

- Under the "one-step approach," which is favored by some on the economics team, we would decline to adopt an agreement in Kyoto, and not adopt any new agreement with respect to developed country commitments until developing country commitments are agreed as well.

The two-step approach offers the possibility of maintaining momentum in the international negotiations (although even this approach will provoke a negative reaction abroad and could preclude an agreement in Kyoto). The cost is that we will have committed to a target and timetable before we know what we'll get from developing countries. It is unclear how the Senate would react to such a strategy.

Our best approach may be to maintain some ambiguity about our precise intentions: to emphasize that we won't bring back a treaty without real commitments from the developing countries. Since we don't know precisely how other countries will react to the one-step or two-step approach, it may be best to emphasize the general point -- and to maintain some flexibility for our negotiators in Kyoto.

Regardless of our approach, however, demanding binding targets from key developing countries implies that we will not be ratifying any international climate agreement for at least several years. Furthermore, *insisting on a Kyoto Mandate may produce an extremely negative reaction abroad, and that reaction could preclude any agreement in Kyoto even under the two-step approach.*

III. COMMON COMPONENTS OF ALL THREE PLANS

In addition to toughening our stance on developing countries, your advisers agree that the following policy components should form part of any plan on climate change:

1. Tax cuts

There is much interest in a Climate Change Tax Plan package of tax *cuts* in the near term

to spur energy efficiency and lower-carbon technologies. But there are two critical questions about such a tax package:

- An overall strategic question, given the budget agreement, is whether we want to offer tax cuts in any area. A potential danger with proposing a Climate Change Tax Plan -- emphasized in particular by Secretary Rubin -- is that we could open up a bidding war over tax cuts generally. If we decide to include tax cuts in our FY 1999 budget anyway, this is clearly less of a problem.

- A specific question, if we decide to offer a tax cut package, is how best to design the package. Treasury is working with DOE, EPA, and other agencies to put together a package of tax cuts amounting to perhaps $1.5 billion per year. But accordint to Treasury staff, the options are unlikely to produce carbon reductions for less than $100 per ton.

Some of the preliminary ideas include: tax subsidies to convert coal-fired power plants to gas; extension of the existing tax incentive for wind and "closed loop" biomass energy; tax credits for purchases of "superstar" energy-efficient devices and fuel-efficient cars; investment credits for energy-efficient buildings; and an expanded research tax credit for energy-efficiency research. The package will be further developed and refined over the next week. The goal is to be prepared in case you want to announce the broad outlines of a tax cut plan when you announce our overall policy package later this month.

2. Federal R&D effort

Your advisers support an aggressive Federal technology and R&D effort, including an additional $500 million per year starting in FY 1999 and ramping up to an additional $1 billion by FY 2003. The Department of Energy's 5-Labs study, the Department of Energy's 11-Nation Labs draft study, and the recent report from the President's Committee of Advisors on Science and Technology (PCAST) have all studied potential technologies that could help to reduce the cost of carbon emissions reductions.

The effort would focus on promising areas including:

- Energy efficient equipment (e.g., a public service campaign to attract attention to the "Energy Star" label);

- 21st Century Housing (streamline federal, state, and local building and utility regulations in ways that encourage innovation in construction);

- Expanded Partnership for the Next Generation Vehicle (expand work on the next generation vehicle technologies including fuel cells; and expand PNGV to include light trucks/sport-utility vehicles);

- PNGV for Heavy Trucks (partnership with engine manufacturers to double the efficiency of heavy-duty trucks for civilian and military applications);

- Industries of the Future (enhance industry/government research partnerships in areas such as chemicals, aluminum, forest products and steel manufacturing technologies); and

- Renewables R&D (expand research partnerships in key renewable technologies such as wind, photovoltaics, geothermal, biomass and hydropower to accelerate cost reductions).

DOE and EPA believe that such a package could have a substantial effect on carbon emissions by 2010. Others believe that the package will be beneficial, but that its results will only manifest themselves over a longer period of time.

3. Federal procurement system

The federal government spends more than $7 billion per year on energy. While Federal energy consumption is a tiny fraction of the total U.S. energy consumption, we are still the nation's single largest consumer of energy. Significant strides have already been made during the past decade -- energy consumption per square foot in federal buildings, for instance, is down by 15 percent from the 1985 level, and energy use in federal vehicles (both civilian and military) is down about 27 percent from 1985. We can still do more, for example by expanding the use of Energy Savings Performance Contracts, reinventing federal procurement, taking a "sustainable design" approach to federal facilities, and developing more efficient military propulsion systems. This effort could include a 6-12 month review of existing Executive Orders on purchases and a directive to federal agencies to prepare greenhouse gas reductions plans.

4. Industry out-reach

Several industries have approached us recently to offer cooperation in reducing greenhouse gases. Steel, for example, believes it could reduce emissions 10 percent *below* 1990 levels by 2010 with a sectoral plan. The cement industry believes it can significantly reduce emissions in the same time frame.

Your advisers recommend that you ask leading industrial sectors to prepare greenhouse gas reduction plans over the next 6-12 months. These plans could help inform our domestic implementation strategies, including the design of our domestic emissions trading program. It could also help build a constituency for action among moderate business groups.

5. 5-Year Science Reviews

Under the existing climate treaty, the Intergovernmental Panel on Climate Change is charged with reviewing the state of the science every five years. Several corporate and Congressional leaders have suggested supplementing these reviews with additional studies by the

National Academy of Sciences or your Committee of Advisors on Science and Technology (PCAST), on a similar 5-year cycle.

6. Emphasize long-term goal of stabilizing concentrations

The goal of the existing climate treaty is "to stabilize concentrations of greenhouse gases in the atmosphere at levels that avoid dangerous anthropogenic interference with the climate system." However, the Parties to the climate treaty have never defined precisely what levels are dangerous. Support for a specific, long-term goal would be well-received in both the business and environmental communities. Many business constituencies have advocated focus on the long-term goal, to assist with planning. Environmental constituencies believe such a focus would help educate the public.

Your advisers believe the United States should announce support for a specific, long-term goal. The task of defining the goal (e.g., to keep concentrations of greenhouse gases from significantly exceeding twice pre-industrial levels, or roughly 550 ppm) could be assigned to the National Academy of Sciences as part of the first five-year scientific review mentioned above.

7. Global Environmental Facility

The United States is significantly in arrears to the Global Environmental Facility, which assists developing countries in reducing greenhouse gas emissions. (Of the $430 million pledged for FY93-FY97, we have been able to contribute roughly $185 million.) These arrears reduce our leverage with developing countries in negotiations under the climate treaty.

Your advisers recommend you reemphasize your strong commitment to the Global Environment Facility and support clearing U.S. arrears at the earliest practical date. Funding for the Global Environment Facility should be pursued as a top priority.

8. Bilateral dialogues

We are pursuing bilateral dialogues with key developing countries (including China, Brazil and India) to promote clean energy. Often, interest in energy efficiency and renewable energy is greater in these settings than in the politicized, multilateral setting of the Climate Convention. Discussions focus on regulatory structures for clean energy development, technical assistance, export credit and related items.

You or members of your Cabinet will sign several agreements of this type during your upcoming trip to Latin America. Work is underway in this area in connection with the Jiang Zemin state visit later this month. Your advisers recommend that we pursue these dialogues with increased effort in the years ahead.

9. Other possibilities

Other possible elements, which have not yet been fully vetted, include a renewable portfolio standard and other carbon-reducing policies in electricity deregulation; National Environmental Policy Act (NEPA) guidance with respect to greenhouse gas emissions; common energy-efficiency guidelines for export credit agencies; a corporate greenhouse gas reporting system modeled after Toxic Release Inventory; and streamlined standards to improve energy efficiency, where appropriate.

IV. THREE OPTIONS

PACKAGE 1

OVERALL STRATEGY

- The long-term goal of the treaty is to *stabilize concentrations* of greenhouse gases in the atmosphere at a level that will prevent dangerous anthropogenic interference with the climate system. This goal could be achieved with concentrations at or somewhat above a doubling of pre-industrial levels in the next one hundred years.

- The strategy here is to propose the least-cost approach, both in terms of timing and developing countries, to stabilizing concentrations over the long run. The logic is that only by proceeding in this least-cost approach could we get domestic agreement to undertake a serious climate change policy.

TARGETS AND TIMETABLES

- Concentrations can be stabilized through the following targets and timetables:

  Reduce emissions growth in the United States in the near term (for example, growth from 2000-2010 less than growth over 1990-2000); then

  Eliminate emissions growth in developed countries 10 to 20 years after treaty is signed (e.g., 2010-2020); then

  Reduce emissions levels in developed countries gradually to reach — and then to decline below — 1990 levels in later years to be decided, stabilizing concentrations.

- This timetable begins effective action soon to establish Presidential leadership.

- The schedule of reducing emissions and emissions growth is determined by the degree of economic cost that is acceptable, coupled with the rate of improvement in emissions-reduction technologies that results from increases in carbon prices.

- As in the second plan (see below), there would be periodic review of the underlying science, the data on the path of emissions, and the economic impact, to allow for adjustments in the policy.

- Insist on the current U.S. flexibility positions of international trading, multiple multi-year targets, joint implementation (subsidies of non-carbon energy sources in developing countries), banking, and borrowing.

DEVELOPING COUNTRIES

- The goal is the least-cost global approach to stabilization of carbon concentrations in the atmosphere.

- Negotiate and begin a new Kyoto Mandate, requiring developing country participation (in stages), starting with more-advanced (Annex B) developing countries, with graduation as countries develop. Developing countries commit to reduce the rate of growth of emissions consistent with stabilizing carbon concentrations and continued economic growth, with ceilings on costs.

- One-step: the U.S. will not initial agreement until Annex B countries have binding commitments.

DOMESTIC IMPLEMENTATION

- Develop a tradable permits system, with auction of all permits (rather than grandfathering), in the near term; impose the system at a level of emissions near the baseline (for example, with an implied permit price of perhaps $10 per ton). The system could take effect while the Kyoto Mandate was negotiated, to emphasize U.S. leadership and credibility; or it could be postponed until the treaty was ratified, as an incentive for developing-country compliance. (A carbon tax, if feasible, would be an alternative method of implementation.)

- Change the number of permits in small, gradual, predetermined steps, based on economic cost and aggressive technological progress (with the implied permit price rising to perhaps $22 per ton or more by 2015). As in the second plan below, review domestic implementation system periodically.

- A portion of funds raised would be used for cost-effective technology research and diffusion programs, including basic research. The bulk would be available for a range of domestic priorities (tax relief for individuals; business investment incentives; the solution to the fiscal effects of the demographic imbalance; infrastructure; etc.) chosen to make the program attractive.

- Begin a series of voluntary industry programs to develop plans to meet the targets.

- Provide for banking and borrowing to deal with short-term fluctuations. Borrowed permits would be issued at a premium cost, and banked permits could be resold later at higher prices.

- Provide economic growth insurance or a cost cap on permits that would allow the sale of additional permits. The price would be set consistent with our estimate of the acceptable

economic cost, and would be high enough to encourage emissions-efficient investment choices in the near term. (If the cost cap were in effect over an extended period, the target would not be met.)

- These policies are market-oriented. There would be no inefficient, command-and-control regulations used to reduce emissions.

- Include common components listed above.

SUPPORTERS

Larry Summers, Janet Yellen, Frank Raines, Secretary Daley, and Secretary Herman.

PROS

- The principal benefit of this approach is that it reduces the cost of beginning to address climate change by allowing more time for the economy to adjust gradually to the new constraints being placed on it.

- Business and labor groups would support this approach.

- The approach would also be strongly supported by leading economists, such as William Nordhaus of Yale. It is consistent with the economics consensus on the least-cost path to the environmental goal of stabilizing concentrations in the very long run.

CONS

- This approach would be completely unacceptable to the environmental and international communities. We could respond that if the emissions path it envisions is met, it would stabilize concentrations and thus produce the same climate benefits as other paths that are substantially more economically costly.

- This option depends on steep -- and possibly implausible -- emissions reductions in distant decades to achieve our environmental goals.

- It would be awkward to reconcile this approach with previous statements made by both you and the Vice President. We could respond that we are starting over with a new Kyoto Mandate, and that part of that mandate will be to achieve environmental goals through the least-cost approach.

- There is no chance of an international agreement in Kyoto or the near future with this proposal. But if an agreement is reached that incorporates this approach, it may be much easier to ratify.

PACKAGE 2

OVERALL STRATEGY

- This approach involves a hybrid plan that includes a commitment to reduce emissions to 1990 levels by 2015 or 2020 with a safety valve to cap economic costs.

- The approach begins with the tax cuts, R&D, and other initial steps in the common components section above, before the permit system becomes effective.

- The safety valve would ensure that permit prices could never rise above some ceiling, by allowing the U.S. Government to sell an open-ended number of additional permits at that price. This approach thus allows you to set an ambitious goal for the country while insuring that the costs are not excessive. But with a relatively low ceiling price, the overwhelming majority of economists will claim that we could not possibly avoid having to trigger the safety valve and thus fail to meet the stated goal of 1990 by 2015 or 2020. Opponents could attack the approach as lacking in credibility.

TARGET AND TIMETABLE

- 1990 by 2015 *or* 1990 by 2020, with a safety valve (explained below). The purpose of the safety valve is to allow us to adopt a relatively aggressive target and timetable, with the understanding that we will only meet it if possible to do so at reasonable cost.

- An issue that needs to be resolved is how the safety valve would be handled in the international negotiations, if at all.

- Additional reductions (to be determined) after 2015 or 2020.

- Support international trading and joint implementation.

DEVELOPING COUNTRY

- Kyoto Mandate for negotiations, with a goal for them to be completed by 1999.

DOMESTIC IMPLEMENTATION

Initial actions

- Common components plan. Emphasize tax cuts and R&D to build corporate support.

- Emphasize commitment to market-oriented policy tools to reduce emissions.

- Avoid decisions about grandfathering vs. auctions. Instead appoint commission to suggest structure of domestic emissions trading program -- auctioning with tax cuts, or grandfathering with an excess profits tax.

  -- The commission would work with industry groups to evaluate their vision of the trading system.

  -- The commission would also study possible adjustment programs for areas and sectors that will bear a disproportionate burden from emissions reductions.

  -- One possibility would be to give the commission's recommendations base-closing legislative treatment, although there may be concerns about such a mechanism given the scope and importance of the commission's work.

  -- Deadline for commission to report would be early 1999 or 12 months following treaty.

Domestic emissions trading program (with safety valve) starts in 2005

-- Commission decides on structure of permit program.

-- The permit requirements between 2005 and the first review in 2008 could be set slightly below business-as-usual levels.

-- Ceiling on permit price, as defined below, to cap economic costs

Safety valve (ceiling on price) in permit trading system

-- The tradeable permit system would include a safety valve: the U.S. government would stand ready to sell a potentially unlimited number of permits at a given price, ensuring that the permit price could not rise above that level. *This safety valve is absolutely essential to the domestic viability of this approach.*

-- The price would start at $10 per ton in 2005 and rise in real terms by $1-$2 per year (0.25-0.5 cents per gallon) until it reaches $30 per ton in 2015 or 2020.

-- If any funds are raised from the safety valve mechanism, they could be devoted to further emissions reductions -- additional tax cuts for families, for carbon-reducing investments by businesses or families, tax cuts for R&D, Federal investments in R&D or energy-efficiency, or for investments in carbon-reducing efforts in other countries.

5-Year review process

- The Clean Air Act requires EPA to undertake a regular 5-year review of air quality

standards, and other statutes require similar reviews. Similarly, every five years, a commission -- which builds on the implementation commission above -- would review progress on emissions reductions, and how the economy was responding. It would then make recommendations to the President and Congress about how to adjust the policy stance toward climate change.

- The commission to report on domestic implementation (mentioned above) would be the first of these commissions. The first report would thus occur in 1999 or 12 months following the treaty. The second report would be in 2004, and the third in 2009. The third commission report would be able to evaluate the operation of the domestic permit system after four years of experience (since the permit system will begin in 2005).

SUPPORTERS

Gene Sperling and Katie McGinty constructed this compromise plan, as requested by Erskine. They worked closely with Todd Stern in developing a package that the three of them support with one difference. Gene supports a 1990 by 2020 timetable, while Katie supports the 1990 by 2015 timetable.

Gene feels that the 2020 date is important for three reasons:

1. It boosts the credibility of the relatively low price ceiling in the plan, by allowing more time for the economy to adjust before the timetable binds and thus raising the probability that the safety valve would not have to be invoked;

2. It attenuates corporate and union opposition to the plan; and

3. It allows us some room to bargain from at the international negotiations in Kyoto and beyond.

Katie feels that the 2015 date is important for three reasons:

1. Your announcement of any date after 2015 would pose unacceptable risks of immediately cratering the Kyoto negotiations.

2. With any date later than 2015, there is little or no chance that we will be able to convince the international community to accept other components of our position (e.g., joint implementation, Annex I international trading, the safety valve, and our developing country stance).

3. A 2015 timetable offers at least some possibility of support from moderate environmental groups -- especially if we also commit to some reductions, even small ones, from 1990 levels by 2020.

Secretary Pena and Secretary Slater both support the package. Todd Stern supports it with a 1990 by 2015 timetable.

Dan Tarullo supports a hybrid of Package 1 and Package 2. As in Package 1, he supports starting the domestic implementation package immediately upon agreeing to a treaty, not in 2005. He also believes strongly in auctioning permits or some other mechanism of raising revenue, rather than grandfathering permits. But he believes that we can commit to 1990 levels by 2020, with the explicit acknowledgment that the uncertainties of technological development and diffusion, as well as consumer behavior. He favors a reassessment in 2007 to see if the targets and timetables need to be adjusted.

Your economic team urges that if you choose this option, you should choose the 2020 timetable and emphasize that you will *not* use command-and-control regulations to avoid invoking the safety valve. They would also urge a careful analysis of the best level for the trigger price.

NOTES

The fundamental strategy here is four-fold:

- First, we will focus our entire policy efforts up to 2005 on tax cuts, R&D efforts, Federal energy efficiency improvements, and the other components of the policy package listed in Section III of the memo.

- Second, the permit system would start in 2005 -- so that the debate over energy price increases explicitly pertain only to 2005 and beyond. At the same time, environmental groups will appreciate that the permit system begins within the next 10 years.

- Third, the plan puts a ceiling on the permit price to limit the economic downside and stunt opposition attacks about the economic costs involved.

- Finally, the plan still gives the nation a goal of reaching 1990 emission levels by 2015 or 2020 -- a goal that is subject to a cost cap, but is more binding than the non-binding aim agreed at Rio.

The main problem with this option is that it may be harshly criticized as promising more than the implementation plan can deliver. Current models almost uniformly suggest that we would not be able to meet our target and timetable at a price below $30 -- i.e., that we could not avoid triggering the safety valve. To put the point another way, this approach will limit the permit price to $10 to $30 per ton ($15 to $45 billion year). But economic models almost uniformly suggest that permit prices would have to be substantially higher to achieve 1990 emissions levels in 2015 or 2020. Therefore we could be attacked on our credibility -- that our plan did not contain enough restraint to meet its stated emissions reduction goal.

Those who support this option believe that the answer to the credibility argument is not a fight over economic models. Rather, they argue that in the face of incredible uncertainty over events twenty years away, it is best to put forward a sound -- even if highly optimistic -- plan for the nation. In particular, we should not unnecessarily impose economic hardship when technological breakthroughs, new scientific understandings or successful international trading could lower costs. If we take on the economic model debate directly, we will almost certainly lose. The best tact is to emphasize the uncertainty, and to note that future administrations and Congresses will assess new information every 5 years and make appropriate adjustments. We could get some outside validation for our emphasis on uncertainty from those who believe that international trading is possible, from those who believe that economic models tend to exaggerate the costs of meeting environmental goals, and from those who believe that technological development and diffusion could respond strongly to even a limited price signal. The safety valve idea could also receive outside validation: similar ideas have been embraced by Resources for the Future and Brookings, although they may not agree with our trigger price.

Another key aspect of defending this plan is to emphasize that we are not supporting using command-and-control measures if the ceiling price does not produce the full reductions needed to hit the emissions target. Specifically, when asked about whether setting an optimistic target with the ceiling price would mean that higher energy taxes or command-and-control regulations in the future, we should state that we are against such measures and that we would assume that future Congresses would also oppose such measures. Without this guarantee, opponents may feel threatened instead of comforted by our reasonable ceiling. Furthermore, we would point out that such scenarios would not take place for a decade, and that we would not expect future Congresses to support such command and control alternatives as well.

With this posture, we would be arguing that we are committed to reaching 1990 levels by 2015 or 2020 -- but not at any cost. We would not expect future administrations or Congresses to allow the costs of complying with the treaty to become extreme or excessive. We would also note that the 5-year reviews would allow us to adjust our policy stance as more information becomes available. Finally, it is important to note that we would still taking real steps to reduce emissions even if the safety valve *is* triggered. Indeed, the *policy steps* under this approach if the safety valve were triggered are equivalent to those proposed under Plan 3. Even with the cap, the cost to polluting would be higher than today, and thus we would divert emissions from the business-as-usual path. We would also start the emissions trading program by the relatively early date of 2005, which should help to address some of the concerns environmental groups may have with this approach.

PROS

- Seeks to hit a middle ground -- still proclaims a target and timetable, but only at reasonable economic cost. With a target of 1990 by 2015 or 2020 -- tempered by the safety valve, but still stronger than our Rio commitment -- we would have a chance of remaining "in the game" in the international and environmental communities. By limiting the economic costs, we could avoid undue disruption to the economy and stunt potential attacks.

- Permit system starts in 2005, so that we begin to deflect from business-as-usual path within a decade. The early start date would also help utilities to integrate their planning for reductions of NOX (under EPA's recent clean air rule) and carbon emissions.

- Consistent with our language of "binding but *realistic*" and "reducing emissions while we grow the economy."

- Starting with only tax cuts and R&D for 7 years, and not beginning the permit system until 2005, *may* make it harder for the Administration to be demagogued on tax increases.

CONS

- Risks splitting the loaf and pleasing no one:

  -- Business groups may still demagogue the plan, arguing for example that $20 per ton is approximately the same size as the BTU tax proposed in 1993. If we decide that the plan would be revenue-neutral, we could respond with that point, and note that it would not become effective for several years.

  -- Business groups could also charge that the combination of a relatively tight target and timetable with a low trigger price would imply that command-and-control regulations would be used to fill the gap. We could respond by emphasizing our commitment to market-based solutions.

  -- Many environmental groups will oppose, arguing that the 2015 or 2020 date is too late and that the safety valve undermines our environmental commitment. We could respond that on their optimistic predictions about new technologies, the safety valve would not be needed. We could also respond that our policy is a politically realistic way of addressing the climate change problem. Some more moderate groups may support the package, especially in light of the 2005 start for the permit system and if the package includes further reductions beyond 2015 or 2020. Although environmental groups are calling for reductions below 1990 levels by 2010, a relevant threshold for many of them is reductions below 1990 levels at least by 2020.

- Mainstream models almost uniformly suggest that without worldwide international trading, there is little likelihood that we could avoid triggering the safety valve at $30 per ton. Some of your advisers could be forced to admit that the overwhelming weight of conventional economic analysis suggests that the safety valve would be triggered.

- Will seriously complicate international negotiations. In combination, the 2015 or 2020 date, our domestic cost cap and our insistence that developing countries do more will be perceived as lack of U.S. leadership.

PACKAGE 3

OVERALL STRATEGY

- This package is similar to Package 2 in containing a safety valve, but it involves steeper emissions reductions and higher economic costs than under Package 2. In this sense, it conforms most closely to the first two constraints noted in the first section above (environmental and international). It involves less dramatic reductions than those proposed by the EU or Japan, but has some chance of being accepted internationally. Despite provisions that cap the permit price at about $50 per ton, this package would likely be strongly opposed by much of the U.S. business community. And as above, the cost cap comes with a real risk: it implies that we could fail to reduce emissions to 1990 levels by 2010 or 2015.

TARGET AND TIMETABLE

- 1990 levels by 2010 with safety valve *or* 1990 levels by 2015 with safety valve
- Further reductions at a later date.
- The permit price would be capped at roughly $50 per ton by allowing the U.S. Government to sell an unlimited number of additional permits at that price.
- Require adequate provisions for international emissions trading, joint implementation and banking.

DEVELOPING COUNTRIES

- Two-step approach as outlined above. Kyoto Mandate for negotiations, with a goal for them to be completed by 1999.

DOMESTIC IMPLEMENTATION

- Domestic permit trading system, with a safety valve that ensures a ceiling of about $50 on the permit price.
- Common components plan. Emphasize tax cuts and R&D in near term to build corporate support.

SUPPORTERS

Carol Browner, Secretary Babbitt, and Brian Atwood support the plan -- but only with the 1990 by 2010 timetable.

Jim Steinberg supports this package, emphasizing the importance of a credible trigger price (one set high enough that it could be defended as a reasonable estimate of the cost of meeting the target).

Jack Gibbons supports this approach, but emphasizes the importance of a significant reduction in the 2020-2030 timeframe linked to a long-term stabilization goal.

Strobe Talbott supports this general approach. He could also be supportive of Plan 2. Secretary Glickman supports this package, but is also willing to support Plan 2.

PROS

- Kyoto agreement perhaps possible (especially if 1990 by 2010), although not guaranteed -- especially given the safety valve and our position with respect to developing countries.

- Some support from environmental groups (especially if 1990 by 2010), although some will consider the emissions reductions to be too weak and the safety valve to be problematic.

- Stronger start in addressing environmental problem limits need to depend on steep -- and arguably implausible -- emissions reductions in distant decades to reach environmental goals.

CONS

- The commitment would be attacked as the largest energy tax hike in history -- costing $75 billion per year. Despite the safety valve, many would charge that a commitment of this nature could have substantially adverse effects on the economy.

- Strong corporate opposition -- especially if 1990 by 2010 -- for not allowing enough time for the economy to adjust.

- Relative to the $30 ceiling in Plan 2, this plan would produce greater economic dislocation and more powerful ammunition for opponents that want to attack the economic costs of the plan.

- The ceiling poses many of the same tensions as in Plan 2. A $50 ceiling may prove inadequate to meet a target of 1990 by 2010.

Policy

KEY ELEMENTS OF THE U.S. CLIMATE CHANGE PROPOSAL

October XX, 1997

Elements of an International Agreement

I. Greenhouse Gas Emission Target and Timetable - The U.S. believes that binding emissions limits are critical for achieving real reductions in greenhouse gas emissions. Such limits must be both environmentally responsible and economically sound. After careful review, the U.S. proposes to reduce greenhouse gas emissions to 1990 levels by **XXX [and to XXX % below 1990 levels by XXX]**

II. Global Participation - Recognizing the need for a global approach to climate change, the U.S. is committed to a framework that involves all countries and will not assume binding obligations until developing countries make adequate commitments in terms of their own obligations.

III. Flexible Implementation - Given the enormous scope of a global effort to reduce emissions, it is vital that reductions be achieved by the most efficient and cost-effective means possible. The U.S. insists that any agreement recognize this by creating international market incentives for reducing emissions, including through *international emissions trading* and *joint implementation*.

Elements of a Domestic Emissions Reduction Plan

IV. Carbon Emissions Trading System - To promote an efficient, market-oriented tool for achieving meaningful emissions reductions, the Adminsitration proposes to create a domestic system for trading carbon emissions permits.

V. Tax Incentives - To spur energy efficiency and to encourage the development and dissemination of lower-carbon energy sources, the Administration is working on a package of tax cuts **[amounting to up to $1.5 billion per year]**. **[More to say here??]**

VI. Industry Outreach - Recognizing the important role of voluntary efforts, the Administration will ask key industry sectors to prepare over the next 6-12 months a plan for how they would achieve emissions reductions and for how the Federal government can provide assistance. Additionally, the Administration is committed to ensuring that early reductions achieved in a pre-mandatory period are accounted for.

VII. Federal Technology R&D - To stimulate the development of energy efficient and lower-carbon technologies, the Administration proposes an aggressive Federal technology effort targeting a limited number of promising areas.

VIII. Federal Procurement and Energy Use - To reduce greenhouse gas emissions from Federal sources, the Department of Energy will spearhead a comprehensive effort to lower the Federal government's $7 billion annual energy bill.

IX. Electricity Restructuring - In light of the potential of electricity restructuring to afford substantial opportunities for emissions reductions, the Administration supports **[XXX]**.

Other Elements

X. Partnership with Developing Countries - Recognizing the development challenges of a number of the world's largest greenhouse gas emitters, the Adminstration commits to helping these countries grow sustainably, including through clearing U.S. arrears to the *Global Environmental Facility* and pursuing *bilateral dialogues* with key nations.

XI. Science Reviews - In order to help define a long-term goal for stabilizing emissions of greenhouse gases in the atmosphere and to supplement the work of the Intergovernmental Panel of Climate Change, the Administration has charged the **[National Academy of Sciences]** with conducting periodic 5-year reviews on key scientific issues.

Policy

'97 OCT 14 PM 11:15

NATIONAL SECURITY COUNCIL

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Climate Change and National Security
Adjusting Baselines

Mr. Steinberg (NSC), Ms. Goodman (DoD), and Mr. Pomerance (State) discussed climate change and national security in a conference call at 1330, on October 10, 1997. During the discussion, Mr. Steinberg requested clarification on the magnitude of the DoD's greenhouse emissions attributable to operations and how this would impact the US baseline. In 1990, the US reported greenhouse gas emissions of 1458 million metric tons carbon equivalent (MMTCE). DoD's operations and training in 1990 resulted in greenhouse gas emissions of approximately 15.5 MMTCE within the US.[1] This is approximately 1% of the 1990 US baseline.

Adjusting Baselines: If military emissions are excluded from the protocol, we could attempt to adjust the baseline for each nation:

Option 1: Adjust the baseline by subtracting 1990 military emissions from the national baseline. For the US, military operations and training resulted in greenhouse gas emissions of 15.5 MMTCE. This would be subtracted from the reported US total.

Option 2: Adjust the baseline using data from a more recent year. This option could be necessary if nations do not have accurate data for 1990 military emissions. For example, if 1996 data are used to adjust baselines, the US would have a smaller downward adjustment. DoD fuel use has decreased by 36% worldwide since 1990. This results from a smaller force structure and the retirement of the oldest, least fuel efficient weapon systems. By 1996, DoD domestic greenhouse gas emissions from operations and training dropped to 11.1 MMTCE while overall US greenhouse gas emission grew by 12%. As a result, in 1996, DoD operations and training emissions amounted to 0.7% of total US emissions.

[1] In 1990, DoD used 171 million barrels of fuel. Of this amount, approximately 20% was used outside the US. Fuel used by DoD outside the US counts in the baseline of the country where the fuel is used. The remaining fuel, 137 million barrels, represents DoD's 1990 fuel usage within the US and accounts for 15.5 million metric tons carbon equivalent (MMTCE) of greenhouse gas emissions. This is the amount included in the US's 1990 baseline, which is 1458 MMTCE. Thus, DoD's operational emissions for 1990 represent about 1.06% of total US emissions.

Climate Change and National Security Issues

A concern has been raised by DOD that capping greenhouse gas emissions under the Kyoto agreement could affect our national security. This view is based on the fact that emissions of greenhouse gases are considerably increased during military activity, largely as a consequence of ramped-up systems operations. For the United States, the numbers are relatively small: DoD emissions during normal operations represent less than one percent of the U.S. total, and even during significant overseas deployments (e.g., Iraq), did not rise to more than about 1.5 percent. While in the United States, we may be willing to pay the incremental cost of such increased emissions in order to participate in various military operations, other countries may not be willing to make such a choice. Given that most operations are multi-national, creating a global cap may create a situation in which countries may be forced to choose between participation in a military operation or meeting a global climate change treaty mandate. Three options are suggested to address this issue.

Option 1: Cap with Exemption.

Accept a greenhouse gas cap, but provide a specific exemption/exclusion for military operations (either complete or limited to aspects of national or collective security, humanitarian activities, peacekeeping, peace enforcement, United Nations, or NATO or other multinational actions). A number of technical "fixes" would be require to the U.S. text to accommodate this alternative; these are not discussed here. The options has the advantage of providing surety that neither our military operations nor those of other countries would be compromised by the need to limit greenhouse gas emissions under the treaty. However, it could be exceedingly difficult to negotiate internationally – and could also give rise to calls for other exemptions or exclusions.

Option 2: Cap with Safety Valve.

Accept a cap, but limit the amount that any country would be obligated to pay to comply with its obligation. While this option does not mitigate the need to include the costs of increased emissions in planning a peacekeeping force, it will limit the cost – and the cost can be approximately determined in advance. This would allow countries to exceed their emissions budgets for military activity without demanding compensating reductions in other sectors in order to remain in compliance. However, this option would also be extremely difficult to negotiate internationally – and has already received vocal opposition from many in the environmental community (independent of the national security concern which it might partially address).

Option 3: Cap with no exemption.

In this option, a cap would be adopted, and no special provisions would be incorporated to accommodate national security. This alternative assumes that global climate change should be taken into account in making military operations decisions, and that it would be inappropriate to exempt any sector or activity from a greenhouse gas emissions obligation. This option requires no change in the existing U.S. protocol language; however, it clearly does not address the concern raised by DoD.

If the United States chooses to move this issue forward for inclusion in the Kyoto agreement, it will need to be done promptly. Specific textual language will need to be developed, allies (perhaps at first within NATO) will need to be encouraged to support (or perhaps even to offer) this proposal, and a negotiating strategy will need to be conceived and implemented. A decision must therefore be made promptly on the course of action to take on the substantive concern raised.

Proposal on QELROs
by the Government of Japan
September 29, 1997

1. As the president-designate of the COP3, the Government of Japan proposes 5% as a base reduction rate for deciding a reduction target for each country on the premise that the following conditions from (1) to (3) are accepted. The base year of this reduction is 1990. The target period for the reduction is five years from 2008 to 2012 (the first budget period).

(1) Green house gasses covered by this proposal include carbon dioxide, methane and nitrous oxide.

(2) As the quantified target includes a portion prescribed by future technological development and changes of energy situation and industrial structure, etc. which are uncertain factors not foreseen at present, compliance clauses in regard to this portion should have certain flexibility. Formulation of this flexibility has to be stipulated in a protocol or another legal instrument. In any case, the emissions of any country shall not exceed its emissions in 1990.

(3) The target for an individual country is differentiated by emission per GDP, emission per capita and population growth:

Countries with the following conditions may apply any one of the following Alternative Reduction Rates:

(a) For a country of which emissions per GDP in 1990 (A) are less than the emission per GDP of all Annex I countries in 1990 (B):

Alternative Reduction Rate (%) = 5% × (A/B)

(b) For a country of which emissions per capita in 1990 (C) are less than the emission per capita of all Annex I countries in 1990 (D):

Alternative Reduction Rate (%)= 5% × (C/D)

(c) For a country of which population growth from 1990 to 1995 exceeds the population growth of all Annex I countries for the same period, the higher growth of population should be considered in deciding the target of the country. Concrete formulation of this alternative reduction rate is to be developed.

2. Banking, borrowing, emissions trading and joint implementation should be adopted under certain conditions.

3. Emissions for the second budget period shall not exceed those for the first budget period. More sophisticated method of differentiation should be applied for the second budget period.

5% - [illegible] / pop growth of Annex I (%)

Basic statistics of Annex I Parties (Reduction Target)

COUNTRY	CO2 EMISSION		POPULATION					Per Capita			GDP	Per GDP			Differentiation
	1990		1990	1995	2010	Growth Rate 1995/1990	Differentiation (1) Population	1990 CO2	Deviation	Differentiation (2) Per Capita	1990	1990 CO2	Deviation	Differentiation (3) Per GDP	(4) Total
	(1000t-C)	ratio(%)	(thousands)	(thousands)	(thousands)	(%)	(%)	(t-C/capita)	(%)	(%)	(million US$)	(t-C/$)	(%)	(%)	(%)
JUSCANZ	1,901,417	50.99	432,830	451,279	496,565	4.3	3	4.39	23.3	5	9,675,470	196.52	-9.4	4.5	3
Japan	315,000	8.45	123,537	125,095	127,152	1.3	5	2.55	-28.4	3.6	2,932,216	107.43	-50.5	2.5	2.5
U.S.A.	1,351,915	36.26	249,924	263,250	297,486	5.3	2.6	5.41	52	5	5,489,504	246.27	13.6	5	2.6
Canada	126,175	3.38	27,791	29,463	33,946	6	2.3	4.54	27.5	5	568,078	222.11	2.4	5	2.3
Norway	9,686	0.26	4,241	4,337	4,556	2.3	4	2.28	-36	3.2	115,343	83.97	-61.3	1.9	1.9
Australia	78,809	2.11	16,888	18,088	21,367	7.1	1.8	4.67	31.2	5	294,532	267.57	23.4	5	1.8
NZ	6,948	0.19	3,360	3,575	4,034	6.4	2.1	2.07	-41.9	2.9	43,526	159.63	-26.4	3.7	2.1
Iceland	592	0.02	255	269	307	5.5	2.5	2.32	-34.8	3.3	6,243	94.88	-56.3	2.2	2.2
Switzerland	12,292	0.33	6,834	7,202	7,717	5.4	2.5	1.8	-49.4	2.5	226,028	54.38	-74.9	1.3	1.3
EU	896,074	24.03	365,102	371,523	375,856	1.8	5	2.45	-31.2	3.4	6,692,709	133.89	-38.3	3.1	3.1
U.K.	157,367	4.22	57,441	58,258	59,919	1.4	5	2.74	-23	3.9	975,506	161.32	-25.6	3.7	3.7
Germany	276,588	7.42	79,365	81,591	80,466	2.8	3.7	3.49	-2	4.9	1,639,966	168.65	-22.2	3.9	3.7
Holland	45,709	1.23	14,952	15,503	16,239	3.7	3.3	3.06	-14	4.3	283,683	161.13	-25.7	3.7	3.3
Denmark	14,189	0.38	5,140	5,181	5,173	0.8	5	2.76	-22.5	3.9	129,126	109.88	-49.3	2.5	2.5
Sweden	16,706	0.45	8,559	8,780	9,266	2.6	3.8	1.95	-45.2	2.7	229,767	72.71	-66.5	1.7	1.7
France	99,964	2.68	56,718	57,981	60,130	2.2	4	1.76	-50.6	2.5	1,195,486	83.62	-61.4	1.9	1.9
Austria	16,145	0.43	7,705	7,968	8,251	3.4	3.5	2.1	-41	3	158,416	101.92	-53	2.4	2.4
Finland	14,700	0.39	4,986	5,107	5,314	2.4	3.9	2.95	-17.1	4.1	134,817	109.04	-49.7	2.5	2.5
Greece	22,391	0.6	10,238	10,451	10,458	2.1	5	2.19	-38.5	3.1	81,838	273.6	26.2	5	3.1
Ireland	8,378	0.22	3,503	3,553	3,777	1.4	5	2.39	-32.9	3.4	44,813	186.95	-13.8	4.3	3.4
Italy	116,984	3.14	57,023	57,187	55,985	0.3	5	2.05	-42.4	2.9	1,095,075	106.83	-50.7	2.5	2.5
Luxembourg	3,094	0.08	381	406	439	6.6	2	8.12	128.1	5	10,350	298.88	37.8	5	2
Portugal	11,495	0.31	9,868	9,823	9,791	-0.5	5	1.16	-67.4	1.6	67,243	170.95	-21.2	3.9	1.6
Spain	61,997	1.66	39,272	39,621	39,514	0.9	5	1.58	-55.6	2.2	491,932	126.03	-41.9	2.9	2.2
Belgium	30,368	0.81	9,951	10,113	10,334	1.6	5	3.05	-14.3	4.3	154,688	196.32	-9.5	4.5	4.3
FIT	931,162	24.97	248,403	246,843	243,318	-0.6	5	3.75	5.3	5	824,545	1129.3	420.7	5	5
Bulgaria	22,634	0.61	8,991	8,769	8,242	-2.5	5	2.52	-29.2	3.5	20,726	1092.03	403.5	5	3.5
Czech	45,216	1.21	10,306	10,296	10,444	-0.1	5	4.39	23.3	5	31,599	1430.92	559.8	5	5
Slovakia	15,894	0.43	5,256	5,353	5,707	1.8	5	3.02	-15.2	4.2	14,321	1109.84	411.8	5	4.2
Hungary	19,547	0.52	10,365	10,115	9,678	-2.4	5	1.89	-46.9	2.7	33,055	591.35	172.7	5	2.7
Poland	113,163	3.03	38,119	38,388	39,938	0.7	5	2.97	-16.6	4.2	58,976	1918.8	784.8	5	4.2
Romania	46,664	1.25	23,207	22,835	22,316	-1.6	5	2.01	-43.5	2.8	38,244	1220.18	462.6	5	2.8
Russia	651,469	17.47	147,913	147,000	143,134	-0.6	5	4.4	23.6	5	608,126	1071.27	394	5	5
Estonia	10,308	0.28	1,575	1,530	1,461	-2.9	5	6.54	83.7	5	7,490	1376.26	534.6	5	5
Latvia	6,266	0.17	2,671	2,557	2,398	-4.3	5	2.35	-34	3.3	12,008	521.84	140.6	5	3.3
Total	3,728,653	100	1,046,335	1,069,645	1,114,939	2.2		3.56	0		17,192,724	216.87	0		3.2

* *Other countries are not in this list(Turkey, Lithuania, Belarus, Ukraina)*
* *Emission Data are based on National Communications(FCCC/AGBM 1996 7)*
* *Population Data are from "World Population Prospects (the 1994 Revison)"(United Nations)*
* *GDP Data are calculated from National Communications(FCCC/AGBM 1996 7)*

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Technology Policy

FAX MEMORANDUM

6 pages, including this one

TO: Gene Sperling
Todd Stern
Katie McGinty

Call if problems,
703/354-1588

CC: Jack Lew
Josh Gotbaum

FROM: T.J. Glauthier

DATE: September 14, 1997

RE: Technology Strategy for Climate Change Mitigation

Here is a draft of a program-type description for a U.S. Technology Strategy. This is the strategic formulation that would be supported by the types of detailed individual technology write ups that I shared with you yesterday. It will be useful to get your reactions to this overall approach, and especially to deal with the issues that I've identified at the end of the paper.

We still need to plough ahead with the agencies to get more complete development of the individual technology options, especially realistic estimates of emissions reduction potential and funding requirements, both near- and long-term. As we get those, we can put together overall program options at different funding levels in the context of our overall climate change strategy.

I look forward to talking to you further about this tomorrow.

(Hope you're watching the game now.....Redskins ahead at this point, 10-7)

9/14/97 draft

A U.S. TECHNOLOGY STRATEGY FOR CLIMATE CHANGE MITIGATION

GOAL To join forces with the nation's leading corporate, university and other research centers to develop, demonstrate and encourage the market adoption of technologies in key sectors of the economy that will enable the U.S. to stop the growth of the country's greenhouse gas emissions in the future and, at some point, to return them to 1990 levels and lower, while maintaining or increasing overall economic performance and consumer satisfaction. In addition, to foster the development of these and related technologies for export to, or joint venture with, developing countries also working to minimize greenhouse gas emissions.

LONG-TERM TECHNOLOGIES

For the long-term, the strategy focuses on basic energy technologies, where breakthroughs are needed to provide radically different paradigms capable of providing high performance services with zero or very low emissions of greenhouse gases. An example of this type of program is the present "Partnership for a Next Generation of Vehicles" (PNGV) in which the auto manufacturers and the government are collaborating to develop a production prototype vehicle by 2004 that will achieve three times the fuel economy of a standard passenger car, 80 mpg, with the same performance and passenger amenities. The long-term technology strategy will phase up to a level of $..... per year of federal funds. Because of the very long-term nature of this basic research, non-federal funding is expected to be limited. Examples of the research that are included in this area are:

- Small, light hydrogen fuel cells for automobiles and light-duty trucks, that can meet the weight, size, performance and maintenance requirements of these vehicles
- Biofuels research that can produce liquid fuels from agricultural products and waste materials at a price equivalent to 75 cents per gallon of gasoline or less
- Aircraft engines and design innovations that will reduce the combination of CO_2 and No_x emissions (both greenhouse gases at high altitudes) by a factor of five
- Expanded "Industries for the Future" program to focus on topics jointly-identified with the industries, such as biological process for catalytic reactions and chemical separation to achieve.....
- Bulk energy storage, such as advanced batteries, that can .....
- Carbon sequestration, including injection of CO_2 into aquifers and other geological or oceanic formations

MEDIUM-TERM TECHNOLOGIES

For medium-term technologies, the strategy focuses on refining and proving

technologies that have already been demonstrated in the laboratory, but may need critical incremental improvements, such as to achieve key threshold performance levels, and which need to be proven under real-world operating and use conditions. The strategy, when fully implemented, will reach a level of $..... per year of federal funding, which should leverage an equal or greater level of private sector funding of these technologies. These projects should be cost-shared at least 50% by the private sector to ensure that they will respond to true market needs. Examples of the types of medium-term technologies that are included in the strategy are:

- Hydrogen fuel cells for buildings and heavy-duty transportation, that are able to operate for over 5,000 hours per year for 10 years or more with outputs of that can power a school, shopping center, or long-haul truck or train
- Advanced turbine systems for use in combined heat and power systems at industrial facilities, which can meet new air quality standards and achieve twice the energy efficiency levels of conventional electricity generation and separate process heating systems
- Biomass production and processing for electric powerplant use on a scale to support a commercial powerplant of 300 megawatts on a sustainable, long-term basis
- A PNGV program for heavy trucks, as a partnership between the truck engine manufacturers and the Defense Department which purchases commercial truck engines for its trucks and heavy combat equipment, to demonstrate a medium/heavy duty diesel engine that will achieve .....

NEAR-TERM TECHNOLOGIES

For near-term technologies, the strategy focuses on actions to encourage market adoption of improved technologies that have been proven in pilot tests to be superior technologically and economically, but are not being used widely by end users. The reasons for that may include market barriers, lack of information and demonstrations, and initial investment cost. The federal role will be one of supporting the private sector, consumer groups, and others in funding demonstrations, supplying consumer information, streamlining regulations, and encouraging the development of innovative financing programs. [?? tax credits, accelerated depreciation, emissions limits/allowances, financing, efficiency standards and regulations??] These incentives will be particularly focused on encouraging investment in more efficient technologies when capital equipment stock is replaced. This program will reach a level of $..... when fully phased in, and should leverage a much larger amount of private sector funding, since these products are close to full market status. Examples in this area are:

- Solar power, where the "Million Solar Roofs Initiative" is a partnership with businesses and government to develop and encourage voluntary programs to deploy one million solar

photovoltaic and hot water systems on residential, business, and government rooftops by the year 2010

- New residential housing construction, where our new "Partnership for Advanced Technologies in Housing" (PATH) program is starting to work with builders, suppliers, insurance companies, and local regulators to develop and use building designs and production methods that can lower costs, improve safety, and also reduce greenhouse gas emissions by 50%
- A cities partnership with the nation's mayors to stimulate the improvement of energy efficiency and reduction of energy costs and air pollution in major cities through the use of alternative fuel buses and other municipal vehicles, more efficient street and other lighting, and energy-saving investments in municipal buildings
- A Federal government initiative to use the government's purchasing power and its 500,000 buildings and .....,000 vehicles to demonstrate advanced energy efficient technologies while also saving money for the public. Since 1990, the Federal government has reduced its total energy usage by 18% and reduced its energy bill from over $11 billion to just $8 billion in 1995. This will also include actions in locations where large numbers of the public will experience them, such as the National Parks, which are visited by over 200 million people per year.

PRINCIPLES

- Partner with the private sector to the maximum extent feasible, including cost-sharing and joint agreement on plans and goals
- Include the nation's universities and other research institutions along with the federal government's research laboratories and centers
- Evaluate specific areas of research on their potential for both cost-effective and absolute levels of reduction in future greenhouse gas emissions, and for maintaining high levels of performance and user satisfaction
- Develop specific, peer-reviewed performance goals
- Maximize market-based approaches and minimize the government's attempt to pick "winners" and "losers", especially by focusing on target performance levels needed in various applications, rather than on specific technologies

EMISSIONS REDUCTIONS

This strategy is designed to provide both long-term and near-term benefits in reducing greenhouse gas emissions. The very long-term research initiatives are, of course, quite uncertain with respect to the technological performance they will achieve in emissions reduction. Their goals, however, are very ambitious and are aimed at the step function improvements that are needed to deal with the climate change issue in the long run. The shorter-term elements of the strategy are, of

course, also uncertain, but primarily as a result of uncertainty about customer and market acceptance of the technologies, rather than about their underlying technical capabilities.

Acknowledging those uncertainties, this technology strategy is estimated to achieve carbon dioxide reductions in about ..... years reaching approximately ..... to ..... million tons per year from the projected levels under a business as usual set of technology assumptions.

In the longer term, by 2030 and beyond, this strategy should lead to advances that would reduce emissions on the order of ..... to ..... per year, and could potentially be much higher.

FUNDING

When fully phased in, the Climate Change Technology Strategy should be funded at an annual level of $ ..... per year from the federal government. That should leverage an additional amount of at least $ ..... in private sector funding for the development and demonstration of these technologies.

The full phasing in of this strategy will depend upon the availability of funds from the sale of emissions allowance auctions or other new sources of revenue. By reinvesting a portion of such revenues in this technology strategy, these funds are being put back into the economy in a manner that creates jobs, improves the competitive standing of U.S. industry, and will provide long-term benefits to the country.

In the meantime, to initiate the technology strategy, the Federal Government will seek an increase in funding from the Congress beginning in the next Budget, to be submitted in February.

MANAGEMENT

The Federal implementation of this technology strategy will be led by .... It will involve practically every Federal department and agency, and, of course, the whole system of national laboratories and research centers throughout the country. Every effort will be made to work closely with the Congress to enlist their advice and support for this important national initiative.

In order to ensure a high quality, independent oversight and review of the strategy over time, the President's Council on Science and Technology is being asked to establish a standing committee to provide an annual review of the program. As with other such PCAST committees, it is expected that this one will include leaders from the private sector, universities, independent research centers, and public interest groups.

ISSUES

- Funding — the use of auction or other climate-related revenues for funding, and the concept of delaying the full phase in of the strategy in until such funds are available
- Funding levels and emissions reductions, including the allocation among long-, medium-, and near-term technologies
- Incentives — what are we willing to include, especially to stimulate the near-term adoption and use of these technologies: direct funding, information, streamlining regulations, financing or preferential financing in government programs, tax credits, accelerated depreciation, emissions trading, efficiency standards and regulations?
- Management — who will run it? Should we have a formal outside review group, like the PCAST committee described above?

TOTAL P.06

OFFICE OF TIMOTHY E. WIRTH
UNDER SECRETARY
FOR GLOBAL AFFAIRS

Policy C

'97 SEP 14 PM5:05

DEPARTMENT OF STATE
2201 C Street, N.W.
Room 7250
Washington, D.C. 20520
Phone: 202-647-6240 Fax: 202-647-0753

TO: TODD STERN

FROM:

DATE: 9.14

FAX: 456-2215

Number of Pages (including cover): 4

COMMENTS:

United States Department of State

Under Secretary of State
for Global Affairs

Washington, D.C. 20520–7250

September 12, 1997

PERSONAL

TO: Larry Summers
Deputy Secretary
Treasury Department

FROM: Timothy E. Wirth <TEW (BJ)>

SUBJECT: Climate Change - A Revised Scenario III

I am sorry we missed each other, but I wanted to get back to you before my prolonged trip starting today, and as we prepare for Monday's Principal's meeting.

These are my own ideas, and follows on my attempt to answer Jack Lew's good question yesterday, Strobe's comments, Bruce's questions, and the need to try to move the ball forward.

Hope this is helpful.

cc: Bruce Babbitt
Strobe Talbott
Stu Eizenstat
Jack Lew
Eugene Sperling
Katie McGinty
Todd Stern

United States Department of State

Under Secretary of State
for Global Affairs

Washington, D.C. 20520–7250

September 12, 1997

PERSONAL MEMORANDUM

TO: Larry Summers
Deputy Secretary
Treasury Department

FROM: Timothy E. Wirth TEW (AP for)

I'm sorry we couldn't get together again before my extended trip, but I wanted to take this opportunity to register my thoughts in the process in which we are engaged related to the President's decision-making on Climate Change.

GOAL:

You have heard me stress over and over again the need to focus on our goal - why are we doing all of this anyway? The ultimate objective is to stabilize the concentrations of carbon in the atmosphere; this goal must be stated repeatedly, and despite claims to the contrary, I don't think most people understand:

- We must make clear the difference between stabilizing emissions, and stabilizing the concentration of carbon in the atmosphere. Stabilization of concentrations is the central idea. All the economic and political strategy flows from the stabilization objective.

- While the concentrations goal is the ultimate objective, an appropriate first step is a significant reduction in emissions.

The President's Statement

1. I believe that any Presidential statement must begin with an outline of a stabilization goal and an affirmation of the need to stabilize at about double pre-industrial levels of CO2.

2. We would then follow with an outline of the potential consequences of not acting, including a discussion of the environmental costs (e.g. sea levels; storms, glaciers), and the economic costs (e.g. property damage, agricultural losses) of not acting.

3. He would then discuss the need for US leadership on the issue; serious domestic action will get the other developed countries to move; and US example will bring in the whole world.

4. Next would be the outline of the US domestic action: a realistic target (1990 levels) within a feasible time frame (2010-2020). Included would be an attempt to design the financial instruments that may be needed; emissions trading and JI.

5. Also needed is a major technological commitment, which will happen only if the economy receives a signal that commitments on emissions reductions will begin early, and will continue over a prolonged period beyond an initial period.

6. As part of the economics background the President needs the following from you and the economic team:

a. The cost of not acting.

b. The benefits of flexible financial instruments (trading and JI)

c. The benefits of recycling any fees or revenues raised.

d. The need to design special packages for impacted areas; the model would be the proposal made by Senator Byrd for West Virginia and the impacts of the Clean Air Act.

e. The economic benefits of the steps taken (lower health care costs due to pollution and particulate reduction, for example).

f. The need to start the ramp up now, so that we don't lay the costs on future generations.

g. The plethora of economic studies (e.g. Repetto/WRI study), and the letter from the economists.

7. The statement would also include an outline of our revised developing country strategy. Again quote Senator Byrd: "We are in the same boat; we have a bigger oar now; they phase in; we all have to row together." We would also indicate that we will move to ratify when these pieces are in place, thus addressing the Senate Resolution.

I believe that this is a fair outline of a revised Scenario III. It links domestic and foreign policy strategies, per Jack Lew's good intervention. It maintains US leadership, per Strobe Talbott's comments. It is right for the environment, per Bruce Babbitt's question, and it is politically feasible, per Bruce's comments. It includes <u>all</u> the economic variables, not just a few. And it provides the President with a road map and not just a description of the potholes.

Policy

~~CONFIDENTIAL~~

October 10, 1997

MEMOTO: Todd Stern

FROM: Kevin Fay

SUBJECT: Presidential Path Forward on Climate Change

I understand that the President is expected to consider a decision memo in the next couple of days on the path forward on climate change.

The discussion in the last few days of the "safety valve" concept appears to have thrown off consideration of the bigger picture issues. I offer the following views on the key issues in the current discussion. Also, in light of the unlikely chances of getting developing country commitments, even to a future negotiating schedule, I urge that the President not get bogged down in minutiae that will only help your opponents.

The President appears strong, forceful and visionary if he announces a long-term objective, a long-term vision on technology, insistence on developing country commitments, a commitment towards flexible market-based initiatives, indicates a sincere willingness to move the US onto a reduction path beginning with voluntary initiatives and transitioning into a binding commitment.

The President should reempasize the US support for binding commitments internationally that are realistic and achievable, and that until such an agreement is reached, the US will embark on an effort in the US to get on the path toward reductions.

Long term objective

The President appeared to hint at the White House Conference that the long term objective of not exceeding a doubling of carbon by 2100 was desirable. It was noted that this curve on John Holdren's graph was green.

The 550 ppm curve deals with carbon only. If it is clear that the long term objective is to not more than double carbon and other greenhouse gases (on a carbon equivalent basis) most of the moderate to left industry representatives will not object. The environmentalists will complain it is not enough. The EU has posited 550 ppm as the long term goal. A doubling goal long term with all gases would be slightly higher than 550 ppm.

Mid-term objective

The long-term objective applies to the world. The president needs to have a "vision" for a US objective. The analogies I have used are the moon landing and the National Highway System. The president should announce a US technology initiative over the next 50 years to reduce Per capita emissions by some significant percentage or to reduce emissions per

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unit of GDP. He should announce that the Vice President is in charge of the task force to develop a long term technology strategy to achieve this as efforts are made over the next 2-3 years to complete the treaty negotiations.

Binding target and timetable

The Japanese have been criticized for their proposal on 5% below 1990 levels by 2012. (Closer analysis of their proposal shows that it is really a differentiation proposal that would mean no reductions below 1990 levels for Japan.)

I see no benefit to the President to getting into specific numbers at this time. Assuming that the toughest target the US supports is stabilization in the 2010-2015 timeframe, the US is still the right end of the spectrum. It creates no leverage for us on any of the other framework issues.

The President could say that it is important that we stop the overall growth of emissions in the near future and begin to achieve real reductions over the next two decades. He should key off of John Sweeney's remarks that there is nothing magical about 1990 levels or 2010, but that it is imperative that the US and the rest of the world get on a path of reductions in order to achieve his longer-term objective.

He could hint that the combination of early voluntary measures and effective market-based policies may actually allow us to achieve more than just the 1990 level.

Developing Countries

The President has been very good on this subject. He could now indicate that the treaty negotiating text is inadequate in this regard, and absent specific commitments by developing countries toward the long-term objective, and appropriate entry into force requirements (a significant percentage of overall greenhouse gas emissions and a majority of both Annex I and developing country parties,)that the US is unable to sign onto the protocol.

Emissions Trading and Joint Implementation

The Chairman's text leaves the decision on JI until later. This is unacceptable and should be tied into the debate over developing country participation. Emissions Trading is included in the chairman's text, but the language can be approved. The President should indicate that the EU can bubble its emissions only under the emissions trading article of the treaty and only to the extent that such bubbling is allowed for all other parties.

The Safety Valve

While the concept may have some merit. It is too new and too uncertain what is intended here. The treaty has a withdrawal mechanism which could be utilized. It is currently generating significant opposition from the environment community and the utility industry, who view it simply as a tax. The manufacturing community does not have enough understanding of the concept to have a current opinion.

I would not have the President get into any detail about this. It may be a useful approach to hold in reserve for future congressional ratification. Since we do not currently have enough information about it to even consider its problems or benefits, the initial reaction of most of my companies would be suspicion.

From a political standpoint, it appears to play into the hands of the opposition who are now running ads that the Administration is planning to tax energy.

This discussion is fairly reminiscent to the last minute release of the health care plan--it will be characterized by the greens as a bad for the environment, and is being characterized by the business community as unnecessary government intervention in the market or the return of tax and spend policies.

I do not want to stifle consideration of the idea. At this stage, however, it is too late to interject this topic into the international negotiations, and fraught with great political danger on the domestic scene. I would consider it very dangerous to have the President involved in this debate at this time.

Voluntary Approaches/Credit for Early Action

The President should announce his intent to have the Vice President, in conjunction with the 50 year technology strategy, to engage 10 key industries in negotiations on voluntary initiatives such as that described by the steel industry. This immediately puts a burden on the auto and oil industries, and the Republicans, who have openly sought a voluntary approach.

The President should, as the Vice President did the other day, indicate his support for the concept of credit for early action. Everyone seems to have a different idea how this should be given. I would put this on the list if issues to be negotiated with industry in the development of the technology strategy and the voluntary programs.

SUMMARY

Absent the US abandoning its position, it highly unlikely that there can be an agreement in Kyoto. A Presidential speech along the lines I have outlined above gives enough specifics on the path forward that would allow the parties to come up with a plan B, but also force the immediate engagement of industry in the US. The Administration should be careful not to introduce new concepts at this time that are not well thought out, or will simply give additional ammunition to the opposition.

FAX

DATE: Friday, October 10, 1997

TO: Todd Stern, White House Staff Secretary

FAX: 202 456-2215,,4021

FROM: Alcalde & Fay

PAGES: 4

MEMO

Todd,
Enclsoed are some thoughts for your consideration. Feel free to share with Gene and Katy. I am meeting with my companies this morning on credit for early action and the safety valve. Call if you have questions.

Kevin

THE WHITE HOUSE

WASHINGTON

October 1, 1997

MEMORANDUM FOR THE PRESIDENT

FROM: **GENE SPERLING**
DANIEL TARULLO
KATHLEEN McGINTY

SUBJECT: **Climate change**

As promised in our climate change workplan, this memorandum provides more detail on some of the issues that were raised during our meeting on September 18. We have held three principals meeting in the past week, and plan to hold one Friday, to pin down specific recommendations from the NEC/CEQ principals. We will then put together an NEC/CEQ recommendations memorandum and a briefing book that contains the underlying memoranda from the principals and other background materials. The recommendations memo and briefing book will be submitted to you by the end of this week, to inform your thinking before the October 6 White House conference.

Specifically, this memorandum:

- Outlines the sources of current emissions in the United States;
- Discusses several aspects of a tradeable permits system, including:

  →The benefits of a permit trading system relative to traditional regulation;

  →The lessons offered by the SO_2 trading program; and

  →Direct allocation versus auctioning with revenue recycling; and
- Explores some of the costs and benefits of a slower approach.

I. SOURCES OF EMISSIONS IN THE UNITED STATES

Carbon dioxide (CO_2) accounts for more than 85 percent of U.S. greenhouse gas emissions. Roughly one-third of CO_2 emissions are from transportation, one-third from buildings and one-third from industry.[1] U.S. CO_2 emissions are now approximately 10 percent above 1990 levels, and are projected to be 28 percent over 1990 levels by 2010 absent policy interventions. Other greenhouse gases include methane (from landfills and livestock), nitrous oxide, and some engineered chemicals such as CFCs and HFCs.

In addition to the discussion below, the appendix -- prepared by OSTP -- presents more detailed data and figures on the sources of emissions. (Some of the potential emissions reductions mentioned in the appendix are not accepted by all agencies.)

TRANSPORTATION

Transportation contributes 31 percent of of U.S. CO_2 emissions. Its emissions are growing by about 2 percent (10 million tons) per year -- roughly twice as fast as industry and buildings -- because of increases in vehicle miles traveled and the increasing popularity of fuel-inefficient sport utility vehicles, minivans and pick-up trucks (which together now account for almost half of all new passenger vehicle sales).

Transportation: Sources of CO_2 emissions

Source	Emissions in millions of tons	As % of transportation emissions
Automobiles	152	34.9%
Light trucks	101	23.2%
Heavy trucks	67	15.4%
Aircraft	57	13.1%
Other	59	13.4%
TOTAL	437	100.0%

[1] In this accounting, the CO_2 produced to generate electricity is charged to the sector using the electricity. Taken together, emissions from all electricity production amount to 36 percent of CO_2 emissions.

BUILDINGS

Residential buildings produce 19 percent of U.S. CO_2 emissions, and commercial buildings account for another 15 percent -- implying that buildings account for over a third of total emissions. Emissions from both residential and commercial buildings are growing by 1 percent annually (2.6 and 2.1 million tons respectively). Energy demand in residential buildings is greatest for heating, electrical appliances, and air conditioning. In commercial buildings, demand is greatest for lighting, electric equipment, and air conditioning.

Buildings: Sources of CO_2 emissions

Source	Emissions in millions of tons	As % of building emissions
Space heat	211	43.0%
Appliances	98	20.0%
Cooling	69	14.0%
Lights	69	14.0%
Water heat	44	9.0%
TOTAL	490	100.0%

INDUSTRY

Industries produce about a third of all CO_2 emissions. Emissions from this source are expected to grow at 0.8 percent per year (4 million tons). About 80 percent of all industrial CO_2 emissions come from petroleum refining, chemicals, paper, lumber, and metals.

Industry: Sources of CO_2 emissions

Source	Emissions in millions of tons	% of industry emissions
Machine drive/electrolytic	149	32.0%
Steam	126	27.0%
Process heat	89	19.0%
Off-road equipment	33	7.0%
Heat/air conditioning/light	28	6.0%
Feedstocks/other	42	9.0%
TOTAL	466	100.0%

ELECTRICITY GENERATION

As noted, the CO_2 produced to generate electricity is charged to the sector using the electricity in the accounting above. Emissions from all electricity production amount to 36 percent of CO_2 emissions.

The table below shows that coal accounts for 50 percent of electricity generated in the U.S., but 77 percent of CO_2 emissions from electricity generation. Coal produces 72 percent more greenhouse gases than natural gas per unit of energy delivered -- which is why a carbon emissions reduction program would have a much larger impact on coal prices than on natural gas or other energy prices.

On average, the electric energy produced by an electric generator is only about a third of the energy input -- the other two-thirds is released as waste into the air or nearby waters. As more generation occurs closer to industrial and commercial sites, it should be easier to capture more of the heat from electric generation that would otherwise be wasted.

Electricity

Source	Share of electricity CO_2 emissions	Share of electricity generation
Oil	1.9%	1.5%
Natural gas	20.7%	23.0%
Coal	77.4%	50.1%
Nuclear	--	15.8%
Hydro & renewables	--	9.6%
TOTAL	100.0%	100.0%

II. Tradeable Permits

During our meeting with you last week, we discussed a tradeable permits system for reducing carbon emissions. This section examines several questions related to tradeable permits.

Tradeable Permits Versus Mandated Standards

A natural question about tradeable permits is why they reduce the costs associated with meeting a given emissions reduction objective. Wouldn't it be easier and more straightforward to mandate standards on items such as automobile fuel efficiency?

Mandated standards are more costly than market-based systems to reduce pollution for two reasons: First, standards usually only affect the market for new equipment; they do not

increase the incentive for owners of existing equipment to scrap their old, inefficient capital more rapidly. Second, standards do not affect the incentive to conserve energy once the new equipment is purchased. For products where additional usage is discretionary (such as cars, but unlike refrigerators), this can be significant. A standard for automobile efficiency does not increase incentives to cut out wasteful driving. A tradeable permits system, on the other hand, focuses directly on the activity in question, allowing reductions to take place wherever they are cheapest and imposing no arbitrary constraint on incentives for further improvement. And in most cases, a tradeable permits system is less administratively costly.

An illustrative example

An example may be helpful. Assume that there are two types of coal-fired plants, both of which emit 100,000 tons of carbon per year. The first type can easily switch to less carbon-intensive fuels (such as natural gas), and thereby reduce carbon emissions even for a given level of energy output (since natural gas has less carbon per BTU than coal). To be more specific, this first type of power plant can achieve carbon emissions reductions at a cost of $25 for every carbon ton reduction. The second type, however, was designed in a manner that makes it extremely difficult to switch fuel to reduce emissions: it can achieve emissions reductions only at a cost of $150 per ton.

The average cost of mandating that carbon emissions at all plants fall by 30 percent is therefore $2.6 million per plant ($0.75 million at the first type, and $4.5 million at the second). Under a permit system, however, the total cost would be dramatically reduced by allowing the second type of plant to buy permits from the first type. This way, a 30 percent reduction in total emissions would cost only $1.5 million per plant (all of the 60,000 ton reduction would occur at the first type of plant, at a cost of $25 per ton). In this example, the permit system produces a cost saving of over 70 percent *to achieve the same environmental goal.* This level of cost saving is not unrealistic: studies by environmental economists often find that market-based systems reduce the cost of environmental regulations by as much as 90 percent.

CAFE standards

You mentioned the specific case of fuel efficiency standards. The CAFE standard for automobiles was introduced in 1978 at a level of 18 mpg, and tightened until it reached 27.5 mpg in 1985. Fuel efficiency rose significantly during the same period, with average miles per gallon increasing by roughly 50 percent between 1975 and 1985. But it is difficult to separate the combined impacts of the CAFE standards and higher fuel prices: The two oil shocks in the 1970's clearly increased consumer demand for more efficient vehicles.

Since 1985, fuel efficiency has remained stagnant and CAFE standards have remained unchanged. Since real gasoline prices have fallen steadily in the 1980's and 1990's, fuel economy would likely have fallen -- rather than remained stagnant -- over this period if not for the CAFE standards. Technology relevant to fuel economy has continued to improve at a rate that would

allow fuel efficiency to climb about 2 percent per year, but auto makers are using this improved technology to add features such as increased vehicle horsepower and size, not fuel economy. Indeed, the past decade has seen a dramatic rise in sales of fuel-inefficient light trucks -- first minivans and pick-ups, then sport utility vehicles -- which now account for nearly half of all passenger vehicle sales and are subject to much lower CAFE standards (21.5 mpg) than cars.

Proponents of fuel efficiency standards argue that increases in CAFE standards could re-route this trend of technical improvement to greater mileage. Some have proposed modifications to CAFE to make it more flexible and cost-efficient, such as allowing trading between companies, or (as part of a broader emissions trading program) with other sectors. Fuel-efficiency standards could also be used to promote commercial introduction of PNGV vehicles with double or triple current fuel economy. (At present, our PNGV partners have pledged only to develop prototypes, but have not committed to sell them.)

Raising CAFE standards, however, can entail substantial -- albeit hidden -- costs. First, consumers prefer to use technology for improved features rather than fuel efficiency -- and forcing them to reverse this preference would be both unpopular and costly. For example, several studies have estimated the cost of reducing carbon emissions with CAFE standards. One estimated the implied cost of carbon reductions from increasing the CAFE standard to 37.5 miles per gallon at $106 per ton of carbon reduced; another estimated that raising CAFE standards to 40 miles per gallon would be equivalent to a carbon price of $104 per ton. Second, to the extent that higher CAFE standards raise the cost of new cars, they tend to discourage new purchases -- thus limiting the overall efficiency benefit by keeping older cars on the road longer than they would have otherwise remained. Finally, increasing CAFE standards would be politically difficult. Auto-makers will resist efforts to increase standards, especially for sport-utility vehicles -- where the Big 3 make much of their profits (up to $10,000 per vehicle).

Since CAFE standards apply only to new cars and vehicles, an increase takes a decade or more to work its way fully through the vehicle fleet. This means that if a significant effect is to be felt by 2010, any CAFE increases would need to begin early.

The SO_2 Example: How Much Can We Learn From It?

The Clean Air Amendments of 1990 required a 50 percent reduction in SO_2 emissions from electric-utility boilers. To accomplish this goal, an emissions trading program was constructed, under which 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.) A natural question is whether the experience under the SO_2 programs provides insight into a carbon emissions trading system. Two notable aspects of the SO_2 experience include:

- First, a tradeable permit system can reduce the cost of meeting environmental problems involving a limited number of polluters (e.g., electric utilities). Relative to the previous

command-and-control approach to reducing SO_2 emissions, the tradeable permits program is widely hailed as a success in producing cost-effective environmental protection. Utilities found new and less costly ways to reduce SO2 emissions than had been anticipated at the time the legislation was enacted.

- Second, the cost estimates before the trading system began operations were too high. Around the time that the 1990 Amendments were enacted, a commonly held view was that achieving the targeted reduction in SO_2 would require the price of emissions to rise above $400 per ton, and possibly as high as $1,000 per ton. Today, the price of SO_2 allowances ranges between $90 and $120 per ton -- despite the fact that SO_2 emissions from utilities in 1995 and 1996 were 3 million tons lower than required.

There are several important caveats, however, that limit the applicability of the lessons from the SO_2 program to a carbon emissions program. In particular:

- A carbon emissions program would be *substantially* larger than the SO_2 program: 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. And a significant reduction in carbon emissions will require much more fundamental changes in the structure of the American economy than the SO_2 program. Treasury and CEA argue that any emissions trading system for carbon will be substantially more difficult -- and perhaps even impossible -- to administer than is the case for SO_2. EPA -- which administers the SO2 program -- does not believe that this difference in scale would significantly complicate administering a C02 trading program.

- Simple price comparisons -- showing that the actual permit prices are much lower than predicted -- may be somewhat misleading. Some of the early price estimates conflated the two phases of the program (we're still in the first phase), and were based on inaccurate guesses as to the provisions of the final bill. The last pre-enactment estimate -- the one with the best information about the legislation that would actually be passed -- projected that the permit price would be between $170 and $200 per ton. The degree of true prediction error may be less than some have suggested.

- The remaining discrepancy between predicted and actual permit prices under the SO_2 program partially reflects the deregulation of the freight-carrying railroads -- a development that had nothing to do with the SO_2 program -- which facilitated increased use of low-sulphur coal. Although there are many policy areas that could affect the cost of a carbon trading program -- such as electricity deregulation -- it is, by definition, impossible to know how unexpected future policy actions will affect such costs.

Direct Allocation Versus Auctioning-With-Revenue Recycling

Another issue related to a permit system, and one we touched upon in our meeting, is whether the permits should be auctioned or allocated (that is distributed by the government to designated recipients). One approach to allocating permits would be to "grandfather" them to existing emitters. It is essential to recognize that regardless of whether the permits are auctioned or allocated, consumers are likely to bear most of the costs involved in reducing emissions (through higher energy prices). Thus the choice between auctioning and allocating does not in any way avoid the role of higher energy prices in reducing carbon emissions.

To summarize the pros and cons:

DIRECT ALLOCATION

PROS

- More difficult to characterize as a tax: An allocation program does not involve directly raising revenue. Previous allocation programs -- such as the SO_2 program -- have not been viewed as a tax.

- Corporate support: Our outreach effort suggests that an allocation system could be crucial to generating corporate support -- or at least minimizing opposition -- for the effort to reduce greenhouse gas emissions. But it is not possible to avoid imposing costs on at least some current polluters, so that opposition will remain in the corporate sector.

CONS

- Regressivity: Even with allocated permits, companies are likely to pass most of the higher energy costs on to consumers. Any program that involves direct allocation to businesses thus protects corporations even though they do not need protection, and gives away the funds that could protect consumers, who will bear most of the costs from adjusting to the emissions reduction scheme.

- Corporate welfare: One way to think about the difference between direct allocation and auctioning is to recognize that allocation is functionally equivalent to auctioning the permits, and then giving the proceeds of the auctions back to the recipients of the permits. If permits are "grandfathered," this wealth would go directly to existing emitters. The optics of "giving away" to companies as much as $50 to $100 billion per year, which represents about *10 to 20 percent of total after-tax corporate profits,* may be difficult.

- Inefficiency: Treasury, Commerce, and CEA have grave reservations about the efficiency

-- and indeed even the feasibility -- of an allocation system, especially if the permit requirement is imposed downstream (e.g., on electric utilities). First, any downstream option must settle for only partial coverage of emissions to limit administrative burden. Second, the typical downstream system creates obvious incentives for evasion (e.g., cheating or building units that fall just short of the cutoff level).

AUCTIONS

PROS

- Auctioning would raise revenue -- potentially more than $100 billion a year -- that could be used to reduce other taxes, fund the adjustment programs favored by the labor unions, offset the regressivity of the emissions reduction scheme, or raise national saving. As some rough examples of what could be done under a revenue-neutral auction approach, $50 billion raised from auctioning permits could be used for one of the following:

  →Exclude over $3,000 of payroll from both parts of the 12.4 percent OASDI tax;

  →Cut the employees' OASDI payroll tax (currently 6.2 percent) by 25 percent; or

  →Reduce the 15 percent income tax rate in the lowest bracket to 12.7 percent.

CONS

- Business groups are likely to recognize this as a tax. The theoretical benefits of auctions as a means of distributing the permits will be much less salient to the CEO of a large corporation than the necessity of having to purchase permits to continue operations. Businesses will view an auction as an obligation to pay for something they currently do for free -- even if they are able to pass the higher costs on to consumers.

- An auction would be more easily characterized as a tax than an allocation program. Although we could emphasize the differences between an auction and a tax, the auction would be scored by budget experts as a revenue flow to the Treasury.

III. THE COSTS AND BENEFITS OF A SLOWER APPROACH

The case for an approach with earlier reductions

Absent policy interventions, atmospheric greenhouse gas concentrations will increase during the next century to levels unknown on this planet for 50 million years. To avoid such extraordinary increases, *global* greenhouse gas emissions must at least begin to decline from projected levels early in the next century. For *global* emissions to begin to decline in this time frame, developed countries must move quickly to reduce their emissions, followed rapidly by

action by developing countries.

Those in favor of an approach with earlier reductions -- such as implied by reaching 1990 levels by 2010 -- argue that if the United States delays emissions reductions, it makes it more likely that other developed countries will do so too. It will be much longer, as well, before developing countries take any steps to reduce emissions. In such an event, businesses and consumers will make another generation of investment in relatively inefficient plant and equipment, and the world will become more and more committed to greenhouse gas concentrations far outside the range of historic experience.

- **Effect of delay on later emissions reductions.** For example, if our goal were to stay below 550 ppm of CO_2 in the atmosphere, a ten-year delay in starting emissions reductions would require emissions reductions to proceed much faster in later decades. Even assuming steep reductions in greenhouse gas emissions in distant decades (which our children and grandchildren may or may not be able to achieve), reductions must begin soon to avoid serious environmental damage.

The case for an approach with small reductions earlier and steep reductions later

Other advisers are extremely concerned that a target anywhere close to 1990 emissions levels by 2010 would be excessively costly, like the oil price increases of the 1970s and imposing a reduction in the living standards of the average family of about $1,000 -- equivalent to a tax on consumers at least five times as large as the Administration's 1993 BTU tax proposal. These advisers argue that the same environmental goals can be achieved at substantially lower economic cost by adopting a more gradual approach -- one that allows the economy to adjust slowly over time to the new constraints being imposed. There are three major reasons that a more rapid approach raises overall costs:

- ***Capital stock.*** It is very expensive to scrap capital stock while it is still in the prime of its useful life, and replace it with new plant and equipment that is more energy-efficient. Making efficiency improvements when the plants would have been replaced in any case significantly reduces the costs of such improvements because there are no additional costs of scrapping otherwise productive plant.

- ***Lead time for technologies.*** A second motivation for a slow takeoff in curbing greenhouse gases emissions is that it takes considerable time before emerging carbon-free or carbon-lean technologies are developed. Waiting until these new technologies are available before making expensive emissions-saving investments offers the potential of both lower economic costs and higher environmental payoffs.

- ***Macroeconomic impact.*** Your economic advisers believe that a plan to attain 1990 emissions levels by 2010 would produce "stagflation" -- higher unemployment and higher inflation. In contrast to the two oil shocks, the increases in energy prices associated with

a treaty to reduce greenhouse gases would be anticipated, rather than a surprise. Nevertheless, your economics team expects that the efforts of the Federal Reserve to contain inflation, coupled with likely efforts on the part of workers to recoup real wage losses -- even if those losses are anticipated -- will lead to a period of higher unemployment.

Policy

United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

26 pages

October 2, 1997

TO: NEC - Peter Orzag
NSC/CEQ - David Sandalow
WHCCTF - Dirk Forrister

FROM: OES/EGC - Jonathan Pershing

SUBJECT: Draft Interim Negotiating Text

Attached please find a copy of AGBM Chairman Raoul Estrada's draft negotiating text. This document will be discussed at an informal session next week in Bonn, Germany. Along with approximately 20 other countries (both Annex I and non-Annex I), Special Negotiator Mark Hambley and OES/EGC Director Dan Reifsnyder will attend for the U.S. Estrada intends to revise the text before the Bonn AGBM session in light of the comments he receives.

In this context, the document should be considered a draft and not distributed outside the U.S. government. We have also circulated it to several agencies for their review. We ask that any comments be submitted to our office by COB Monday, October 6, 1997 as Mark and Dan leave for Bonn that evening.

DRAFT

COMPLETION OF A PROTOCOL OR ANOTHER LEGAL INSTRUMENT

Consolidated negotiating text by the Chairman

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INTRODUCTION

1. At its seventh session, the Ad Hoc Group on the Berlin Mandate (AGBM) "requested the Chairman, with the assistance of the secretariat, to prepare a Chairman's text to be the focus of work at the next session, drawing on the outcome of the work of the AGBM at its seventh session" (FCCC/AGBM/1997/5, para. 13).

2. The consolidated negotiating text by the Chairman which follows responds to the above mandate. It is derived from the outcome of the work of the AGBM at its seventh session (see FCCC/AGBM/1997/INF.1) as well as informal consultations conducted by the Chairman.

3. The consolidated negotiating text is presented to the AGBM for its consideration without prejudice to the negotiating text by the Chairman (FCCC/AGBM/1997/3/Add.1) and the original proposals from Parties contained in the relevant miscellaneous documents (FCCC/AGBM/1996/MISC.2 and Add.1-4 and FCCC/AGBM/1997/MISC.1 and Add.1-5) which remain before the group.

4. The consolidated negotiating text has been prepared in recognition of the fact that certain issues under discussion in the AGBM could lend themselves to being addressed through related decisions to be taken by the Conference of the Parties (COP), where appropriate in parallel with the adoption of the new instrument.

5. Although the AGBM has not yet reached agreement on the form of the legal instrument to be adopted by the COP at its third session, the structure of the consolidated negotiating text is based on that of a protocol, in line with the thrust of deliberations in the Group to date. Parties may wish to note, however, that other options are still open to the AGBM and that, were agreement to be reached on another legal instrument, for example an amendment, the relevant elements in the consolidated negotiating text could be adapted accordingly.

6. Parties are invited to focus their negotiations on the consolidated negotiating text at the eighth session of the AGBM, in order to reach agreement on the final text for a protocol or another legal instrument to be adopted by the COP at its third session, and thereby fulfill the mandate entrusted to them.

Annex

CONSOLIDATED NEGOTIATING TEXT BY THE CHAIRMAN

Preamble

The Parties to this Protocol,

Being Parties to the United Nations Framework Convention on Climate Change, hereinafter referred to as the "Convention",

In pursuit of the ultimate objective of the Convention as stated in its Article 2,

Recalling the provisions of the Convention and *being guided* by the principles contained in its Article 3,

In fulfilment of the Berlin Mandate adopted by decision 1/CP.1 of the Conference of the Parties to the Convention at its first session,

Have agreed as follows:

Article 1

For the purposes of this Protocol, the definitions contained in Article 1 of the Convention shall apply. In addition:

1. "Convention" means the United Nations Framework Convention on Climate Change, adopted in New York on 9 May 1992.

2. "Montreal Protocol" means the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, as subsequently adjusted and amended.

3. "Parties" means, unless the text otherwise indicates, Parties to this Protocol.

4. "Parties present and voting" means Parties present and casting an affirmative or negative vote.

5. "Subsidiary bodies" means the subsidiary bodies established by Articles 9 and 10 of the Convention.

6. *Other definitions, as required.*

Article 2

Each of the Parties included in Annex I to the Convention or acting under Article 9 shall:

1. Adopt and implement policies and measures to assist in the fulfilment of its emission commitments under Article 3.

2. Aim to implement the policies and measures under this Article in such a way as to avoid adverse impacts on other Parties, especially developing country Parties and in particular those identified in Article 4.8 of the Convention.

3. Aim, where appropriate and as part of its national portfolio of policies and measures to address climate change determined according to national circumstances, to implement policies and measures in the priority areas identified in Annex P.

4. Co-operate to enhance the individual and combined effectiveness of their policies and measures, in accordance with Article 4.2(e)(i) of the Convention. To this end, these Parties shall take steps to share their experiences and exchange information on policies and measures adopted and implemented under this Article, particularly those in the priority areas identified in Annex P. The Meeting of the Parties shall, as soon as practicable, consider modalities through which such policy co-operation might be facilitated. In its deliberations on this matter, the Meeting of the Parties shall take into account relevant work being done by other bodies.

5. Co-operate to develop common performance indicators relating to the implementation of policies and measures adopted under this Article, with the aim of improving comparability and transparency of reporting and facilitating the sharing of experiences and exchange of information among the Parties. The Meeting of the Parties shall, as soon as practicable, make recommendations on the definition of such performance indicators, taking into account relevant work being done by other bodies.

Article 3

1. [Each of] the Parties included in Annex I to the Convention shall reduce [or limit] [its/their] [net] [aggregate] anthropogenic emissions of the greenhouse gases listed in Annex G as a basket from [1990-levels/the average annual level for the period 198[_] to 199[_]] by [_] percent [by 2010/over the period 200[_] to 20[_]].

[2. The emission commitments for each Party included in Annex I to the Convention [are those indicated in Annex Q] [shall be established through the process set out in Annex D and shall be inscribed for it in Annex Q].]

[3. The emission commitments for each Party included in Annex I to the Convention [are those indicated in Annex Q] [shall be determined] in terms of budgets.]

4. Parties included in Annex I to the Convention undergoing the process of transition to a market economy may select a base [year/period] other than [1990/average annual emissions over the

period 198[_] to 199[_]] for their emission commitments. [Where relevant, this chosen base [year/period] shall be inscribed in Annex Q.]

5. Each Party included in Annex I to the Convention shall aim, by 2005, to have achieved at least half of its emission commitment under this Article.

6. Each Party acting under Article 9 shall ensure that its [net] emissions of the greenhouse gases listed in Annex G as a basket do not exceed its emission commitments. The level and base [year/period] of the emission commitments for each Party acting under Article 9 shall be determined in accordance with the provisions of that Article.

[7. For the first budget period, from 200[_] to 20[_], each Party included in Annex I to the Convention shall be allocated a budget equal to [[_] per cent/the percentage inscribed for it in Annex Q] of its [net] [average annual] [carbon dioxide equivalent] emissions of the greenhouse gases listed in Annex G in [1990/the period 198[_] to 199[_]], or the [year/period] determined in accordance with paragraph 4 above, multiplied by [_] (*number of years in budget period*).]

[8. For the first budget period, each Party acting under Article 9 shall be allocated a budget equal to the percentage determined in accordance with Article 9 of its [net] [average annual] [carbon dioxide equivalent] emissions of the greenhouse gases listed in Annex G in the base [year/period] determined in accordance with Article 9, multiplied by [_] (*number of years in budget period*).]

[9. Any emissions allowed or emission credits which a Party acquires from another Party in accordance with the provisions of Article 5 or Article 6 shall be added to the emission budget of that Party.]

[10. Any emissions allowed or emission credits which a Party transfers to another Party in accordance with the provisions of Article 5 or Article 6 shall be subtracted from the emission budget of that Party.]

[11. The procedures established in paragraphs 7 to 10 above shall be used to set the emission budget of each Party included in Annex I to the Convention or acting under Article 9 for subsequent budget periods, unless otherwise decided by the Meeting of the Parties.]

[12. The Meeting of the Parties shall, as soon as practicable, decide upon modalities for the auditing of emission budgets.]

[13. If a Party included in Annex I to the Convention or acting under Article 9 reduces its emissions during a budget period by a greater percentage than that required by its emission commitment, this difference shall be credited to the emission budget of that Party for the subsequent budget period.]

[14. If a Party included in Annex I to the Convention or acting under Article 9 exceeds its emission budget for a budget period by up to and including [_] per cent, that Party shall not be considered as being in a state of non-compliance if it subtracts the amount of excess emissions from

its subsequent budget at a rate of [_:1].]

15. Based on the work of the Intergovernmental Panel on Climate Change and advice provided by, *inter alia*, the Subsidiary Body for Scientific and Technological Advice, the Meeting of the Parties shall regularly review and, as appropriate, amend the list of greenhouse gases in Annex G with a view to including other greenhouse gases and source [and sink] categories not controlled by the Montreal Protocol. Any amendment to the list of greenhouse gases in Annex G shall be in accordance with the provisions set forth in Article 18 and shall only apply to those emission commitments that are adopted after its entry into force.

16. Until such time as any greenhouse gases not controlled by the Montreal Protocol from any source [and sink] are covered by quantified emission commitments under this Protocol, Parties included in Annex I to the Convention or acting under Article 9 shall make every effort to control their anthropogenic emissions by sources and enhance their removals by sinks of such gases.

Article 4

1. Each Party included in Annex I to the Convention or acting under Article 9 shall establish a national system for the accurate measurement of anthropogenic emissions by sources [and removals by sinks] of all greenhouse gases not controlled by the Montreal Protocol.

2. Methodologies for measuring anthropogenic emissions by sources [and removals by sinks] of all greenhouse gases not controlled by the Montreal Protocol shall be those accepted by the Intergovernmental Panel on Climate Change and as agreed upon by the Conference of the Parties at its third session. Based on the work of the Intergovernmental Panel on Climate Change and advice provided by, *inter alia*, the Subsidiary Body for Scientific and Technological Advice, the Meeting of the Parties shall periodically update such methodologies.

3. The global warming potentials used to calculate the carbon dioxide equivalence of anthropogenic emissions by sources [and removals by sinks] of greenhouse gases not controlled by the Montreal Protocol listed in Annex G shall be those accepted by the Intergovernmental Panel on Climate Change and as agreed upon by the Conference of the Parties at its third session. Based on the work of the Intergovernmental Panel on Climate Change and advice provided by, *inter alia*, the Subsidiary Body for Scientific and Technological Advice, the Meeting of the Parties shall regularly review, and as appropriate revise, the global warming potential of each such greenhouse gas.

Article 5

1. Any Party included in Annex I to the Convention or acting under Article 9 may transfer to, or acquire from, any other Party included in Annex I to the Convention or acting under Article 9 any of its emissions allowed [for that budget period] for the purpose of meeting its emission commitments under Article 3.

2. The Meeting of the Parties shall, at its first session or as soon as practicable thereafter, decide upon modalities, rules and guidelines for emissions trading as defined in paragraph 1 above, including methodologies for verification and reporting.

3. Parties included in Annex I to the Convention or acting under Article 9 may participate in emissions trading as defined in paragraph 1 above, as soon as the Meeting of the Parties has agreed upon the rules and guidelines referred to in paragraph 2 above.

Article 6

1. For the purpose of meeting part of its obligations under Article 3, any Party included in Annex I to the Convention or acting under Article 9 may receive from any other Party included in the same Annex or acting under that Article, in conformity with the rules of this Article, the carbon dioxide equivalent emission reductions resulting from specific investments aimed at reducing anthropogenic emissions of greenhouse gases listed in Annex G in any sector of the economy.

2. If a decision is taken by the Conference of the Parties to the Convention at the conclusion of the pilot phase of activities implemented jointly in accordance with decision 5/CP.1 to allow joint implementation with Parties not included in Annex I to the Convention, then Parties included in Annex I to the Convention or acting under Article 9 may, jointly with Parties not included in Annex I to the Convention, undertake concrete projects aimed at reducing and limiting anthropogenic emissions of greenhouse gases listed in Annex G in any sector of the economy, in conformity with the rules of this Article and the regulations adopted for this purpose by the Meeting of the Parties.

3. Parties participating in joint implementation projects, in accordance with their contribution to the project, have the right to share among themselves the credits achieved by the projects.

4. In order to generate credits, joint implementation projects shall satisfy the following conditions:

(a) Parties participating in joint implementation projects shall be in compliance with their obligations under Article 3 and shall have a national mechanism for the accounting, certification and verification of their greenhouse gas emissions, in accordance with Article 4 of this Protocol and the methodologies adopted for this purpose by the Meeting of the Parties;

(b) Participation in joint implementation projects shall be voluntary and shall require prior acceptance, approval or endorsement by the participating Parties;

(c) Joint implementation projects shall bring about real, measurable and long-term environmental benefits related to the mitigation of climate change, whilst avoiding adverse environmental and social effects. Projects must provide a reduction in emissions that is additional to any that would otherwise occur;

(d) Joint implementation projects must be compatible with, and supportive of, national environment and development priorities and strategies, and must contribute to cost-effectiveness in achieving global benefits;

(e) Joint implementation projects can be undertaken by two or more Parties;

(f) Joint implementation projects shall be supplemental to domestic policies and measures, which should provide the main means of meeting emission commitments under this Protocol;

(g) Joint implementation projects shall be assessed on a project basis. Credits shall be calculated and allocated on an annual basis. They shall be subject to stringent emission reduction verification and accountability methodologies. For each project, a baseline shall be established setting the net environmental benefits of greenhouse gas emission mitigation and reduction. as compared with a baseline without the project; and

(h) Parties shall report on joint implementation projects in their national communications using guidelines to be adopted by the Meeting of the Parties at its first session and reviewed periodically thereafter.

5. A Party may authorize government agencies, private sector entities, non-governmental organizations or individuals to participate, under the surveillance of that Party, in actions leading to the generation, transfer or receipt of credits for joint implementation projects under this Article.

6. At its first session, the Meeting of the Parties shall adopt and periodically review thereafter:

(a) Criteria and guidelines for the attribution of emission credits to Parties in accordance with paragraphs 1 or 2 of this Article;

(b) Guidelines for reporting on joint implementation projects and for establishing national mechanisms for the accounting, certification and verification of greenhouse gas emissions;

(c) Methodologies for calculating project baselines and actual emissions in order to assess the incremental impact of the project;

(d) Methodologies for monitoring the reduction reported, and for the verification and auditing of credits;

(e) A process for reviewing the total reduction achieved by reported joint implementation projects and the conformity of the joint implementation projects with this Article.

7. If a question of a Party's implementation of the requirements of this Article is identified by either the review process under paragraph 6(e) above or in accordance with the provisions of Article 8, transfers and acquisitions of emission credits may continue to be made after the question has been identified, provided that any such credits may not be used by any Party to meet its obligations under Article 3 until any issue of compliance is resolved.

Article 7

1. Each Party included in Annex I to the Convention or acting under Article 9 shall incorporate in its annual emissions inventory submitted pursuant to decision 3/CP.1 of the Conference of the Parties to the Convention at its first session, in accordance with methodologies and guidelines adopted by the Meeting of the Parties, the following supplementary information:

[(a) From the first year of the first budget period established under Article 3, a calculation of its remaining emission budget for that period;]

[(b) A detailed quantification of any emissions allowed or emission credits acquired or transferred according to the provisions in Articles 5 and 6;]

[(c) Where relevant, details of any emissions allowed carried over or subtracted from a previous budget period pursuant to Article 3, paragraphs 13 or 14.]

2. Each Party included in Annex I to the Convention or acting under Article 9 shall incorporate in its national communication submitted under Article 10(a) and (b) and Article 12 of the Convention the following supplementary information on the implementation of its commitments under this Protocol:

(a) A detailed description of the national measurement system it has established pursuant to Article 4;

(b) An evaluation of trends revealed by the annual inventories submitted under paragraph 1 above over the reporting period with a separate evaluation for the greenhouse gases listed in Annex G;

(c) A detailed description of the policies and measures it has adopted under Article 2 including information on the steps it has taken to promote co-operation with other Parties in the sharing of experiences and the exchange of information, and its performance indicators;

(d) A specific estimate of the projected effects of the policies and measures it has adopted under Article 2 on anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol, with a separate evaluation for projected effects on the greenhouse gases listed in Annex G;

(e) Information on actions and projects undertaken pursuant to Article 5 and Article 6;

(f) An assessment of the estimated impacts on other Parties, especially developing country Parties and in particular those listed in Article 4.8 of the Convention, of the policies and measures adopted and implemented under Article 2.

3. Each Party included in Annex I to the Convention or acting under Article 9 shall submit the

information required from it under this Article together with the first national communication due under the Convention [one year] after the Protocol has entered into force for that Party. The frequency of subsequent communications by all Parties shall be determined by the Meeting of the Parties.

4. The Meeting of the Parties shall adopt methodologies and guidelines for the submission of the information required under this Article at its first session and shall periodically review such guidelines thereafter.

Article 8

1. The national communications submitted pursuant to Article 7 by each Party included in Annex I to the Convention or acting under Article 9, including its annual inventories submitted over the reporting period, shall be reviewed by expert review teams.

2. Expert review teams shall be co-ordinated by the secretariat and shall be composed of experts selected from those nominated by Parties and, as appropriate, by intergovernmental organizations.

3. The review process shall assess all aspects of a Party's implementation of this Protocol, including the likelihood that a Party will achieve its emission commitments under Article 3. The expert review teams shall prepare a report to the Meeting of the Parties assessing the implementation of a Party's commitments and identifying any potential problems in the fulfilment of commitments. Such reports shall be circulated by the secretariat to all Parties. In addition, the secretariat shall identify for further consideration by the Meeting of the Parties any questions of implementation indicated by such reports.

4. Guidelines for the review of implementation by expert review teams and the identification of questions of implementation by the secretariat shall be decided upon by the Meeting of the Parties at its first session.

5. The Meeting of the Parties, with the assistance of the Subsidiary Body for Implementation, shall consider:

(a) - The national communications submitted by Parties under Article 7 and the expert reviews thereof conducted under this Article;

(b) Any questions of implementation identified by the secretariat under paragraph 3 above.

6. Pursuant to its consideration of the information referred to in subparagraphs (a) and (b) above, the Meeting of the Parties shall take decisions on any matter necessary for the implementation of this Protocol.

7. The Meeting of the Parties shall, as soon as practicable, consider and approve appropriate procedures and mechanisms to determine and address cases of non-compliance with the provisions

of this Protocol.

Article 9

1. Any signatory or Party to this Protocol not included in Annex I to the Convention may, at any time, notify the Depositary that it has opted to be bound by this Article. The Depositary shall inform the other signatories and Parties of any such notification.

2. Such notification, supported by an inventory of emissions of greenhouse gases not controlled by the Montreal Protocol and a projection of future emissions, shall include a formal declaration on the following points:

(a) Its chosen historical base [year/period] for the implementation of subparagraph (c) below;

(b) The policies and measures to mitigate climate change which it plans to adopt;

(c) The level of reduction or limitation of anthropogenic emissions of greenhouse gases listed in Annex G it is ready to undertake.

3. Where a notification has been made pursuant to paragraph 2 above, the secretariat shall include it in the agenda for the next Meeting of the Parties which shall decide on the acceptance of such notification.

4. After its acceptance by the Meeting of the Parties, a notification by a signatory shall enter into force on the date of entry into force of the Protocol for that State, and a notification by a Party to the Protocol shall enter into force on the ninetieth day after the acceptance of such notification.

Article 10

1. The Meeting of the Parties shall periodically review the adequacy of the commitments of the Parties included in Annex I to the Convention or acting under Article 9, with a view to achieving the objective of the Convention. Based on this review, the Meeting of the Parties shall take appropriate action.

2. The first review shall take place at the [ ] session of the Meeting of the Parties and in conjunction with pertinent reviews under the Convention. Further reviews shall take place at regular intervals thereafter, to be determined by the Meeting of the Parties.

Article 11

1. In order to advance the implementation of existing commitments in Article 4.1 of the Convention, in accordance with Article 4.7 of the Convention and without introducing new

commitments for Parties not included in Annex I to the Convention, all Parties shall:

2. (a) Develop, at the national level, local emission factors, activity data and models which reflect the socio-economic conditions of each Party for the elaboration and periodic updating of national inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol, in order to improve the data included in their national communications;

(b) To the extent possible, move towards using methodologies fully compatible with those of the Intergovernmental Panel on Climate Change for the preparation of national inventories of greenhouse gases not controlled by the Montreal Protocol;

(c) Co-operate in identifying and agreeing on specific means and approaches to foster bilateral, regional and global co-operation to facilitate the development of national inventories of emissions of greenhouse gases not controlled by the Montreal Protocol, local emission factors, activity data and models which reflect the socio-economic conditions of each Party.

3. (a) Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to facilitate the mitigation of, and adaptation to, climate change such as, *inter alia*, removing obstacles to the limitation of greenhouse gas emissions and to the enhancement of sinks and reservoirs, enhancing energy efficiency, emphasizing market-oriented pricing, encouraging reforms in the energy sector and establishing appropriate energy regulatory structures, increasing the use of renewable energy, making improvements in the transport and industrial sectors, promoting the development and sustainable management of greenhouse gas sinks and reservoirs, improving the integration of climate change considerations into agriculture, and generally taking actions to address climate change that, in the context of their national priorities, objectives and circumstances, are economically justified;

(b) Co-operate bilaterally and multilaterally in identifying and agreeing on specific means and approaches to foster bilateral, regional and global co-operation to facilitate the mitigation of, and adaptation to, climate change by formulating and implementing relevant programmes of measures referred to in paragraph 3(a) above, giving special consideration to supporting measures which favour the economic development of developing country Parties and minimizing the adverse effect of mitigation policies on countries whose economies are highly dependent on income generated from the production, processing and export or consumption of fossil fuels and associated energy-intensive products.

4. (a) Promote effective modalities for access to, and the transfer of, environmentally sound technologies, know-how, practices and processes pertinent to the mitigation of, and adaptation to, climate change, in particular to developing countries, including the formulation of policies and programmes for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain, and encourage the private sector through financial and fiscal incentives to promote and enhance access to, and transfer of, patent protected environmentally sound technologies, in particular to developing countries;

(b) Prepare and communicate national inventories of the need and market potential for

environmentally sound technologies, know-how, practices and processes pertinent to the policies and programmes mentioned in paragraph 4(a) above, on the basis of national and regional programmes containing measures for the mitigation of and adaptation to climate change;

(c) Co-operate in identifying and agreeing on specific means and approaches to foster bilateral, regional and global co-operation to facilitate increased access to, and the transfer of, the environmentally sound technologies, know-how, practices and processes referred to in paragraphs 4(a) and 4(b) above, in particular to developing countries.

5. Promote and co-operate in providing the necessary financial and technological resources for the sustainable management, conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems.

6. Co-operate, as appropriate to their national technical and financial capabilities, in preparing for adaptation to impacts of climate change through the assessment at the national and, where appropriate, regional level, of the environmental, economic and social impacts of climate change, including sea level rise, changes in storms or storm surges, and risk to coastal ecosystems, including fragile ecosystems, wetlands, coral reefs and atolls, as well as freshwater supplies, arid and semi-arid areas, drought and desertification, and for the protection and rehabilitation of terrestrial, coastal and marine ecosystems and areas affected by drought, desertification or floods.

7. (a) Take steps towards identifying and implementing procedures to ensure that climate change considerations are taken into account in relevant governmental decisions;

(b) Co-operate in developing, and to the extent possible utilize, relevant indicators to assist in the assessment of the impacts of climate change and response measures on the economy, infrastructure, human settlements, social and cultural practices, public health and the quality of the environment with a view to minimizing any adverse effects, and include such assessments in national communications.

8. Co-operate in developing at the national and, where appropriate, regional level, systematic observation and data archives, scientific and technical research, and support for improving endogenous capacities and capabilities to participate in international and intergovernmental programmes, conferences, meetings and seminars related to the climate system, and the enhancement of access to, and exchange of, data and analyses thereof, obtained from areas beyond national jurisdiction, taking into account the particular concerns and needs of developing country Parties in implementing Article 5 of the Convention.

9. Promote and co-operate in providing the necessary financial and technological resources for the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies, including through the establishment of relevant mechanisms for this purpose in the subsidiary bodies of the Convention.

10. In accordance with Article 6 of the Convention, develop and implement education and training programmes and strengthen national institutions, including through the exchange or secondment of personnel to train experts, and develop guidelines and relevant methodologies for this purpose.

11. Communicate to the Meeting of the Parties through the secretariat information related to the implementation of their commitments under this Protocol, in accordance with Article 10.2(a) and (b) and Article 12 of the Convention and Article 7 of this Protocol, taking fully into account the guidelines for communications adopted by the Conference of the Parties to the Convention and any subsequent guidelines that the Meeting of the Parties may adopt.

Article 12

1. The financial mechanism defined in Article 11 of the Convention, as well as the entity or entities entrusted with its operation, shall serve as the financial mechanism and entity or entities for the purposes of this Protocol.

2. Additional funding for the purposes of implementing Article 11 shall be provided to the financial mechanism by developed country Parties and other developed Parties included in Annex II of the Convention in a predictable and identifiable manner.

3. On matters related solely to activities under Article 11 of this Protocol, the financial mechanism, as well as the entity or entities entrusted with its operation, shall function under the guidance of, and be accountable to, the Meeting of the Parties.

4. The developed country Parties and other developed Parties included in Annex II of the Convention may also provide, and developing country Parties avail themselves of, financial and technological resources for the implementation of Article 11 of this Protocol through bilateral, regional and other multilateral channels.

Article 13

Alternative A
(*Meeting of the Parties*)

1. A Meeting of the Parties is hereby established.

2. The Meeting of the Parties shall keep under regular review the implementation of this Protocol and shall make, within its mandate, the decisions necessary to promote its effective implementation. To this end, it shall:

(a) Exercise the functions assigned to it under this Protocol;

(b) Exercise any other such functions as may be required for the implementation of this Protocol, including any functions that may be assigned to it by the Conference of the Parties to the Convention.

3. The Meeting of the Parties shall, at its first session:

(a) Adopt, by a two-thirds majority of the Parties present and voting at the meeting, rules of procedure for itself;

(b) Adopt, by consensus, financial rules, in accordance with guidance received from the Conference of the Parties to the Convention, to ensure that any additional funds for the operation of this Protocol are provided by the Parties to this Protocol.

4. The Meeting of the Parties may establish such further subsidiary bodies as may be deemed necessary for the implementation of this Protocol.

5. Parties to the Convention that are not Parties to the Protocol may participate, without the right to vote, in the proceedings of any ordinary session of the Meeting of the Parties.

6. The secretariat shall convene the first session of the Meeting of the Parties in conjunction with the first session of the Conference of the Parties to the Convention that is scheduled after the date of the entry into force of this Protocol. Subsequent sessions of the Meeting of the Parties shall be held every year and in conjunction with sessions of the Conference of the Parties to the Convention, unless otherwise decided by the Meeting of the Parties.

7. Extraordinary sessions of the Meeting of the Parties shall be held at such times as may be deemed necessary by the Meeting of the Parties, or at the written request of any Party, provided that, within six months of such a request being communicated to the Parties by the secretariat, it is supported by at least one third of the Parties.

8. The United Nations, its specialized agencies and the International Atomic Energy Agency, as well as any State member thereof or observers thereto not Party to the Convention, may be

represented at sessions of the Meeting of the Parties as observers. Any body or agency, whether national or international, governmental or non-governmental, which is qualified in matters covered by the Protocol and which has informed the secretariat of its wish to be represented at a session of the Meeting of the Parties as an observer, may be so admitted unless at least one third of the Parties present object. The admission and participation of observers shall be subject to the rules of procedure adopted by the Meeting of the Parties at its first session.

Alternative B

(Conference of the Parties)

9. The Conference of the Parties to the Convention shall serve as the Conference of the Parties to the Protocol.

10. In accordance with Article 17.5 of the Convention, when the Conference of the Parties exercises its functions with regard to matters concerning the Protocol, decisions shall be taken only by those of its members that are, at the same time, Parties to the Protocol.

11. When the Conference of the Parties exercises its functions with regard to matters concerning the Protocol, any member of the Bureau of the Conference of the Parties representing a Party to the Convention but, at the same time, not a Party to the Protocol, shall be substituted by an additional member to be elected by and from the Parties to the Protocol.

12. The Conference of the Parties shall, at its first session after entry into force of this Protocol, decide upon modalities for the conduct of business on matters relating to this Protocol.

13. Without prejudice to paragraphs 9 to 12 above, the Parties to the Protocol may also meet at any such times as may be deemed necessary by the Parties to the Protocol.

Article 14

1. The secretariat established by Article 8 of the Convention shall serve as the secretariat to this Protocol.

2. Arrangements made for its functioning under Article 8.3 of the Convention shall apply *mutatis mutandis* to this Protocol.

[3. To the extent that these are distinct, the costs of secretariat services for this Protocol shall be met by the Parties thereto.]

Article 15

1. The Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation of the Convention shall serve as the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation of the Protocol.

2. When the Subsidiary Bodies exercise their functions with regard to matters concerning the

Protocol, decisions shall be taken only by those of their members that are, at the same time, Parties to the Protocol.

3. When the Subsidiary Bodies exercise their functions with regard to matters concerning the Protocol, any member of the bureau of the Subsidiary Bodies representing a Party to the Convention but, at the same time, not a Party to the Protocol, shall be substituted by an additional member to be elected by and from the Parties to the Protocol.

Article 16

1. The Meeting of the Parties shall, as soon as practicable, consider the application to the Protocol of the multilateral consultative process referred to in Article 13 of the Convention in the light of any relevant decisions that may be taken by the Conference of the Parties to the Convention.

Article 17

1. Any Party may propose amendments to the Protocol.

2. Amendments to the Protocol shall be adopted at an ordinary session of the Meeting of the Parties. The text of any proposed amendment to the Protocol shall be communicated to the Parties by the secretariat at least six months before the session at which it is proposed for adoption. The secretariat shall also communicate proposed amendments to the signatories to the Protocol, to the Parties and signatories to the Convention and, for information, to the Depositary.

3. The Parties shall make every effort to reach agreement on any proposed amendment to the Protocol by consensus. If all efforts at consensus have been exhausted, and no agreement reached, the amendment shall, as a last resort, be adopted by a three-fourths majority vote of the Parties present and voting at the meeting. The adopted amendment shall be communicated by the secretariat to the Depositary, who shall circulate it to all Parties for their acceptance.

4. Instruments of acceptance in respect of an amendment shall be deposited with the Depositary. An amendment adopted in accordance with paragraph 3 above shall enter into force for those Parties having accepted it on the ninetieth day after the date of receipt by the Depositary of an instrument of acceptance by at least three-fourths of the Parties.

5. The amendment shall enter into force for any other Party on the ninetieth day after the date on which that Party deposits with the Depositary its instrument of acceptance of the said amendment.

Article 18

1. Annexes to the Protocol shall form an integral part thereof and, unless otherwise expressly provided, a reference to the Protocol constitutes at the same time a reference to any annexes thereto. Such annexes shall be restricted to lists, forms and any other material of a descriptive nature that is of a scientific, technical, procedural or administrative character.

2. Any Party may make proposals for an annex to this Protocol and may propose amendments to annexes to the Protocol.

3. Annexes to the Protocol and amendments to annexes to the Protocol shall be adopted at an ordinary session of the Meeting of the Parties. The text of any proposed annex or amendment to an annex shall be communicated to the Parties by the secretariat at least three months before the session at which it is proposed for adoption. The secretariat shall also communicate the text of any proposed annex or amendment to an annex to the signatories to the Protocol, to the Parties and signatories to the Convention and, for information, to the Depositary.

4. The Parties shall make every effort to reach agreement on any proposed annex or any amendment to an annex by consensus. If all efforts at consensus have been exhausted, and no agreement reached, the annex or amendment shall, as a last resort, be adopted by a three-fourths majority vote of the Parties present and voting at the meeting. The adopted annex or amendment shall be communicated by the secretariat to the Depositary, who shall circulate it to all Parties for their acceptance.

5. An annex that has been proposed and adopted or amended in accordance with paragraphs 2, 3 and 4 above shall enter into force for all Parties to the Protocol six months after the date of the communication by the Depositary to such Parties of the adoption or amendment of the annex, except for those Parties that have notified the Depositary, in writing, within that period of their non-acceptance of the annex or amendment. The annex or amendment shall enter into force for Parties which withdraw their notification of non-acceptance on the ninetieth day after the date on which withdrawal of such notification has been received by the Depositary.

6. If the adoption of an annex or an amendment to an annex involves an amendment to the Protocol, that annex or amendment to an annex shall not enter into force until such time as the amendment to the Protocol enters into force.

Article 19

1. Each Party to the Protocol shall have one vote, except as provided for in paragraph 2 below.

2. Regional economic integration organizations, in matters within their competence, shall exercise their right to vote with a number of votes equal to the number of their member States which are Parties to the Protocol. Such an organization shall not exercise its right to vote if any of its member States exercises its right, and vice versa.

Article 20

1. This Protocol shall be open for signature and subject to ratification, acceptance, approval or accession by States and regional economic integration organizations which are Parties to the Convention. It shall be open for signature at United Nations Headquarters in New York from [_] to [_], and shall be open for accession from the day after the date on which the Protocol is

closed for signature.

2. Any regional economic integration organization which becomes a Party to the Protocol without any of its member States being a Party shall be bound by all the obligations under the Protocol.

3. In the case of such organizations, one or more of whose member States is a Party to the Protocol, the organization and its member States shall decide on their respective responsibilities for the fulfilment of their commitments under the Protocol. They shall notify the Depositary, who shall in turn inform the Parties, of the allocation of their respective responsibilities for the fulfilment of their commitments under the Protocol in each of their instruments of ratification, acceptance, approval or accession. In such cases, the organization shall be bound to fulfill those commitments it notifies that it will undertake and the member States shall each be bound to fulfill all other commitments. In the absence of such notification, the member States shall individually be responsible for the fulfilment of all their commitments under the Protocol. The organization shall inform the Depositary, who shall in turn inform the Parties, of any substantial modification to the allocation of respective responsibilities between the organization and its member States for the fulfilment of their commitments under the Protocol. The organization and its member States shall not be entitled to exercise rights under the Protocol concurrently.

4. The Meeting of the Parties shall review the notification of allocation of responsibilities between the organization and its member States and of any modification thereto. Pursuant to its review, the Meeting of the Parties may request further information or make appropriate recommendations to the organization and its member States.

5.

Article 21

No reservations may be made to this Protocol.

Article 22

1. This Protocol shall enter into force on the ninetieth day after the date of deposit of the fiftieth instrument of ratification, acceptance, approval or accession, provided that the Parties included in Annex I to the Convention which have deposited their instrument of ratification, acceptance. approval or accession by that time represent no less than fifty per cent of the total aggregate anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol listed in Annex G of Parties included in Annex I to the Convention for 1990.

2. For each State or regional economic integration organization that ratifies, accepts or approves the Protocol or accedes thereto after the date of entry into force of the Protocol, the Protocol shall enter into force on the ninetieth day following the date of deposit of its instrument of ratification, acceptance, approval or accession.

3. For the purposes of this Article, any instrument deposited by a regional economic integration

organization shall not be counted as additional to those deposited by States members of this organization.

Article 23

1. At any time after three years from the date on which the Protocol has entered into force for a Party, that Party may withdraw from the Protocol by giving written notification to the Depositary.

2. Any such withdrawal shall take effect upon expiry of one year from the date of receipt by the Depositary of the notification of withdrawal, or on such later date as may be specified in the notification of withdrawal.

3. Any Party that withdraws from the Convention shall be considered as also having withdrawn from this Protocol.

Article 24

The original of this Protocol, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations.

Annexes

[**Annex D**

Process for the establishment of differentiated emission commitments under Article 3 for Parties included in Annex I to the Convention

[1. [Individual emission commitments shall be established for each Party included in Annex I to the Convention/For the purposes of establishing their emission commitments, Parties included in Annex I to the Convention shall be grouped into [_] categories].

[2. The emission commitments for [each Party/group of Parties] shall be established through [a process of political negotiation] [based on] [the application of the following criteria:]

[(a) Carbon dioxide equivalent emissions per capita of the greenhouse gases listed in Annex G;]

[(b) Carbon dioxide equivalent emissions per unit of gross domestic product of the greenhouse gases listed in Annex G;]

[(c) Gross domestic product per capita [growth];]

[(d) Effective emissions in a given time period, defined as the increase in global mean surface temperature at the end of the period, as determined by an agreed climate change model, resulting from both the net anthropogenic emissions of an agreed set of greenhouse gases in each year of that time period and from the initial concentrations of those greenhouse gases in the beginning of the period;]

[(e) Projected population growth;]

[(f) Emission intensity of gross domestic product;]

[(g) Emission intensity of exports;]

[(h) Fossil fuel intensity of exports;]

[(i) Share of renewable energy in energy supply.]

3. The emission commitments for each Party included in Annex I to the Convention shall be inscribed in Annex Q.]

Annex G

Greenhouse gases covered by the emission commitments set forth in Article 3

Gas	**Source [and sink] category**
Carbon dioxide (CO_2)	Fuel combustion Industrial processes [Changes in forests and other woody biomass stocks]
[Methane (CH_4)	Fuel combustion Fugitive fuel emissions Enteric fermentation Animal waste Waste
Nitrous oxide (N_2O)	Fuel combustion Industrial processes [Agricultural soils]]
[Hydrofluorocarbons (HFCs)	[Industrial processes Other uses]
Perfluorocarbons (PFCs)	[Industrial processes Other uses]
Sulphur hexafluoride (SF_6)	[Industrial processes Other uses]]

Annex P

Agreed priority areas for the implementation of policies and measures under Article 2

1. Removal of obstacles to the limitation and reduction of emissions of greenhouse gases not controlled by the Montreal Protocol and to the enhancement of sinks and reservoirs, particularly in the light of reviews of policies and practices conducted pursuant to Article 4.2(e)(ii) of the Convention.

2. Enhancement of energy efficiency in all sectors, including the energy production and transformation, industrial, transport, residential and commercial and agricultural sectors.

3. Progressive phasing out of market imperfections and fiscal incentives that run counter to the objective of the Convention, including, *inter alia*, subsidies on all fossil fuels.

4. Encouragement of reforms in the energy sector and establishment of appropriate regulatory structures aimed at promoting policies and practices which limit or reduce emissions of greenhouse gases not controlled by the Montreal Protocol.

5. Promotion, development and increased use of renewable forms of energy.

6. Development of measures to limit the growth in emissions of greenhouse gases not controlled by the Montreal Protocol in the transport sector.

7. Co-operation with the International Civil Aviation Organization and the International Maritime Organization to limit or reduce emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, respectively.

8. Protection and enhancement of sinks and reservoirs of greenhouse gases not controlled by the Montreal Protocol and promotion of sustainable forest management practices, afforestation and reforestation.

9. Integration of climate change considerations into agricultural practices and promotion of sustainable forms of agriculture.

10. Research on, and development of, innovative climate-friendly technologies, and exchange and transfer of such technologies, particularly to developing country Parties.

11. Limitation and reduction of emissions of hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

[Annex Q

Name of Party	Emission commitment (per cent)	Baseline (where relevant)]

Derek — Some ideas for Kyoto
Any thoughts?? - Policy
SS

SECTOR-BASED APPROACH

I. Key Considerations

* Sectoral-based approach provides flexibility for tailoring actions to meet the particulars of individual sectors

* Could be structured to build on existing voluntary programs and to provide incentives for early voluntary reductions

* Sector specific compacts are being used by other nations to reduce greenhouse gas emissions

* Key elements of sector-based approach:

  -- equitable emission reduction targets for major sectors that constitute large majority of emissions in the U.S.

  -- voluntary programs within each sector for achieving targets with annual reporting of emissions and actions

  -- fallback program for meeting targets should voluntary efforts fall short

  -- complementary technology strategy to support mid- and long-term efforts

  -- sector programs should facilitate, to the extent possible, cost effective trades across sectors (domestic emissions trading)

  -- sector programs should provide for use of joint implementation and international emissions trading

* Possible Shortcomings of a Sector-based approach

  -- problems associated with overlaps and double-counting among energy suppliers and users

  -- fails to cover 100% of emissions with resulting uncertainty about meeting target

  -- increases transactions costs and problems of achieving cross-sector cost effective reductions

  -- past voluntary programs failed to keep pass with emissions growth and were not supported by Congress

* Possible Advantages of a sector-based approach

-- avoids large transfers/potential for windfalls under broad-based approach

-- allows targeting of reductions on a few key sectors

-- facilitates use of a broader range of actions to achieve reductions

II. One Possible Design

A. Identifying key Sectors

--Key sectors to be included in compacts: (all number are rough estimates)

o electric utilities with roughly 35% of carbon emissions

o transportation with roughly 30% of carbon emissions with separate compacts for autos/light trucks, heavy trucks and aircraft

o Industry with roughly 20% of energy use excluding electricity; separate compacts covering roughly 80% of total use would be achieved through 7 industries: petroleum refining, chemicals, steel, aluminum, metal casting, glass, and forest products.

-- Carbon emissions from residential and commercial use are less suited to sector compacts, but are already extensively addressed in CCAP programs and would continue to fall within an expanded CCAP regime.

-- Methane, nitrous oxide and HFCs/PFCs are also being extensively treated within CCAP programs and would continue to be handled in this context.

-- For those sectors with compacts, an equitable target and timetable would be set based on whatever is agreed to in Kyoto. (If Kyoto fails to produce a clear outcome, this same structure could be used for making progress in any interim period.)

-- Sector compacts would establish means of achieving targets within that sector and individual company objectives for the period leading up to any binding commitment. These could be based on historic emissions, performance standards or other allocation formula.

-- Companies and sectors that fail to achieve their objectives (either directly or through emissions trading or JI) would be subject to a fallback regulatory regime to achieve any shortfall.

-- Companies and sectors that exceed their objectives can bank excess reductions or sell them to other sectors.

-- Companies and sectors that meet their objectives would fall outside of any fallback regulatory regime.

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FACSIMILE COVER SHEET

LAWRENCE H. SUMMERS
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DATE: 29 September 1997

TO: Todd Stern

FROM: Lawrence Summers

FAX: 456-2215

PHONE: 456-2702

NUMBER OF PAGES TO FOLLOW: 5

MEMO:

The Deputy Secretary of the Treasury

TODD STERN

Todd,

As we discussed.



Room 3326 **622-1080**

*Global Warming**

John Deutch
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I believe that what we know now about global warming justifies imposition of a modest tax on carbon emissions by the US and other developed nations. This is a first step toward assuring that future generations will not find atmospheric loading increased so much that it cannot be practically reversed before calamitous the earth's climate sustains calamitous damage.

Gases in the atmosphere create a natural "greenhouse effect." Atmospheric greenhouse gases permit shorter wavelength sunlight to pass through to hit the earth, while absorbing longer wavelength infrared radiation radiated from the earth to space. Since the industrial revolution human activity has increased the concentration of carbon dioxide by about 35 per cent, principally through the burning of fossil fuels -- coal, oil, and natural gas -- in power plants, motor vehicles, and industrial facilities. The weight of informed scientific opinion is that the earth's average temperature will increase by about two to six and a half degrees Fahrenheit by the year 2100. If this anthropogenic effect turns out to be at the upper end of this range, the resulting increase in temperature will cause considerable climate change around the globe.

However, there are considerable uncertainties concerning the "greenhouse effect": (1) the magnitude and timing of the temperature elevations in response to differing emission patterns; (2) the role of human influence relative to natural variability in the trend of increasing greenhouse gas emissions; (3) the regional pattern of climate change that is caused by the warming (it is likely to be greatest at higher latitudes and the poles); (4) the ability of ecosystems to adapt to the changed climate patterns; and (5) the costs of alternative policies to slow the pace of the anticipated global warming or to ameliorate its adverse social, environmental, and economic effects (if and when it occurs), for example by protecting coastal areas threatened by flooding from higher sea levels.

Effective action requires the concerted effort of all nations and involves significant economic costs. There exists no compelling political or economic rationale for allocating these costs among nations, for example, between developed nations whose past emissions have contributed almost entirely to

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*Comments prepared as invited speaker Twelfth MIT Global Change Forum September 29-October 1, 1997; Boston, Massachusetts

today's atmospheric burden, and developing nations such as China, India, Brazil, Mexico, and Indonesia, whose anticipated future economic growth and energy use will account for the bulk of growth in emissions.

Adjustments to more energy efficient and lower emitting means of production, for example, a shift away from electricity generated from coal, will have major economic impact, at least during a transition period. Not surprisingly, this prospective economic dislocation has prompted opposition from a broad industry coalition. As result, a July 25, 1997 sense of the US Senate resolution (S. Res. 98) sponsored by Senators Byrd and Hagel, warns: no treaty would be ratified (1) that had a serious economic impact on the US; (2) unless all countries (developed and developing) make commitments (not necessarily identical for all parties) for greenhouse gas reductions. Therefore, Congress will want to consider implementing measures before ratifying a treaty.

In December 1997, in Kyoto, as a party to the 1992 Framework Convention on Climate Change, the United States is committed to enter into negotiations intended to culminate in a treaty setting legally binding targets and a timetable for the reduction of greenhouse gas emissions. In these negotiations, the US appears to have accepted two conditions adopted in Berlin in 1995 by Parties to the Framework Convention on Climate Change: First, quantitative emission limits will, at least initially, be applied only to developed nations and those developing nations who voluntarily agree to adhere. Second, the goal will specify that developed nations reduce emissions to 1990 levels at a yet to be determined future time, such as 2005 or 2010.

The US stresses the importance of maintaining flexibility in how each nation reaches its target, and shows great interest in allowing international trading of unused emission amounts within the permitted level. There is also considerable interest in the concept of "joint implementation," where developed countries would obtain credits for investments in energy efficient and emission avoiding technologies in developing countries. These credits would permit developing countries to achieve industrial activity and economic growth with lower emissions than would otherwise be the case. Tradable international permits and "joint implementation" recognize the reality that the most attractive opportunities for cost/effective reduction of greenhouse gases are in the developed world. These measures are a sound theoretical way to achieve efficient allocation of desired emission reductions.

The official US position is a response in part to successful diplomatic pressure from Europe. European nations advocate adoption of 1990 level targets. Because of the collapse of industrial activity in Eastern Germany, the Soviet Union, and other Eastern European countries since the end of the Cold War, adoption of a 1990 baseline provides a windfall to Germany, Russia and other countries by awarding them excess permitted emission levels. Thus, a 1990 baseline benefits the European Community and Russia relative to the US,

especially as compared to the adoption of a 1997 baseline. It is also worth noting that "joint implementation" would likely result in large transfers to China, which is already running a huge trade surplus with the US.

Developing nations strongly believe they should not bear economic costs associated with reducing greenhouse emissions they did not create. In my opinion, the absence of adherence of the major developing nations to the proposed Convention makes the adoption of any target levels by developed countries unacceptable, even as a starting point for a lengthy process of evolution of international measures to meet the global climate threat. Developing nations are simply not going to agree to any constraints at present. Even if they did agree, there is little prospect many of these countries would or could enforce emission constraints. We cannot wait for significant narrowing of the national income gap between developed and developing nations to gain their commitment; for by that time, these nations will be emitting more greenhouse gases than today's developed countries. Without global adherence, international tradable permits and joint implementation are unlikely to slow global emission growth, and there will be increased incentives for energy intensive industries to shift to unconstrained countries.

There is a big difference between agreeing to target emissions in principle at an international conference and designing and adopting a practical target emission system for the US (or other countries). This is not technically easy. Nor will it prove to be politically easy, because the public is being asked to make economic sacrifice today for uncertain collective benefit in the distant future.

I suggest an alternative approach for the US:

First, the Administration places too much emphasis on reaching international agreement and pays too little attention to achieving the domestic consensus required for an effective control regime. The US public does not now accept that global warming is a potentially significant environmental threat. Most importantly, a greater effort should be made to convince industry and labor that current knowledge justifies some control measures, if only to establish the national and international mechanisms that might be needed, if the more pessimistic climate effects prove to be true. We need a continuous assessment process to adjust control measures depending on what we learn. However, during the next decade, there is unlikely to be sufficient progress, in scientific understanding or empirical observation, to narrow the significant uncertainties mentioned above.

Second, the Administration must increase the priority on developing new technologies for greater efficiency in energy utilization and for alternative energy supply technologies that are less carbon dependent. While such research is unlikely to solve the global climate problem, the cumulative effect of

innovation can lower the economic costs substantially. Such energy technology development inevitably must involve industry in a major way. The experience in response to the oil crisis in the US, Europe, and Japan in the late 1970s and early 1980s should remind us of the difficulty governments have of carrying out sustained research, development, and demonstration programs. We should not forget, however, that if the more pessimistic climate change estimates prove true, there will be an urgent need for alternative energy technologies, perhaps even nuclear based. Encouraging the dispersion of best practice technology, both domestically and internationally, is also important.

Third, the Administration should propose an emission tax for the US (and all industrialized countries) on carbon and, where practical, on other greenhouse gases, notably methane. The tax should initially be set at a low level of between $5 and $10 per ton of carbon emitted (well below the $100 per ton which is estimated to be required for a market response shift adequate to reduce emissions to pre-1990 levels). The revenue raised from this tax should be used to reduce other taxes, or for three purposes: (1) to reduce the economic impact of job dislocation caused by the shift away from coal and other high carbon fuels; (2) to fund "joint implementation" projects in the developing world that would reduce carbon emissions below what they would have otherwise been; and (3) to stimulate new energy efficient technologies.

There are several reasons for favoring a carbon tax over emission ceilings at present. First, a tax is simpler to administer and to adjust up or down depending on what is learned. Second, while a tax is sure to be unpopular with industry and labor, if properly structured, it is likely to be more popular than adoption of emission targets without adherence by the developing countries and in the face of the uncertainties. Beyond providing economic incentive, the tax will signal to industry the importance of reducing carbon emissions in the future. Third, the tax will generate revenue for the purposes mentioned above. Finally, a tax will demonstrate US resolve to deal with global warming and may prove easier to negotiate internationally with developed and developing countries than a binding emission ceiling. For those who say with some justification, that a tax is politically unrealistic, I would remind them that the proposed target emissions involve a much larger, although slightly concealed, economic burden on US citizens.

The main point is that the US should propose a small carbon tax as an alternative to the current national emission targets on the table for Kyoto. It is a first step that is more consistent with the state of scientific knowledge and the extent of international consensus; and it is a first step that is more likely to be politically acceptable in the US today.

Tim:
An excellent letter from Repetto on how the new particulate/ozone standards lower the implicit cost of carbon
Rodney

Todd Stern
Policy
RP

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August 29, 1997

Dr. Janet L. Yellen
Chair
Council of Economic Advisors
314 Old Executive Office Building
17th & Pennsylvania Avenue, NW
Washington, D.C. 20502

Dear Dr. Yellen:

I've been thinking about the concerns you expressed recently over the size of the implicit carbon tax that would be needed to achieve a stabilization target at 1990 levels by 2010. Earlier on, at Dr. Munnell's request we had undertaken a meta-analysis of modeling results on this issue and found that, like the GDP impacts, the predicted tax level was quite sensitive to underlying modeling assumptions. In short, the more flexibility and substitutability assumed in the economy, the lower the predicted implicit tax. Lower bound estimates were about $50 per ton of carbon, about half the level that the IAT analysis inferred from the DRI model. These lower estimates are consistent with the recent findings of DOE's national labs study.

The predicted tax to achieve stabilization is also sensitive to the baseline assumptions that determine future energy demands, fuel mix and energy costs in the absence of any climate policy interventions. In my review comments on the IAT analysis, I pointed out that those baseline assumptions largely ignored considerations of air quality, transport congestion, and energy security in forecasting energy costs and energy demands. Consequently, the baseline assumptions probably overstated energy demands and understated energy costs.

In particular, the modeling underlying the IAT analysis ignored the recently adopted revisions to the air quality standards for ozone and fine particulates, which will require tighter emissions standards for utilities and industries in many regions. Since those regulations had not been finalized when the IAT analysis was underway, the omission is understandable. Nonetheless, those new regulations are significant because they will force many utilities to retrofit older coal-fired thermal plants with expensive NOx reduction equipment in order to keep them operating. This additional capital expenditure requirement alters the economics of replacing older coal-fired plants with new higher-efficiency combined-cycle gas-fired plants. By adding to the costs of keeping the older plants in operation, it lowers the implicit carbon tax that would be

necessary to make new gas-fired plants competitive. Since utilities are the main market for coal and reducing coal use is the key to achieving stabilization of carbon emissions, the economics of backing out coal from electricity generation are crucial.

WRI has undertaken some preliminary calculations exploring the magnitude of this effect. We compared generating costs from a fully-amortized, baseload coal plant operating at 33% fuel efficiency and a new gas-fired plant capable of 50% efficiency. We found that ignoring retrofit cost a carbon tax of approximately $78 per ton would be needed to make it economical to scrap the coal plant and build or buy electricity from a new gas-fired plant. However, when estimated retrofit costs of about $100/KW for additional NOx controls are factored in, the required tax drops to $64 per ton of carbon. Naturally, these calculations are sensitive to various parameters, such as capacity factors, fuel efficiency, fuel prices, and retrofit costs, so that a detailed analysis would have to be based on actual utility plant and system characteristics. Nonetheless, these preliminary results suggest that in ignoring the impact of the new air quality restrictions, the IAT analysis substantially overestimated the implicit carbon tax needed to achieve stabilization. I'd be happy to send your staff the details of the calculations, if that would be useful.

Sincerely,

Robert Repetto

Robert Repetto
VP & Sr. Economist

cc: Dr. Jeffrey Frankel, Chief Economist, CEA
Hon. Tim Worth, Under Secretary Department Of State

Policy

The Role of Technology

There are three ways to reduce greenhouse emissions:

- Energy Efficiency (i.e. reduce the energy intensity of the economy)
- Clean Energy (i.e. reduce the carbon intensity of the economy)
- Carbon Sequestration (i.e. remove carbon from the economy)

Emission reductions need to occur in four areas:

- Buildings
- Transportation
- Industries
- Utilities

Substantial new investment is needed in three areas:

- Basic Research
- Applied Research and Development
- Deployment

Current Technology Reports

- Report of the President's Committee of Advisors on Science and Technology
- "Technology Opportunities to Reduce U.S. Greenhouse Gas Emissions" (Draft) (Report of Eleven National Lab Directors)
- "Scenarios of U.S. Carbon Reductions" (Report of Five National Labs)

SCENARIOS OF U.S. CARBON REDUCTIONS:
Potential Impacts of Energy-Efficient and Low-Carbon Technologies by 2010 and Beyond

CONCLUSIONS

A vigorous national commitment to develop and deploy energy-efficient and low-carbon technologies has the potential to reduce U.S. carbon emissions to 1990 levels in the medium term (i.e. 2010) and produce energy savings that are roughly equal to or exceed costs. International trading or flexibility in meeting a stabilization target, considered by other studies, could increase those savings further. Beyond the medium term, the next generation of these technologies promises to enable a continuation of aggressive carbon emissions reductions over the next quarter century. The study assumes penetration of technologies from expanding Clinton Administration initiatives, such as the Partnership for a New Generation of Vehicles, natural gas technologies, the Climate Change Action Plan and renewable energy such as wind and biomass.

BACKGROUND

Five Department of Energy national laboratories led by Oak Ridge and Lawrence Berkeley National Laboratories have conducted a comprehensive, peer-reviewed, one year "bottom-up" analysis of the role technology can play in stabilizing U.S. carbon emissions. It is the most authoritative and documented study of this subject since the National Academy of Sciences and the Office of Technology Assessment reports in 1991. The study documents in detail how four key sectors of the economy - buildings, transportation, industry, and electric utilities - could respond to a climate treaty launched in the year 2000 with a goal of stabilizing emissions in 2010 and a U.S. cap and trade system is phased in. This study examines the potential effect of an aggressive program of clean technology research, development, and deployment combined with alternative marginal permit prices of $25/ton and $50/ton of carbon.

RESULTS

The study concludes that energy efficiency and low-carbon technologies have a very large potential to reduce U.S. carbon emissions while meeting the full energy needs of U.S. businesses and families and providing a positive return on investment for the nation. Many consumers and businesses would save money through reduced energy use and lower overall energy bills. Current projections suggest that a carbon emissions reduction of 390 million metric tons (MMT) is required to stabilize U.S. emissions in 2010 at 1990 levels. A combination of energy efficiency, low-carbon technologies and relatively inexpensive coal power plant conversions to natural gas - motivated by a vigorous national program and a $25/ton carbon permit price - can reduce 2010 emissions by a total of 230 MMT. Under a $50/ton carbon permit price, technology investments are estimated to reduce 2010 emissions by a total of 390 MMT. The analysis also suggests that substantial additional savings are available if permit prices were to begin to rise above the $50/ton level. Annual investment costs of such reductions are estimated to be $50 to $90 billion per year, but result in substantial energy bill savings in the range of $70 to $90 billion in 2010.

In the long term, these climate change mitigation actions will provide additional benefits not considered in the study - reductions in criteria air pollutants (i.e. ozone and fine particles), decreased dependence on imported oil, greater industrial productivity, and U.S. leadership in technologies likely to be a major source of international trade and jobs in the next century.

METHODOLOGY

In contrast to previous studies that use top-down economic modeling , the five laboratory study uses a bottom-up technology-by-technology assessment as well as a top-down engineering-economic modeling approach. It uses a wide variety of technology cost and performance information to assess potential impacts. Detailed analyses of the buildings, industry and transportation sectors quantify the impacts of end-use energy efficiency improvements and low-carbon technologies on carbon emissions, while a utility sector analysis estimates the impacts of low-carbon technologies, changes in operations and conversion of some coal power plants to natural gas.

[Lois Attached)

A Technology Portfolio for Reducing Carbon Emissions: $500 Million Level

It is clear that no single strategy, whether economic or technological, will ensure that the U.S. can reduce and stabilize carbon emissions while maintaining a robust and healthy economy. The US however can develop technologies that if deployed, will be able to reduce emissions in the U.S. with little impact on economic productivity or consumer preferences. A multi-pronged approach to technology investment would include three kinds of actions: R&D investments; public–private partnerships; and implementation initiatives.

If successful, the set of technologies and initiatives proposed here could help reduce potential emissions by more than 175 MMT by 2010 at an annual incremental investment above the FY1997 appropriation of about $500 million.

	Federal Costs ($millions above FY97 appropriated)		2010 Potential Carbon Savings	2020 Potential Carbon Savings
	FY99	FY03	MMT	MMT
Equipment Efficiency	50	150	15-20	30-75
21st century housing	35	60	3-5	15-20
Expanded PNGV (including expansion to light trucks)	100	160	30-60	100-150
PNGV for heavy trucks	40	100	10-20	30-50
Advanced Aircraft	40	40	10-20	30-40
Biofuels	25	55	5-10	20-40
Combined Heat and Power	30	60	15-35	30-70
Industries of the Future	20	60	10-20	20-40
Motors and other systems efficiency	15	25	5-10	10-30
Renewables R&D	95	140	5-10	40-60
Renewables Deployment	25	50	15-30	40-50
Carbon Sequestration R&D	50	100	0	50-75
TOTAL	500	1,000		

Buildings

Energy Efficient Equipment: Improve equipment efficiency including lighting, commercial air conditioning loads and demonstrating fuel-cell systems. This will be accomplished with increased federal research partnerships to develop advanced building equipment and appliances; a public service campaign to attract increased attention to the "Energy Star" label; and accelerated work on energy efficiency standards for appliances under existing authority.

21st Century Housing: Create a partnership with builders, suppliers, insurance companies and state

and local governments that will undertake a program to accelerate development and demonstration of inexpensive, efficient, attractive housing and streamline federal, state, and local building and utility regulations in ways that encourage innovation in construction.

Transportation

Expanded Partnership for the Next Generation Vehicle (PNGV): Increase the probability of meeting the original PNGV goals by increased funding; expand work on the next generation vehicle technologies including fuel cells; and expand PNGV to include light trucks/sport-utility vehicles.

PNGV for Heavy Trucks: Expand partnership with engine manufacturers to double the efficiency of heavy-duty trucks for civilian and military applications, which produce about 15% of CO_2 in transportation.

Advanced Air Traffic Control, Advanced Aircraft: Create technologies and practices to produce a 35% reduction in greenhouse gases per passenger miles traveled by 2020.

Biofuels: Accelerate R&D on the number of crop species under development, crop harvest, handling and storage systems and crop to fuel conversion processes to significantly expand use of biomass fuels as new automobile technologies are developed.

Industry

Combined Heat and Power: Accelerate the development and widespread use of combined heat and power systems in industry. Widespread use of these very efficient technologies can be accomplished largely through regulatory reform and streamlined permitting.

Industries of the Future: Enhance industry/government research partnerships in areas such as chemicals, aluminum, forest products and steel manufacturing technologies that can lead to large emissions savings.

Motors and Related Systems: Accelerate the use of market-ready industrial motor systems, steam systems and compressed air storage to improve efficiency and productivity across industry.

Renewable Energy

Renewables R&D: Expand research partnerships in key renewable technologies such as wind, photovoltaics, geothermal, biomass and hydropower to accelerate cost reductions.

Renewables Markets: Support early demonstrations of renewable technologies through federal procurement of solar rooftops, cost-shared demonstrations of early biomass cofiring, expanded field verification of wind energy and other actions.

A Technology Portfolio for Reducing Carbon Emissions: $1 Billion Level

The next $500 million increment would have two basic components. The first is mid- to long-term basic and applied research and development and carbon sequestration R&D described in the draft DOE report *Technology Opportunities to Reduce U.S. Greenhouse Gas Emissions* prepared by the directors of eleven National Laboratories. This investment will create the foundation for substantial reductions in U.S. emissions *below* 1990 levels in the long term. The second component is tax incentives to accelerate the use of current energy efficient and clean energy technologies. These incentives will reduce the direct cost to consumers and businesses of near-term emissions reductions.

If successful, the initiatives proposed here could result in additional emissions reductions by 2010 and substantially higher reductions in the post-2010 period.

	Federal Costs ($millions above FY97 appropriated)		2010 Savings in	2020 Savings in
	FY99	FY03	MMT Carbon	MMT Carbon
$500 Million Technology Increment	500	1000		
Basic Research:	100	150	TBD	TBD
Materials Science				
Chemical Sciences				
Biotechnology				
Geosciences, Computation, etc.				
Cross-Cutting Technology Research	100	100	TBD	TBD
Fuel Cells				
Hydrogen energy				
Sensors and Controls				
Electricity Transmission				
Energy Storage				
Carbon Sequestration	50	50	TBD	TBD
Tax Incentives to Accelerate PNGV Introduction	n/a	100	TBD	TBD
Renewable Energy Tax Credits	100	100	TBD	TBD
Accelerated Depreciation for Efficient Industrial Equipment	150	100	TBD	TBD
SUBTOTAL	500	600		
TOTAL (at $1,000 Million Level)	1000	1600		

Superconductivity

Basic Research

Materials Science: Conduct research and development to create advanced materials for critical components in a variety of advanced energy systems - including lightweight vehicles, high temperature turbines, fuel cells, advanced engines and a variety of new smart systems.

Chemical Sciences: Accelerate research in a variety of chemical processes vital to an array of energy technologies. Such processes include materials separations in industry, chemical catalysts and combustion.

Biotechnology: Expand R&D in a range of areas including bioprocessing, energy crops, photosynthesis, and genetic engineering to increase the carbon fixation of some plant species.

Geosciences, Computation, Environmental and Ecological Sciences and Nuclear Sciences: Expand and create public/private partnerships to pursue a variety of breakthrough science and technologies including atmospheric and ocean carbon cycles, geophysics for CO_2 injection into underground aquifers, response of ecosystems to increased CO_2, advanced nuclear systems, advanced computation for energy systems component design, and computational techniques to increase understanding of a wide variety of natural and artificial processes.

Cross-Cutting Technology Research

Fuel Cells: Accelerate research and development on fuel cells, highly efficient devices which produce electricity and hot water with virtually zero emissions and have broad potential applications in power generation, buildings, industry and transportation vehicles.

Hydrogen Energy: Expand R&D on hydrogen production, storage and use. This clean burning fuel has wide potential in transportation, industry and power generation.

Sensors and Controls: Accelerate R&D on a wide array of sensors and controls. These technologies play a critical role in clean energy production, efficient industrial processes and carbon sequestration through ensuring maximum process efficiency at minimum cost.

Electricity Transmission and Distribution: Develop new materials and technologies to reduce electrical transmission losses - including superconducting cables, sophisticated control systems, and superconducting transformers.

Energy Storage: Expand R&D on energy storage technologies such as advanced batteries, ultracapacitors and superconducting storage to efficiently and inexpensively store energy.

Carbon Sequestration

Given the huge global resources of fossil fuels, the world economy will likely continue to use large quantities of fossil energy for the foreseeable future. A variety of technologies have the potential to separate out carbon and sequester that carbon. This initiative will establish a substantial R&D effort to develop technologies such as decarbonization of fuels, ocean storage, injection of underground aquifers and increased biological absorption of atmospheric CO_2.

Tax Incentives

Tax Incentives to Accelerate PNGV Introduction: A tax credit could be provided for early purchasers of PNGV vehicles. This credit could partially defray the additional capital cost of these vehicles and would end when initial higher purchase prices fall.

Renewable Energy Tax Credits: Tax credits and other financial incentives could be provided to investors in renewable power systems. These incentives could be performance based and also be available to municipal utilities. These incentives would phase out as renewable energy system costs decrease.

Accelerated Depreciation for Efficient Industrial Equipment: Investments in energy efficient and low-carbon industrial technologies could be eligible for accelerated depreciation. Eligibility would be based on improvements in performance.

A Technology Portfolio for Reducing Carbon Emissions: $2 Billion Level

An additional federal budget expenditure of $1 billion would focus largely on a long term objective of further reducing emissions in the 2020-2030 period. The science and technologies developed would have large global market potential - putting the U.S. in the position of leadership in the technologies and science needed to reduce global atmospheric concentrations of greenhouse gases.

The portfolio of initiatives at this level focus on rapid acceleration of breakthrough energy efficiency and clean energy technologies, critical basic research and cross-cutting technology development, advanced carbon sequestration and selected tax incentives to accelerate use of not only current advanced technologies but also more advanced technologies as they become available.

The breakthrough R&D on energy efficiency, clean energy, basic research, cross-cutting technologies and carbon sequestration are described in the draft DOE report *Technology Opportunities to Reduce U.S. Greenhouse Gas Emissions* prepared by the directors of eleven National Laboratories. These investments will further establish a solid foundation not only for substantial reductions in U.S. emissions in the long term, but also expanded U.S. leadership in energy and environmental technologies in the coming decades.

	Federal Costs ($millions above FY97 appropriated)	
	FY99	FY03
$1000 Million Technology Increment	1000	1600
Energy Efficiency R&D	150	150
Advanced Buildings Technologies		
Advanced Industrial Technologies		
Advanced Transportation Technologies		
Advanced Agriculture and Forestry		
Clean Energy R&D	150	150
Fossil Resource Development		
Fossil Power Generation		
Nuclear Energy		
Renewable Energy		
Basic Research:	200	200
Materials Science		
Chemical Sciences		
Biotechnology		
Geosciences, Computation, etc.		
Cross-Cutting Technology Research	100	100
Fuel Cells		
Hydrogen energy		
Sensors and Controls		
Electricity Transmission		
Energy Storage		
Carbon Sequestration	100	100
Tax Incentives	300	300
Accelerated PNGV Introduction		
Renewable Energy		
Accelerated Depreciation for Efficient Industrial Equipment		
Biofuels Production		
Accelerated Depreciation for Low Carbon Industrial Technologies		
SUBTOTAL	1000	1000
TOTAL (at $1,000 Million Level)	2000	2600

≤ Policy

European Union Policies and Measures to Achieve the -15% Kyoto Negotiation Position

by Kornelis Blok and Dian Phylipsen[1]

1. Introduction

On 2 March 1997 the Environment Council of the European Union has decided upon a negotiation position for the third Conference-of-the-Parties to the UN Framework Convention on Climate Change, to be held in December 1997 in Kyoto. The fifteen ministers responsible for environment there decided that [1]:

... the Community should propose that Annex X parties, individually or jointly, in accordance with the Berlin Mandate, shall reduce emission levels for CO_2, CH_4 and N_2O together (...) by 15% by 2010 (reference year 1990).

Part of the agreement within the European Union (EU) is an agreement on the internal burden sharing. Another important aspect is the agreement on so-called common and coordinated policies and measures (CCPM's). In the March council decision twelve areas, both for CO_2 and non-CO_2 greenhouse gases are mentioned for which such common policies should be adopted.

In this paper the question will be discussed whether these policies and measures are sufficient to attain the 15% reduction as proposed by the Environment Council.

First of all, some remarks will be made on the present level of greenhouse gas emissions and the projected business-as-usual development in the European Union. Subsequently, the status and potential effects of common and coordinated measures will be discussed. Finally, an overview will be presented, including the effect on 2010 EU greenhouse gas emissions.

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[1] Dr. K. Blok is assistant professor at Utrecht University and director of Ecofys Energy and Environment. Drs. G.J.M. Phylipsen is a researcher at Utrecht University. They both served as consultants to the Netherlands' government during it's presidency of the European Union. Address: Dept. of Science, Technology and Society, Padualaan 14, NL-3584 CH Utrecht, fax +31-30-2537601.

The negotiating body within the European Union is the so-called EU Ad Hoc Group on Climate. In September 1996 this Ad Hoc Group established an Expert Group to provide technical analysis to support the Ad Hoc Group's work. The results presented here are in general based on the work of the Expert Group. An extended compilation of the work is available from the authors [2]. The conclusions in this paper are for the full responsibility of the authors.

2. Business-as-usual development

The emissions of CO_2 in the European Union in the year 1990 amounted to 3328 Mtonnes (908 MtC) [3]. In the year 1995 emissions are, after a dip in the early nineties, more or less at the same level. Main causes for the stabilization of emissions are: the limited rate of economic growth in the early nineties, the reduction of activities in former East-Germany (effect on emissions approx. 4%) and the shift from coal to natural gas (notably in the UK).

For the year 2000 there are several projections, ranging from stabilization to a slight increase, up to 5% [4]. A commonly used business-as-usual scenario is the so-called Conventional Wisdom scenario developed on behalf of the Directorate-General for Energy of the European Commission. In this scenario GDP growth until the year 2010 is somewhat over 2% per year. CO_2 emissions in 2010 are expected to grow by 9% compared to 1990 [5].

In 1990 emissions of methane were 24.7 Mtonnes (519 Mtonnes CO_2-equivalent) and of nitrous oxides 0.92 Mtonnes (286 Mtonnes CO_2-equivalent) [3]. From these figures we see that the two gases contribute about 20% to total EU greenhouse gas emissions. The emission of other greenhouse gases like HFC's and PFC's in 1990 is estimated to have been not more than 50 Mtonnes CO_2-equivalent (except gases that are subject to the Montreal Protocol).

Projections of non-CO_2 greenhouse gas emissions are not readily available for the EU as a whole. However, from national projections available for most countries, one can derive that in the year 2000 emissions of CH_4 will probably have declined by about 10% compared to 1990 and those of N_2O by 25% [6]. This decline is mainly due to a decrease of CH_4 emissions from landfills and N_2O emissions from adipic acid production.

3. Policies and measures to reduce CO_2 emissions

Nine policy areas have been distinguished: six in the energy policy area, two economic instruments and one in transportation. Here, the

potential effect of these measures on CO_2 emissions, the possible policy incentives and the actual status of policy formulation will be discussed.

Renewable energy programmes

In 1996, the European Commission published a green paper on renewable energy [7]. The target set out is to double the contribution of renewable energy from 6% in the early nineties to 12% in the year 2010 (15% in terms of avoided primary energy). Compared to a moderate development in a business-as-usual scenario, such doubling saves 200 Mtonnes of CO_2 emissions.

Important instruments may be those directed at supporting renewable energy in the liberalising EU energy markets (including so-called Non-Fossil Fuel Obligations). Other instruments are already in place, like extended R&D programmes. As biomass should have an important contribution to the growth of the share of renewables, also adaptations in agricultural policies are important.

Cogeneration programmes

Combined generation of heat and power (cogeneration or CHP) may have a substantial share in EU power generation. The ultimate cogeneration potential is estimated to be 50% of total EU power production. On the medium term the growth is restricted by the slow turnover rate of capital stock in electricity production. For the year 2010 the contribution of enhancing the implementation rate of CHP is estimated to be 110 - 220 Mtonnes.

Although some individual countries already have considerable shares of cogeneration, for the EU as a whole, policy development in this field is still in an early stage. It is expected that liberalisation of EU energy markets will boost at least some applications of CHP. Other possibilities can be found in the new draft of the Large Combustion Plant Directive that states that operators of power plant should justify why they do not apply cogeneration.

Energy effiency improvements of appliances

It is estimated that adequate policies on household and office appliances may save 150 million kWh of electricity consumption [8]. This is equivalent to 55 - 90 Mtonnes of CO_2 emissions, depending on the type of fuel saved.

Several policies are already in place, including R&D programmes, mandatory energy consumpton labelling and minimum energy efficiency standards for refrigerators and freezers (EC-directive, in place up from 1999). Furthermore, negotiations on voluntary energy efficiency standards are in progress between the European Commission and the manufacturers of washing machines, TV's and VCR equipment (standby-mode). This set of instruments is by far not

e.g. in the form of best-available-technology performance descriptions. Implementation of such guidelines, however, will be more time-consuming than closing voluntary agreements.

Progressive removal of fossil fuel subsidies

Fossil fuel subsidies in the European Union are especially important with respect to the coal industry, e.g. in France, Germany, Spain and the UK. There is a tendency - in line with the common policy agreed upon in 1993 which sets conditions for subsidies to be allowed - to reduce or cease such subsidies.

The effect on CO_2 emissions for the year 2010 are estimated to be at least 15 Mtonnes.

Increase of minimum tax levels

The discussion on taxation of energy products or CO_2 emissions in the EU is ongoing from the early nineties. Recently, the European Commission has drafted a new proposal for a directive on 'minimum excise duties' for energy products. It is proposed to gradually increase the minimum duties on non-automotive energy carriers to 0.7 ECU/GJ (equivalent to $30 - 50 per tonne of carbon) [10]. The expected effect on CO_2 emissions is moderate: approx. 40 Mtonnes.

It is still highly uncertain whether the Commission's proposal will be accepted by the member states.

Modal switch in transportation

Based on limited data it is estimated that changes in modal split may lead to a CO_2 emission reduction on the order of 30 Mtonnes.

Some policy development is underway, especially with respect to freight transport (switch from road to rail).

4. Policies to reduce other greenhouse gas emissions

Not for all sectors where greenhouse gases, other than CO_2, are emitted, emission reduction options are available. Nevertheless, for a number of areas policy formulation is under way.

Reduction of CH_4 emissions from landfills and other sources

Methane emissions from landfills in the EU are declining. Extra reduction of landfilling organic waste, methane collection from landfills and biological methane oxidation can reduce emissions further by 30 - 60 Mtonnes of CO_2 equivalent in the year 2010 (compared to the declining baseline) depending on the extent to which these measures are combined.

The European Commission has proposed a directive aiming at waste

prevention and ensuring high standards for the disposal of waste, including methane recovery.

Furthermore, the European Commission has issued a Strategy Paper on methane [11]. Here, policies and measures in various other areas (coal mining, natural gas production and distribution, enteric fermentation) are discussed, but no concrete proposals are put forward.

N_2O emission reduction in the chemical industry

Technical measures are available or under development that can reduce N_2O emissions from chemical industry by over 90%.

Most far ahead are the adipic acid manufacturers (70% of N_2O emissions in EU chemical industries) of which the big five have agreed to cut emissions before the year 2000. For emission reduction from nitric acid plants technology development is required, but also for these plants substantial reductions are expected to be feasible before 2010. No policies have been implemented yet.

Reduction of fluorocarbon emissions

In 1990 emissions of fluorocarbons and SF_6 were fairly small. However, due to the partial replacement of Montreal Protocol substances like CFC's and HCFC's by HFC's the business-as-usual emissions are expected to rise.

Emissions may increase to 150 Mtonnes CO_2-equivalent in 2005 - 2010. However, due to the uncertainty in replacement rates, this figure is highly uncertain. It is estimated that at least two-thirds of these emissions can be avoided by applying leak-free systems or non-fluorinated compounds.

Fluorocarbons are not part of the Council proposal. Policy development is still in an embryonic stage.

5. Overview and discussion

An overview of the reduction potential of the measures is given in Table 1. The total effect of the measures for CO_2 emission reduction may have a combined effect of 430 - 760 Mtonnes (avoiding double counting, e.g. on CHP and minimum energy taxation) compared to the baseline. If all these measures are successful emissions will not increase by 9% as in the business-as-usual scenario, but decline by 5 - 15%. Whether the upper end of this range will be attained depends on the degree of ambitiousness of the policies implemented. A first conclusion may be that the -15% target in principle is achievable for the EU with concrete policies and measures.

Note that in some areas additional emission reductions are possible, e.g. energy efficiency improvement in buildings, light industry, air traffic and freight traffic and material efficiency improvement. An earlier study for the year 2005 explored the potential effect of policies and measures in these areas as well and showed that there is indeed additional potential [12].

Table 1. Overview of common and coordinated policies and measures and the expected emission reduction potential (in Mtonnes of CO_2 equivalent).

Renewable energy	up to 200
Cogeneration	110 - 220
Energy efficiency electric appliances	55 - 90
Energy in buildings	?
Energy efficiency passenger cars	80 -120
Energy efficiency heavy industry	70 - 130
Removal of subsidies	15 or more
Energy taxation	40
Modal switch	up to 30
HFC's	~ 100
Methane from landfills	30 - 60
N_2O chemical industry	70 - 95

For methane stronger emission reductions are feasible. The Strategy Paper from the European Commission estimates the potential to be 40% in 2010 compared to 1990. This is not unimportant: if this full potential were to be realised the required emission reduction for the other two gases would only be 11 - 12% in order to reach the average target of 15%.

For nitrous oxides the emission reduction potential is uncertain, especially due to the fact that it is uncertain to what extent individual countries have already included emission reduction measures in their baseline estimates.

6. Conclusions

In this paper an overview was given of the policies and measures availble for greenhouse gas emission reduction in the European Union. Common and coordinated policies and measures can lead to a reduction of CO_2 emissions by 15% in the year 2010 compared to 1990. However, this requires an ambitious policy. For most of the relevant areas such policies are in place or under development. The situation can be alleviated by developing national and coordinated policies in some other areas, including methane emission reduction.

References

1. Council conclusions on climate change, Meeting document CONS/ENV/97/1 REV 1, General Secretariat of the Council, European Commission, Brussels, 1997.

2. G.J.M. Phylipsen, K. Blok, H. Merkus: The Expert's Group work on EU Common and Coordinated Policies and Measures, Dept. of Science, Technology and Society, Utrecht University, 1997.

3. Communication of the European Commission to the UN-FCCC, COM(96) 217 final, Brussels, 1996.

4. Report on the in-depth review of the national communication of the European Community, FCCC/IDR.1/EUR, UN-FCCC secretariat, Bonn, 1997.

5. European Energy to 2020 - A Scenario Approach, European Commission, Luxembourg, 1996.

6. Based on individual country submissions to the secretariat of the UN-FCCC.

7. Energy for the Future: renewable sources of energy. Green Paper for a Community Strategy, Communication from the Commission COM(96)576, Brussels, 1996.

8. P. Bertoldi: European Union Efforts to Promote More Efficient Use of Electricity: the PACE Programme, European Commission, Brussels, 1996.

9. A Community strategy to reduce CO_2 emissions from passenger cars and improve the fuel economy, Council Conclusions, European Union - The Council, 8748-96, Brussels, 1996.

10. Proposal for a Council Directive restructuring the Community framework for the taxation of energy products, European Commission, Brussels, 1997.

11. Strategy Paper for reducing methane emissions, European Commission, COM(96)557, Brussels, 1996.

12. K. Blok, D. van Vuuren, A.J.M. van Wijk, L.G. Hein: Policies and measures to reduce CO_2 emissions by efficiency and renewables, WWF Netherlands, Zeist, 1996.

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SPECIAL REPORT

May 1997

Climate Change Policy: What Action Should We Take?

*by Margo Thorning**

Over the past decade and a half, the ACCF Center for Policy Research has sponsored groundbreaking research on tax and environmental policies to encourage capital formation and enhance environmental quality. As the United States stands poised to agree in Kyoto, Japan in December of 1997 to limit future carbon emissions, the Center offers this Special Report to help focus the climate debate.

Under the Framework Convention on Climate Change signed in Rio de Janeiro in 1992, the United States has agreed to negotiate an international treaty on future greenhouse gas emissions without, according to many experts, careful evaluation of this many-sided issue. The experts believe that the agreement that the United States is poised to sign in Japan has potentially serious consequences for all Americans, and these consequences have not been fully analyzed and understood.

The release earlier this year of a letter signed by 2,300 members of the 20,000-member American Economic Association in support of carbon taxes or the auctioning of emission permits to reduce U.S. carbon dioxide (CO_2) emissions could lead some policymakers, as well as the average citizen, to believe that all the environmental and economic questions about climate change policies have been settled. This is not the case. Significant doubts remain in the academic and think-tank community about the wisdom of the United States signing a binding agreement to stabilize or reduce future CO_2 emissions.

Economic Impact of Binding Emission Limits

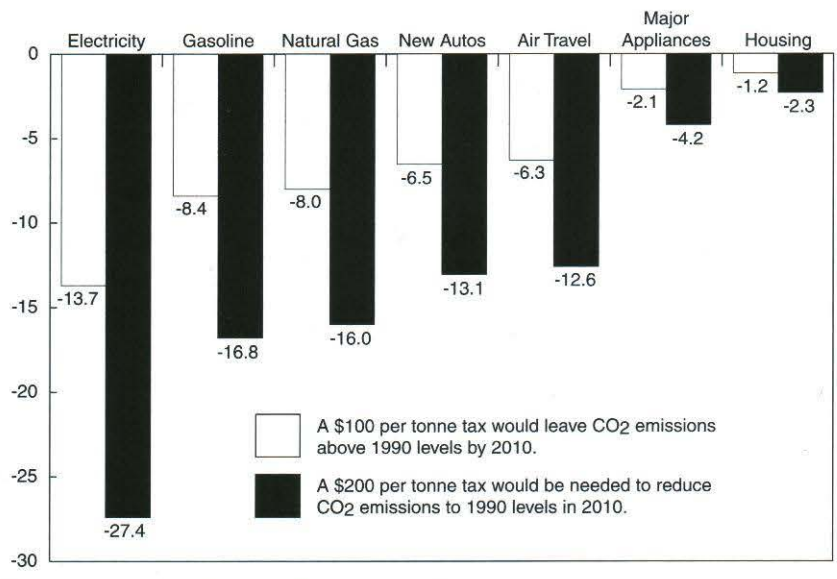
Research conducted over the past decade by top climate change scholars such as Professor Richard Schmalensee of the Massachusetts Institute of Technology, Professor Alan S. Manne of Stanford University, Dr. Richard Richels of the Electric Power Research Institute, Dr. W. David Montgomery of Charles River Associates, and Dr. Lawrence M. Horwitz of Primark Decision Economics, concludes that the cost of stabilizing CO_2 emissions would impose a heavy burden on U.S. households and industry. For example, Dr. Horwitz's analysis shows that reducing emissions to 1990 levels by 2010 or 2015 would require a tax in the range of $200 or more per tonne of carbon emitted. Horwitz argues that these taxes would reduce U.S. GDP growth by more than 4.0 percent annually or over $350 billion per year. Economic growth would slow as emissions are reduced due to lost output as prices rise for carbon-using goods—goods that must be produced using less carbon and/or more expensive processes. Output would also fall because of slower net capital accumulation, reflecting the premature obsolescence of capital equipment due to sharp energy price increases. In addition, Horwitz predicts that household disposable income would fall by 1.2 percent, and wages would also drop. At the same time, electricity prices could more than double from the current $0.07 per kWh to as much as $0.15–0.16 per kWh, according to a study by Montgomery. And as a result of the tax-induced price increases, household electricity consumption could fall by more than 30 percent, requiring a significant change in the daily life of practically every American citizen. Expenditures on items such as autos and housing would also decline, even if all the tax revenues were "recycled" back to consumers (see Figure 1).

Environmental Impact of Emission Limits

Scholars such as Professors Manne and Schmalensee and Drs. Jae Edmonds, James Dooley, and Marshall Wise of Pacific Northwest National Laboratory (PNNL) warn that there will be almost no environmental benefits were the United States and other industrialized countries to stabilize CO_2 emissions by 2010 or 2015 because most of the new emissions would come from China, India, the former Soviet Union, Latin America, and other emerging economies. In

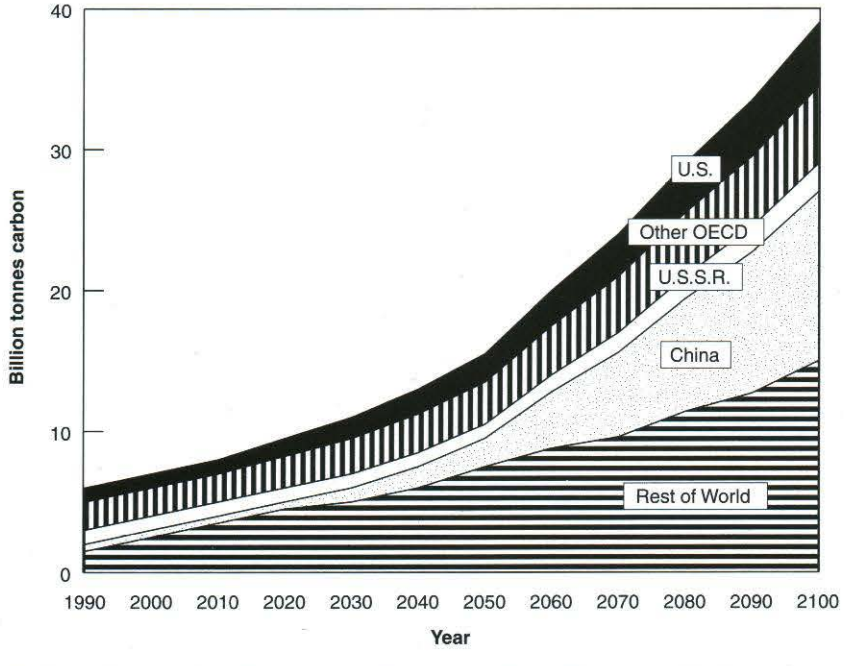
**Dr. Margo Thorning is Senior Vice President and Director of Research of the ACCF Center for Policy Research. The Center is the education and research affiliate of the American Council for Capital Formation. Its mandate is to enhance the public's understanding of the need to promote economic growth through sound tax, regulatory, and environmental policies. For further information please contact the ACCF, 1750 K Street, N.W., Suite 400, Washington, D.C. 20006-2302. Telephone: 202/293-5811; fax 202/785-8165; Web site: http://www.accf.org; e-mail: info@accf.org.*

Figure 1 Negative Impacts by 2010 on U.S. Household Consumption Due to Alternative CO_2 Emissions Reduction Proposals (% change from baseline)



Source: Lawrence M. Horwitz, "The Impact of Carbon Dioxide Emission Reductions on Living Standards and Lifestyles," in *An Economic Perspective on Climate Change Policies* (Washington, D.C.: American Council for Capital Formation Center for Policy Research, October 1995 Special Report)

Figure 2 Relative Carbon Contributions of Different Regions to Global Carbon Emissions



Source: Based on A.S. Manne and R.G. Richels, *Buying Greenhouse Gas Insurance: The Economic Costs of CO_2 Emission Limits*. (Cambridge, Mass.: MIT Press, 1992), p. 91.

fact, developing nations, which would not be required to cut CO_2 emissions under the proposed international treaty, already produce about 50 percent of all emissions—and by 2050 are expected to produce 75 percent of all greenhouse gases, according to Montgomery (see Figure 2).

Cost-Effective CO_2 Stabilization Policies and U.S. Economic Growth

Reducing global CO_2 emissions should be a gradual, three-stage process, according to PNNL's Edmonds, Dooley, and Wise. During the next 25 years (Stage I), we should commit resources to the development and spread of new energy technologies such as hydrogen transformation from natural gas, advanced liquefied hydrogen fuel cells, biomass, solar photovoltaic, and nanotechnology (the design and building of structures atom-by-atom). These experts believe that although such technologies are now in their early stages, their development could revolutionize energy production while sharply reducing the cost of stabilizing atmospheric concentrations of greenhouse gases. Stage II, from 2020–2050, would see the enforcement of an emissions cap; Stage III could see the gradual phaseout of all free-venting of carbon into the atmosphere if the science indicates the need for such a policy.

Conclusions

The consensus of these noted scholars is clear. Given the need to increase U.S. economic growth to address challenges such as the looming retirement of the baby boom generation, policymakers should weigh carefully the likely negative economic impact of precipitous near-term reductions in U.S. CO_2 emissions and energy use. Adopting a thoughtfully timed climate change policy would both enhance U.S. and global economic growth and lead to long-term stabilization of carbon concentrations in the atmosphere. ❖

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