United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

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Date: 9/24/97
Time: _____

FAX Cover Sheet

A few revisions marked

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Number of pages to follow: 14

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Memo: Current Q's and A's per our conversation today. They are being circulated to OMB. We still have Q's and A's to fill in.

Questions for the Record Submitted by Chairman Schaefer to
Under Secretary of State Timothy Wirth
House Committee on Commerce
Energy and Power Subcommittee
July 15, 1997

1. Q: **Please identify each member of the Interagency Analytical Team (IAT) from the date of its inception to the present time, any other participants inside or outside the Administration, and specify their responsibilities.**

A: Attached is former Under Secretary Ehrlich's list of people to call regarding IAT meetings Members of the IAT had varying levels of participation and responsibility.

2. Q: **When was the IAT formed and what were the IAT's instructions? Please provide any documentation regarding the formation of the IAT and its mission, responsibilities, membership or assignments.**

A: Previously, Agencies worked independently on climate change economic analysis. Beginning in February 1996, however, the Department of Energy and the Environmental Protection Agency began to work together on global climate change analysis and called it the IAT. Their joint efforts provided the analytical foundation for the Springfield Global Climate Change Workshop in June 1996.

Former Under Secretary Ehrlich joined the Administration's climate change analysis effort shortly after the June 1996 Climate Analysis Workshop. He oversaw the analysis from mid 1996 to May 1997. Under Secretary Ehrlich's instructions were to use the IAT to provide a set of analytic tools that would allow the Administration to better understand the economics of the climate change issue.

3. Q: **Please indicate the total costs of the IAT's efforts and the share paid annually by each Department or Agency that was involved and please identity the source of the funds within each Department or Agency.**

A: Costs for the IAT were primarily for personnel. No effort was made to ~~accumulate~~ keep track of costs related to the IAT activities. DOE and EPA, who had primary responsibility for the analysis efforts, did have some contract costs for modeling.

4. Q: **Is the IAT still in existence? If so, what are its current responsibilities?**

No IAT economic analysis of global climate change is underway.

5. Q: **Please provide a copy of all drafts of the IAT report in addition to the May 16th and 30th, 1997 drafts, both earlier and later.**

A: Enclosed with this response are photocopies of the May 12th, May 16th, and May 30th drafts of the IAT paper. The May 12th draft was circulated among members of the IAT and senior members of the Administration involved in climate change policy. The May 16th draft was circulated to the peer reviewers, members of the IAT, and senior members of the Administration involved in climate change policy. The May 30th draft was released to the public on July 15th.

6. Q: **Please explain how the peer reviewers were selected? What instructions were those peer reviewers given? Please provide copies of any correspondence or instructions that were sent to the peer reviewers.**

A: The peer reviewers were selected based on recommendations from senior IAT members. Former Under Secretary Ehrlich made the final selection after consultation with the IAT and members from the White House Task Force on Climate Change.

Former Under Secretary Ehrlich sent letters and attachments to each of the reviewers as well as personally contacting each of them. The letter dated March 20th is a copy of the initial letter sent to Professor Jorgenson. Identical letters were sent to the other peer reviewers over a period of weeks. Enclosed with this letter were a technology note and information on the IAT models and baseline. The undated letter is a copy of the letter that was sent to all reviewers on May 16th with copies of the May 16th draft of the IAT report. Copies of materials sent to the reviewers are enclosed.

7. Q: **If the IAT effort is in fact a "failed" project as indicated in Administration testimony at the Subcommittee hearing how will the Administration determine the appropriate level of future international climate change commitments for Kyoto and later?**

A: The IAT effort generated much useful information about how to model constraints on greenhouse gas emissions and their potential economic effects. However, the IAT process was unsuccessful in providing a sufficiently narrow range of estimated economic effects to support the Administration's overall decision-making process. As part of the

ongoing Administration decision process, a number of different economic and other analyses are being evaluated as guides to the likely effects of reducing greenhouse gas emissions.

8. Q: **As late as last May when Dr. Ehrlich and others in the Administration held briefings on the then draft analysis and assessment there was no hint that the Administration considered this effort a failure and the models to be unreliable. What occurred since May that caused the Administration to apparently reach a different conclusion from that of Dr. Ehrlich?**

A: When the Administration provided briefings on the work being done by the IAT, the focus was on determining baselines for emissions levels, economic growth, and other key variables. and for explaining the different models that were being used. As the work done by the IAT proceeded, the wide range of economic outcomes called into question the benefits of continued IAT work on these economic models, given the many other competing claims on agency resources.

9. Q: **The IAT draft Analysis referred to three scenarios which resulted in costs of future climate commitments of approximately $200, $100, or $50 per ton carbon tax equivalent. Has the Administration concluded that a $200 per ton carbon tax equivalent cost will not harm the U.S. economy, jobs, and global competitiveness? Has the Administration concluded that a $100 per ton carbon tax equivalent cost will not harm the U.S. economy, jobs, and global competitiveness? Has the Administration concluded that a $50 per ton carbon tax equivalent cost will not harm the U.S. economy, jobs, and global competitiveness. Please provide the basis for any of the above conclusions. If the Administration does not support any of the above costs, what analysis or other information does the Administration intend to rely on to support a different amount?**

A: The implicit price of carbon for the United States reported by the IAT ranged from $9 to $145, depending on the situations modeled, and the assumptions and models used. Similarly, the impact on the U.S. gross domestic product spanned a wide range. The IAT found that the estimates of the costs to the U.S. economy of a carbon emissions reduction policy depended on factors, including targets and timetables, technology assumptions and the implementation of international emissions permit trading. As Dr. Janet Yellen remarked in her July 15,1997, testimony to the House Commerce Subcommittee on Power , "It boils down to this: if we do it dumb, it could cost a lot, but if we do it smart, it will cost much less, ~~and indeed could produce net benefits in the long run~~."

10. Q: **Is the paper prepared by the IAT both an analysis and an assessment? How does it relate to the "analysis and assess merit" referred to in Paragraph 4 of the Berlin Mandate? Has the Ad Hoc Group on the Berlin Mandate provided an analysis and assessment as required by the Berlin Mandate?**

A: The IAT analyzed a wide range of emissions targets and timetables as well as a range of implementation plans (such as international emissions trading and joint implementation). The IAT analysis does not have any direct relationship to the cited paragraph from the Berlin Mandate.

11. Q: **The IAT draft states that the central policy modeled for the analysis "is aimed at reducing carbon and other greenhouse gas emissions by stabilizing them at 1990 levels" and that policy would be "announced in 2000 and its restrictions are phased in over a ten year period, so that the policy would take full effect In 2010." Reports in the media after the Denver Summit that President Clinton attended also referenced this date of 2010. In light of EIA's projection of emissions 22% above 1990 levels by 2010, is the Administration considering a target and timetable that calls for stabilization at 1990 levels by 2010?**

A: The IAT's analysis focused on a standard emissions target widely used in the academic literature. The Administration is in the process of determining its position on targets and timetables. The Administration's negotiating position is still in development.

12. Q: **The Administration frequently cites the 2000 economists who say they support controlling greenhouse gases. Their statement supports as the mechanism either carbon taxes or emissions permits. In the past, the Administration has said it opposes the use of taxes. Is that still the Administration's position?**

A: The Administration's position on implementation options or strategies relating to greenhouse gas emissions reductions is still under development. This position will be determined in conjunction with a position on targets and timetables, which is also under development.

13. Q: **The IAT draft explains that these emissions reductions to achieve stabilization would be through "issuing tradable permits at the earliest point of energy production or when imported into the U.S." and that the permits "are initially auctioned in a way that is revenue neutral: i.e., all revenues generated would be recycled through the economy.". Would these revenues be deposited in the treasury as miscellaneous receipts under the Economy Acts? Would they then**

have to be recycled through changes in the tax laws or by appropriation? How would they be recycled?

A: The IAT considered a range of revenue recycling possibilities at a very abstract level. The IAT did not examine the legal framework under which these abstract options might be implemented in the United States.

14. Q: **Does the Administration believe that permit auctions are the equivalent of a new tax? If not, please explain.**

A: In general, they are not equivalent. Auctions focus on fixing quantities and leave prices free to fluctuate, while taxes focus on prices and allow quantities to adjust to changed price levels.

15. Q: **The IAT draft states that "among fuels, demand for coal bears the brunt of greenhouse gas stabilization." What is the impact on the U.S. economy as a whole and on the relevant coal regions of this policy towards coal? What will be the job impact? Is the Administration adopting an anti-coal policy? How is the policy consistent with President Clinton's 1995 reply to Mr. Dingell that the U.S. will not agree to any protocol that harms our economy and jobs or our competitiveness?**

A: The IAT analysis found that the implicit price of carbon would range from $9 to $145 per ton depending on the model and assumptions used and the specific scenario analyzed. Economic and job impacts would similarly span a range depending on the factors such as the rate of technological change, targets and timetables, and international emissions permit trading.

It is important to stress that the IAT analysis is just that – analysis – and not policy, as the question suggests. The IAT examined a wide variety of different analytic scenarios as part of its work, and explicitly was not charged with making policy recommendations.

16. Q: **How long after December 1997 does the Administration think it will take to obtain Senate advice and consent of any Kyoto agreement, to ratify that agreement, and to enact implementing legislation?**

A: There is little information on which to judge the timeframe for the advice and consent process, or for the enactment of implementing legislation in the climate arena. The U.N. Framework Convention on Climate Change was ratified by the Senate in October 1992, only four months after it was signed by President Bush at the Earth Summit in Rio de Janeiro in June 1992. That Convention required no implementing legislation. However,

other Conventions, such as the Law of the Sea, have yet to be ratified, more than a dozen years after signature.

17. Q: **Which agency or department would be responsible for implementing the provisions of any agreement reached in Kyoto, including provisions relating to joint implementation, emissions trading and advancing Article 4.1?**

A: It is anticipated that several Departments and agencies would have a role in the implementation of provisions related to joint implementation, emissions trading and Article 4.1, including the Department of State, the Department of Energy, The Department of Justice, the Treasury Department, the Department of Agriculture, the Agency for International Development, the Environmental Protection Agency, and possibly the National Oceanographic and Atmospheric Administration and the National Aeronautics and Space Administration. The precise role of each could only be determined once specific provisions had been decided upon.

18. Q: **What consideration has been given or plans made regarding passage of legislation necessary to implement any agreement reached in Kyoto?**

A: While some consideration has been given to the activities required under various agreement provisions (particularly those introduced by the United States), the lack of general acceptance of any of these provisions in the international negotiations makes the development of any specific legislative proposals premature. The Administration would intend, as part of its package of material to be sent to the Senate, to include it proposals for legislation that would be required to fully implement any agreement.

19. Q: **Article 17.4 of the Framework Convention on Climate Change (FCCC) specifies that only "Parties to the Convention may be Parties to a protocol." However, there is no assurance that all or even a majority of the 167 Parties to the FCCC will deposit instruments of ratification, acceptance, approval or accession to any protocol adopted by the Parties by consensus or otherwise in Kyoto. What assurances does the U.S. now have that most, if not all, developing country parties to the FCCC will become Parties to a Kyoto protocol? Why is it in the U.S. interest to agree, without assurances, to a protocol that proposes to set legally binding post-2000 targets and timetables for Annex I Parties only and also imposes on the U.S. new and legally binding commitments to advance implementation of Article 4.1 of the FCCC, such as those prescribed in paragraph 1, 2, 3, and 4 fo Article 5 of the U.S. draft protocol?**

A: [EGC]

20. Q: **In a July 18, 1994, letter to the then House Committee on Energy and Commerce [the State Department] said:**

> **We agree that there are substantial commitments beyond 2000 for all parties to the Framework Convention under Article 4. Article 4.1 (applicable to both developed and developing countries) contains commitments that are not limited by any specific timetable.**

a) **Is there any evidence to date that the U.S. is not abiding by these Article 4.1 commitments? If there is none, why should the U.S. voluntarily agree to reaffirm, as required by Article 5.1 of the June draft, to what the U.S. already agreed to when it ratified the FCCC in 1992?**

b) **Is the U.S. asserting that other Annex I Parties are not abiding by such commitments? If so, please identify those Parties.**

A: [EGC]

21. Q: **Paragraph 2 of Article 5 of the U.S. draft Protocol mandates each Party to "strengthen its legal and institutional framework to advance implementation" of Article 4.1 commitments. What "framework" does the Administration have in mind? Does this suggest a new Federal or international agency or program? Would this be done through new legislation? If not, how would it be achieved in the U.S.?**

A. The Berlin Mandate calls for the negotiating process to "continue to advance the implementation" of Article 4.1 commitments, which also apply to developing countries. The primary U.S. objective, in proposing paragraph 2 of Article 5, was to encourage developing countries with inadequate legal and institutional frameworks to strengthen such frameworks so as to improve implementation of Article 4.1. However, it was considered that there was no reason why such an obligation could not apply to all Parties, namely that all Parties could reasonably be asked to do something to strengthen their frameworks. Even the United States, with its highly developed legal and institutional system, could, for example, enhance its existing administrative abilities to collect and report on inventories of greenhouse gas emissions. It was not intended that any international institutions or processes would be needed to implement such a provision.

22. Q: **Article 5.3 requires that each Party take "measures to facilitate investment in climate-friendly technologies." What "measures" does the Administration contemplate? How would they be implemented in the U.S.? What are their regulatory and budgetary implementations?**

A: [Seidel]

23. Q: **Article 16 of the draft provides that the Parties "shall adopt, by [2005], binding provisions so that all Parties have quantitative greenhouse gas emissions obligations and so that there is a mechanism for automatic application of progressive greenhouse gas emissions obligations to Parties, based upon agreed criteria."**

a) **Does this mean that there could be a second protocol or another legal instrument by [2005] which is only 7 years after the December meeting in Kyoto?**

b) **Do the words "all Parties" in this Article mean that only the "Parties" to the U.S. draft protocol would be required to "adopt" by 2005 such an instrument? Unless developing country Parties to the FCCC, such as China, India, and Brazil, become Parties to the Kyoto instrument (as proposed by the U.S.) prior to [2005], how does this Article address the issue of greenhouse gas emission growth by all non-Annex I Parties?**

c) **Could such a new instrument adopted by [2005] impose new and additional obligations on the U.S. beyond those proposed to be adopted in Kyoto? Why is that possibility a good result for the U.S. economy, trade, and competitiveness?**

d) **What "mechanism for automatic application of progressive greenhouse gas emissions obligations" does the Administration contemplate by this proposal? What are its implications for the U.S., including its sovereignty?**

A: [EGC]

24. Q: **Article 16.1 of the Convention provides that "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." The U.S. draft protocol states, that it may not be "appropriate" to adopt the Article 16.1 Convention example.**

Please explain why. Does the U.S. support annexes that would be substantive and mandatory?

A: You correctly note that Article 16.1 of the Convention limits the use of annexes to certain types of material. This is not because there is any inherent reason why annexes should be so restricted. Rather, it is because Article 16 goes on to provide an entry-into-force procedure for annexes (and amendments to annexes) under which an annex (or amendment to an annex) enters into force for a Party unless a Party affirmatively does not accept it. (Other modifications to the Convention must be affirmatively accepted by Parties to be binding on them.)

In the context of the Convention, as well as other treaties, the U.S. insisted that the quid pro quo for such a "tacit" amendment procedure with an "opt-out" provision was that annexes be limited to material of a technical (scientific, etc.) nature. This view is consistent with views expressed by the Senate. The purpose of the U.S. comment with respect to the climate change protocol was to flag that annexes are not automatically entitled to "opt-out" procedures; rather, it depends on their context.

25. Q: **Article 9 of the U.S. draft provides that Parties "shall cooperate" in establishing a "long-term goal" regarding concentrations of gases. Article 10 calls for meetings at "regular intervals" to, among other things "periodically review the adequacy" of the Protocol and Article 8 calls for periodic review of the Protocol and guidelines "in light of evolving scientific knowledge related to climate change." Article 2 already suggests a minimum of two budget periods. Article 16 tells the parties to adopt "binding provisions" by [2005] for progressive "obligations." Does the State Department contemplate, over the next several decades a continuing process of meetings of both the protocol and Convention Parties annually and a series of IPCC assessments, special reports and technical papers leading to a series of protocols or other legal instruments that are likely to have significant economic impacts on the Parties and their people? Why is there a need for such frequent meetings and reviews?**

A: The U.S. has proposed a periodic review of the agreement to insure that any changes in the science are fully taken into account by the Parties. Such flexibility insures that if new information emerges indicating a reduced need to act, the agreement could be modified; conversely, if additional actions needed to be taken to address the threat of climate change, appropriate action would not be delayed. The U.S. proposal also seeks to insure that Parties would be fully informed regarding the compliance of all other Parties – thus removing a potential problem of one Party gaining a competitive advantage though not fully meeting its obligations, while other complying Parties might be penalized. Finally, the U.S. proposal, while setting specific commitments for developed countries, recognizes the need for all Parties to participate. It therefore calls for the negotiation of a new agreement by [2005] that would require all countries – including developing

countries – to adopt legally binding limits on their emissions. We assume that at each stage of the process, a full assessment of the costs and benefits of action would be taken prior to committing the United States to any new legal obligation.

The U.S. proposal for an agreement does not specify the frequency of IPCC Assessments. These reports (the third of which is anticipated to be released in late 2000 or early 2001), have so far been scheduled on a five year cycle – long enough to allow new scientific information to develop, but frequently enough to provide the policy community with regular updates on the state of knowledge regarding the climate change issue.

26. Q: **The Global Climate Coalition sent a letter to the Department of State on February 14, 1997, raising a number of questions about the January 17, 1997, version of the U.S. draft protocol, particularly in regards to trading. The Administration has not yet responded to those questions. Please respond to them as part of your reply to this inquiry.**

A: [EGC]

27. Q: **The EU proposal made recently in Denver was developed last March as an EU "negotiating position for the ongoing negotiations on the Berlin Mandate" and it includes burden-sharing of a 10% reduction among EU members of the "overall emission reduction objective by the Community as a whole." This appears to be a form of differentiation, a concept the U.S. is not supporting. The existing FCCC bubble applicable to the EU presumably only covers policies and measures and, when adopted, it only covered the 12 Parties that were members of the EU in 1992. Does the U.S. understand that the EU is seeking, by its submissions and discussion with the U.S. delegation, to extend a form of the FCCC bubble to a protocol and another legal instrument that may be adopted in Kyoto, to expand the bubble to cover any target and timetable or financial obligations and not just policies and measures, and to expand the bubble to include all present and future members of the EU, such as countries from Central and Eastern Europe? Why is such an expanded bubble in the economic and competitive interests of the U.S.?**

A: The EU has made clear that it believes the bubble covers not only policies and measures, but also any target and timetable. IT has argued that it may use the bubble not only in meeting the non-binding aim of the Convention, but also in meeting any new obligations established under the protocol or other legal instrument. To date, the EU has not discussed with us whether it also covers financial issues. They have also indicated they have not yet determined how or under what circumstances the bubble would apply to new member states.

The United States believes it is the interest of a stable Europe that the European countries continue to develop economically, and has so far been disinclined to intervene in the domestic affairs of any European nation. However, in the context of any new agreement under the Climate Convention, we have not yet accepted that the European member states should be allowed to "bubble" their obligations, nor would we support their doing so unless we were satisfied that such an agreement would not disadvantage the United States.

28. Q: **What is the potential impact of such an expanded EU bubble on the U.S. proposal for international emissions trading? Would it ensure that the EU would get the benefit of any emissions deficit derived from such Central and Eastern European Members and deprive the U.S., Japan, Australia, and Canada of that deficit? Would the U.S. then have to rely primarily on Russia's emissions deficit in order to derive any of the benefits of trading?**

A: The impact of an expanded EU on any emissions trading provisions is dependent on the level of the target, and the restrictions placed on a trading regime. If country targets or trading restrictions were set so that they required "real" reductions, no specific benefit would necessarily accrue to the European Union, and any reductions would entail real costs. Neither is it clear that the European Union would necessarily claim all the benefits of an expanded membership – emissions trading should in theory equalize the price of reducing a unit of emissions regardless of whether it is in Europe or Russia or the United States. Most analysis does suggests that if the U.S. is to use emissions trading to substantially offset its domestic emissions, even the entirety of the Eastern European country emissions would not suffice; Russia is the only country large enough to accommodate our current levels.

29. Q: **Article 22.3 of the FCCC requires that regional economic integration organizations must declare the "extent of their competence" with regard to obligations under the FCCC. Does the U.S. believe that the EU has the competence to carry out legally binding targets and timetables and to enforce any differentiated targets for its members if they fail to achieve them?**

A: It is not yet clear how the EU competence will be applied in its implementation if any new obligations under a new legal instrument. We, along with others (e.g., Australia and Japan) have insisted that the issue of EU competence be made fully transparent and provisions for compliance be made acceptable to all Parties before we would agree to allow the EU to undertake its commitments as a single entity rather than individually through each member state.

30. Q: **The State Department's September 9, 1996, reply to the Committee stated that the U.S. did not agree to an "EU Bubble in Berlin" and that the U.S. delegation "successfully opposed including language in the Berlin Mandate which might have suggested that any country or group of countries could "bubble" in the post-2000 period." The reply then said:**

> **Clearly, the question of "bubbling" with respect to post-2000 commitments is complex, and one that will be closely scrutinized and carefully considered as negotiations progress. The Administration has consistently and continuously consulted with Congress, as well as with U.S. industry and U.S. NGOs, on all aspects of the negotiations concerning post-2000 commitments and will continue to do so.**

The Administration has not yet held meaningful discussions with this Committee on the issue of the EU bubbling to "meet target and timetables," its implications for the U.S., its merits, or its complexities. Given the fact that the negotiations are just approaching a conclusion in Bonn and Kyoto, when do you plan to consult us on this aspect of the negotiations?

A: [EGC]

31. Q: **Since 1992, the composition of the only "regional economic integration organization," namely the EU, has grown from 12 to 15 members and several countries want to expand it further. Under what circumstances would the U.S. agree to an EU bubble that is or could be expanded?**

A: The U.S. has made it clear throughout these negotiations that there is no EU entitlement to a so-called "bubble" in the Kyoto agreement. Indeed, how a bubble would operate upon EU expansion is one of the many concerns that we and others (for example, the Japanese) have raised in connection with the EU proposal.

32. Q: **The EU has proposed an amendment to the Convention to provide for a vote to adopt all future protocols by three-fourths if all efforts at consensus are exhausted. The proposed amendment would appear to have a retroactive effect for Kyoto.**

a) **Under this proposal, is it possible that three-fourths of the FCCC Parties could vote to "adopt" any Protocol that imposed new obligations for Annex I and/or non-Annex I Parties and then decide not to deposit an instrument of ratification, etc.?**

b) Does the U.S. support such an amendment to the Convention?

c) Has the U.S. changed from its June 19, 1996, response to this Committee in regards to any of these matters? Would the Administration agree to a resolution of one of these matters, namely voting on a protocol, without a resolution of the financial and budget matters for both the Convention and all future protocols?

A: (a) Yes. Under the current Climate Convention, as well as this proposal, Parties could adopt an agreement (pursuant to whatever rule of procedure governs adoption) and then not ratify.

(b) We have substantial concerns about the provisional application aspect of the proposal. In effect, it amends the treaty without waiting for the Parties to ratify the amendment.

(c) [Unsure of response to Committee in July 1996 – must cross-reference.]

33. Q: **Does the Administration intend that any international emission trading program would apply in the same way and to the same extent to public and private entities internationally and in the U.S.? For example, would it apply to local governments and to defense or other agencies of each Party and to the emissions of such entities? What will be the impact on the U.S. Defense Department of an international, or, for that matter, a domestic, emissions trading program?**

A: [Seidel]

34. Q: **Greenhouse gases not covered by the Montreal Protocol are not pollutants within the meaning of the Clean Air Act and are not subjected to the command and control provisions of the Act or other environmental laws. It is our understanding that although the U.S. has cited (in a September 9th reply to this Committee) authority to implement the Climate Change Action Plan with voluntary measures, the U.S. draft protocol, because it may call for mandatory measures, could not be given full effect in the U.S. without the enactment of new legislation by Congress. Do you share that understanding? Is the Administration considering a domestic emission trading legislative program patterned on the 1990 Clean Air Act?**

A: [Seidel]

35. Q: **I understand that the Administration has recently established the White House Climate Change Task Force, a Deputies Group and an Assistant Secretaries group. Please explain the role and purpose of each in regards to the development of the Administration's position and policies for the international negotiations for a protocol or another legal instrument in 1997 and for the development of implementing legislation in the U.S. Please identify the members of each group. Please provide any documents regarding the formation of these groups, their membership, mission, tasks, and/or assignments.**

A: [Seidel]

36. Q: **Please provide a table of all contracts, cooperative agreements, grants, and interagency agreements and any extensions thereof (hereinafter referred to as "agreements") entered into with any individual, agency, or public or private entity (foreign or domestic) by or through any federal Department or Agency, including the Departments of State, Commerce, and Energy, the Environmental Protection Agency, for the period beginning July 1, 1994 to the present that relates to, or includes (directly or indirectly) climate change matters or issues of any kind. These should include matters relating to (a) domestic or international emission trading, including economic and other analysis of such trading, the administration and verification of such trading in the U.S. and elsewhere, (b) public outreach, general and specific public education, grass roots, community outreach, workshops, (c) transportation efficiency, alternative fuels, transportation generally, utilities, impact on pollutants like ozone and particulate matter, and (d) any legal analysis of these matters and of the Convention or of any statutes concerning climate change or trading. Each table should identify the date of the agreement, the agreement recipient, the amount of Federal funds, the term, including extensions, a brief description, the product, and whether it is publicly available, and the status. Please include with each table the applicable "Statement of Work," including any revision thereof, for each agreement.**

A: [Interagency]

TO MJ
7-25

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RETURN TO:

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON COMMERCE
ROOM B-334,
RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515

Subject: **The Economic and Environmental Impact of the Proposed International Global Climate Change Agreement**

Hearing date: **July 15, 1997**

Referred to: **Janet Yellen**

Testimony given by you before the Committee appears on the attached typewritten print. Please indicate corrections, if any, in **RED,** and return the **original** within 1 week of receipt.

PLEASE NOTE: Only technical, grammatical, stenographic, and typographical corrections will be accepted.

If supplemental material has been requested for the record by the Committee, it should be of photographic quality for reproduction. Please indicate clearly, by page and line, where material is referenced. A copy of this information should also be sent directly to the Member requesting the material. **Please supply a data disc of material and prepared statement if possible.**

Thank you.

7/30/97

Joe Patterson,
Publications Office
Ph. 225-0430

Reviewed and
made edits of
Janet's testimony

RPTS COLCHICO

DCMN HERZFELD

THE ECONOMIC AND ENVIRONMENTAL IMPACT OF THE PROPOSED INTERNATIONAL GLOBAL CLIMATE CHANGE AGREEMENT

Tuesday, July 15, 1997

House of Representatives,

Committee on Commerce,

Subcommittee on Energy and Power,

Washington, D.C.

The subcommittee met, pursuant to call, at 1:00 p.m., in Room 2123, Rayburn House Office Building, Hon. Dan Schaefer [chairman of the subcommittee] presiding.

Present: Representatives Schaefer, Crapo, Whitfield, Rogan, Shimkus, Bliley (ex officio), Hall, McCarthy, Markey, Pallone, Dingell (ex officio).

Also Present: Representative Sawyer.

Staff Present: Catherine VanWay, Counsel; Sue Sheridan, Minority Counsel.

Mr. SCHAEFER. Now I would like to recognize the panel, the Honorable Janet Yellen, the Chair of the Council of Economic Advisors; and, of course, the Honorable Tim Wirth, Under Secretary of Global Affairs, U.S. Department of State.

We will start with you, Dr. Yellen.

STATEMENT OF JANET YELLEN, CHAIR, COUNCIL OF ECONOMIC ADVISORS

Ms. YELLEN. Good afternoon, Mr. Chairman and Members of the subcommittee. I appreciate the opportunity to discuss with you today the economics of global climate change.

In his speech to the United Nations in June, President Clinton emphasized that the risks posed by global climate change are real and that sensible preventive steps are justified. That assessment accords with the views of more than 2,300 economists, including 8 Nobel laureates, who signed a statement supporting measures to reduce the threat of climate change.

At this time, the administration has not settled on a particular set of policies to reduce greenhouse gas emissions. Instead, the President indicated in his U.N. speech that he intends to engage in discussion with all interested parties, Members of Congress, other elected officials, scientists, economists, business and labor

leaders, about the problems posed by greenhouse gas accumulations and the costs and benefits of corrective action.

This discussion is intended to inform the administration's decision-making process, which will culminate in a U.S. policy position in the international negotiations in Kyoto in December of this year.

Now, an important step in this and any policy process is determining the impact a policy will have on the American economy. President Clinton's top priority, since his first days in office, has been revitalizing the U.S. economy, creating jobs and investing in people and technology to enhance long-term growth. And we have made tremendous progress. So any policy the President ultimately endorses on climate change will be informed by his commitment to sustaining a healthy and robust economy.

In my testimony today, I would like to describe some of the principal lessons that emerge from ~~now~~ the voluminous literature, much of it relatively recent, on the economic impacts of policies to address global climate change.

Before I begin my discussion of the economic literature, though, I would first like to acknowledge the uncertainties associated with estimating both the costs and the benefits of reducing greenhouse gas emissions. Just to provide some perspective, as you all know, it is difficult to gauge

exactly what impact the balanced budget agreement will have on the U.S. economy's growth rate, levels of employment, interest rates, consumption and so forth over the next 5 years. But when it comes to global climate change, it is orders of magnitude more difficult to gauge the effects of policies on the economy. We are concerned with not just the next 5 years and not just the American economy, but, rather, we are concerned with economic and physical processes that operate globally and over decades, even centuries.

Both the costs and the benefits of climate protection are very difficult to quantify or predict with any certainty at all. In short, if anybody tells you that he or she has the definitive answer as to the costs and benefits of particular climate change policies, I would suggest that you raise your collective eyebrows.

Having said that, let me turn to the economic literature and try to summarize what I think we know so far about this difficult topic. The economic literature includes estimates using many different models to evaluate numerous alternative emission reduction strategies. If fact, because there are so many different models, economists initially faced huge difficulties in comparing results. To solve that problem and thereby enable meaningful comparisons, many economists have calibrated the various models by performing some standardized simulation. Specifically, they have assessed the

consequences of stabilizing greenhouse gas emissions at 1990 levels by 2010 or 2020.

Within the administration, a staff-level working group, dubbed the Interagency Analysis Team, has attempted to estimate some of the economic implications of climate change policies. ~~What they did was~~ They took the emissions scenarios most often used in the economic literature, ~~and~~ that is stabilizing emissions at 1990 levels by 2010, ~~they took that~~ as a starting point for their own analysis.

I want to emphasize that this scenario is not, and I reiterate, not administration policy. Instead, it was picked to make comparisons with other models easier. The modeling effort produced some useful lessons, but as we found, and you can see in the peer reviewers' comments, it also suffered from serious shortcomings. Both the lessons and the shortcomings point to one clear conclusion, which is that the effort to develop a model or a set of models that are going to give us definitive answers as to economic impacts of any given climate change policy is futile. Rather, we are left with a set of parameters and relationships that influence estimates of the impacts.

I understand that a draft of the staff analysis was given to the subcommittee this morning, along with the reviewers' comments, and I would be happy to answer any questions that you may have about that modeling effort.

I would like to draw, however, in the remainder of my testimony, some lessons. Modeling efforts both inside and outside the administration clearly indicate that economic analysis can do no more than estimate a range of potential impacts from particular policies and highlight how the outcomes depend on the underlying assumptions about how the economy works and the way in which policy is implemented; and I want to just briefly summarize what I think some lessons are that we have learned from the economics literature thus far.

First, the magnitude of the costs of reducing greenhouse gas emissions in the various models depend crucially on a number of key assumptions about how the economy works. Essentially, the lesson we have learned is the greater the substitution possibilities and the faster the economy can adapt, the lower the costs. Second, costs depend critically on how emission reduction policies are implemented; and it just boils down to this: If we do it dumb, it could cost a lot, but if we do it smart, it will cost much less, and indeed it could produce net benefits in the long run.

The over 2,300 signatories of the economists' statement argued that any global climate change policy should rely on market-based mechanisms. These mechanisms allow for flexibility in both the timing and in the location of emissions reductions and thereby minimize the costs to the

U.S. economy. The economists concluded that there are policy options that would slow climate change without harming American living standards, and these measures may, in fact, improve U.S. productivity in the longer run.

The third lesson that emerges from the study of economic climate protection is ~~the~~ that developing, as well as developed, countries must be part of the process. While developed countries are responsible for most of the greenhouse gas currently in the atmosphere, developing countries are starting to catch up. Also, the table--the timetable for the inclusion of developing countries is important. The sooner the developing countries face incentives to move away from carbon-intensive energy sources, the less likely it is that they will become dependent on those types of fuels to spur their own economic growth. In short, we know that global problems require global solutions.

Let me conclude by saying that policies to promote economic growth, create jobs and improve the living standards and opportunities of all Americans have been and always will be the top priority of the President and his administration. In his remarks to the Business Roundtable on global climate change, the President said, quote, "Let's find a way to preserve the environment, to meet our international responsibilities, to meet our responsibilities to our children, and grow the economy at the same time."

I believe that some of the lessons we have learned from the economic literature will help us to achieve the President's goal.

Thank you. I would be happy to answer any questions you may have.

Mr. SCHAEFER. Thank you very much, Dr. Yellen.

[The statement of Ms. Yellen follows:]

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Mr. SCHAEFER. The Chair would note Mr. Sawyer from Ohio is with us. Even though he is not a Member of the subcommittee, he is a Member of the full committee and will be able to ask questions when everyone else is finished.

I have a couple here that I would kind of like to start with. First of all, I am sure you both are familiar with this particular study. This is the one by the ~~Argon~~ Argonne National Laboratory, and that was just released not too long ago, and it went into the impact of six U.S. industries and what the effect would be on these industries.

I would ask you, Dr. Yellen, could you tell me what energy prices were assumed in this study? And this would be for the record. And what was the result of this particular study, in a synopsis?

~~Ms. YELLEN. I believe the energy price assumptions--~~

Mr. SCHAEFER. Turn your microphone on.

Ms. YELLEN. Sure.

Mr. SCHAEFER. Thank you.

Ms. YELLEN. I believe the energy price assumptions that were used were taken from an earlier analysis, ~~--is that--from 1996~~. ~~They would be akin to the kinds of assumptions that~~ you see in the base case, I believe, in the paper, the staff paper that was released. ~~They entailed large and implicit~~ increases in the price of carbon and were based on the assumption of no flexibility in implementation. ~~all the kinds~~

This flexibility is what
of things that I emphasized and Under Secretary Wirth emphasized that we would be seeking to achieve and know would greatly reduce the costs of implementing these policies.

Mr. SCHAEFER. For the record, could you quote those prices for us, please?

Argonne study

Ms. YELLEN. The price increases that were in the Argon?

Mr. SCHAEFER. Yes, ma'am.

Ms. YELLEN. I believe, if I have this right, that there were several scenarios. I believe there were two scenarios. In the first scenario, in the United States, there was an increase in the price of oil in 2010 of $122 and of coal of--

Mr. SCHAEFER. $122 per what?

Ms. YELLEN. Per metric ton of oil equivalent and of coal of $106 per metric ton. Those were some of the assumptions. There were several scenarios, I believe, two scenarios.

Mr. SCHAEFER. Yes. Let me get this straight now. Isn't one scenario by the year 2010 to be 10 percent under 1990 levels, another one to be 1990 levels, and another one to be 10 percent above 1990 levels? I think that is in the draft analysis; is that correct?

Ms. YELLEN. I will check this out, if I might, and submit it for the record, try to reconcile these two sets of assumptions and get back to you, if I can.

[The information follows:]

******** COMMITTEE INSERT ********

Mr. SCHAEFER. But the way that I am understanding it and reading it is if we go 10 percent below 1990 levels, we are talking about $200 increase per ton; and if we go to 1990 levels, it is around $100; and if we go 10 percent above 1990 levels, it is 50 or approximately. I guess what I am trying to get at is, number one, has the administration adopted a policy on which one they are going to go for? And the key is where is it going to kick in that we start losing industries out of this country or having them fold?

Ms. YELLEN. ~~Okay.~~ I would like to reiterate what I said in my opening remarks, which is that the administration has not formulated a policy at this time with respect to timetables or targets, ~~that~~ The report that we have released to you today is a staff analysis and its focus on, as a starting point, 1990 emissions levels by 2010 did not reflect a policy choice. This is a work that is a draft. It shows you where the team is at this point. This is work that ~~we will that~~ the staff will be concluding, because ~~in a sense~~, when you look at the reviewers' comments, you see that this was not successful.

I believe ultimately ~~this is futile exercise to try to derive sets of precise forecasts as to what will happen to energy prices.~~ The staff report, therefore, focused on a baseline scenario that is not a policy recommendation of the administration. It was for them a starting point so that

they could calibrate their models, begin talking the same language and make sure that they were on the same page. I believe the ultimate objective was to get a sense of confidence in this set of models so they could later be used to analyze policies that were under contemplation.

I think, as you can see from what the reviewers have said about these models and what we have learned from this exercise, is ~~there is a sense in which this is futile~~, and as we formulate a policy, I think we will have to rely on not this set of models, but input from many sources, including the broad economics community, many kinds of economic analysis and input from outside of economics.

So I want to emphasize, this kind of scenario that is the baseline in this report and was the starting point in the ~~Argon~~ Argonne Lab study is not the policy of the administration.

Mr. SCHAEFER. I am very pleased to hear that. The question, I guess, I have is: When is the administration going to have a policy so that we will know it before Kyoto?

Ms. YELLEN. Well, we are involved in a process of attempting to engage in discussions, as I mentioned, with Members of Congress, with business leaders, with labor leaders, and I think we need input from all of those constituencies as we try to formulate a policy and try to come up with something that would put us on the path ~~in a sensible way~~ toward reaching the goal of beginning to deal in

a meaningful way with buildup of greenhouse gas, but in a manner that will be economically sensible.

Mr. SCHAEFER. As I can recall in the 104th Congress, it was stated at this time that this was going to be forthcoming, and you have only like less than 6 months now, and we still don't have it. And I think that that is what the committee is basically concerned with.

I have used up my time. I am going to turn to the gentleman from Michigan, Mr. Dingell, for whatever questions he might have.

RPTS STALLSWORTH

DCMN KRISTOFFERSEN

Mr. DINGELL. Mr. Chairman, thank you.

Mr. Chairman, I would like to welcome my old friend Mr. Wirth back, a valuable member of this committee. It is good to see him.

Ms. Yellen, we thank you for being with us, too.

Ms. Yellen, I found your statement to be very interesting and very helpful. You indicate that the administration is not settled on a particular new set of policies to reduce greenhouse gas emissions; and there I am quoting. This would be good news. But I do have some concerns about where the administration has been headed in the post-Berlin negotiations, and I hope you can help me clarify this problem.

Are you familiar with the so-called Geneva declaration of last July in which the United States concurred with the statement instructing the developed nations to accelerate negotiations on the text of a legally binding protocol or other legal instrument in time for Kyoto, which would include, for developed countries alone, quantified, legally binding objections for emission limitations and significant overall reductions within specified time frames such as 2005, 2010, and 2020?

Ms. YELLEN. I am familiar with the--

Mr. DINGELL. Now, are you familiar with the statement that Ms. Claussen, who was then a part of the United States negotiating team, made on July 18, 1996, stating that the United States would like to wholeheartedly endorse this excellent declaration?

Ms. YELLEN. I am not familiar with that statement.

Mr. DINGELL. Mr. Wirth, she did that, did she not?

Mr. WIRTH. She did. I think she probably did that at my urging, Mr. Chairman.

Mr. DINGELL. Now, let's go a little further here. Ms. Yellen, are you aware of the draft text the United States submitted in January to the U.N. in which we proposed a cap and trade emissions systems to facilitate new commitments applying solely to the developed nations which are premised on specific emissions reduction obligations assumed by those countries?

Ms. YELLEN. Yes.

Mr. DINGELL. Now, Ms. Yellen, are you telling us now that the administration either no longer stands for these particular policies or does stand for these particular policies? I am not clear. What is the position of the administration? Is the administration proposing a plan which will cause the United States to assume responsibilities that will not be assumed by the developing nations?

Ms. YELLEN. Well--

Mr. DINGELL. I mean, that is a simple question. It only requires a yes or a no.

Ms. YELLEN. There are very few things so simple as to require a yes or no answer.

Mr. DINGELL. I have enormous respect for you, and I know that you are an economist that can simplify these difficult questions for me. So a yes or no will help me understand this.

Ms. YELLEN. The administration regards participation, meaningful participation, as Under Secretary Wirth emphasized in his statement, of developing countries to be a very important aspect.

Mr. DINGELL. Maybe you and Mr. Wirth can help me. I guess Mr. Wirth is coming back to have it rest in his lap.

Mr. Wirth, is it the position of the United States that we will assume responsibilities as a developed country that will not be assumed by the undeveloped countries?

Mr. WIRTH. Well, it depends on when, Mr. Chairman.

Mr. DINGELL. Well, no, no, no. Are we going to assume responsibilities that developing countries are not going to accept at the same time?

Mr. WIRTH. At the initial point, that is the case.

Mr. DINGELL. Pardon?

Mr. WIRTH. At the initial time, that is the case. We are the developed countries.

Mr. DINGELL. So the United States--

Mr. WIRTH. And we have been, if I might, Mr. Chairman--if I might, Mr. Dingell--

Mr. DINGELL. All I want to do is get the answer to my question, because I only have a little time, Mr. Wirth. You and I are good friends, and I am sure we will want to discuss it in some private capacity at a different time.

Mr. WIRTH. And we have in the past, and I look forward to it, Mr. Chairman.

Mr. DINGELL. Now--and I thank you. So we are going to then accept responsibilities, at least in the early stages, that will not be accepted by other countries.

Mr. WIRTH. That is correct.

Mr. DINGELL. Very good.

Mr. WIRTH. By the developing world. Only the Annex--so-called Annex I countries will have a defined set of emissions responsibilities.

Mr. DINGELL. That means the answer is yes.

Mr. WIRTH. The specifics. That is right.

Mr. DINGELL. Now, Ms. Yellen, I note that the President has had an increased involvement in the climate change issue. And as you mentioned in your testimony, there will be a White House conference on the subject later this year. I am delighted to know that, as you see it, the process is, quote, intended to inform the administration's decision-making

process, close quote, as we head towards Kyoto. Is that right?

Ms. YELLEN. That is correct.

Mr. DINGELL. Why are we getting the administration informed before we finally settle on a position? Or, rather, why are we getting the administration informed after we have settled upon a position?

Ms. YELLEN. We haven't settled on a position.

Mr. DINGELL. Well, our position, Mr. Wirth tells me, is that we will accept responsibilities that the developing countries will not be accepting, at least for some time in the distant future. Isn't that right?

Ms. YELLEN. Well, certainly our position with respect to targets and timetables is something that is not settled. We have, in the manner that Under Secretary Wirth just explained, made it a focus to bring the developing countries into an agreement. ~~And the flexibility provisions in terms of~~ International trading, joint implementation, and multiyear emissions budgets, ~~these have been~~ are flexibility provisions that have been part of the--

Mr. DINGELL. Perhaps you could help me. Should I give you and Mr. Wirth time to debate this question out amongst yourselves? He seems to be of the view that we are accepting responsibilities that the less developed countries and developing countries are not accepting. In other words, we

constituted up to this time?

Mr. WIRTH. That is up to the leadership of the House and the Senate, Mr. Chairman. And I can't speak to what the House leadership or the Senate leadership has done.

Mr. DINGELL. Now, Mr. Wirth, I am delighted to see your new--your emphasis in your testimony on developing nations. You note--and I quote--the issue is not whether developing countries, especially the big and rapidly developing ones, take on quantified commitments or limit or reduce their emissions of greenhouse gases. Clearly, it will be impossible to abate the threat of climate change unless they do.

Now, Ms. Yellen, what kind of economic advantage does a country that doesn't take on these kinds of responsibilities get over a country that does? Don't they get a huge advantage in terms of costs? They don't have to impose controls. They don't have to use special high-cost fuels. They can do all kinds of wonderful things to achieve the cheapest possible production, can't they?

Ms. YELLEN. Well, I would simply say it depends on the way in which an agreement is implemented, and--

Mr. DINGELL. Well, there will be, according to what we know, no imposition of requirements upon the developing countries at all, will there?

Ms. YELLEN. Not initially.

together. As in the framework convention on climate change, all of the Annex I countries would have the same requirements, whatever those may be, that are agreed upon in Kyoto. We have also proposed a new group called the so-called Annex B countries--

Mr. DINGELL. Who are they?

Mr. WIRTH. --which would be the--well, we believe those are the countries that are growing very rapidly and moving into close to developed countries.

Mr. DINGELL. Is China in them?

Mr. WIRTH. Maybe those that had joined the OECD.

Mr. DINGELL. Is China going--

Mr. WIRTH. Well, initially, the ones that have joined the OECD, I believe, are Korea and Mexico.

Ms. YELLEN. I believe so.

Mr. WIRTH. Is that right?

Ms. YELLEN. Korea and Mexico.

Mr. DINGELL. What are they going to be bound to do?

Mr. WIRTH. Well, we are proposing that there be a new category of countries of those that have matured more quickly and that they have to assume no responsibility--to assume greater responsibilities than those in the developing world that have not reached that level.

Mr. DINGELL. In point of fact--

Mr. WIRTH. China aspires, for example, to OECD status, I

at some future time to negotiate further changes, which might then bind them to limit the emissions of their greenhouse gases.

Mr. WIRTH. Well, I don't believe that is either awkward or begging. I think that it is a reflection of reality. And the reality is that the developed world has put most of the greenhouse forcing gases up into the atmosphere. We have to take first responsibility.

Mr. DINGELL. Mr. Wirth--

Mr. WIRTH. We also have to develop, as outlined in my testimony--

Mr. DINGELL. Mr. Wirth, that is a fine answer, but it is not to my question. My concern is that the United States is committing itself to a course of action which is going to pose huge economic constraints on our competitiveness and upon our ability to trade and to produce and to survive in an enormously competitive world.

Now, Ms. Yellen, can you tell us, if you were negotiating out something, would you forget the facts after you had essentially laid out the framework of the agreement? Is that a good way to negotiate?

Ms. YELLEN. Well, as I have emphasized, the policies certainly with respect to timetables and targets are not settled; they are under debate. We want to hear from lots of constituents. Nothing is settled about that, and there will

be considerable analysis to ensure that whatever time tables and targets are adopted--

Mr. DINGELL. Analysis?

Mr. WIRTH. --are sensible.

Mr. DINGELL. The agreements? The agreements that we had last year were that the information was going to be produced to this committee forthwith. It is almost a year since that. But a major part of the agreements have already been completed, and that is the structure of the treaty and who is going to be bound to do what.

The United States is going to be bound to produce legally binding legislation here in the Congress which will reduce the level of emissions of greenhouse gases. There is no such requirement on the Chinese or the other developing countries. I am curious why we made these agreements to do these things before we got this document entitled "The Economic Effects of Global Climate Change Policies."

Mr. WIRTH. Mr. Dingell, if I might, first of all, the differentiation of responsibilities between Annex I and non-Annex I countries was created in the original framework convention and climate change that was agreed to by the Congress in 1992. That is not a creation of something that we just did. It does reflect reality, but it is not a creation of something that just occurred or was proposed. That has been broadly agreed to now for 5 years.

longer run.

Dr. Yellen, would you reflect on that statement and any particulars that you would like to share with this subcommittee on those potential policies. It seems to me there is a real fear out there of change and an assumption that change will be bad. But these 2,300 economists, which is quite a gathering, eight Nobel Laureates, seem to feel differently. If you can share some of your thoughts with us.

And if time remains, Mr. Wirth, I wonder if you would reflect for us on the fact that the administration has been assessing the costs of climate change policies for over a year, what you were finding with regard to those. And in light of the recent assessment by the World Resources Institute, does it confirm some of those findings as well?

Thank you.

Dr. Yellen.

Ms. YELLEN. Yes, I am happy to have a chance to respond on the 2,300 economists. I think the view that they have developed is that climate change poses real risks to the economy. We can't quantify or even describe exactly what the implications for the U.S. or other areas would be with any precision, but there is a real risk with serious possible outcomes, and it justifies taking out, as they have put it, sometimes, an insurance policy.

I think an insurance policy would be a set of commitments

to reduce greenhouse gas emissions and implement policies that would, at this time, send credible signals to the private sector that would lead to the development and implementation of new technologies ~~and the implementation~~, particularly as capital stock turns over. ~~and~~ The opportunities are there to make real decisions about what sorts of energy should be used in new projects and to send signals that would result in the right choices being made that would have payoffs for decades into the future.

An analysis that many economists have done suggests that there are a set of policies that would produce that kind of technological change. They would stimulate investment.

One of the reasons that productivity growth could rise is because some of the policies that have been under consideration in the economics community would provide stimulus to investment, and more rapid investment would have a payoff ultimately in terms of higher growth. And one can see that in many of the analyses, both in ~~this report~~ the staff report that we released today, and in a much broader range of economic literature.

Ms. MCCARTHY. Well, I will look forward to reviewing that staff report, because I do think there is much to be gained, many positive examples that are probably contained therein. I was very much struck, with my own State when we chose to turn to alternative fuels, and other sources of

clean air debate for 15 years, and we were able to come up with a solution that had a major impact on clean air.

It is a perfect domestic example, not a perfect parallel, but a very good example for where these kinds of flexible economic interests allow us to make major steps on the environment at very, very lowered costs, lower, by the way, than the modelers had suggested. Miraculous.

Ms. YELLEN. Well, I think that you have hit really the important points in your answer. There are better and worse ways to do this. And one of the results the staff modelling paper, if it were released--you know, we don't believe there can be a single model. I think we are at the end of the road on that exercise.

But if I look back on it and say, what do you learn from that exercise, and what do you learn from the study of the World Resources Institute study that Under Secretary Wirth just mentioned--which I would also commend; it is an excellent piece of work--it is that there are ways of doing this that really are market friendly, flexible, and lower the cost. ~~And~~ I think that those features are flexibility over time, flexibility over places where emissions reduction is done, and, as we know from our own experience in the acid rain program and other uses, for example, the kind of thing that many of the economists have in mind would be the use of tradable permits.

Now, the administration has no policy, but that is the kind of market-friendly policy that I think provides opportunities to lower the cost, and, as the WRI study shows, there can be ways of doing this--and the economists recognize this--that produce benefit.

So, for example, if some method were chosen--and economists tend to focus on this--a permit system that generated some revenues initially, they could be recycled and it would provide an opportunity to reduce taxes that we think interfere with the incentives to work and to save and to invest. And that is the kind of opportunity that creates growth.

Now, again, the administration hasn't devised any domestic policy at all for how this would be implemented, but the work of the economists and the work that is summarized in that paper shows that there are opportunities here and that this can turn itself into sensible, practical, pragmatic policies and end up with a win for the economy.

Mr. SCHAEFER. Would the gentlelady yield just for a second?

Ms. MCCARTHY. Certainly, Mr. Chairman.

Mr. SCHAEFER. How have the developing countries responded to this credit or the trading issue?

Ms. YELLEN. I am going to turn that over to Mr. Wirth.

Mr. WIRTH. Well, without as much enthusiasm as we would

like.

Mr. SCHAEFER. That is what I thought.

Mr. WIRTH. Both to trading or joint implementation.

Mr. SCHAEFER. I am not saying it is a bad idea. I think it is a good.

Mr. WIRTH. I think it is a good idea. I think that there are a couple of reasons for that. One, they are holding back until they see what we do in terms of our overall commitment on targets and timetables. So they are not going to do anything in our direction.

Second, I don't think that many of them have understood what is meant by "joint implementation" or by "emissions trading" as we have proposed them. I don't think that they understand that. They don't understand that this is a way of significant transfer of technology, for example, which is exactly--as we talked a little bit about China today--that is what the Chinese want. They are going to be building hundreds of very, very large power plants, and they would much rather have our cleaner technology than their dirtier technology. And this becomes a way for us all to work together on that kind of common problem.

Mr. SCHAEFER. I thank the gentlelady.

Ms. MCCARTHY. May I inquire further, Mr. Chairman?

Thank you very much. I appreciate very much your comments with regard to flexibility, market-friendly

policies. Certainly fiscal policies become a key component to that. While guiding my commission in the State of Missouri, I was chairing the Ways and Means Committee there and made the very strong link to sound fiscal policy and sound environmental policy turning into good economic policy.

So I think that should be something we keep in mind as we go forward on this and certainly look to policies that we might set here at the Federal level to comply with the international efforts. I wanted to ask you about these models and the flexibility that you mentioned.

Can we expect precise answers from climate models, or should we basically take a look at those as approximate guidelines for the future? How precise can they be? I think that is an area where we run into problems when we look to these charts and graphs and these fine reports and don't know quite how to use them.

Ms. YELLEN. I think if I leave you with any message today at all, it should be that we should not place our reliance on any particular model or even a large range of models and that attempting to find precision with respect to estimates of GDP changes or job changes or price changes is a futile exercise. That is the reason that we are issuing the staff paper in its current state.

And we are not going to continue in any search for perfection here, but there are a lot of models. If you look

at the reviewers' comments, you will see that each model has its strength, each model has weaknesses. There are things that none of the models that our staff looked at took into account that we know to be important. Indeed, I don't think there is any model at all out there that takes into account in the analysis of global climate change all of the factors that could be important.

So I don't think we should be looking for truth here in the form of a single set of numbers. As we go forward, though, I think the models, what were economic analysis, just more generally, do offer us some insights.

For example, we know without needing to look at a model that market-friendly flexibility policies of the kind that we have both emphasized ~~of course they~~ are going to lower the cost or raise the benefit of any policy that we would put into effect.

We know that if you want to do something efficiently using markets, if we are going to reduce emissions, then we need ~~trying~~ to make sure that the units of emissions that we reduce are the ones that are least costly to emit, ~~that~~ The firms that are doing that, or the individuals, are the ones that would bear the smallest cost, not the highest cost, ~~that~~ The countries that do ~~it~~, ~~the~~ real emissions reductions are the ones that can do it at lowest cost, not at highest cost, ~~and~~ When we think about flexibility, over time, ~~that~~ we need to reduce emissions

at the times when it is least costly rather than most costly.

Now, the truth is, we don't need any economic models at all to know that that is the case. This is standard economics that every student of economics learns in an elementary course. What our own exercise and the other exercises that have been done throughout the economics professions show us, they give us a rough handle on how much difference it could make. And, again, I don't want to quantify anything here, I think it is a mistake, but you can just see, if you look through the report, this is not a small difference, these flexibility issues, ~~this~~ makes a big order of magnitude difference in terms of how much it impacts firms in our economy.

Ms. MCCARTHY. Thank you, Dr. Yellen and Mr. Wirth.

Mr. Chairman, thank you for indulging a new member of the committee with an extension of time.

Mr. SCHAEFER. The lady asks some very good questions.

The gentleman from Illinois, Mr. Shimkus.

Mr. SHIMKUS. Thank you, Mr. Chairman.

Mr. Wirth, when we measure global temperature with a satellite, what do we find?

Mr. WIRTH. It depends on what ~~the~~ satellite is measuring.

Mr. SHIMKUS. As far as global temperature in the past 50 years.

up and walk you through, you know, the details of this.

Mr. SHIMKUS. We are always open to hear, obviously, both side of the issue and look forward to working with that. Obviously, it is a major concern.

Dr. Yellen, from an economist's point of view, where do we spend money best: A billion dollars to eliminate .001 percent of emissions from U.S. factories, or the same billion dollars to the clean up 10 percent of emissions in developing nations?

Ms. YELLEN. You know, it seems to me that in pursuing any kind of emissions reduction target, what we want to try to achieve is to find a mechanism where that can be done at the lowest possible cost, and it could be the United States, it could be Europe, it could be developing countries.

Within the United States, it could be one industry or one firm or another industry. And the virtue of a market mechanism is that it creates the kind of incentive. Domestic trading of permits, for example, creates the set of incentives domestically; international trading, internationally; joint implementation with developing countries outside Annex I. These mechanisms create a way of having that reduction done wherever it is cheapest. It is allowing the market to work. So that if there is a firm in the United States that would find it extremely difficult and

very costly to reduce emissions, it doesn't make sense to ask that firm to do it when there is another firm, that might not face such a constraint, that can do it very cheaply.

Mr. SHIMKUS. And my point is not just within our own borders but across national borders. That is why I am interested in the joint implementation and emissions training aspect--

Ms. YELLEN. It makes a lot of sense.

Mr. SHIMKUS. --if we are all in the same boat together, which is the argument.

Mr. WIRTH. Absolutely.

Mr. SHIMKUS. I was also interested in the comments on subsidies, reducing subsidies internationally. And if I can respond to what I thought was--what I heard was that if you eliminate the subsidies, power will become more expensive, so people will not consume as much power, thus alleviating one of the problems in the developing nations, which runs contrary--which I thought was alluded to earlier--which kind of runs contrary to the other debate that we are having here, which is deregulating the utility industry here in the Nation, in which we say we take away the subsidies and we allow the industries to compete. We are going to have lower cost and probably the higher consumption of power across the board nationally.

So I mention that because I don't know if that

argument--would you comment on that? I guess the best thing is to comment on that. I think the bringing down of subsidies and allowing competition nationally will allow--internationally, and of course in the developing nations, which is what was the premise, would encourage more utility usage.

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DCMN PARKER
[3:05 p.m.]

Ms. YELLEN. I think one's normal view in a market system is that when markets work prices come down. That is beneficial to consumers and we end up with a system where that the prices that consumers or firms pay for something reflect the true cost to society of using that resource.

So the kinds of restructuring of electricity that are discussed in the United States, I think, are meant to produce a more competitive industry where the costs of electricity are more reflective of the cost to society of producing that. And I think that is a good system as far as it goes.

What we recognize here, though, is that the use of fossil fuels, the burning of fossil fuels, does produce environmental damage and that we need to find some way of addressing that, and that could be certainly in economic models--again, the administration has no policy, but that the cost of using those fuels, whether it is electricity or gas or coal or whatever, should be somewhat higher to reflect the adverse effects that using those fuels have on the environment.

And so I think it cuts both ways.

Mr. SHIMKUS. The last question, this one to Mr. Wirth, is there a provision in the agreement that would give

that we could take to ameliorate them?

Mr. MARKEY. What would be the benefits of taking the--I have already pointed out the benefits in that my home's value would go up.

Mr. WIRTH. The Malden Yacht Club.

Mr. MARKEY. Yes.

Mr. WIRTH. I think that as we look at the--for example--let me do this. Let me ask Dr. Yellen, who is the economist in our midst, may be the most appropriate to comment on the economic sides of this.

Mr. MARKEY. Okay. Dr. Yellen.

Ms. YELLEN. On some of the economic benefits. Well, first, I would see the development--

Mr. MARKEY. What is the cost of inaction as opposed to the cost of action? We have had a lot of discussion about the cost of action. Now, how about the cost of not doing anything?

Ms. YELLEN. Well, I think the cost of inaction is that we will fail to take the steps now sooner to develop the kinds of new technologies that would be very useful in reducing our reliance on fossil fuels. By waiting to take those steps, we will, for example, have new plants built based on ~~with making~~ choices that would not be efficient if we were to begin to take some credible steps now. And when we finally decided later on that it was important for all of the

reasons, all of the environmental reasons, so that your home doesn't become beach front later on to take steps, we would find that we had waited to act until a time when it was unduly expensive.

So taking actions in advance to begin to buy an insurance policy and move us on the right road and acting in a timely fashion ultimately makes it less expensive to address a problem that we believe is real and I think that the scientific evidence supports as a genuine problem.

Mr. MARKEY. One of the goals should be, of course, that we have energy-saving technologies, for example, that we can adopt more efficient renewables.

As we debate the electricity restructuring legislation before this committee this year, what recommendation would you give to us with regard to the percentage of renewables that we should build into the portfolio of utilities as they are allowed out into the competitive retail electricity marketplace?

Ms. YELLEN. I don't have a particular recommendation to give you. Electricity restructuring is under consideration, and I think that they--

Mr. MARKEY. Would you recommend that there be--would you recommend that we, in fact, include some renewables portfolios so that this one-third of--this utility sector does, in fact, have an agenda that we would give it so that

it could participate in the changeover from the fossil era to the renewable?

Ms. YELLEN. Well, I don't have a particular recommendation today that I want to set before you.

Mr. WIRTH. If I might, Congressman, I was in California a couple of months ago and the California Public Utility Commission is talking about developing, as they are deregulating their rate structure, of developing the capacity for consumers to purchase so-called green power.

There would be enough pooling of their purchasing power that that would provide a very, very significant market for renewables. And without putting that--a certain percentage of renewables into their rate base or into their new rate structure, rather putting it on the side of consumer choice was felt in this discussion to be one in which they thought they would get a 20--maybe a 20 percent return; 20 percent of consumers in California would choose to purchase green power, which would, therefore, develop a not insignificant market.

Mr. MARKEY. So if we establish, for example, a 10 percent minimum, that wouldn't be unduly burdensome?

Mr. WIRTH. Well, that would be something that you all decide to do. I suspect--knowing the debates on this committee, I suspect that that would run into very significant controversy.

I would point out just the choice side as being done in

lot of difficulty getting these together, and it is a bit disingenuous for some of them to say we had not been sharing this, as we had been sharing the very difficult nature of putting them together and we did not have an honest result or an honest model that we could then make available.

Mr. CRAPO. Would the gentleman yield briefly?

Mr. ROGAN. Yes.

Mr. CRAPO. Mr. Wirth, did I just hear you say that the administration is not going to continue with the economic analysis?

Mr. WIRTH. No, that is not what I said.

Ms. YELLEN. As we go forward and develop policy, certainly there will be economic analysis brought to bear on any policies that would be under consideration. But the plan would be to use a wide range of tools and bits of analysis and not any single model or any small group of models or certainly not merely the three models that are discussed in that report.

Mr. CRAPO. So this document that we received today, will this document--it is a draft document, I understand. Is it ever going to be finished?

Ms. YELLEN. No, it is never going to be finished. It represents--this committee has asked to see the state of the administration's analysis. This is the state of the analysis. As the Under Secretary just explained, the initial

desire had been to take work that had been done in various parts of the administration, to bring together a group that would have, in essence, a tool kit that it could reliably use to analyze policies that would be under consideration.

Mr. CRAPO. Well, then are we--is this committee going to be able to see a final document that constitutes the administration's economic analysis and its assessment of this issue at any time?

Ms. YELLEN. I think the answer is that if a policy is proposed, naturally representatives of the administration will be ready to testify and explain what they think the impact of any proposed policy would be on the American economy. ~~that~~ Any policy that is proposed, the President and the administration would want to feel was a good policy, that was beneficial for the American economy and we would stand ready to testify to that effect.

Mr. CRAPO. But I haven't heard you say--

Ms. YELLEN. And explain the logic.

Mr. CRAPO. But I haven't heard you say that there will be a policy adopted by the administration before.

Mr. WIRTH. Mr. Crapo.

Mr. CRAPO. Yes.

Mr. WIRTH. Let me just make a distinction between the original question about the specific sort of tool kit or hardware. We had hoped that there might be a powerful single

sort of tool kit in the form of a model. That model would be the three--EPA had one, DOE had one and DRI was the third.

Ms. YELLEN. DRI is the third.

Mr. WIRTH. DRI is the third, and we attempted to put those three together and that everybody could kind of plug their numbers and assumptions and so on into that model. That was just a tool. We have not been successful in making that tool work so we will not have a single item that we can give to anybody and say this is going to produce--is going to tell you what the economy is going to do.

We will, however, you know, obviously share all kinds of economic results and assumptions and so on as we go into the development of a specific set of policy measures.

That is a different question than the one specifically asked about the model itself. That tool kit has not worked. As Dr. Yellen says, we have got a whole variety of other tools.

Ms. YELLEN. This is the state of the tool kit as of May 30th. You can see how far it got. It shows a standardized policy, not the administration's policy, but a standardized policy to analyze. You can see how far they got. You have reviewers' comments that said these kinds of approaches have some strengths; they have weaknesses; that as the administration developed and analyzed policies, we should be using a broad range of economic analysis, and that is what we

will do as we go forward.

So this is the state of this work, but I think that trying to develop any single model or small set of models is an approach that is futile and so ~~this--there is not~~ I have no expectation that there will be a final draft, a final draft of this staff paper. This is where it is now.

Mr. CRAPO. Thank you. I will pursue this further in my questions.

I thank the gentleman for letting me interrupt there. The gentleman will not be penalized for his time.

Mr. ROGAN. Thank you, Mr. Chairman.

Based upon the Chairman's questions, and actually he was pursuing the line that was of interest to me, I am not sure if my confusion has been heightened from the responses. And so let me just ask you directly--and as an aside, I will also confess I have not had the opportunity to see this draft__ staff report. And is it my understanding that this has just either been released today or within the last few days?

Ms. YELLEN. Yes. I believe it was released this morning. It was given--

Mr. ROGAN. So then I have an excuse for my ignorance.

Ms. YELLEN. Yes. It was given to the committee--

Mr. ROGAN. So you will forgive me for asking just some basic questions about that.

Do I understand, Dr. Yellen, this is to be a staff draft

analysis as to the economic impact on American industry or is this merely an analysis that was put together setting forth some model or paradigm of how we should make these analyses?

Ms. YELLEN. This was, as I tried to explain, in an attempt to assemble a useful tool kit to analyze a range of policies that might be under consideration, ~~and~~ because ~~different models determine in different~~ various parts of the government were approaching different problems ~~differently~~ using different assumptions and different baselines as to what energy usage would be in the absence of any treaty, they tried to get together and to better communicate by standardizing what they did. ~~And~~ They took an initial set of assumptions to standardize on and that is what you see in this document that is referred to as the starting point analysis. It looks at attempting to reduce to 1990 levels of emissions by 2010.

They chose that not because that is the administration's policy, but because it was a common scenario and many ~~outside~~ outside economists who have models had also analyzed that. So it provided some comparability internally in the administration among agencies and outside.

Mr. ROGAN. So if I were to ask either of you the question, for instance, if we proceed with these proposals as the administration is requesting, how will this impact American steel or iron industries, are you able today to give

this committee an answer to that question?

Ms. YELLEN. No. We are not able to give an answer to that question.

Mr. ROGAN. Or to other industries or economic--

Ms. YELLEN. No, we are not able to give an answer to that question.

Mr. ROGAN. If--we have been at the bargaining table now for some 18 months. Is that correct?

Mr. WIRTH. Actually--essentially.

Mr. ROGAN. We are now at mid-July, and this is supposed to go into effect in December, as I recall it. Is that correct?

Mr. WIRTH. No, it will not go into effect until we come back to the Congress. This will probably be a protocol or an amendment to the original treaty and that will have to go to the United States Senate for approval and then it will require implementing legislation to get it done. So my guess is, Congressman, that we won't--this won't go into effect until--the Chairman is smiling up there--the year 2000, 2001.

There is an election that intervenes in there and I don't know if that will have anything to do with the timing or not.

Mr. ROGAN. Not that that has anything to do with anything that happens up here.

So December is when the negotiations are set to conclude; is that correct?

Mr. WIRTH. Yes.

Mr. ROGAN. Are we going to be able, in this committee, to hear testimony from either of your offices or from some other agency in the administration before December that will give us a solid economic analysis as to particular American industries?

Ms. YELLEN. I think that the committee should expect analysis in support of a policy that we propose, that it is our obligation to explain why we think it will be appropriate for dealing with this problem and good for the American economy, but if by forecast what you are saying is what is the impact on the number of jobs in the steel industry in 2020, I think that is something that we shouldn't try to produce. I think that is a hopeless, futile exercise. And the kinds of uncertainties that we are dealing with here, I think, preclude being meaningful with attempting to come up with that kind of detailed number.

Mr. ROGAN. Although I appreciate your position, it seems to me that if we now take the position that economists cannot make forecasts, that essentially does away with the profession of economists.

Mr. WIRTH. I don't think we are saying that economists can't make forecasts. I think economists are going to continue to make forecasts until the cows come home. The question is, do we believe that is going to be so detailed

and specific that that will allow us, as Dr. Yellen pointed out, to make specific predictions as to what will happen to the job base in X industry in Y region of the country? And the answer to that is that it won't--we won't be able to do that.

Ms. YELLEN. I just think that is--

Mr. ROGAN. My recollection is from one of your opening statements someone made at least passing reference to this Argonne National Laboratory draft report that was prepared after having been commissioned by the Department of Energy. And there hasn't been much discussion about that, but I get the sense that the report itself, if not the sentiments expressed in the report, may have been the basis for Mr. Dingell's concerns.

In looking through the report on this draft report that was prepared February 1997, under the auspices of the Department of Energy, there doesn't appear to have been the same reluctance to make the type of analyses that I have been asking questions about and what both of you have been hearing bipartisan concern about. Specifically, this report says that in the iron and steel industries, quote, "the imposition of increased energy costs will devastate the U.S. steel industry without a significant decrease in worldwide energy related emissions, that the cost of production would increase from $48 to $128 per ton and have significant economic

consequences as a result thereof."

In the petroleum refining industries, it says that refineries located in the United States would be devastated and would become noncompetitive with refineries in developing countries.

This goes on to analyze the same sort of results in the paper and allied products industries, aluminum industry, chemical manufacturing, cement and so forth.

I would like to hear the administration's response as to those projections.

Ms. YELLEN. This was, as I understand it, an exercise in which panels of industry representatives and experts were asked to make an assumption about projected energy price increases and analyze what it would mean for their industry.

Now, the projected energy price increases are certainly not those that are coming out of any policy that is a proposal of the administration.

Mr. ROGAN. Okay. Doctor, let me just interrupt for one moment because I want to make sure I follow the premise of your response.

My understanding, and my report that I have before me, indicates that these analyses were prepared specifically to assess the impact of mandatory climate commitments as being proposed by this treaty.

Do you have a different understanding of that?

Ms. YELLEN. My understanding is that the panelists were simply given an assumed set of energy price increases, and asked to say what would happen in this particular scenario.

Now, as both of us have emphasized in our testimony, we consider flexibility implementation provisions to allow international trading and joint implementation to be extremely important in any treaty. ~~And~~ These are things that would bring down markedly--even bring down impacts on prices of energy markedly, relative to the kinds of scenarios that these panelists were asked to consider.

I need to look into this in more detail, but I think the sort of scenario, price scenarios, that these panelists were asked to consider, come out of relatively stringent and rigid policies. Those are not the policies of the administration.

So if you say, what information comes out of this? I would say, it simply reinforces the need to pursue sensible climate change policies, not the kinds of policies that are going to have this effect. And--

Mr. ROGAN. And finally--I am sorry. Go ahead.

Ms. YELLEN. I mean, I would simply emphasize that President Clinton has made as his number one priority pursuing policies that are good for this economy, that generate jobs, that generate economic growth. And I simply could not imagine that he would endorse policies that he thought ~~would~~ have Draconian impacts on the economy.

Mr. ROGAN. We won't put that to a vote today.

But let me just finally say that I have heard reference a couple of times in this hearing to the figure that the United States has 4 percent of the world's population and contributes 22 percent of the world's pollutants. I don't know if bantering those figures about is supposed to suggest that there is some unfair or objectionable imbalance, but as a noneconomist I am assuming that the world economic output contributed by the United States of America somehow is greater than 4 percent and so that those figures, in a vacuum, might mean one thing, but when we measure the American effect on the world economy, that perhaps 4 percent does not really tell the story.

Is that at least a fair assumption?

Mr. WIRTH. The purpose is not to talk about the U.S. contribution to the world economy. The purpose is to simply point out that with a small percentage of the world's population, we contribute a very significant percent of the world's greenhouse forcing gasses. Now, to say--

Mr. ROGAN. We also contribute a very significant percentage of food and clothing for the world, too, isn't that a fair statement.

Mr. WIRTH. Fine. I mean, one can say a whole lot of things. We are bigger than a lot of countries and we have two oceans, or whatever.

But my question is about the number of drafts. We have just received the May 30th draft. And since we are deep into the negotiation process already and only about 5 months away from the Kyoto conference, seriously is this the last draft? Is this the one you are going to go to bat with? Is this the lineup that you are going to have when they say play ball over there in December?

Ms. YELLEN. It is not the lineup. It is not the administration's analysis. It is a draft of a staff working paper.

Mr. HALL. Is this the one we have been waiting for when we asked for a final draft?

Ms. YELLEN. The committee has asked for this report and we are turning it over to you even though it might be less than what you or we would have hoped for when we embarked on this project.

In many ways, it is a failed project. It is an attempt to ~~put together,~~ assemble a tool kit that we would consider sufficiently reliable to analyze policies that might be under consideration. ~~And~~ What you see in the May 30th draft, which is the last complete draft, is where the staff got to in this exercise, and what the response of the outside reviewers were about the ability of this exercise or an expanded exercise to lead to a tool kit that we would be able to rely on solely in moving forward with analysis of policies.

I think we have concluded that when we ultimately develop and propose a policy, we will not rely on this tool kit. We will bring to bear many pieces of economic analysis done by economists in the government and outside the government and what we are giving you is the staff work as of the end of May, according to your request.

Mr. HALL. You know, we glean from speeches and drafts and testimony to try to keep ourselves abreast of it and try to be supportive of your actions in the field or wherever they might be, and in December. How will the future analysis be fed into the administration's negotiating position? How do you do that?

I guess you will be wargaming it or drafting right up to the day you go over there. Is that your statement? There may be something that might cause you to change or to adjust it.

Mr. WIRTH. Well, let me just tell you about what the process is inside the administration for this, Congressman. There is a sort of staff working group of very senior staff members in each agency and there is then an Assistant Secretary working group that tries to refine what comes out of the staff working group. That then goes to a group that the President has asked to convene, a so-called deputies group, and then finally to the Cabinet and the President.

So there are a lot of iterations and layers that anything

Well, is the attempt to do a Berlin Mandate analysis on track or is it dead?

Mr. WIRTH. An attempt to do--

Ms. YELLEN. A Berlin Mandate analysis.

Mr. WIRTH. No. I mean, that is very much--the third volume of the intergovernmental climate change is out. That was produced--that was printed in the spring of 1996. That is a very helpful approach. We are using that, using our own economics, using our own technology group for--in all of the inputs we can get for developing a policy that we will be--from which we will be negotiating in Kyoto and which we will bring back to the Congress as part of the protocol or amendment to the treaty and which we will bring back to you for enabling legislation.

Mr. HALL. And if the work isn't done, we will get an agreement anyway?

Mr. WIRTH. Excuse me?

Mr. HALL. And if the work isn't done, if you haven't had an opportunity to--

Mr. WIRTH. We are moving in on them. We have got a lot of pieces out there, Congressman Hall; the idea of a binding treaty, flexible economic instruments; starting to get the commitments of the developing countries worked into this. I mean, we are starting to see the outlines of what may be or we hope will be an agreed-upon treaty in Kyoto.

Mr. HALL. Mr. Chairman, I need to ask just one other thing here about what President Clinton has undertaken on the climate change issue and has mentioned the White House conference on the subject, quote, later this year, end quote.

When is that to take place and how does that work into your plans for Kyoto?

Mr. WIRTH. The President, in discussing the--as we are moving into the Summit of the 8 in Denver and then the United Nations General Assembly special session, the President had to develop a position for discussions with the Europeans in particular and then at the United Nations, and it was his conclusion that we in this country had to do a better job of developing a broad base of understanding of the science and the need for change, and he has initiated a process that will go on all summer long of a whole series of meetings around the country.

The Cabinet are going to be engaged. He is going to be doing a number of events. Vice President Gore will be doing a number of events, and that will lead up to a White House conference which will be held mid--I think mid to late September. I don't think a specific date has been set yet.

Mr. HALL. You think mid to late September?

Mr. WIRTH. Approximately, or generally.

Ms. YELLEN. Or early October.

Mr. WIRTH. It has to be done in time that out of that, I

think that the-- it is going to be done within the time frame of the final preparatory meeting which occurs in early to mid October--late October. So it has to be done before late October so we get all the final input and have that; then boil it down so we can use it. I would guess that the White House conference would then come mid, late September, early October.

Mr. HALL. Can you be a little specific about how it is going to be conducted? Would it be oral presentations? Is there going to be written material or what are the procedures going to be? Who is going to be invited?

Mr. WIRTH. We can submit that to you for the record, Congressman Hall.

Ms. YELLEN. I am not aware of that right now.

Mr. WIRTH. That is being worked on by the White House right now.

Mr. HALL. I thank you.

Mr. WIRTH. Thank you very much, Congressman.

Mr. CRAPO. Thank you. The time of the gentleman has expired and it has come my turn to ask questions. And I want to come back to the same issue we have been on here now for a while , because Mrs. Yellen and Mr. Wirth, it seems to me--I can only speak for myself, but I think from what I have heard from the other Members today and in previous hearings and in discussions with them, that for essentially 2 years now we

have been expecting the administration to come forward with an economic analysis and ultimately a policy based on that analysis which we could evaluate.

And to me, the revelation today is that in Mrs. Yellen's words that we have a failed project, essentially, that the effort to bring these economic models or studies together has failed.

Is that correct?

Ms. YELLEN. To bring them together in which we can rely on that project for a complete analysis of policies that might be proposed, that is failed. But any policy that might be proposed, naturally has to be supported by a variety of different kinds of economic analysis.

That project of a small group of models that will be the vehicle to analyze a policy ~~that~~ has failed. We will bring lots of pieces of economic analysis from inside, outside, to bear.

Mr. WIRTH. Let me try it this way, Congressman.

Mr. CRAPO. Yes.

Mr. WIRTH. Can I try it this way? We have to make a trip and let's say we have to get across the country and there are a variety of ways to get there. We can fly. We can walk. We can peddle. We can take a car. And we decided that one of the key ways of getting there was to build a car, and we wanted--there were three different models that we were

with on this issue understood it the way I did, and that is that in previous hearings and in previous statements we were told that you were going to tell us what was going to be the economic analysis. And if I understand you correctly today--see, the reason is because Congress is supposed to have a role in all of this, and the location you were going to arrive to in your analogy would sort of be the policy you are ultimately going to come up with, and what I understand you are telling me today is that you don't know what vehicle you are going to use yet out of this three different options or maybe others, and maybe this is going to be a conglomerate, but whatever it may be you don't know what it is and, therefore, you can't tell us what it is and, therefore, we cannot participate with you in development of policy or in evaluation of the decision-making.

I guess the question I have: Is there going--is this: Is there going to be some time, some point in time, at which the administration tells Congress what its economic analysis is in sufficient time for us to evaluate it before Kyoto?

Ms. YELLEN. I think what the President has indicated is that over the next several months ~~what~~ he wants ~~to do is~~ to confer broadly to get input from Members of Congress about what they think our policy should be, to reach out to businesses and to labor leaders and to State and local governments and to all affected parties and to hear from

them, what do you think the policy should be?

Mr. CRAPO. So, in other words, we have been asking the President--

Ms. YELLEN. Yes.

Mr. CRAPO. --what he was going to do, and you are telling me now the President is going to ask us and the rest of America what he should do?

Ms. YELLEN. And wants to listen to what that input is before he tries to reach a conclusion that he is going to put forward.

Mr. CRAPO. I think that is very admirable for the President to seek that kind of input. But the question that we have been asking for 2 years now is, since the President is the one who goes to Kyoto, in effect, at some point the President has to make a decision.

He is going to--we have heard a lot of testimony here today about the fact that there is going to be a commitment made in Kyoto, which apparently is going to be dropped in our lap to implement in terms of policy, and we are trying to influence that at the outset rather than deal with it after the fact.

And the question is: Is there going to be some time, some date, at which the administration will tell this committee what its economic view of the circumstances are and what policy it is going to adopt based on that economic view?

time when you can say to this committee, these are the economic analyses which we have used to devise this policy; am I correct?

Ms. YELLEN. I think we don't want to base that analysis on one model. We want--

Mr. CRAPO. Then do--

Ms. YELLEN. We want--

Mr. CRAPO. Are you going to base it on any models or on three models or ten models? Or is there going to be a point in time at which the administration bases its decision on some kind of economic analysis?

Ms. YELLEN. Certainly economic analysis has to come to bear.

Mr. CRAPO. Then will we be able to have you tell us what that economic analysis is going to be? Or are you simply going to say, there are lots of models and lots of pieces in this tool kit and here you, Congress, can look at them like we are.

Ms. YELLEN. I think when a decision has been arrived at, it is incumbent on us to explain how we arrived at that decision and why we regard it as a sensible decision. I feel we have to be prepared to explain that. But we are not there yet.

Mr. CRAPO. But can you understand our frustration?

Ms. YELLEN. Yes, I can.

Mr. CRAPO. Because for 2 years now we have been trying to get there. And what I am hearing you tell me is that shortly before it is a done deal, you will tell us what the deal is. And at that time, we will get to know what the economic analysis on which the deal is founded is. Is that accurate?

Ms. YELLEN. I can understand the frustration that you feel in this process, and I wish myself that we were further along in it.

Mr. CRAPO. But I want to be sure that I am accurate there. Is what I just described accurate, that shortly before you have come to a done deal, we will find out what that deal is?

Ms. YELLEN. There is no done deal until September.

Mr. WIRTH. There is no done deal before September.

Mr. CRAPO. Shortly before you have come to a final position, which will be taken to Kyoto, you will tell us?

Mr. WIRTH. In that final position, a U.S. position going into Kyoto will be ready for the late October final preparatory meeting. We have to back up from that and have that significant--

Mr. CRAPO. Is there any ability for Congress to influence that policy after October's meeting?

Mr. WIRTH. What our target and timetable is going to be?

Mr. CRAPO. Yes.

question is then, has the administration done any analysis, or are you just referring to other analyses that have been done?

Ms. YELLEN. Let's see. With respect to international emission trading, there is some analysis in the document. This set of models, this suite of models that are described there did permit some analysis.

Mr. CRAPO. But no results were shown in the draft today.

Ms. YELLEN. Yes. There are lots of results; there are loads of numbers and lots of results in the draft. And as I emphasized in my testimony earlier, ~~I think although--you know, on the one hand, I have emphasized that~~ these are not models on which we should rely for tasks. Qualitatively, what you see in the analysis that ~~is~~ there is a very substantial reduction and impact due to international trading. That qualitative conclusion, I think is quite valid.

~~You know,~~ I would recommend to you that you look at the tables on pages 19 and 20 in the paper. Again, we don't want to stand by the precise numbers here, but qualitatively, I think you get a very clear sense of the kind of impact that international trading can make.

Mr. CRAPO. Let me get to kind of a more general look at the issue that you are trying to raise with that specific issue, and it is this. In your earlier testimony, Mrs.

Yellen, you indicated that you felt--and tell me if I am wrong here, but I thought you indicated that you felt that you thought the economic analysis, whatever it may be and however it may be conducted, would ultimately show that there is some--that the policy that you are moving toward will be good for the economy, these new targets and implementation dates, whatever they are going to be.

Did you say that?

Ms. YELLEN. I think it is incumbent on the administration, in presenting a policy, to be able to defend it and explain why it is a sensible, pragmatic, reasonable approach to the issue that we are dealing with. The President has emphasized that he is looking for such an approach, that he regards the problem as real and he wants to develop an approach that deals with it in a sensible way.

I think we have to be prepared to defend that we have found such an approach. When it comes to such features as flexibility, whether it is international trading of permits or joint implementation, ~~that~~ the Under Secretary has told you that we already endorse them and they are already embodied in our proposal. I think you can look at this paper and see the kind of difference it can make and, even without numbers, what economists will tell you is a very good reason these things should matter and reduce costs.

We could debate whether they have the costs of achieving

a given target, make it a quarter or less. We can argue over the magnitude that the impact that these flexibility provisions have. But economics, just pure economic reasoning on its own tells us that the ability to trade enables us ~~to do for~~ and the world to achieve a given goal at lower costs, That is its purpose.

So I would be prepared to defend those kinds of flexibility provisions without any numerical forecast of precisely what difference they make. On the other hand, I think the analysis shows in some models they do make a large difference.

With respect to targets and timetables, I think we will have to go to a number of different pieces of analyses that are available in order to make some sensible choices there.

Mr. CRAPO. Well, I recognize what you said about the targets and timetables and differences in the studies. But as I have read the report--and you can pick what you want out of the reports, but one of the studies indicated that using some of the targets and timetables, that we could look to see possibly a 26-cents-per-gallon increase in the cost of refined petroleum, $1.49 for 1,000 cubic feet in the cost of gas, and 2 cents per kilowatt hour increase in electricity. And just to give you--I am sure you know this, but to give the audience an indication that our 2-cent increase in electricity generation cost is like a 100 percent increase.

Ms. YELLEN. Those are big impacts. ~~And~~ I want to emphasize, that is not a policy that is being proposed. ~~And~~ the numbers you are citing, even in the models that have been examined, are numbers one gets when one assumes the absence of the kinds of flexibility that the Under Secretary has explained are ~~oddly~~ obviously central to the approach you want to pursue.

Mr. CRAPO. Well, I guess you can see our frustration, because it is very hard for us to conduct this kind of a discussion with you on the policy when we don't know what the promised economic analysis is to review it, to see what its peer review status is, when we don't know what policy options we are applying those economic analyses to.

And this committee, I can assure you, will fulfill its responsibility to participate in the development of this policy. I am still at a loss to figure out at what point in time we are going to be given information from the administration to enable us to participate in this role.

Mr. WIRTH. Well, again, we are sharing information with the committee, as we have it. We have asked the committee to come to every session. We have had briefings up here on the Hill, you know, on something of a steady ~~basis~~ to which all members and their staffs have been invited, explaining where we are and what is going on. We have made very clear, I think, what the overall package looks like; we have talked

about that today. We have made significant progress on that. The one remaining piece, as you well know, is targets and timetables.

Mr. CRAPO. And what you have made clear so far, including the possible range of targets and timetables that are under consideration, has raised a significant amount of concern nationwide.

Mr. WIRTH. Well, it should--

Mr. CRAPO. That is why we want to engage in this debate with you.

Mr. WIRTH. That is true. It should raise a significant concern because we are related to climate change, which has also raised a significant amount of concern. Let's remember that what the President is attempting to do is to look at this very, very significant long-term environmental problem, which he believes is very serious and one in which we have to intervene in terms of being responsible to our children, grandchildren and great-grandchildren, that we have to begin now.

So that is the environmental side of this that has to be weighted with an economic policy that makes it work, which is also very significant. We are talking here about the most--as I point out in my testimony, certainly the most complicated issue that I have ever worked on and maybe the most important one that any of us has ever worked on. And

this is--your frustration at not having this piece or that piece exactly done is shared by us; we don't have all those pieces either.

But we have come an enormous distance and, you know, we do have a long way to go in this last sprint, in the last 5 months. And we, Congressmen, very much look forward to working with you and other members of the committee in getting there; and we will get there.

Mr. CRAPO. With regard to the role of Congress--I think I heard this in your testimony earlier, Mr. Wirth, but I would like both of you to respond to this question--do you acknowledge that before any of these decisions even--whatever may be agreed to by the administration at Kyoto becomes binding on the United States that it would be subject to a vote in the Senate?

Mr. WIRTH. Yes. We have said this from the start. This would be either a protocol to, or a protocol or amendment to the climate treaty which would require approval of the Senate.

It would also require, Congressman--I can't imagine something that we could do to achieve what has to be done that wouldn't require enabling legislation, which will go to this committee, and to the House as well as to the Senate.

Mr. CRAPO. And do you agree with that, Mrs. Yellen?

Ms. YELLEN. I do.

Mr. CRAPO. All right. Thank you. I have no further questions.

Mr. Hall, do you have any questions?

Mr. HALL. Mr. Chairman, I think I would. It seems that we are getting to the same situation we got into with the NAFTA situation where they--the word NAFTA itself cries out that they didn't want to have to undergo the approval of having a treaty approved by the Senate for fear they couldn't get the required number. And of course I voted against NAFTA, but NAFTA passed, and I hope it works; I fully and totally support it now.

But it is--I think what the Chairman is trying to say here is that we would like to have some input before the fact; and where you make yourself available when you set hearings here and meetings and workshops, Tim, you know that doesn't fit our schedule nine times out of ten because we are going in about 90 different directions.

But I think what the Chairman is almost crying out for here is some opportunity to, as you go closer to the decision, the time to make a decision, that we get to meet and have some input. And I have never known you to close the door on anybody; and I think we could ask to you come back over, could we not, if we needed to?

Mr. WIRTH. Congressman Hall, we would set up whatever schedule you would like to do--members of the committee would

like to do, members of the subcommittee would like to do. We are open to that, absolutely.

Let me also add that we are as unhappy about not having all of this modeling work and all of this economic analysis out there, that we had hoped was going to be done early in this year. And that has made our job, I can tell you--as you can tell from all the questioning here, that has made our job a heck of a lot more difficult.

Mr. HALL. I am frankly--well, I am worried about the world, but I am more worried about this country. And I remember cross-examining a John Connelly appointment, when I was in the Texas senate, to the EPA. They worked free, and it would have cost this guy $25- or $50,000 to even serve, for his time alone.

And they pushed him so hard about, how did he feel about pollution. He gave that age-old answer, he was against it. And that made three of the senators mad. And finally the guy just said, well, pollution smells a hell of a lot better than poverty. And that got his confirmation killed.

I don't know that I didn't agree with him on his reaction there. But what I guess I am hoping is that we don't let some little country, the little countries of the world take advantage of us because in the Argonne National Lab report dated February 5th of 1997, it was pointed out that it said, the main conclusion of this study is that policy constraints

placed on these six large industries--and the ones they were talking about there were six energy-intensive industries, petroleum refining, paper and allied products, iron and steel and aluminum and cement. The constraints placed on these six large industries in developed countries, but not on their less developed trading partners, would result in significant adverse impacts on the affected industries.

And the President has made a speech--I don't just remember the exact date of it, when he talked about his pledge not to undercut U.S. competitiveness. And that would be very easy to do with what some of us would think was an outrageous or ridiculous international compact or agreement that held us to it, that we are probably going to honor, that a lot of others aren't.

Those are the things that we are fearful of up here. And I think that is the reason that we would like to have as much of your time as we can to get together, when we can spare the time and you can spare the time. But keep us abreast of what is going on rather than having it all hit the fan when you come back and you have entered into an agreement, been nice to one another, and hit glasses up against one another, and you come back here and have something that we in the oil patch can't live with, the John Dingell's up in Michigan can't live with, and others.

I think that is what the Chairman is talking about, if I

understand him correctly, that we would like to be in on this deal. And if you are going to have a draft analysis every 45 minutes, we would like to know about it and just see them and not get a May draft analysis, dated June, and get it here in July, 10 hours before the meeting.

I know you didn't set that stage, but--and you know those things happen, and when they happen, you are always fearful of what is behind it and why did it happen, why did they hold this back. Let me read it again.

You know, just like when Bill Sharp and others finally passed a deal knocking out windfall profits tax, hell, I couldn't believe it, I had to read it five times to be sure it was all right.

We just need someone with your intellect, your ability, your background and your experience and, I think, your commitment to spend some time with us before you go over there, that basically you weren't there a while ago. See, that is the way we are, here today and gone tomorrow.

Mr. WIRTH. We appreciate your commitment and understanding and involvement, Congressman; and we really appreciate, Mr. Chairman, all the time that you have spent with us today. It has been a long afternoon and I know how much--how many other things are on your plate, so from our--

Mr. SCHAEFER. It has been very productive.

Mr. WIRTH. --perspective, we hope this is just the

beginning for the next 5 months.

Mr. SCHAEFER. The gentleman from New Jersey.

Mr. WIRTH. Mr. Chairman, can I--

Mr. SCHAEFER. Oh, I am sorry.

Mr. WIRTH. Would it be possible--I was at a group downtown, and I was supposed to go tell them the truth about climate change. I was supposed to be there at 3:30.

Mr. SCHAEFER. And I understand.

Mr. WIRTH. Maybe I--

Mr. SCHAEFER. Dr. Yellen was, too?

Mr. WIRTH. I am sorry; is that all right?

Mr. PALLONE. Don't worry. There is no problem. You are more than welcome.

Mr. WIRTH. Thank you very much.

Mr. SCHAEFER. If you had any written questions or anything--

Mr. PALLONE. No, I can ask my questions of the chairwoman, Chairmen, if that's all right.

Mr. SCHAEFER. Oh, okay.

Mr. WIRTH. Does she have to leave too?

Ms. YELLEN. I can take another question.

Mr. SCHAEFER. Thank you, Mr. Wirth. I appreciate it.

Mr. WIRTH. Thank you very much, Mr. Chairman, Mr. Hall, Congressman Pallone.

Mr. SCHAEFER. And, yes, Dr. Yellen did rearrange her

— Dr. Yellen, you note that the permit price would be less than 1/10 the price estimated by other models. Why the large discrepancy?

So if it's trading, CDM, + 6 gases, explain to me how those will work?
Have we ever done anything like intl trading before? CDM?
How do the models account for the costs of conducting trades?
How do you account for the other gases in your analysis? Is this approach an economic, or an engineering approach, as you described the 5 labs study?

/ Could you give an example of one of the historical examples you assessed? One of the sectoral examples you assessed?

— We understand that the negotiators in Kyoto were in constant contact with CEA. Could you describe ~~about~~ the analysis you did for the negotiators? Did your analysis account for 6 gases, sinks? Did you use any models? Were decisions made based on only 1 model? Isn't that a "futile" effort?

Q&A QUESTIONS REGARDING TRADING

International trading

It sounds like the conclusion of low costs depends on the idea that we will be buying emission permits from other countries.

What percentage of emission reductions are achieved in this way, versus domestically?
Do you honestly believe that international trading of this sort is feasible?[1]
What would be the costs if we to have to meet these targets without international trading?

Transfers

What would be the monetary value of these transfers?
Do you expect the American taxpayer to pay other countries for the right to drive their cars and run their factories?
If it doesn't go directly through the budget, aren't you having the same effect by imposing onerous requirements on private citizens, and then "allowing" them to pay foreigners?

Russia and paper tons

Is it true that you mainly expect the purchases to come from Russia (and the Ukraine)? What percentage? Isn't this a disguised form of foreign aid?
Is it true that we wouldn't even be paying them to reduce their emissions, but instead be paying them for reductions that they have already undergone (so-called "paper tons")?
What makes you think a country that can't even run a functioning legal system or maintain a decent economy is a reliable partner in such a deal? What's to stop them from just taking the money and doing nothing?

Domestic permit trading

How exactly is this permit trading system (2008-2012) supposed to work?
The idea is to drive up the price of energy, right?
Isn't it a disguised tax? A mandate or "taking", then?
How would you rate the relative importance of the permit trading scheme and CC Technology Initiative in accomplishing the emission reductions called for under the treaty?

---

[1] "However, the proposed schemes for both international permit trading and joint implementation require enforcement and monitoring mechanisms that may be difficult to establish in the near term." ... " your economic advisers are concerned that substantial barriers would arise in implementing any workable analogue of such an idealized system--at least in the near term. Consequently, they would stress that Annex I international permit trading and joint implementation between the U.S. and nonAnnex I countries can realistically serve only a limited role in reducing the costs associated with meeting a "1990 by 2010" target. " ..." the actual benefits of such a system are apt to fall short of this utopian portrayal." 9/20/97.

Oil price shock

The only historic experience with restraining emissions (let alone reducing them) was the 1970s, correct? How did the reduction in emissions then compare with that required under the Treaty?[2] Didn't this take a much bigger increase in oil prices than you are predicting now? Didn't it cause the largest two post-war recessions, with huge increases in unemployment? Why should things be different this time?

What about the study from EPI that predicts large job losses?

---

[2] "*If attained through domestic emissions reductions alone* this target entails a reduction in CO_2 emissions of about 28% relative to projected 2010 emissions in the absence of policy intervention--a change in energy use in excess of that achieved during the decade of the oil shocks."..."Economic analysis suggests that reaching 1990 emissions by 2010 would result in a stagflationary macroeconomic shock on the economy approximately equal in magnitude to the effects of the combined oil shocks of the 1970's. Both unemployment and inflation would undoubtedly rise for a time"

Hohenstein.William @ epamail.epa.gov
02/24/98 01:04:09 PM

Record Type: Record

To: Adele C. Morris/CEA/EOP, Randall W. Lutter/CEA/EOP, Joseph E. Aldy/CEA/EOP

cc:

Subject: Agriculture and the Kyoto Agreement

Last fall, we conducted an analysis of the impacts of potential climate change polices on the Agriculture Sector using Bruce McCarl's Agriculture sector Model (ASM). We examined the costs to the agriculture sector of $25, $50, and $100/ton taxes (permit prices). We also examined the potential of recycling revenue generated by carbon policies back to the farm sector through a CRP-type program. The report has undergone EPA review, but has not yet undergone external peer review. Bruce plans to publish a paper from it later this spring. The key findings are as follows:

An Impact Assessment of
Climate Change Policies and Carbon Permit Prices on the U.S. Agriculture Sector

Executive Summary

The U.S. government is considering various climate change policies that may result in economy-wide impacts. One policy option to reduce greenhouse emissions in the U.S. is to establish a carbon cap and trade system, under which carbon permit prices would emerge and eventually be internalized into the farm and non-farm sectors through higher energy prices. This study explores potential impacts on the U.S. agriculture sector from the imposition of various carbon permit prices. Specifically, it examines economic welfare, commodity price, and environmental impacts associated with introducing three levels of carbon permit prices ($25, $50, or $100 per ton carbon) in 2000, 2005, 2010, 2015, or 2020. A national agriculture model (ASMSOIL) is used to assess these impacts. The findings of this study suggest relatively small agriculture sector losses result in any of the years from the introduction of carbon permits, while positive local environmental benefits occur in terms of lower soil erosion and water use.

The major observations are that when carbon permit prices are internalized through higher energy and chemical prices: (1) the U.S. agriculture sector is not very sensitive to these prices because the resulting higher energy prices make up a relatively low part of the total cost of production for

the farming sector; (2) soil erosion and irrigation water use declines but cropland and chemical (pesticide and fertilizer) usage expands slightly initially; (3) Achieving U.S. soil erosion goals becomes cheaper but the implementation cost of expanding or maintaining the U.S. CRP acreage; (4) carbon price revenues are large and more than offset any higher CRP costs; and, (5)the farm sector results are largely stable over the 2000-2020 time period and do not imply that, within agriculture, any one time period of implementation is better than any other for introducing a carbon trading system. Also, the farm welfare losses may be offset by environmental gains in terms of erosion control and greenhouse gas reduction. Given the consistency of these results across time and farm impact measurement, this study suggests that the minimal farm welfare losses may be compensated by the environmental gains in terms of land management, factor use, erosion control, and greenhouse gas reduction.

The entire report will be sent as soon as it arrives.

In addition, here are a few (very general) talking points that could be used to respond to the Farm Bureau analysis.

Themes for Climate Change Outreach to the Agriculture Community

There is scientific consensus that global warming is occurring and that it is driven by human activities

Agricultural communities are vulnerable. Threats to US agriculture include increased climate variability and extreme weather events. While some analysis indicates that parts of the US agriculture economy could benefit from slight climate change , if climate change is not averted, higher GHG concentrations will have major negative effects.

Natural ecosystems, including those that are of great interest to farmers, will not be able to adapt to the rate and increased variability of climate change.

Major opportunities exist in the agriculture sector to reduce greenhouse gas emissions and sequester carbon cost-effectively.

The costs of the Kyoto agreement are small. Energy price increases have been greatly exaggerated. Shifting to conservation tillage will require less fuel.

HARVEY.REID @ EPAMAIL.EPA.GOV
02/02/98 10:02:00 AM

Record Type: Record

To: Joseph E. Aldy

cc:
Subject: non-CO2 cost curve -Reply

Joe:

I can respond to your questions on methane and the high-gwps, but Bill will have to respond on the sinks and n oxide data.

Our original estimates went up to $100/ton and the only data point you are missing is our $100/ton estimate. methane, it doesn't add much to go from $70 to $100 (about 1.3 mmtce for methane). There are no reductio $50/ton for the high-gwps. These estimates were largely developed in 1996 using prior year data so you could assume they are in 1996 dollars (I've checking on this but I would use this for now).

As for documentation, these were derived from bottom-up cost curves for specific sources of these gases. We developed the methane cost estimates as part of a forthcoming report we are developing on opportunities and of methane reductions in the U.S. (we are doing a companion report on international methane emissions and re opportunities). For example, for methane, the reductions at various costs are the sum of 4 categories of sourc coal mines; landfills; livestock manure; and natural gas production, transmission, and distribution systems. We excluded some source categories that we didn't consider good candidates for an emissions trading system (e.g. ruminant emissions) or where we believe the potential reductions are small (e.g., wastewater, rice, biomass bur

Similarly, for the high-gwp gases, we developed detailed bottoms-up cost estimates for industrial and process sources of HFCs, PFCs, and SF6. The industrial sources include a range of industries, such as magnesium production, HCFC-22 production, aluminum smelting, and semiconductor manufacturing. The process sources range of end-uses for HFCs and PFCs, such as refrigeration, air conditioning, cleaning agents, sterilants, and fo The estimates were derived by technical staff familiar with the chemical substitutes for CFCs and the degree of market penetration and costs for various substitution technologies.

Hope this helps. We'd be interested in seeing your new draft and results when you are ready. Call me at 564- you have questions.

-- Reid

historical analysis
Sectoral

analysis during Kyoto

how do you assess 6 gases.?

Michele Jolin
02/23/98 10:20:21 AM

Record Type: Record

To: See the distribution list at the bottom of this message

cc:
Subject: Yellen's mock hearing on Tuesday

Todd has asked me to assign participants at Tuesday's mock hearing the following areas for questions:
Orszag: international competitiveness; cost estimates; impact on specific industries (e.g. jobs); climate change policy package (tax cuts, R&D); voluntary industry initiatives
Gruber: cost estimates; international trading; capital flows abroad; technology optimisim; sinks; permit trading
Frankel: international trading; transfers to Russia; paper tons; distribution of costs; permit trading; oil shocks
Lutter: Ancillary and climate benefits; electricity restructuring; developing country participation; CAFE standards
Aldy: cost estimates; comparisons with other models

Other folks will be at the mock hearing (Sandalow, Greenfield), but you all will be the main questioners.
Thanks
Michele

Message Sent To:

Jeffrey A. Frankel/CEA/EOP
Randall W. Lutter/CEA/EOP
Joseph E. Aldy/CEA/EOP
Peter R. Orszag/OPD/EOP
Jonathan.gruber @ ms01.do.treas. sprint.com @ inet

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▶ 2

To Joe Aldy	From Bill Hohenstein
Dept./Agency	Phone #
Fax # 395-6870	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

William Hohenstein

02/24/98 01:04 PM

To: Adele_C._Morris@oa.eop.gov, Randall_W._Lutter@cea.eop.gov, Joseph_E._Aldy@cea.eop.gov
cc:
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EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON, D.C. 20500

THE CHAIRMAN

October 3, 1997

MEMORANDUM FOR THE PRESIDENT

FROM: **JANET YELLEN** JY
LAWRENCE SUMMERS LS

SUBJECT: **Targets and Timetables for Reducing Greenhouse Gas Emissions**

Executive Summary

This memo provides a preliminary evaluation of the likely economic consequences for the United States of a program to attain 1990 CO_2 emissions levels by 2010. It concludes that the attainment of such a goal would necessitate at least a doubling in energy prices and impose substantial economic costs. In contrast, a more gradual emissions reduction path that eliminates emissions growth by 2010-2020 and reduces emissions to 1990 levels thereafter captures nearly identical environmental benefits as the more aggressive approach while entailing costs between one tenth and one third as large.

If attained through domestic emissions reductions alone the "1990 by 2010" target requires a reduction in CO_2 emissions of roughly 30% relative to projected 2010 emissions assuming "business as usual". *The reduction in energy use needed to meet this goal would be comparable to that achieved during the decade of the OPEC price hikes, so that energy price increases of similar magnitude are likely.* Economic analysis and historical precedent suggest that energy price increases of this size would have stagflationary consequences. As in the decade of the oil shocks, both unemployment and inflation would undoubtedly rise, at least for a time.

An "idealized" system of international permit trading among Annex I countries could hypothetically halve the change in carbon emissions prices needed to attain a 1990 by 2010 goal. This would mean paying Russia and other Eastern European countries to reduce emissions in place of the United States. However, such an arrangement could prove infeasible for a number of reasons, including difficulties in establishing adequate enforcement and monitoring mechanisms in the near term. Joint implementation with non-Annex I countries is likely to marginally reduce the impact on energy prices in the United States.

The memo argues that a more gradual timetable for emissions reduction can deliver virtually identical environmental benefits at a fraction of the cost. The aggressive "1990 by 2010" path is extremely inefficient because it requires premature scrappage of capital and foregoes the considerable advantages of waiting for the development of carbon-lean technologies

before replacing existing plant and equipment. In contrast, a timetable that eliminates emissions growth in the second decade of the program (2010-2020) and reduces emissions to 1990 levels and below in subsequent decades is consistent with a long-term goal of stabilizing atmospheric CO_2 concentrations. *The total cost of this "back-loaded" approach is likely one third to one tenth that of the "front-loaded" 1990 by 2010 program.* Implementation of the gradual timetable requires an early, modest increase in the price of carbon emissions, along with a credible commitment to further emissions price increases over time.

In comparison with a more gradual emissions reduction timetable, the environmental benefits of an aggressive abatement target are minimal. For example, the expected difference in global average temperature in 2100 along a fast-takeoff abatement path that attains 1990 emissions by 2010 and a slow-takeoff abatement path that peaks in 2015 and attains 1990 emissions by 2040 is less than 0.05 degrees Celsius. Between now and 2100, global average temperature is expected to rise about 2½ degrees Celsius irrespective of the path chosen for Annex I stabilization, assuming developing countries continue with business as usual.

The body of this memorandum lays out the rationale for these conclusions.

I. Introduction

The Framework Convention on Climate Change signed at the 1992 earth summit in Rio de Janeiro called for carbon dioxide emissions in 2000 at 1990 levels. Most countries, including the United States, are unlikely to achieve these emissions reductions. But the Rio approach remains historically important, and most quantitative proposals that have been advanced in the run up to Kyoto can be understood as variants of the Rio target and timetable. In particular, a proposal to "stabilize CO_2 emissions at 1990 levels by 2010" (and variants thereof, including a more stringent proposal by several EU countries to stabilize at 10% below 1990 levels by 2010) has received considerable attention.

This memo assesses the consequences for the U.S. economy of a program to attain 1990 CO_2 emissions levels by 2010. It compares the costs and cost effectiveness of this baseline proposal with those of alternative targets and timetables that entail a less rapid initial reduction in CO_2 emissions levels. The conclusions described here rely on the substantial body of economic analysis that has been conducted by researchers worldwide, including the Intergovernmental Panel on Climate Change (IPCC), and Administration economists.

II. 1990 by 2010: The Scope of the Task

To appreciate the ambitiousness of a program to curb U.S. emissions levels to 1990 by 2010 it is necessary to recognize that, by 2010, emissions are likely to exceed their 1990 levels by about 31 percent.[1] As of 1996, energy related carbon emissions were already 9 percent above 1990 levels. Growth in the economy through the end of the next decade would further raise energy use and carbon emissions. Even under an optimistic assumption concerning the pace of improvement of energy efficiency (0.9 percent per year), there would be further increases in carbon emissions of about 22 percent over current levels by 2010 if we continue with business as usual. A substantial increase in the price of carbon emissions will be needed to induce such a large emissions decline.

An increase in the price of carbon emissions--whether achieved through a system of tradeable emissions permits or a carbon tax--creates incentives to reduce emissions in two separate ways: by reducing overall energy use; and by inducing switches among fuels, away from high-carbon fuels like coal and toward low- and no-carbon fuels, such as natural gas and renewable energy. Reasonable estimates suggest that interfuel substitution in response to higher carbon emissions prices could accomplish between 25 and 45 percent of the overall task, with the remainder occurring through reduced energy use. The implication is that overall energy use must

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[1] This assumes a 2.4 percent annual GDP growth rate. Even with a more moderate assumption of 2.2 percent annual GDP growth, carbon emissions in 2010 would exceed their 1990 level by about 28 percent.

decline by about 15% to 18% relative to "business as usual" levels to attain the 1990 by 2010 emissions target. Energy use *does* respond to changes in the price of energy; but history suggests that the responsiveness is *low* over periods as short as a decade. In particular, the experience of the United States during the 1970s and 1980s suggests that energy prices would need to at least double--as they did during the OPEC oil shock period--to attain a 1990 by 2010 target.

Comparison with the Oil Shocks. Figure 1 shows aggregate energy use in the United States and the relative price of energy over the period 1960 to 1990. During the oil-shock period --1973 to 1984--energy use remained virtually constant in absolute terms while GDP grew about 2.5% per annum in real terms. The relative price of energy rose about 130 percent during these years. Again assuming a 0.9 percent pace of improvement in energy efficiency with constant energy prices, the 130 percent energy price hike served to reduce energy use about 16 percent relative to the "business as usual" baseline. *This experience suggests that an increase in relative energy prices roughly comparable to the 130% OPEC-induced rise will be needed to lower energy use by the 15 to 18 percent required to reach the 1990 by 2010 target. A 130% increase in energy prices translates into a carbon tax of roughly $170 per ton.*

Model results. Numerous economic/energy models have been used to estimate the impact of a 1990 by 2010 program on energy prices. These models arrive at the same conclusion as was generated above using no model whatsoever: a program to achieve 1990 emissions by 2010 would likely entail *at least* a doubling of energy prices. A broad range of models place the carbon permit price required to achieve 1990 emissions by 2010 in the range of $80 to $250 per ton. If fully passed through to energy prices, a permit price of $100 per ton, for example, entails a 76 percent increase in energy prices. The impact on the prices of different sources of energy are all large, but the effect on coal is particularly severe. The price of coal would more than triple, while the price of a barrel of petroleum would increase by about fifty percent. Gas at the pump would increase in price by about 26 cents. Relative to the BTU tax proposed by the Administration in 1993 a $100 implicit carbon tax is about 5 times as large. Thus, attaining a goal of 1990 by 2010 would have very large effects on our economy.

Evidence from International Comparisons. A final piece of evidence confirming the conclusion that a strong price signal over a long period of time is necessary to alter energy use comes from comparisons of energy usage between the United States and Europe. It should hardly be surprising that energy use per dollar of GDP is lower in Europe than the United States. Energy prices in Europe have long been substantially higher--roughly double U.S. energy prices. Moreover, major differences in living patterns between the United States and Europe result in higher European energy efficiency. In addition to the geographical "advantage", from an energy efficiency standpoint, of Europe's higher population density, resulting in lower transportation requirements, Europe has locked in place many long-run adaptations to high energy prices. Innovations in the design of housing and transportation systems and the configuration of residential areas have occurred in response to high energy prices. But in spite of its natural advantages and its long history of high energy prices, energy per dollar of GDP is only 44% lower in Europe than in the United States. This means that even if the United States were to

become Europe--energywise per dollar of GDP--its energy savings, even in the long run, would be no greater than 44 percent. This U.S.-Europe comparison supports the conclusions drawn from the natural experiment of the oil shock: namely, a return to 1990 emissions will not occur without very major price measures over a long period of time.

The Role of Technology and the Scope for "No Regrets" Policies. According to the preceding assessment, a large price inducement is necessary to meet a 1990 by 2010 target. Your economic advisers agree on this conclusion. However several of your advisers are more optimistic about the chances of achieving a 1990 by 2010 target. They emphasize the current availability of "no regrets" (cost-saving) technologies that promise substantial opportunities for abatement. A recent report by the Department of Energy research laboratories, for example, catalogues emissions-saving technologies that, by their calculations, are currently "cost effective." If put in place now, such practices could allegedly reduce emissions by between 30 to 50 percent of the amount needed to reach a 1990 by 2010 target. Even so, the report finds that "aggressive" and "invigorated" government policies--including potentially costly and intrusive regulations and standards--as well as a $50 carbon tax would be necessary to reach the 1990 by 2010 target.

Your economic advisers agree that there now exist unused technological opportunities for emissions reduction, but we question by what means, over what time frame, and at what expense government policies could change private behavior if such opportunities are currently underutilized. Engineering studies generally ignore the sometimes subtle disadvantages of available cost-saving technologies or overestimate their hypothetical returns. An example is illustrative: significant energy and cost savings could result if consumers replace incandescent bulbs with compact fluorescents. Over the long lifetime of such bulbs there would also be a substantial monetary gain. However, actual adoption of these light bulbs has been slow to date, possibly due to pure inertia, possibly because consumers dislike their color, or perhaps because they apply a high "discount rate" when valuing energy savings that accrue after the purchaser may have switched residence. Several recent studies have demonstrated that the actual returns to home improvement investments, such as attic insulation, often fall short of those predicted by engineering studies.

Regardless of the reasons, if consumers have not adopted "no regrets" measures at a faster rate, it is likely that additional incentives will be necessary for them to change their minds. Rather than stressing the mere availability of alternative technologies, your economic advisers insist on realistic estimates of likely rates of adoption and diffusion and they stress the need for economic incentives--in the form of a higher implicit price for carbon emissions--to induce the adoption of emissions-saving technology. They point out too that the baseline energy demand estimates used to predict the price increase needed to attain a 1990 by 2010 target already assume substantial ongoing improvements in energy efficiency due to the diffusion of existing technologies and the development of new ones. Significant adoption of such technologies is necessary merely to meet this assumed baseline. Finally, it is important to note that the DOE labs study includes as part of its policy package to reach 1990 emissions by 2010 extensive

regulations, including stringent CAFE and appliance standards and national building codes--command and control policies that your economic advisers would oppose--along with a $50 carbon tax.

To summarize, your economic advisers consider it unrealistic to predict a substantial increase in the pace of adoption of new emissions-saving technologies in the absence of a large increase in the price of carbon emissions--and hence of energy. Based in part on the evidence from the energy shocks of the 1970s, in part on international comparisons, and in part on model results, they are optimistic that such an increase in prices would bring forth a reduction in CO_2 emissions--with larger responses to a given price change likelier the longer the time period for response. The evidence is strong that a very large price increase will be necessary to attain emissions reductions of 20 to 30 percent over a period as short as a decade. *Moreover, other approaches that apparently do not involve large price increases (such as performance standards) will impose even higher costs on the American economy.*

III. Why are the costs of early emissions reductions so high?

The previous section argued that a "1990 by 2010" target would entail high carbon emissions prices and significant economic costs. This section shows that the 1990 by 2010 timepath for emissions reductions is so aggressive as to be inefficient--in the sense of raising substantially the total projected economic cost of reaching a given environmental goal. There are three major reasons why an aggressive takeoff in curtailing emissions raises overall costs: (1) it induces premature obsolescence of the capital stock because it does not allow adequate time for the capital stock to turn over naturally; (2) it provides insufficient lead time to develop and implement new technologies; (3) it causes a significant stagflationary short-term macroeconomic shock. Additionally, an aggressive timetable for emissions reductions does not allow time for the resolution of uncertainty and it does not take advantage of the time-value of money (resources not spent on emissions reductions early on can be invested at a positive return which could purchase more emissions reductions later).

The Role of Turnover of the Capital Stock. The most clear-cut and easily quantifiable reason for the high price tag associated with rapid emissions reductions relates to the need for premature replacement of plant and equipment in response to large increases in the price of carbon emissions. It is expensive enough to replace plants that are fully depreciated, but vastly more so if those plants are still in the prime of their productive lives. Within 20 to 40 years, much of our existing plant and equipment will be ready for replacement anyway; therefore building in greater carbon efficiency at that time will be relatively cheap. *It is important to emphasize that the case we are making here is not based on procrastinating for the sake of avoiding the problem; rather, it is based on simple principles of hard-headed business efficiency.*

The advantage of a more gradual emissions reduction timetable in avoiding the large

costs associated with premature obsolescence of the capital stock can be illustrated by considering electrical power generation. The case of electricity generation is important in its own right since this industry is responsible for 88% of coal use and more than one third of all carbon dioxide emissions in the United States. But the principle concerning the costs of premature replacement applies broadly because reduced greenhouse gas emissions may entail the accelerated retrofitting of housing and commercial structures, the premature scrappage of vehicles and appliances, and the premature replacement of plant and equipment in energy intensive industries.

Figure 2 illustrates the effect of an accelerated retirement schedule for today's U.S. electric power generation capacity installed during the last 40 years. Imagine, to take an extreme case, that a timetable is adopted that necessitates replacing all power plants with less-polluting technology within ten years. This would require retiring 630 out of 670 gigawatts of generating capacity before the end of its normal life span, or 94 percent of the total. If the timetable were extended so that all power plants instead had to be replaced within 20 years, the accelerated replacement of capacity would affect 450 gigawatts of capacity, or 67 percent of the total. Allowing this additional 10 years for turnover avoids the premature retirement of 27 percent of existing electric power plant capacity. With a 30 year horizon, complete turnover would mean accelerated retirement of only 21 percent of the total capacity and, with a 40 year timetable, there would be almost no additional costs due to premature obsolescence.[2, 3]

The Advantage of Waiting for Superior Technologies. The example of electric power generation also illustrates a second important reason why a gradual takeoff in curbing greenhouse gas emissions is ultimately less costly: new technologies take a long time to develop. 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. Under a tight target and timetable with its associated high carbon emissions price, electric utilities will be forced to replace existing capacity in the very near future and to rely on currently available lean-carbon technologies, likely gas-turbine plants. If some delay can be factored in, however, they will be able to install more effective and less costly alternative technologies. A rapid timetable forces long-term investments to be made before superior technologies have been

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[2]The distribution has been truncated at 40 years, the average lifespan of existing electric power plants. A few plants of yet older vintage are still in use.

[3]The same exercise can be performed for coal-fired power plants. These generators produce the most carbon per kilowatt hour of electricity and thus will have a high incidence of replacement even under a moderate abatement plan. If a complete change-over of coal plants were to be accomplished in 10 years, 96 percent of total capacity would be retired early. If retirement occurred over 20 years, only 64 percent would be retired early. Allowing an additional 10 years for turnover would avoid premature retirement of one-third of existing coal-fired plant capacity.

developed and refined.

Implication: The Need for a Credible, Long-Term Price Increase. The example of electricity generation illustrates two general principles. First, the responsiveness of both demand and supply are greater in the long run than in the short run. This means that, with a longer horizon, any given amount of abatement can be accomplished with a smaller increase in carbon emissions prices. Second, and perhaps even more important for policy, any credible emissions reduction strategy must include both a price increase at the outset and also a clear commitment to maintain and likely increase prices further over time. Without such a commitment, the changes in behavior required to meet even a long-run target of emissions reduction will likely not occur. Consider a utility that today is drawing up its plans for a new power plant. That utility will choose among today's technologies, which vary in their costs and CO_2 emissions. In order to induce the utility to choose a more costly, lean-emissions technology today, it must be clear that CO_2 emissions will be costly enough over the 40 years or more lifetime of the plant to justify a more expensive investment option today. A large cumulative reduction in emissions can be achieved over the long term with only a modest carbon emissions price increase now, but only if the commitment to still higher prices in the future is credible and clear.

Stagflationary Macroeconomic Impact. From a macroeconomic perspective, increases in energy prices constitute an adverse "supply shock." Such developments are stagflationary--even if anticipated--because they raise both inflation and unemployment simultaneously, creating a painful macroeconomic dilemma. As noted above, a plan to attain 1990 emissions levels by 2010 would require a change in energy prices over the first decade of the 21st century at least comparable in magnitude to the two oil shocks of the 1970s. Those shocks are widely acknowledged to have raised both unemployment and inflation. Similarly, the energy price increases required by a 1990 by 2010 program would raise inflation, lower real wages, and raise unemployment. Unemployment in the four years after the first oil shock averaged 7.2 percent in comparison to 5.0 percent in the four years prior; and unemployment rose further, to an average of 8.6 percent, in the four-year aftermath of the second oil shock.[4] Although the increases in energy prices associated with a treaty to reduce greenhouse gases would be anticipated, rather than a surprise, we should nevertheless expect that the efforts of the Federal Reserve to contain inflation, coupled with likely efforts on the part of workers to recoup real wage losses will lead to a period of higher unemployment.

Furthermore, it is important to note that most model-based estimates of the costs of a program to attain 1990 emissions levels by 2010 assume that resources are fully employed, thereby ignoring these potential short-term effects. Such models therefore provide no assessment of the consequent increases in unemployment.

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[4] There is debate about how much of this was due directly to the oil shocks, because there was a simultaneous decline in productivity growth and transfers of real income to OPEC producers.

IV. Quantifying the Economic Costs of Gradual versus Fast Take-off

The relative costs of gradual versus fast takeoff timetables in curbing CO_2 emissions has recently been analyzed by the Stanford Energy Modeling Forum (EMF-14).[5] The Stanford group used six large-scale economic/energy models to compare the total projected cost of two alternative emissions reduction time paths--one "frontloaded", the second more "backloaded". *Importantly, both paths were designed eventually to stabilize atmospheric concentrations of CO_2 at double the pre-industrial level--550 ppmv.*[6] Although a high degree of uncertainty is inherent in particular numerical estimates from individual models, the simulations nevertheless point to some robust qualitative conclusions. *The major conclusion to be drawn from this project is that an emissions reductions path characterized by an aggressive initial phase is substantially more costly--3 to 10 times more costly--than a path with a slower takeoff but larger eventual reductions.*

To enable a comparison of the costs of gradual and rapid takeoff strategies, the EMF investigators asked each of six modeling groups to simulate the economic impacts of two alternative strategies to attain stabilization of CO_2 concentrations at 550 ppmv. The first strategy (the WG-1 path) corresponds to an emissions pathway published in 1994 by Working Group 1 (WG-1) of the Intergovernmental Panel on Climate Change (IPCC). The working group computed a set of global CO_2 emissions pathways consistent with stabilization of concentrations at 550 ppmv and several alternative concentration levels. The WG-1 path entails an immediate departure from the baseline or "business as usual" emissions path. Subsequently, Wigley, Richels and Edmonds (WRE) published an alternative set of emissions profiles to achieve the same concentration targets. In contrast to the WG-1 paths, the WRE emissions path was constructed to follow the baseline or "business as usual" scenario in the early years with sharper reductions after this initial phase. Wigley, Richels and Edmonds hypothesized that their more gradual takeoff emissions pathways would yield identical environmental objectives with substantially lower economic costs, for the reasons discussed above. The EMF-14 exercise validates this hypothesis.

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[5] To enable meaningful comparisons of results across models, the EMF has coordinated a series of projects in which a number of large scale energy models are used to estimate the impact of given, specified emissions reduction scenarios under common standardized, benchmark assumptions concerning population and economic activity, discount rates, energy resource availability and prices and technology availability.

[6] All energy models make numerous simplifications and approximations in order to describe the energy sector globally and over the span of a century or more. In particular, all of the models assume full employment, thereby abstracting from the likely short-run macroeconomic costs of an emissions reduction program.

The EMF-14 comparison project assessed the total costs to the OECD, the EEFSU (Eastern Europe and the former Soviet Union) and the non-Annex I countries of the WG-1 and WRE pathways to stabilization of CO_2 concentrations at 550 ppmv. The appropriate economic measure of total cost is the present discounted value of losses in future consumption relative to a "business as usual" scenario. Estimates of regional costs depend on the extent of burden sharing--namely, the assumed "division of labor"--between Annex I and non-Annex I countries in controlling emissions as well as the extent of international emissions trading. Recall that, by the end of the next century--by 2100-- assuming "business as usual"--non-Annex I countries will have more than 90 percent of CO_2 emissions. Thus, developing country participation is absolutely essential to achieving stabilization of concentrations. Consistent with the Berlin Mandate, the simulations assumed that the burden of emissions reduction would fall on Annex I countries exclusively during the early decades; that by 2030, non-Annex I countries would begin to participate; and by 2050, a full transition to targets based on equal per capita emissions rights is assumed.

Figure 3 plots the OECD emissions paths in the WG-1 and WRE scenarios. Under the WG-1 scenario, OECD emissions begin to decline immediately and continue to decline for roughly four decades. For example, OECD emissions fall 10 percent below initial levels ten years after implementation. This corresponds roughly to the requirement of a "1990 by 2010" timetable--that emissions decline about 15 percent from their projected 2000 level during the decade between 2000 and 2010. In contrast, OECD emissions along the WRE path continue to rise for roughly two decades--corresponding closely to a plan calling for emissions to peak around 2020--return to 1990 levels around 2040 and decline substantially further in subsequent decades.

Table 1 illustrates a robust conclusion that emerges from this exercise: fast takeoff in emissions reductions greatly increases the costs. Table 1 shows the cost for both the aggressive (WG-1) and gradual (WRE) paths--both with and without idealized international trading of permits. In 10 out of 12 simulations--for six different models with and without permit trading--the costs on the gradual WRE path is less than a third of the cost on the corresponding fast take-off path. Taking account of the likely adverse short-run macroeconomic consequences of an aggressive path would further strengthen this conclusion.

Table 2 illustrates a second, robust conclusion from the EMF-14 exercise: a viable system of international permit trading would very much reduce OECD costs. With global permit trading, the sharp, early emissions reductions required of OECD countries under the aggressive (WG-1) approach would be avoided through the purchase of emissions permits from countries with lower abatement costs. The average reduction in cost is 56 percent.[7]

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[7] The computations in Table 2 verify that the gradual (WRE) path, which permits emissions to depart relatively little from business as usual for several decades, is a substantially less costly than the alternative WG-1 path with its sharper immediate reductions. Since both

Finally, it is important to note that in most of the EMF models, policy actions to raise carbon emissions prices must be taken at the inception of the gradual (WRE) program and a commitment to increasing emissions prices over time is required to achieve additional emissions reductions. Naturally, the required initial carbon emissions price is substantially lower, at the outset, under the gradual (WRE) than under the aggressive (WG-1) path. Thus, although the gradual emissions path initially approximates the business as usual baseline, credible incentives must be put into place immediately, and strengthened over time, to achieve the needed investments in carbon-efficient technologies.

V. The Environmental Consequences of Gradual versus Fast Takeoff.

While the excess cost of a fast, compared to a gradual emissions reduction path is large, the difference in projected global temperatures over the next century between the fast and the gradual paths is quite small, both in absolute amount and relative to temperature changes expected even if an aggressive policy path is adopted. Under "business as usual" assumptions, average global temperatures are expected to rise about 1 degree Celsius by 2050 and about 2½ degrees Celsius by 2100. An aggressive Annex I emissions reduction path that stabilizes emissions at 1990 levels by 2010 and maintains emissions at the 1990 level thereafter would mitigate this temperature increase by roughly 0.1 degrees by 2050 and 0.2 degrees by 2100.[8] In contrast, a more gradual Annex I emissions path that peaks around 2015, stabilizes emissions at 1990 levels by 2040, and holds emissions constant at 1990 levels thereafter yields virtually identical environmental benefits: the temperature difference between the aggressive and gradual paths diverges by no more than 0.05 degrees at any time over the next century. Similarly, the temperature differences along the aggressive WG-1 and less aggressive WRE paths--both designed ultimately to stabilize concentrations at 550 ppmv--differ by a maximum of 0.2 degrees over the next several centuries.[9]

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paths are arbitrarily chosen to conform with the 550 ppmv concentration target, a natural question concerns the characteristics of an optimal or least-cost path for achieving this concentration target. An important recent study by Alan Manne and Richard Richels uses their MERGE model (included in the EMF-14 project) to compute the least-cost path with 550 ppmv stabilization and international permit trading. The optimal path, while not identical to the WRE path, is similar in character. This least-cost path peaks approximately three decades after the initiation of the program and declines thereafter.

[8] Successful stabilization would require very large cuts from "business as usual" in China, India, and other non-Annex I countries.

[9] If a model assumes that sulfur dioxide emissions decline with the decline in carbon dioxide emissions under climate policy (as predicted, given the extent of sulfur emissions associated with fossil fuel combustion, and incorporated in the IPCC's IS92 emissions

The limited climatological impact of even an extremely aggressive emissions reduction program measured in terms of temperature impacts during the next century reflects the extremely long lags involved in the underlying physical processes and the dependence of temperature on the total stock of carbon dioxide in the atmosphere, rather than the flow of emissions at a given time. Emissions reductions do matter to temperature, but only over an extremely long horizon. The cumulative nature of the process suggests that there is little effect on global temperature from a gradual rather than from a fast abatement takeoff. The addition to the total stock of carbon from a gradual rather than a fast start to abatement adds relatively little to the total atmospheric stock of CO_2 between now and 2100 for four separate reasons: the difference in carbon emissions between a gradual and a fast start over the initial decades of abatement is only a small fraction of total emissions in that period; the stock of CO_2 in the atmosphere is itself the result of many decades of emissions; some of the CO_2 emissions of the early decades will have been re-absorbed; and the most serious build-up in CO_2 under business as usual occurs late in the next century, as a consequence of burgeoning emissions from non-Annex I countries.

Even the potential for a catastrophic environmental event, such as the melting of the West Antarctic ice sheet, a runaway greenhouse effect (e.g., from release of trapped methane with the melting of the permafrost), or a structural change in ocean currents such as the Gulf Stream, which the preceding abstracts from, does not fundamentally affect the basic trade-offs between the high costs of fast vs. gradual takeoff paths. These factors do, however, add--perhaps greatly--to the urgency of adopting moderate long-term greenhouse gas concentration targets and a program involving an immediate, albeit moderate, increase in the price of CO_2 emissions.

VI. International Trading of Permits

As has already been noted, an effective system of international carbon emissions permit trading among Annex I countries could substantially diminish the cost of a CO_2 abatement program. An Annex I trading system could, potentially, reduce the size of the carbon emissions price to attain a 1990 by 2010 goal by up to 50%. Moreover, joint implementation projects with non-Annex I countries could, hypothetically, reduce this figure by half again.

Although international trading and joint implementation--so-called "where flexibility"--has enormous advantages in theory, your economic advisers are concerned that substantial barriers would stand in the way of implementing any workable analogue of such an idealized system--at least in the near term. Consequently, they stress that Annex I international permit trading and joint implementation between the U.S. and non-Annex I countries realistically can

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projections), the more aggressive WG-1 path will be *warmer* than the WRE path between 2000 and 2040. This result reflects the negative impact of sulfate aerosols on the greenhouse effect. Early and substantial cuts in fossil fuel combustion, while decreasing the carbon emissions that warm the atmosphere, also decrease the sulfate aerosols that cool the atmosphere.

serve only a limited role in reducing the costs associated with meeting a "1990 by 2010" target.

A *hypothetical* example shows how an international trading system would work, and why it would reduce each participant country's abatement costs. Suppose, ideally, that every country adopts a domestic permit system to implement its Kyoto target. Absent international trading, the price of emissions permits would surely differ across countries, reflecting differing marginal costs of abatement internationally. With different permit prices in different national markets, profit-seeking traders would be motivated to buy permits in countries where they are cheap and resell them in countries where they are more expensive. Such arbitrage activities would create an international permit market, bringing permit prices into equality worldwide. This idealized system promotes global efficiency in achieving any worldwide abatement goal. Countries with permit prices below world levels have the incentive to reduce emissions more than they otherwise would in order to profit in the international permit market. Countries with high permit prices would have the incentive to purchase permits, thereby relaxing their Kyoto emissions constraints. The U.S. government could avoid any direct participation in such a system as long as it deems foreign-issued permits presented to the U.S. government by U.S. carbon-emitting entities as valid as those issued by the U.S. government itself.

The preceding description of how an international permit trading system would work provides an idealized picture of its possibilities. But the actual benefits of such a system are apt to fall short of this utopian portrayal in part because countries are not obliged to fulfill their Kyoto commitments via a domestic permit trading scheme; indeed, few Annex I countries have indicated an intention to do so. For example, consider a government that has decided to limit domestic emissions through regulatory controls. International permit sales that result in tighter domestic constraints could well be politically unpopular so that a government would hesitate before selling its emissions rights to the United States. Similarly, international permit sales by a country that is meeting its Kyoto obligations through domestic carbon or energy taxes would necessitate a hike in those taxes. In either case, international trading would involve government to government negotiations, and difficult political decisions. In contrast, in the idealized system, trades result from profit-oriented transactions among individuals, mediated through the market.

Monitoring and enforcement issues are also likely to be paramount in insuring the workability of international trading. If domestic enforcement is effective in all countries, so that, in the aggregate, consumers and firms in each country actually limit their emissions to the national permit levels, international permit sales by private agents in the country actually translate into lower domestic emissions. But consider the difficulties that can occur with imperfect enforcement. If the government of a country--country X--finds it difficult either to measure domestic emissions or to enforce the purchase of permits by domestic emitters, then reductions in X's emissions may be insufficient to reach the Kyoto target. Those firms or individuals in X that are lucky enough to have been assigned the rights to X's permits will be able to sell them, at a quick profit, on the international market. With imperfect enforcement, international sales, without corresponding domestic emissions reductions, could emanate from countries with the weakest systems of enforcement. To prevent such "paper trades", which profit

some participants and increase emissions, many countries, including the United States, will want controls to ensure the integrity of international permits. Buyers, too, will want clear concrete guarantees of the validity of permits so as to be sure they are not being passed counterfeit goods. These controls and guarantees will surely inhibit the efficiency of the market and render some--possibly much--of the estimated savings illusory. In fact, most of the benefits projected from the international sale of permits come from inducing emissions reductions from countries in Eastern Europe and the former Soviet Union--countries with particularly weak tax collection and enforcement mechanisms. Without these countries in the scheme the gains from international trading of permits will be very small.

Joint implementation with non-Annex I countries also has the potential to reduce the U.S. burden of attaining any given timetable. Under this type of approach, U.S. businesses could receive credit for the construction of nuclear, oil, or natural gas electricity generation plants in China if it were confidently expected that China would instead have constructed coal-fired plants with much higher CO_2 emissions. Certification of such credits might be overseen by an international agency to ensure that the projects were emissions-replacing. Such a project-by-project system is likely the most that is feasible in the absence of quantitative targets. Your economics advisers have concerns about even this level of endeavor due to the inherent difficulty in establishing that a particular set of projects has actually reduced a country's emissions, absent a reference path enabling a clear quantitative comparison. For example, the construction of a nuclear power plant in place of a coal-powered plant in China could indirectly raise CO_2 emissions elsewhere in the Chinese economy--partially offsetting the direct CO_2 reducing effect of the project--if the reduced demand for coal lowers its domestic price and encourages greater use elsewhere in the Chinese economy. A project-oriented approach to joint implementation will, in effect, constitute a limited form of international trading with high transaction costs. As a result, it will probably capture only a small fraction of the total benefits of full international trading. In contrast, model results concerning the benefits of joint implementation treat it as equivalent to idealized international trading.

VII. Recycling of Revenues

The ultimate economic cost of an emissions abatement program depends upon how the revenues realized from carbon taxes or auctioned permits are used. It has been estimated that the efficiency loss from collecting an extra dollar of tax revenue amounts to around 30 cents. If the revenues from a carbon tax or auctioned permits are used to reduce inefficient taxes inhibiting work or investment, the resulting gains would partially offset the micro-efficiency losses from energy curtailment. The simple lesson is that the costs of emissions abatement may be greatly reduced if the revenues from the taxes levied can be put to good use.

So far we have approached the recycling of revenues from the standpoint of microeconomic efficiency. There is also the potential for using the revenues to abate the macroeconomic consequences of the emissions program. The oil shocks are believed by many

economists to have resulted in increased unemployment because workers resisted the fall in real wages that was associated with the inflationary impact of higher energy prices. Increased wage demands added inflationary pressures to the economy that could only be suppressed by tighter monetary policy. Thus it might be argued that the effects of the real wage shock on inflation and unemployment could be diminished by lowering payroll or other worker taxes to offset the real wage losses from higher energy prices.

But England's experience points to the need for caution in assessing the potential for revenue recycling to allay the macroeconomic consequences of the rising energy costs. In 1979, immediately after her election, Margaret Thatcher increased the VAT tax and simultaneously decreased the income tax. These two policy changes had offsetting effects on real after tax incomes, and therefore might have been expected to have had no effect on wage bargaining. However, the increase in the VAT tax resulted in an immediately noticeable increase in the CPI. A wage-price spiral ensued as workers attempted to maintain their pre-tax real wages.

VIII. Policy Implications

The foregoing arguments point to the attractiveness, from both an economic and environmental standpoint, of a U.S. policy to raise the price of carbon emissions--either through a carbon tax or a system of auctioned permits--by a moderate amount--for example, between $5 and $15 per ton of carbon--in the near term, with further increases scheduled over the longer term. A realistic target and timetable corresponding to such a program would entail continued emissions growth in the first decade of the program, say 2000-2010; elimination of emissions growth in the second decade (2010-2020) and reductions in emissions thereafter. This program entails significant, early policy action and is consistent with a strong U.S. commitment to attaining the ultimate objective of the Framework Convention--namely to stabilize atmospheric concentrations of CO_2 and hence global temperatures.

Figure 1: Energy Prices and Changes in Energy Use

OPEC price hikes lowered energy use substantially

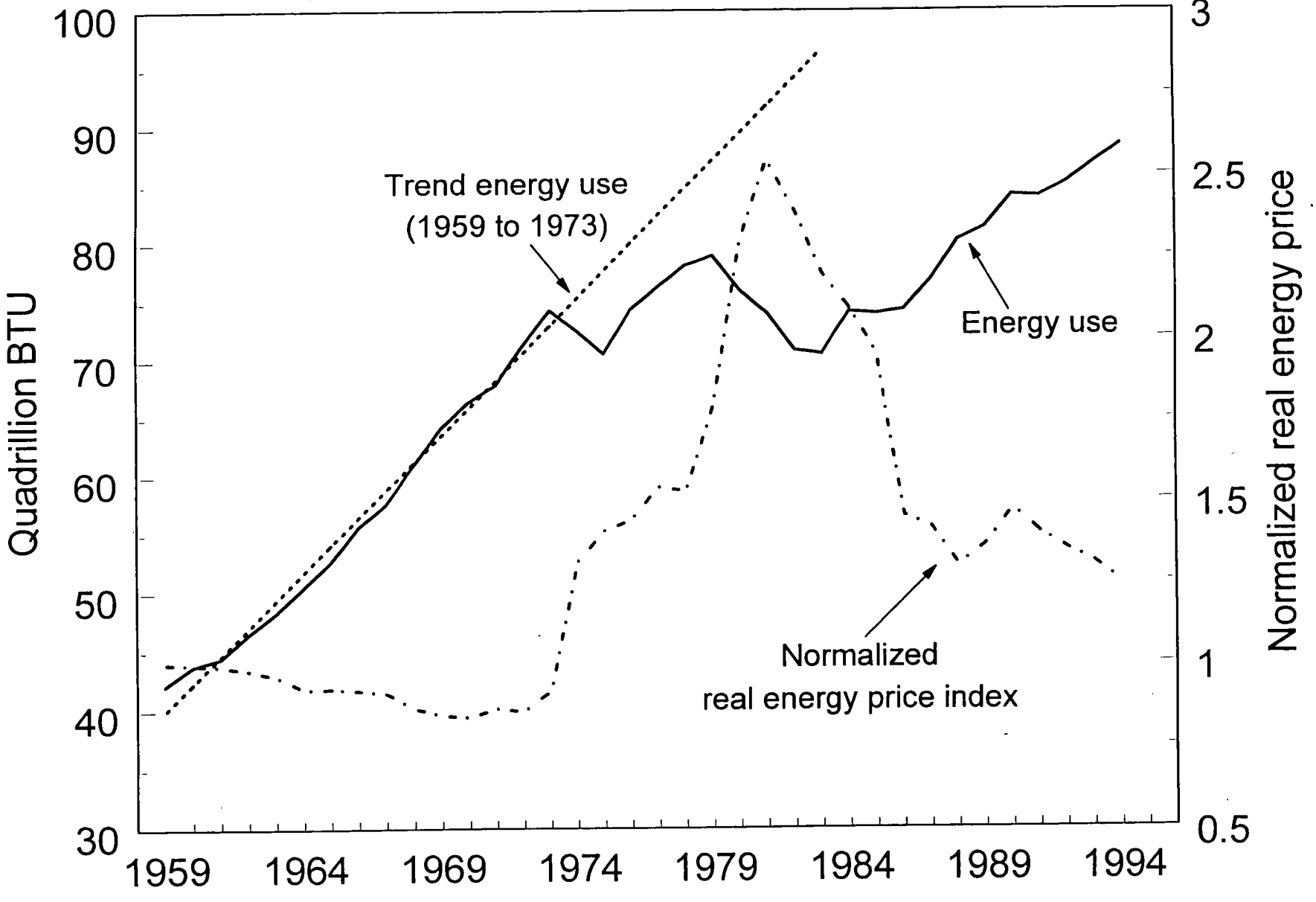
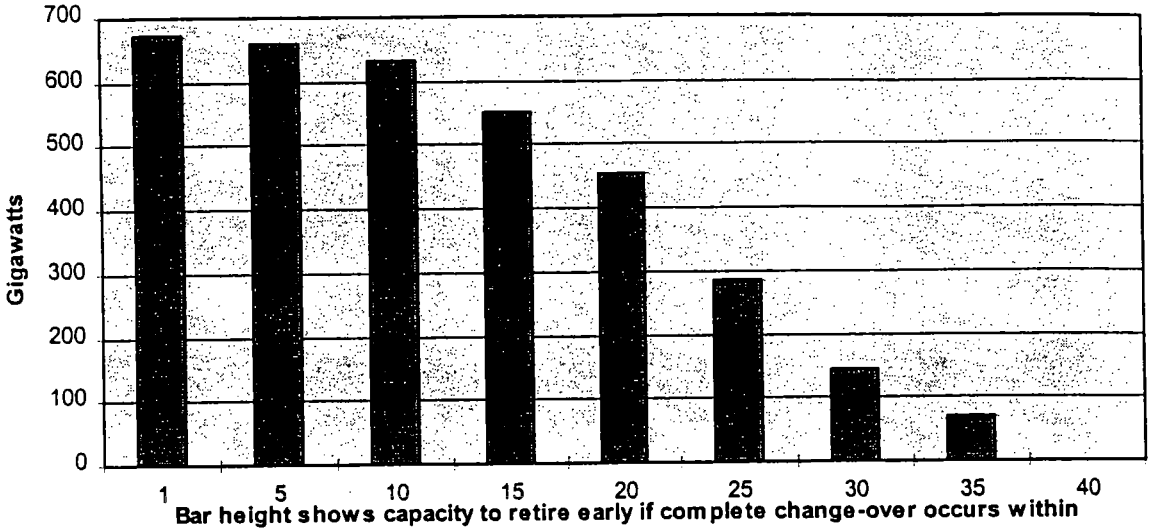
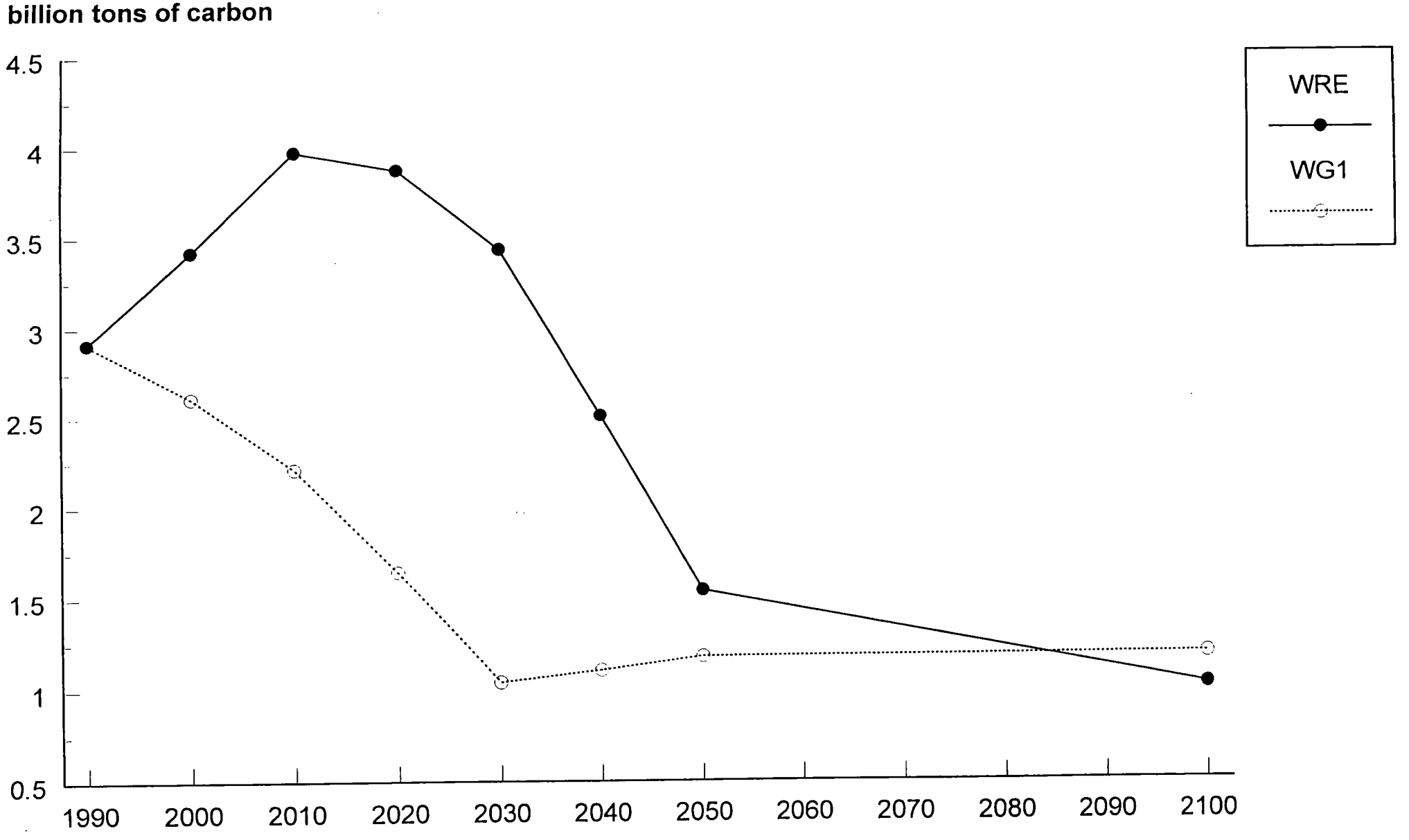


Figure 2: Accelerated Retirement of Electric Power Plant Capacity



Bar height shows capacity to retire early if complete change-over occurs within number of years indicated on the axis. Normal life span of a generator is 40 years.

Figure 3: WRE and WG-1 Emissions Pathways for OECD to Stabilize Concentrations at 550 ppmv



Source: Manne and Richels

Table 1

The Effects of Emissions Pathway on Consumption Losses by OECD Countries, No International Permit Trading (trillions of 1990 U.S. dollars)[a]

Model	WRE	WG1	WRE/WG1
CETA	1.83	5.94	0.31
CPBRIVM	0.64	3.25	0.20
FUND	9.82	11.71	0.84
MERGE	0.85	6.12	0.14
MiniCAM	1.58	6.51	0.24
SGM	1.84	6.17	0.30
		Average:	0.34

The Effects of Emissions Pathway on Consumption Losses by OECD Countries, International Permit Trading (trillions of 1990 U.S. dollars)[a]

Model	WRE	WG1	WRE/WG1
CETA	1.86	4.03	0.46
CPBRIVM	0.17	0.99	0.17
FUND	1.47	4.97	0.30
MERGE	0.60	3.24	0.19
MiniCAM	0.54	3.44	0.16
SGM	0.13	1.48	0.088
		Average:	0.23

[a] Losses measure the present discounted value of foregone consumption through 2100 in trillions of 1990 U.S. dollars.

Table 2

The Effects of International Permit Trading on Consumption Losses by OECD Countries, WRE Emissions Pathway to 550 ppmv Stabilization (trillions of 1990 U.S. dollars)[a]

Model	Trading	No Trading	Trading/No Trading
CETA	1.86	1.83	1.02
CPBRIVM	0.17	0.64	0.27
FUND	1.47	9.82	0.15
MERGE	0.60	0.85	0.71
MiniCAM	0.54	1.58	0.34
SGM	0.13	1.84	0.07
		Average:	0.43

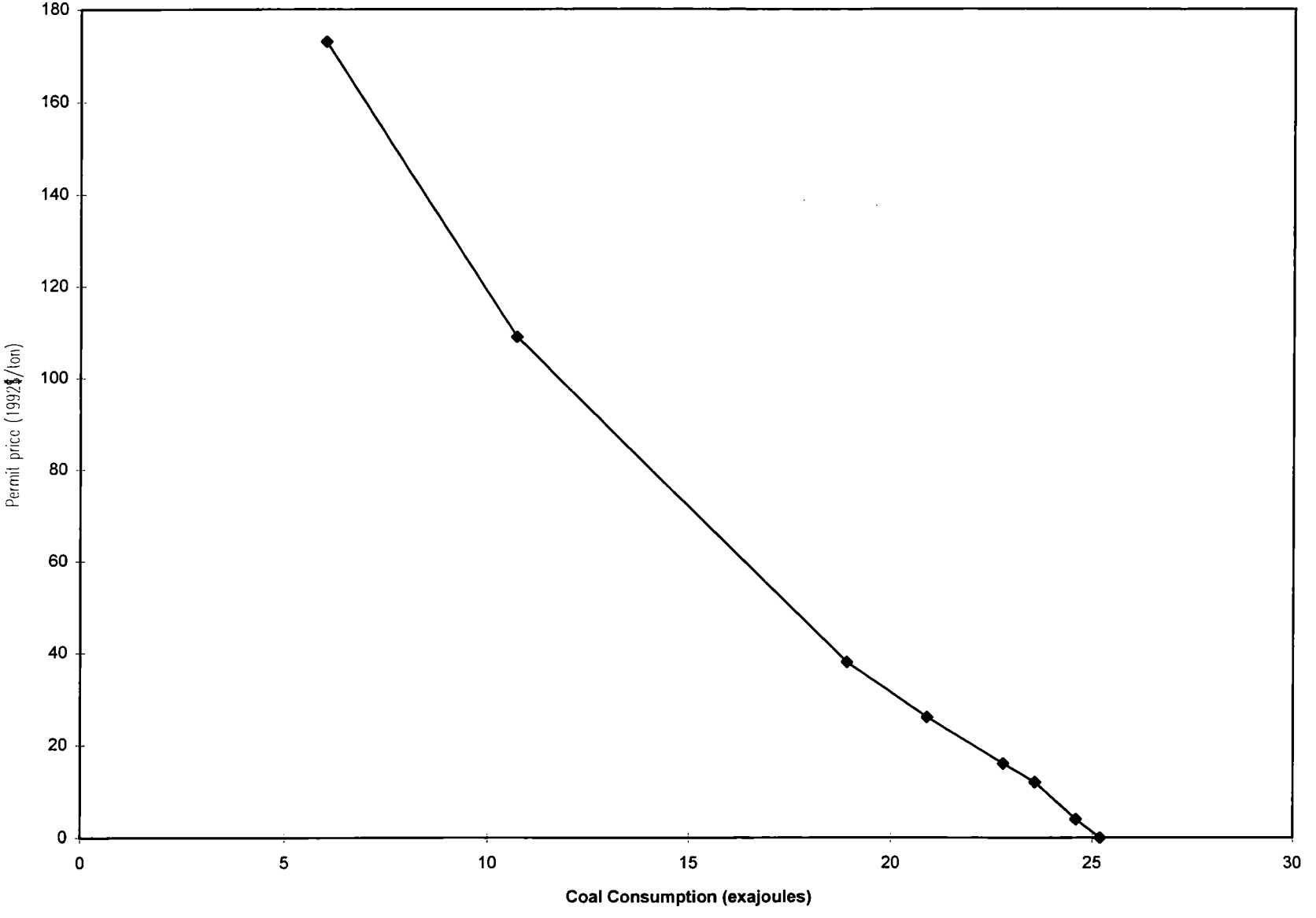
The Effects of International Permit Trading on Consumption Losses by OECD Countries, WG1 Emissions Pathway to 550 ppmv Stabilization (trillions of 1990 U.S. dollars)[a]

Model	Trading	No Trading	Trading/No Trading
CETA	4.03	5.94	0.68
CPBRIVM	0.99	3.25	0.30
FUND	4.97	11.71	042
MERGE	3.24	6.12	0.53
MiniCAM	3.44	6.51	0.53
SGM	1.48	6.17	0.24
		Average:	0.45

[a] Losses measure the present discounted value of foregone consumption through 2100 in trillions of 1990 U.S. dollars.

- coal

- quantification of benefits


180
160
140
120
100
80
60
40
20
0
Permit price (1992$/ton)
0
5
10
15
20
25
30
Coal Consumption (exajoules)

Murkowski Questions **11/17/97, Preliminary Draft**

Responses to Murkowski Questions

2. When will the Administration release to the public the economic analysis that it used in reaching these targets and timetables?

The Administration relied on an array of economic tools and analyses during the process of selecting its target and timetable. Administration staff drew from the substantial economic literature on climate change, energy, and the environment in assessing options for our negotiating position. For example, the Administration considered analyses conducted by the Intergovernmental Panel on Climate Change, the previously released Interagency Analytical Team draft report, and the Department of Energy's Scenarios of U.S. Carbon Reductions. However, there is not a distinct "economic analysis" document.

3. Will the economic analysis used to arrive at these targets and timetables be peer reviewed?

a. If not, why not?

b. If so, will the peer reviewers comments be made public?

There is not a distinct "economic analysis" document that could be peer reviewed.

9. The economic modeling effort that was abandoned by the Administration earlier this year assumed that the mere announcement of an agreement to reduce carbon dioxide would immediately result in a 25% increase in the rate of improvement in energy efficiency.

a. Was this a valid and realistic assumption?

b. Did the peer reviewers feel it was a realistic assumption?

Several of the peer reviewers noted that the rate of energy efficiency improvement (the autonomous energy efficiency improvement, or AEEI) may be on the upper range of estimates of this variable. The Interagency Analytical Team employed this higher rate to represent the increase in technology research and development and diffusion that would occur as the economy operates under expectations of higher energy prices in the future. By the nature of several of the models used in the IAT process, the modelers had to incorporate these price expectations into the AEEI parameter. There is disagreement among informed modelers about how realistic is the AEEI used in the IAT.

10. The Administration economic modeling effort also assumed a decrease in long term interest rates to almost 2%.

a. Was this a valid and realistic assumption?

b. Don't new taxes and higher costs tend to increase inflation and interest rates?

The IAT report indicates that in the modeling exercises, the revenues from carbon permit auctions are used to reduce the deficit. As we heard many times over the past several years during the balanced budget debate, cutting the Federal deficit will lower interest rates. In the IAT's sensitivity analyses, the IAT found that recycling revenues by cutting corporate and payroll taxes would also lower interest rates. To the extent that revenue from carbon permits significantly reduce the deficit, this assumption is appropriate. All of these forms of revenue recycling stimulate saving and investment, and help raise the growth rate of the economy.

11. The Administration modeling effort did not consider the costs associated with the development, implementation, and monitoring of a trading program.

a. Was this a valid and realistic omission?

The purpose of the IAT was not to assess any specific policy position. Since the Administration had not yet developed a policy position internally, the IAT did not have a specific implementation policy to model. It would not be valid for the IAT to devise a specific, hypothetical trading program and model the costs of implementing it.

12. Did the Administration modeling effort take into account the adverse effects on U.S. competitiveness and the potential shifting of producers in the United States?

As several of the reviewers noted, the models used in the IAT do not handle international trade well and the IAT did not specifically account for effects on U.S. competitiveness. However, the Administration did rely on several analyses of competitiveness in coming to its decision on a negotiating position.

Responses to Senator Chafee's Questions

1. The President and his Administration are still going through a process of hearing the opinions of the many interested parties on this issue. This process will culminate with a White House Conference in October on the climate change issue.

However, the framework for the Administration's policy has been largely settled. For example, we support the use of flexible approaches, such as joint implementation and international emissions trading. We support the requirement that non-Annex I countries, as they become wealthier, abide to binding emissions goals. For domestic implementation, we support the use of flexible, market based approaches. Although the President has spoken of the need for realistic achievable targets, the Administration is still deciding the details on targets and timetables and domestic implementation.

2. No one model, or even a small set of models, can give a definite estimate of the effects of a policy on the economy 20 or 30 years into the future. However, a vast array of economic tools exists to provide us with a basis for informed judgment about the likely effects of different climate policies. For example, we know that a market based approach to reducing carbon emissions will be less costly than a command and control approach. The Administration intends to bring to bear on the climate issue many analytic tools and perspectives. Some of these may have strengths on issues where the models used in the IAT analysis were weak. I am confident that the analytic tools and perspectives available to the Administration can provide us with sufficient information to generate ranges of economic effects so that the Administration can make informed policy decisions.

3. The Administration is considering an array of market based approaches to implement climate policy.

4. Tradeable emissions permits and energy taxes share several important characteristics. First, they both send a price signal to markets that would stimulate the development and adoption of energy efficient technologies. Second, they both provide flexibility to achieve emissions goals. In the case of tradeable permits, firms that find it very costly to reduce emissions may purchase permits from firms that find it less costly. In the case of taxes, firms would reduce their energy use until it became more costly than the tax. These both achieve emissions reductions at substantially lower costs than through command and control approaches.

Tradeable emissions permits would provide greater certainty than energy taxes of attaining a specified emissions cap. By specifying a number of permits and allowing firms to trade these permits, the country can ensure that it is meeting an agreed upon carbon emissions goal. A tax, on the other hand, would provide greater certainty than a cap-and-trade approach of limiting costs, since the increase in unit costs would be determined by the tax.

5. For international emissions trading, all countries participating in the trading scheme will need to have their emissions capped.

International emissions trading can significantly decrease the costs of meeting an emissions goal. It would provide greater opportunities to reduce emissions at low costs. If some of the emissions reductions necessary to achieve the U.S. goal can be undertaken in other countries at lower costs, then U.S. emissions control costs will fall. In both the IAT analysis and other modeling efforts, the costs of achieving a variety of emissions goals could decrease by more than half.

For joint implementation, all countries may participate, regardless of when their emissions will be capped. Lower cost abatement opportunities abroad again suggest substantial savings to the U.S. could result if U.S. companies could receive credit for incremental abatement efforts in other counties.

6. Some innovation surely occurs in the absence of a price signal. Many studies suggest that energy use relative to GDP falls each year regardless of the price signal by 0.5 to 1.25 percent. To the extent that energy use is associated with climate change effects, and this causes damages not reflected in market prices, this innovation is unlikely to be sufficient. Additional incentives to innovation, such as price signals, or support for R&D may be needed.

7. As the question notes, some observers of the climate change issue have claimed that capping only developed countries' emissions will result in "leakage": the escape of jobs, capital, and polluting activity to developing countries. Any time countries negotiate international treaties that would apply different rules to different countries, there is a concern about some countries gaining a competitive advantage. However, the economic evidence does not support the argument that climate policy will adversely affect U.S. economic competitiveness. First, non-tradeable sectors account for a substantial share of carbon emissions. Transportation and residential and commercial buildings account for approximately two-thirds of U.S. carbon emissions. For these sectors, the "competitiveness" argument does not appear applicable. Second, energy costs comprise only a small percentage of total manufacturing costs. According to the 1995 Annual Census of Manufactures, energy costs for manufacturing industries averaged just 2.2% of total costs. Given the small share of energy in total costs, differential shifts in existing energy prices are unlikely to have substantial effects on location decisions and trade flows. Third, our experience in this country with environmental regulation has been that it does not cause significant leakage. Firms that decide to relocate to other countries do so because of international differences in labor costs, capital costs, material costs, and exchange rate changes that all swamp the costs of complying with environmental regulations.

To address the possibility of leakage occurring, we should do climate policy smart. If we do it dumb, it will cost our economy a lot. By doing it smart, through flexible, market-based approaches, we will make the costs of complying with an emissions goal much lower. In addition to using market-based approaches domestically, joint implementation and international emissions trading would also lower the costs of climate policy. These lower costs associated with a smart climate policy would decrease the economic rationale for industries to move to developing countries.

Responses to Senator Boxer's Questions

1. As stated in my answer to question 7 of Senator Chafee's questions, some observers of the climate change issue have claimed that capping only developed countries' emissions will result in "leakage": the escape of jobs, capital, and polluting activity to developing countries. Any time countries negotiate international treaties that would apply different rules to different countries, there is a concern about some countries gaining a competitive advantage. However, the economic evidence does not support the argument that climate policy will adversely affect U.S. economic competitiveness. First, non-tradeable sectors account for a substantial share of carbon emissions. Transportation and residential and commercial buildings account for approximately two-thirds of U.S. carbon emissions. For these sectors, the "competitiveness" argument does not appear applicable. Second, energy costs comprise only a small percentage of total manufacturing costs. According to the 1995 Annual Census of Manufacturers, energy costs for manufacturing industries averaged just 2.2% of total costs. Given the small share of energy in total costs, differential shifts in existing energy prices are unlikely to have substantial effects on location decisions and trade flows. Third, our experience in this country with environmental regulation has been that it does not cause significant leakage. Firms that decide to relocate to other countries do so because of international differences in labor costs, capital costs, material costs, and exchange rate changes that all swamp the costs of complying with environmental regulations.

To address the possibility of leakage occurring, we should do climate policy smart. If we do it dumb, it will cost our economy a lot. By doing it smart, through flexible, market-based approaches, we will make the costs of complying with an emissions goal much lower. In addition to using market-based approaches domestically, joint implementation and international emissions trading would also lower the costs of climate policy. These lower costs associated with a smart climate policy would decrease the economic rationale for industries to move to developing countries.

2. The costs of reducing emissions in the U.S., and in Europe and Japan depend on how all of these countries implement their policies. If the U.S. employs a market based approach, the costs will not be that high relative to Europe and Japan. Regardless of the implementation approaches used in these countries, the costs of emissions reductions are not likely to affect U.S. competitiveness. As noted above, energy costs comprise a small share of total manufacturing costs (2.2%). Further, two-thirds of carbon emissions occur in non-tradeable sectors. The evidence on energy price differentials across countries suggests that they are not sufficient to spur firm relocation to other countries.

3. The IAT report did not focus on the benefits of reducing greenhouse gas emissions. Without a benefits assessment, the IAT could not provide estimates of the positive effects on human health and the environment. In addition, the IAT did not study the effects of the risks of climate change on economic activity. However, the report did assess the impacts of climate policy on the

economy. The IAT analysis confirms other economic research (for example, the recent report by the World Resources Institute) that smart climate policy can actually lead to net benefits in the long term. For example, the IAT analysis found that auctioning off tradeable permits and using the proceeds of the auction to lower income and corporate taxes would help the economy grow faster in the future than without climate policy.

4. The longer we wait to take any action can adversely affect the economic and environmental outcomes of climate policy. However, we do know that more gradual efforts to reduce our carbon emissions can lower the economic costs relative to very aggressive reductions efforts while still achieving the same carbon dioxide concentration goal. For example, some international proposals to reduce carbon emissions would have Annex I countries cutting emissions to 20% below 1990 levels by 2005. Such a target would have very substantial economic costs because it does not provide enough time for the capital stock to turn over. It is very expensive to scrap the existing capital stock, while much of it is in the prime of its life, and replace it with carbon-free technology. Further, such a target would require the economy to employ existing low-carbon and carbon-free technologies while longer-term targets would provide more lead time to develop and implement superior technologies. Given that it is the stock of carbon dioxide, not the annual emissions of carbon dioxide, that drive global warming, there is an opportunity to be flexible in the timing of emissions reductions. Less aggressive paths that 1990 -20% emissions level by 2005 could achieve the same carbon dioxide concentration stabilization goal in the year 2100 by increasing carbon reductions in the future when they are less costly to the economy.

5. It is very difficult to assess the nature of the economy, and especially specific industries, 20 or 30 years into the future. If the country embarked on a policy of reducing carbon emissions, obviously the firms and industries that can creatively and cost-effectively reduce their emissions will benefit relative to their competitors. To reduce carbon emissions, it is reasonable to envision that the products and services of industries that develop energy efficient technologies and industries that develop low-carbon based energy (such as renewable energy sources including wind, solar, and biomass) would be in greater demand.

Responses to Senator Lieberman's Questions

1. The Administration's analysis on the issue of climate policy has not occurred in a vacuum. In fact, climate change has been one of the more active areas of research in economics this decade. The economic literature on climate change, complemented by the IAT report, has already done quite a lot to inform the policy development process. Based on the economic research, we have identified some of the important characteristics of the climate policy we will develop: joint implementation, international emissions trading, developing country participation, emissions budgets, and market-based, flexible domestic implementation. My interpretation of the role of economics differs -- I believe economics has informed the process, and I am confident that it will continue to play an important role in our country's deliberations over a climate policy position.

2. As stated in my answer to question 2 of Senator Chafee's questions, no one model, or even a small set of models, can give a definite estimate of the effects of a policy on the economy 20 or 30 years into the future. However, a vast array of economic tools exists to provide us with a basis for informed judgment about the likely effects of different climate policies. For example, we know that a market based approach to reducing carbon emissions will be less costly than a command and control approach. The Administration intends to bring to bear on the climate issue many analytic tools and perspectives. Some of these may have strengths on issues where the models used in the IAT analysis were weak. I am confident that the analytic tools and perspectives available to the Administration can provide us with sufficient information to generate ranges of economic effects so that the Administration can make informed policy decisions.

Schaefer Questions

12. The Administration frequently cites the 2000 economists who say they support controlling greenhouse gases. Their statement supports as the mechanism either carbon taxes or emission permits. In the past, the Administration has said it opposes the use of taxes. Is that still the Administration's position?

The first stage of the President's climate change plan calls for tax cuts over the next 5 years to stimulate the development and adoption of energy efficient and carbon-lean technologies. These targeted tax cuts -- coupled with focussed R&D spending, credit for early action by industry, Federal leadership through improved procurement and energy use, and industry-by-industry consultations to encourage carbon reductions -- provide a solid foundation for the President's plan to reduce our nation's carbon emissions to 1990 levels by 2008-2012. In the next stage, around 2004, we will review our progress and evaluate our next steps as we move toward a market-based permit trading system for carbon dioxide. After the nation has reviewed its decade's worth of experience, a carbon dioxide permit system, consistent with the recommendation of the Economists' Statement on Climate Change, will be implemented.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

TRANSMISSION NUMBER: 202/395-5836
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ENVIRONMENT BRANCH
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Name

Fax # X56809

To: Joe Aldy

From: Bob Tuccillo

Message: Qs/As on climate change

Number of Pages to Follow: 17

Date: 10/8/97

Time: 2:45pm

Total Pages: ___

LRM ID: EHF280

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
Washington, D.C. 20503-0001

Tuesday, October 7, 1997

LEGISLATIVE REFERRAL MEMORANDUM

TO: Legislative Liaison Officer - See Distribution below

FROM: Ronald K. Peterson (for) Assistant Director for Legislative Reference
OMB CONTACT: Robert J. Tuccillo
PHONE: (202)395-5609 FAX: (202)395-5836

SUBJECT: **STATE Qs and As on Global Climate Change**

DEADLINE: **11:00 AM Wednesday, October 8, 1997**

In accordance with OMB Circular A-19, OMB requests the views of your agency on the above subject before advising on its relationship to the program of the President. **Please advise us if this item will affect direct spending or receipts for purposes of the "Pay-As-You-Go" provisions of Title XIII of the Omnibus Budget Reconciliation Act of 1990.**

COMMENTS: **State needs to provide these answers to the Senate Foreign Relations Committee prior to the Thursday 10/9/97 hearing.**
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LRM ID: EHF280 **SUBJECT: STATE Qs and As on Global Climate Change**

RESPONSE TO
LEGISLATIVE REFERRAL
MEMORANDUM

If your response to this request for views is short (e.g., concur/no comment), we prefer that you respond by e-mail or by faxing us this response sheet. If the response is short and you prefer to call, please call the branch-wide line shown below (NOT the analyst's line) to leave a message with a legislative assistant.

You may also respond by:
(1) calling the analyst/attorney's direct line (you will be connected to voice mail if the analyst does not answer); or
(2) sending us a memo or letter
Please include the LRM number shown above, and the subject shown below.

TO: **Robert J. Tuccillo Phone: 395-6609 Fax: 395-5636**
Office of Management and Budget
Branch-Wide Line (to reach legislative assistant): 395-4586

FROM: _____ **(Date)**

_____ **(Name)**

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The following is the reponse of our agency to your request for views on the above-captioned subject:

_____ **Concur**

_____ **No Objection**

_____ **No Comment**

_____ **See proposed edits on pages** _____

_____ **Other:** _____

_____ **FAX RETURN of** _____ **pages, attached to this reponse sheet**

Questions for the Record Submitted by Chairman Hagel to
Under Secretary of State Timothy Wirth
Senate Foreign Relations Committee
Subcommittee on International Economic Policy,
Export and Trade Promotion
June 19, 1997

Senator Hagel

1. Q: **What enabling legislation might be necessary to implement any agreement that would mandate legally-binding emissions reductions on the United States?**

A: Any legally binding agreement would require Senate ratification of the protocol or other legal instrument itself. Any specific legislation to implement domestically the agreement would depend on the nature of the international agreement itself and the policies chosen to implement it domestically. At this time, we are still evaluating a wide range of options for domestic implementation and therefore cannot state with any specificity what implementing legislation might be required.

2 Q: **I understand a Department of Energy official made a presentation at a May 6, 1997 meeting of the Society of Automotive Engineers. At the meeting, this official reportedly said that to return to 1990 greenhouse gas emissions, this country would either have to increase average fuel efficiency to 70 mpg by 2005, or institute gasoline taxes 74 cents per gallon by 2005. Do you agree with the assessment of the Administration official?**

A: The Department official was providing a report based primarily on material developed for the *Policy Dialogue Advisory Committee to Assist the President in the Development of Measures to Significantly Reduce Greenhouse Gas Emissions from Personal Motor Vehicles*. This Presidential advisory committee considered ways to return personal transportation-sector greenhouse gas emissions to 1990 levels by 2005, 2015 and 2025. While this committee did not reach a consensus on the best policies to achieve these goals, substantial analytic work was performed including the information you asked about.

The official did not report at the Society of Automotive Engineers meeting that the U.S. needed to increase automotive efficiency to any specific level or that we would need a gasoline tax in order for the U.S. to stabilize U.S. greenhouse gas emissions at 1990 levels. Rather, what was said was that *if* one tried to return estimated future U.S. emissions from private motor vehicles to their 1990 levels by 2005 assuming the use of either fuel economy standards or a gasoline tax, that a 70 mpg standard or a 74 cent per gallon tax would be required. This is clearly not this Administration's policy.

The Administration favors a flexible approach to reducing emissions that would permit market forces to select the most cost-effective approaches. These should be aided by the availability of advanced technologies that joint government-industry research will provide. We believe there are other preferable approaches to reducing personal transportation emissions besides fuel economy standards or gasoline taxes. These options include the introduction of advanced technology vehicles (now under development - Partnership for a New Generation of Vehicles) and the use of low-greenhouse gas fuels such as cellulosic ethanol. We would note that the Department official concluded his presentation by saying that continued federal and private investment in these promising technologies was a prudent approach to reducing transportation sector emissions and that they were a more cost-effective approach than fuel taxes or fuel economy requirements.

3. Q: **Last year the Administration adopted a position supporting "legally binding commitments" on the United States to reduce greenhouse gas emissions. What entity do you envision enforcing these legally binding commitments on our government and our nation?**

A: The U.S. proposal calls for each Party to establish a system for national reporting and measurement of greenhouse gas emissions, as well as putting in place national compliance and enforcement programs relevant to implementation of its obligations. Thus, the primary responsibility for enforcement is at the national level. In addition, the U.S. proposal calls for the establishment of a review process, in which expert teams, coordinated by the Protocol Secretariat would assess Parties' implementation of their obligations. The Parties to the protocol, based on the results of such reviews, would have the responsibility of reviewing compliance, and determining what consequences (if any) should be applied in cases of non-compliance.

4. Q: **Do you intend any emissions trading scheme to apply equally to public and private entities? Would it apply to city and state governments? Would it apply to the Federal Government and our Armed Forces?**

A: The draft proposal does not establish a domestic system for emissions trading; that decision is left to each Party to determine on its own. However, the regime would permit individual Parties to allow private sector trading as well as sub-national entities such as local or state governments. The Administration has not yet taken a position with respect to the domestic implementation of the protocol in this regard.

5. Q: **Has the Department of Defense conducted a study on the effect the treaty's restrictions would place on its activities?**

A: DoD has a global climate change integrated product team (IPT) in place that is assessing the impacts of the negotiations on DoD activities; however, no conclusions have yet been reached.

6. Q: **The U.S. draft protocol includes language referring to various automatic and discretionary "consequences for non-compliance with obligations." What exactly does this refer to?**

A: In the U.S. view, a legally binding obligation will be essential to ensuring that countries actually lower their levels of emissions. Past experience has shown that in order to implement binding obligations, consequences for non-compliance also need to be developed. A number of alternatives are being considered for such consequences. We anticipate that they will range in severity according to the Articles for which non-compliance is determined. For example, different provisions might be imposed for non-compliance with monitoring than for non-compliance with meeting a budget. Different provisions may also be imposed for multiple incidents of non-compliance than for only a single incident. We believe that allowing non-compliance to be determined on a completely ad hoc basis will limit the effectiveness of the regime. To this end, we have proposed that the non-compliance provisions be made explicit through a decision by the Parties.

7. Q: **The Administration opposes "differentiated" commitments by OECD countries. Yet, I understand the European Union has proposed a mechanism whereby each of its member states would have a different commitment for percentage reductions. Is the Administration considering accepting an exception for the EU?**

A: No. While we believe that the European Union (or any other Party or groups of Parties) may choose to undertake a series of agreements whereby emissions trading might be allowed, we do not believe that the "bubble" as proposed by the EU is an appropriate mechanism. Furthermore, while the Administration has recognized that differences do exist between countries, we do not believe it will be possible to negotiate these differences and reach a consensus on the outcome in time to conclude negotiations by December 1997 in Kyoto.

8. Q: I understand that Argonne National Laboratory conducted a study on "The Impacts of Potential Climate Change Commitments on Energy-Intensive Industries." That study was reportedly completed last November, but still has not been made public. Please explain why it has not been released.

– Are press reports accurate that the study found a devastating impact on the steel, aluminum, cement, chemical, petroleum, and forest products industries?

A. The Department sponsored a project at Argonne in which panels of industry representatives experts from academia, environmental groups, organized labor, the financial community, and government were asked to reflect on the possible industry met to discuss the possible impacts on industry output, employment, energy usage, technology, costs, prices, imports and exports.

The negative conclusions expressed by the participants were predicated on the specific energy price scenarios assumed in mid-1996, which do not reflect key policies advocated in international climate negotiations by the Clinton administration in the intervening year. For example, the assumed fuel price scenarios do not take into account the impact of multi-year emissions budgets, international emission trading, and joint implementation. If adopted, these provisions would lower the costs of achieving emissions reductions in the U.S. and other developed countries and would significantly lower the energy price increases assumed in the workshop scenarios. The Administration has also argued that the developing countries should assume additional obligations in the near future to reduce the projected rapid growth of greenhouse gas emissions. No such actions were reflected in the workshop scenarios.

A draft paper providing a personal interpretation of the workshops was circulated prior to completion of the report by an individual employee of Argonne National Laboratory. That paper was apparently prepared in advance of the participants' review of the workshop summaries to ensure that their input had been reported accurately, and prior to the lead authors' completion of the revised focus papers based on comments received at the workshops.

The final report, The Impact of High Energy Price Scenarios on Energy-Intensive Sectors: Perspectives from Industry Workshops, was issued on July 11, 1997. It includes an accurate and complete summary of the workshop findings, the full text of all the lead authors' papers, and the scenarios given to the participants.

9. Q: **Regarding the Administration's draft report to the U.N. body that was set up to monitor the 1992 Framework Convention on Climate Change: I understand that this draft report says that the U.S. is unlikely to be able to return its greenhouse gas emissions to 1990 levels by the year 2000 for two reasons: First, U.S. energy prices are too low, and second, the U.S. economy is too strong. Is this correct, and if so, do you agree with this assessment?**

A: This report was completed in final in August 1997, and submitted to the Convention Secretariat. Copies have been sent to your committee. That report states that several reasons are anticipated to lead to U.S. emissions in 2000 exceeding their 1990 levels: energy prices being lower than projected when the U.S. emissions reduction program was first established; Congress providing reduced funding from that proposed in the Administration program; and individual programs working less effectively than anticipated. While the economy did perform more robustly than expected, this factor is not considered likely to lead to significant increases in emissions beyond those projected.

10. Q: **In follow-up to my previous question, this draft U.S. report also says that due to economic growth and population growth, U.S. energy consumption would have to be reduced 25% by the year 2010 to return greenhouse gas emissions to 1990 levels.**
– What impact would this level of reduction in energy use have on U.S. economic growth?
-- How does the impact on the United States compare to that of our European and Japanese competitors? I would note that these countries are experiencing much weaker economic growth than the United States.

A: The report does not state that energy consumption would need to be lower – only that to maintain emissions at 1990 levels, emissions would need to be approximately 24% below projected levels. This could be accomplished through changes in efficiency in energy production and consumption, through fuel switching (away from emissions intensive fuels), through the development of new processes that produce fewer emissions, as well as through conservation and reduced energy consumption. No definitive economic analysis has been performed that can provide a guaranteed projection of the effects of such a program. However, most modelers and economists agree that a properly designed program would have little aggregate cost to the U.S. economy, although most recognize that there would be some distributive effects, with some sectors and regions of the country outperforming others. The costs of emissions reductions could be substantially reduced if market instruments such as emissions trading and joint implementation were allowed.

Projections for both Japan and Europe suggest that their economies are unlikely to grow at rates similar to that of the United States over the next decade. However, due to the greater efficiency of these economies (fewer emissions are produced per unit of GDP than in the United States), many economists have estimated that reductions in these countries will be more costly than in the United States. Overall GDP impacts from returning emissions to 1990 levels are thus estimated to be higher in both Europe and Japan than here.

11. Q: **You have stated the belief that technology will lower the costs of this proposed treaty to the U.S. economy. Can you identify which specific technologies will do so, and by how much?**

A: No. The Administration has rejected developing new technologies through a command-and-control type approach. Rather, we are seeking to develop appropriate market signals and maintain a robust marketplace to encourage our private sector to develop those technologies that will generate the greatest emissions reductions at the lowest cost. Historical rates of technology development have varied between 1 percent and more than 3 percent per year. While it seems likely that future development will proceed at similar rates, projecting the effects changes in technology will have on emissions reductions directly is fraught with ambiguity. Existing forecasts suggests, however, that costs with a greater rate of technological efficiency factored in will make it less expensive to achieve a 1990 level of emissions in 2010 than without relying on such changes.

12. Q: **Is the Administration committed to submitting for Senate advice and consent any agreement on climate change reached at the Third Conference of Parties this December in Kyoto, Japan? Are there any circumstances under which the Administration would not submit to the United States Senate any such agreement?**

A: The Administration would anticipate submitting for Senate advice and consent to ratification any agreement adopted in Kyoto that would impose new legally binding commitments on the United States. We do not envision any circumstances in which such a new legal instrument would not be submitted to the United States Senate for Senate advice and consent to ratification.

Senator Kerry

1. Q: **Based on the current scientific knowledge, how much concern should we have about the problem of climate change? Is the Administration using the best available science in making policy decisions?**

A: The Administration's concern about climate change is predicated on the best available scientific information. This includes not only the work of the Intergovernmental Panel on Climate Change (a group of more than 2000 scientists who contributed to an international assessment of the science, impacts, response options and economic issues of climate change), but also on the work of the U.S. domestic scientific establishment as reflected in governmental and non-governmental publications. This body of information, which in its totality represents the vast majority of all the scientific work on this complex and difficult issue, suggests that without significant action, over the course of the next 100 years, we will be faced with substantial

changes in the world's climate system, which could have enormous impacts on the human and natural systems. The Administration views (and believes that Congress and the American people should view) this as a matter for grave concern – not only for the future when these impacts will be felt, but now, when the opportunity still exists to prevent such changes.

2. Q: What is known about the impacts of possible climate change for the United States? In particular, is there any information available about the consequences of sea level rise, about changes in the availability of water and water resources, and possible implications for changes in disease vectors from a change in climate?

A: Human health, natural ecological systems, and socioeconomic systems are all sensitive to both the magnitude and the rate of climate change. The Intergovernmental Panel on Climate Change (IPCC) concluded in its 1995 Second Assessment that, "With the growth in atmospheric concentrations of greenhouse gases, interference with the climate system will grow in magnitude, and the likelihood of adverse impacts from climate change that could be judged dangerous will become greater."

Sea level rise. Global tidal gauge data shows that worldwide sea levels have risen 4 to 10 inches over the last century. Tidal gauge data from the US shows that sea levels have risen by as much as 3 feet over the last century in Louisiana and parts of California and Texas, to 1 foot along most of the Atlantic and gulf coasts. In Los Angeles, sea level has risen about 4 inches over the last 100 years.

The level of the sea is affected by geological and climate factors, although climate has historically had more substantial impacts on global sea level. Throughout geologic history, the sea level has risen and fallen over 1000 feet. Globally, this phenomenon is due to changes in the shape and size of ocean basins, the amount of water in the oceans and the average density of sea water. Over the last 100 years, tide gauges used to determine global sea level trends have shown global sea level to have risen about 4-10 inches. This rise is caused by thermal expansion of ocean water and melting of land-based ice sheets and glaciers. Regional changes in sea level vary from the global average because of other factors such as the independently increasing or decreasing elevation of the land due to tectonic activity, compacting of sediments, or subsurface pumping of petroleum or water. The net effect is referred to as relative sea level rise. Along some of the US Coast, the relative sea level rise has been closer to 12 inches.

Previous relationships between climate and sea level, and increasing concentrations of greenhouse gases, form the basis for expecting an accelerated rise in sea level. Increasing concentrations of carbon dioxide, methane, and other gases released by human activities could raise the earth's average temperature. A warmer atmosphere would retain more water vapor, intensifying the hydrologic cycle in coastal areas and over open ocean. Snow and floating ice would retreat, decreasing the extent to which sunlight is reflected into space, causing additional warming. These two feedbacks would amplify the direct warming from the greenhouse effect. The increased warming would accelerate the rate of sea level rise by expanding ocean water,

melting mountain glaciers, and causing ice sheets in Greenland and Antarctica to melt or discharge ice into oceans, and by depleting groundwater tables.

According to the Intergovernmental Panel on Climate Change, rising global temperatures are responsible for at least 2 to 5 inches of sea level rise, due to thermal expansion of ocean water and the retreat of mountain glaciers.

Estimates of future sea level rise. The amount by which sea level will rise will vary by location. For the global average, it is projected that sea level will rise 20 inches by 2100 (6-38 inches). The amount by which sea level will rise will vary considerably for different segments of the US coast line. In some cases local sea level rise will exceed the global average, in other cases it will be less than the global average. The following are examples for a few locations:

Location	2050	2100
Galveston, TX	1.5 feet	3 feet
Miami Beach, FL	9 inches	1.5 feet
Los Angeles, CA	6 inches	1 foot
Boston, MA	1 foot	2 feet
Grand Isle, LA	2.5 feet	4.5 feet

Why is it a problem if sea level rises? Sea level rise will have a significant effect on the natural environment, infrastructure in developed areas, and on local economies. When we speak of impacts to the natural environment, we are referring to coastal wetlands that will be unable to keep pace with rising sea level, resulting in overall loss in wetland areas, especially in developed areas; loss of beaches due to an increased rate of erosion and inundation; loss of significant habitat in wetlands, estuaries, coral reefs, bays, and wilderness; saltwater intrusion into groundwater and upstream movement of the salt-line in surface water; and increased estuarine salinity that will reduce circulation and decrease the amount of flushing, resulting in an increase in water pollution.

Impacts to infrastructure include damage or destruction of housing, resorts, and other coastal development; flooding of transportation facilities such as bridges, railways, airports and marinas; disruption of utilities for electricity, communication, water supply and sewer systems; and loss of cultural or historical assets such as national parks, monuments and cemeteries.

Finally, the impacts to the local economy include the cost of prevention and protection for natural and manmade environments; the cost of loss and damage to natural and manmade environments due to storm surge, flooding, erosion and inundation; and the loss of industry and employment in tourism, local business, factories, shipping and commercial fisheries.

Coastal wetlands. As the sea level rises, coastal wetlands will be disrupted in a number of ways. These include inundation, erosion, and saltwater intrusion. Specific changes include conversion from one type of vegetation to another within particular wetlands, or conversion of wetlands to open water. Losses of wetlands at specific sites along the coast will depend on the slope of the

land throughout the wetland and adjacent dryland, and whether developed areas lie beyond the wetland limiting the vacant land necessary for new marsh to form.

There could be a substantial loss of coastal wetlands in the United States. Wetlands along the low-lying coasts of the Southeast from North Carolina in the Atlantic to Texas in the Gulf of Mexico are already subsiding due to compression of estuarine or deltaic sediments by new layers of sedimentary deposits. These areas may be either flooded or washed away as water levels rise. About half of the 5.5 million acres of coastal wetlands that remain in the US are found along the Gulf of Mexico, making the potential for loss great.

Salt water intrusion due to accelerated sea level rise will affect estuarine systems in some areas of the North Atlantic and Pacific Oceans, including Puget Sound, San Francisco Bay, and Tijuana Estuary.

Wetlands along highly developed coasts, including much of the Atlantic coast from Maryland to Massachusetts, may become quite vulnerable to climate change because control structures such as sea walls and bulkheads already form barriers to migration. Along undeveloped coasts, the land just above sea level into which wetlands could migrate is generally smaller than the area of wetlands at risk from climate change.

Thus, much of the coastal wetlands may slowly shrink until they are eliminated as the sea rises and pushes them back to the flood-control structures already erected or to be constructed to protect coastal properties.

The loss of coastal wetlands will have a significant effect on the human and natural environment. Coastal wetlands provide a variety of services, such as nursing grounds for many types of fish and shellfish, a resting place for migratory birds, and natural cleansing of ground and surface waters. These services will be diminished or eliminated. Coastal wetlands also protect inland areas from floods, storms and high tides. In many developing nations, wetlands provide the only effective barrier to surges from tropical storms.

Water resources. Climate change will likely have significant impacts on water quality and availability. Precipitation changes and increased evaporation can affect water supplies, water quality and drinking water, and water uses (e.g., hydropower, irrigation, fisheries).

It is expected that climate change will lead to an intensification of the hydrologic cycle. Not only is average global precipitation expected to increase, but the intensity of precipitation events will also likely increase leading to more floods. Droughts are also likely to be more severe due to increased evaporation and drier soils.

Although average global precipitation is expected to increase, there will be a regional "texture" to precipitation changes across the United States. Average annual water supplies may decrease significantly for large areas of the United States, resulting in lower levels in lakes, rivers, and aquifers. This would alter flood and shore erosion patterns, impair navigation, reduce hydropower generation, restrict irrigation and municipal water supplies, cause saltwater intrusion

into freshwater rivers and aquifers, and disrupt wetland and shore ecologies. The regions most vulnerable are the Great Basin, California, Missouri, Arkansas, Texas Gulf, Rio Grande, and Lower Colorado.

Changes in disease vectors. Infectious diseases are still the leading cause of death worldwide, killing over 17 million people in 1995, including nine million young children. Vector-borne diseases (i.e., diseases transmitted by insect "vectors" or small mammal "reservoir hosts") account for a large proportion of these deaths. For example, there are 350 to 500 million new cases of malaria annually; an estimated two million people die from malaria each year, including more than one million children in Africa. While there are relatively few cases of malaria in the United States, recent locally-transmitted cases in New Jersey, New York, and Texas demonstrate the continued risk for transmission of this disease.

The geographic range and life-cycles of pathogens and vectors (e.g., mosquitoes) which transmit disease are affected by climate. Many biological organisms and processes that contribute to the spread of infectious diseases are influenced by fluctuations in the weather, notably temperature, precipitation, and humidity. Outbreaks of infectious diseases (e.g., malaria, hantavirus, St. Louis Encephalitis) have been associated with specific weather patterns.

Frequently, outbreaks of infectious disease follow seasonal patterns related to the life cycle of disease pathogens and vectors. (Mosquitoes, for example, are dormant during one stage of their life cycle in order to survive winter or drought.) In this context, the projected rise in minimum temperatures (i.e., at night and during winter) relative to increases in average global temperature is of particular concern. The increased warming expected in temperate areas, such as North America, also favors the spread of infectious diseases to higher latitudes and altitudes.

The IPCC concluded in its 1995 Second Assessment that climate change would, in aggregate, increase the potential transmission of many vector-borne diseases. In North America, climate may become more suitable the northward spread of vector-borne infectious diseases, with potentially enhanced transmission dynamics due to warmer ambient temperatures. Conditions suitable to the transmission of diseases currently prevalent in the tropics (such as Dengue fever) may become more prevalent in areas of the southern U.S., such as Texas. (For example, recent work by Focks et al. [1995] suggests that the number of weeks during which weather conditions would be suitable for the transmission of Dengue fever would increase in many U.S. cities as average temperatures increase.) Other diseases, such as Rocky Mountain Spotted Fever (RMSF) may decline in the southern U.S. due to the intolerance of the tick vector to high temperatures and lower humidity. However, increased risk of both Lyme disease and RMSF, however, could be expected to be found at higher latitudes in Canada.

While health-care infrastructure may prevent a large increase in disease cases, climate change is expected to impose increasing demands and costs on the current public health system.

3. Q: What are other countries' position on the climate change issue? Other OECD countries? Are these countries taking action to mitigate climate change?

A: More than 160 countries are participating in the ongoing negotiation for a new agreement under the United Nations Framework Convention on Climate Change (FCCC). It is possible to group country positions into several different categories – although it must be recognized that each country has specific and often different circumstances that may distinguish it within its group. Six groups are discussed here: the European Union; the "JUSCANZ" group (including all OECD countries not part of the EU); the EITs (countries with economies in transition to market economies, including eastern Europe and the Former Soviet Union); the Alliance of Small Island States (AOSIS); the OPEC group; the big developing countries (including China, India, and Brazil), which strongly influence the positions of the developing country bloc.

EU With fifteen members states, the EU is often hard pressed to reach a consensus on some of the difficult issues in the climate change debate. However, they have announced their support for a target of Annex I Parties of a 15 percent reduction iO2 emissions by 2010, and a 71/2 percent reduction by 2005. Current data suggests that as a group, the EU will be close to returning to 1990 levels by 2000, although this is largely the result of significant reduction by Germany and the UK; most other countries will individually exceed 1990 levels at the end of the decade. Nearly all countries have taken actions to reduce emissions; all have submitted their first communication, and nearly half are in the process or have completed their second national communication detailing programs and policies that are being taken to mitigate climate change. As a bloc, this group supports a legally binding target, supports joint implementation (although only with countries that have a binding cap), and supports including advanced developing countries (specifically Mexico and Korea) in Annex I. They have argued that the next step should focus on developed country action, and that only following such steps should developing countries be obligated to act.

JUSCANZ (including Canada, Japan, Australia, New Zealand, Iceland, Norway, Switzerland). This group supports position closest to those of the United States. They have endorsed emissions trading, and joint implementation (although with some hesitation), they have endorsed the notion of a multi-year budget, and they have generally been supportive of action for developing countries (although Japan, Norway and Switzerland have been reluctant to push too hard on this front). As a group, these countries anticipate their 2000 emissions will exceed their 1990 levels by more than 10 percent, and each anticipates further growth unless new policies are initiated. Both Norway and Switzerland have proposed legally binding caps on emissions at 10 percent below 1990 levels by 2020. This group of countries has also been the most vocal in support of "differentiation," in which countries would take different levels of commitments as a function of national circumstances. For most, this means their own circumstances would dictate reduced levels of commitments from the Annex I average.

EITs This group of countries' emissions will be substantially below 1990 levels in 2000, and are not expected to return to 1990 levels until approximately 2010. They anticipate having emissions to "sell" under a trading regime – and have been strong supporters of a trading regime. These countries have supported maintaining the provisions in the FCCC that allow EITs some

"flexibility" in implementing their obligations, arguing that their recovery from the collapse of the early 1990's will take time and is a priority. While as a group they are taking some actions to reduce emissions, most actions are in the nature of energy efficiency improvements, and not actions specifically taken for climate change reasons.

AOSIS This group of 37 small island states and low lying coastal countries has been a strong supporter of stringent action to mitigate climate change. Threatened by sea level rise, many of these countries have maximum elevations of less than 3 meters above sea level. However, in spite of their strong rhetoric, these countries have not supported developing country commitments, arguing that developed countries are responsible for the problem and need to act first to find solutions. This group has advocated the most stringent target so far proposed: a 20 percent reduction in CO2 emissions by Annex I Parties below 1990 levels by 2005. They have opposed joint implementation, and have been ambivalent on the issue of emissions trading.

OPEC Concerned that efforts to reduce global emissions will lead to a global reduction in the amount of oil consumed, these countries have opposed action to address climate change. They have also introduced the concepts of a compensation fund, in which countries harmed by climate change mitigation efforts would be compensated for their economic hardship. To date, few countries outside of the OPEC group have supported this proposal. These countries have taken little action at home to reduce emissions, and none have yet released their first national communications detailing their greenhouse gas inventories. They have opposed joint implementation and been silent on the issue of emissions trading.

Big Developing Countries These countries often crate the defining voice for the developing country caucus, in spite of protests from both AOSIS and OPEC. In spite of the projections of climate change which show significant damage to India, China and Brazil from significant climate change, these countries have long argued that efforts to solve the climate change problem are the sole responsibility of the developed world, which due to its large share of historic emissions, should also take on the bulk of the mitigation effort. The group has opposed joint implementation, been silent on emissions trading, and been adamantly opposed to any action by developing countries in the agreement in Kyoto. In spite of their rhetoric, many in this group have taken significant action to mitigate climate change. The United States has undertaken country studies with China, and has worked bilaterally with India and Brazil in their greenhouse gas inventory work, and in the development of policies and measures to reduce emissions. While emissions from each are anticipated to rise substantially as their economies grow, all have begun to move off the emissions intensive path predicted without these efforts.

4. Q: **What information is available on the impacts of joint implementation and emissions trading on the costs of mitigating climate change? What is the Administration doing to ensure that these cost-effective options are included in any agreement in Kyoto?**

A: All economic analyses done to date indicate a significant reduction in costs from the flexibility provided in both emissions trading and joint implementation. Some analyses done suggest that as much as 30 percent of the costs may be eliminated if emissions trading is allowed, and up to 70 percent of the costs may be eliminated if joint implementation is allowed. While these may be optimistic estimates, they provide a strong rationale for including both options in any agreement. It is in light of these kinds of analyses that the Administration has included both in its draft protocol, and that active diplomatic efforts are underway to persuade other countries to endorse these cost-saving approaches. A number of problems have been identified with both options – and it is addressing these concerns that has been the target of both our domestic and international effort. A number of projects in the U.S. Initiative on Joint Implementation are designed to address questions about "additionality" to insure that projects really produce environmental results, and are not merely repackaging of activities that would have occurred anyway. With respect to emissions trading, the United States has sponsored or co-sponsored a number of international workshops to develop methodologies for emissions trading, and to bring together those with expertise in trading programs (many of which were developed in the United

States) with representatives of other countries seeking information. We anticipate that these efforts will ultimately prove effective in bringing an international consensus to our proposals.

5. Q: **Please describe the Administration's efforts to seek input from the private sector, the environmental community, and other interested constituencies in developing its climate change policy.**

A: The Administration has maintained a long standing effort to obtain the views of various constituencies during the course of the climate negotiations. Open meetings typically have been held both before, during, and after major negotiating sessions to discuss relevant issues. Informal roundtables with both industry and environmentalists have also been held prior to major negotiating events. Within the past two months, the President has been directly involved in a series of meetings with scientists, industry and environmental leaders to discuss climate change. Various Cabinet officials have also been meeting with a broad range of constituency groups.

Responses to Senator Chafee's Questions

1. The President and his Administration are still going through a process of hearing the opinions of the many interested parties on this issue. This process will culminate with a White House Conference in October on the climate change issue.

However, the framework for the Administration's policy has been largely settled. For example, we support the use of flexible approaches, such as joint implementation and international emissions trading. We support the requirement that non-Annex I countries, as they become wealthier, abide to binding emissions goals. For domestic implementation, we support the use of flexible, market based approaches. The Administration is still deciding the details on targets and timetables and domestic implementation.

2. No one model, or even a small set of models, can give a precise estimate of the effects of a policy on the economy 20 or 30 years into the future. However, a vast array of economic tools exists to provide us with a solid interpretation of the likely effects of climate policy. For example, we know that a market based approach to reducing carbon emissions will be less costly than a command and control approach. The economic literature on climate change is very rich, and we realize that we need to draw from all of it in order to adequately inform policy development. A large, complicated issue requires more than one or a few tools to assess it. The Administration intends to bring to bear on the climate issue many tools. Some of these tools may have strengths on issues where the models used in the IAT analysis were weak. While this larger set of tools will not provide us with a precise estimate of the effects of climate policy on the economy in 20 or 30 years, I am confident they can provide us with sufficient information to generate ranges of economic effects so the Administration can make informed policy decisions.

3. The Administration is considering an array of market based approaches to implement climate policy.

4. Tradeable emissions permits and energy taxes share several important characteristics. First, they both send a price signal to markets that would stimulate the development and adoption of energy efficient technologies. Second, they both provide flexibility to achieve emissions goals. In the case of tradeable permits, firms that find it very costly to reduce emissions may purchase permits from firms that find it less costly. In the case of taxes, firms would reduce their energy use until it became more costly than the tax. These both achieve emissions reductions at lower costs than through command and control approaches.

Tradeable emissions permits provide greater certainty to attain a specified emissions cap than energy taxes. By specifying a number of permits and allowing firms to trade these permits, the country can ensure that it is meeting an agreed upon carbon emissions goal. If a tax were not set at the right price, then the country may emit too much carbon, and miss the emissions goal, or emit too little carbon, and be more costly than the tradeable approach to complying with an emissions goal.

The certainty associated with the meeting an emissions goal translates into uncertainty for the firms participating in a carbon reduction policy. Under energy taxes, firms know, based on their own costs or production, how much a tax policy would cost them. However, they have less certainty about how much a tradeable permits policy would cost them until the permit market begins operation and establishes a price for the permits.

5. For international emissions trading, all countries participating in the trading scheme will need to have their emissions capped. For joint implementation, all countries may participate, regardless of when their emissions will be capped.

International emissions trading ~~and joint implementation~~ can ~~both~~ significantly decrease the costs of meeting an emissions goal. ~~These flexibility instruments take advantage of~~ opportunities to reduce emissions at low costs. If some of the emissions reductions necessary to achieve the U.S. goal can be undertaken in other countries at lower costs, then ~~our implementation~~ costs will fall. In both the IAT analysis and other modeling efforts, the costs of achieving a variety of emissions goals are modeled to decrease substantially under joint implementation and international trading relative to scenarios with neither instrument. Some studies indicate that the costs could decrease by more than half.

6. ~~Our experience after the Arab Oil Boycotts of the 1970s demonstrated that improvements~~ in energy efficiency occur primarily because of the effects of higher energy prices. Granted, some energy efficiency improvement does occur without a market signal. For ~~example~~, if I decide to replace my 20 year old refrigerator, it is impossible for me to purchase a new refrigerator that requires the same high level of energy -- the technology of refrigerators has improved so much over the past two decades that ~~the new~~ purchase automatically results in an improvement in energy efficiency. However, the economic literature indicates that the majority of energy ~~efficiency improvement~~ is price-driven. ~~The market signal necessary to stimulate the adoption of technologies that generate less greenhouse gas should be provided through a flexible, market-based approach. A command and control approach that mandates specific technologies~~

7. As the question notes, some observers of the climate change issue have claimed that capping only developed countries' emissions will result in "leakage": the escape of jobs, capital, and polluting activity to developing countries. Any time countries negotiate international treaties that would apply different rules to different countries, there is a concern about some countries gaining a competitive advantage. However, the economic evidence does not support the argument that climate policy will adversely affect U.S. economic competitiveness. First, non-tradeable sectors account for a substantial share of carbon emissions. Transportation and residential and commercial buildings account for approximately two-thirds of U.S. carbon emissions. For these sectors, the "competitiveness" argument does not appear applicable. Second, energy costs comprise only a small percentage of total manufacturing costs. According to the 1995 Annual Census of Manufacturers, energy costs for manufacturing industries averaged just 2.2% of total costs. Given the small share of energy in total costs, differential shifts in existing energy prices are unlikely to have substantial effects on location decisions and trade flows. Third, our

that energy use relative to GDP falls each year regardless of the price signal by .5 to 1.25 percent. To the extent that energy use is associated with climate change effects, ~~[illegible]~~ and this causes damages not ~~[illegible]~~ reflected in market prices, this innovation ~~[illegible]~~ is unlikely to be sufficient. Additional incentives to innovation, such as price signals, ~~[illegible]~~ or ~~[illegible]~~ support for R+D may be needed. (?)

significant

experience in this country with environmental regulation has been that it does not cause leakage. Firms that decide to relocate to other countries do so because of international differences in labor costs, capital costs, material costs, and exchange rate changes that all swamp the costs of complying with environmental regulations.

To address the possibility of leakage occurring, we should do climate policy smart. If we do it dumb, it will cost our economy a lot. By doing it smart, through flexible, market-based approaches, we will make the costs of complying with an emissions goal much lower. In addition to using market-based approaches domestically, joint implementation and international emissions trading would also lower the costs of climate policy. These lower costs associated with a smart climate policy would decrease the economic rationale for industries to move to developing countries.

Responses to Senator Boxer's Questions

1. ~~Refer to the answer to~~ As stated in my answer to question 7 of Senator Chafee's questions. copy here that answer.

2. The costs of reducing emissions in the U.S., and in Europe and Japan depend on how all of these countries implement their policies. If the U.S. employs a market based approach, the costs will not be that high relative to Europe and Japan. Regardless of the implementation approaches used in these countries, the costs of emissions reductions are not likely to affect U.S. competitiveness. As noted ~~in the answer to question 7 of Senator Chafee's questions,~~ a study, energy costs comprise a small share of total manufacturing costs (2.2%). Further, two-thirds of carbon emissions occur in non-tradeable sectors. The evidence on energy price differentials across countries suggests that they are not sufficient to spur firm relocation to other countries.

3. The IAT report did not focus on the benefits of reducing greenhouse gas emissions. Without a benefits assessment, the IAT could not provide estimates of the positive effects on human health and the environment. In addition, the IAT did not study the effects of the risks of climate change on economic activity. However, the report did assess the impacts of climate policy on the economy. The IAT analysis confirms other economic research (for example, the recent report by the World Resources Institute) that smart climate policy can actually lead to net benefits in the long term. The 2300 signatories of the economist statement noted that some policy options "may, in fact, improve U.S. productivity in the long run." For example, the IAT analysis found that auctioning off tradeable permits and using the proceeds of the auction to lower income and corporate taxes would help the economy grow faster in the future than without climate policy.

not equivalent to net benefits.

4. IAT actually notes that a 5 year delay is bad -- why? ?

5. It is very difficult to assess the nature of the economy, and especially specific industries, 20 or 30 years into the future. If the country embarked on a policy of reducing carbon emissions, obviously the firms and industries that can creatively and cost-effectively reduce their emissions will benefit relative to their competitors. This illustrates the importance of flexible, market-based approaches. A stringent, command and control approach would constrain the private

sector's creativity to achieve the goals of a climate policy. As we learned through our experience with the sulfur dioxide emissions tradeable permit market, a flexible approach provides the correct incentives for pollution control investment and other creative methods of decreasing sulfur dioxide emissions. To reduce carbon emissions, it is reasonable to envision that the products and services of industries that develop energy efficient technologies and industries that develop low-carbon based energy (such as renewable energy sources including wind, solar, and biomass) would be in greater demand.

Responses to Senator Lieberman's Questions

1. The Administration's analysis on the issue of climate policy has not occurred in a vacuum. In fact, climate change has been one of the more active areas of research in economics this decade. The economic literature on climate change, complemented by the IAT report, has already done quite a lot to inform the policy development process. Based on the economic research, we have identified some of the important characteristics of the climate policy we will develop: joint implementation, international emissions trading, developing country participation, emissions budgets, and market-based, flexible domestic implementation. My interpretation of the role of economics differs -- I believe economics has informed the process, and I am confident that it will continue to play an important role in our country's deliberations over a climate policy position.

2. ~~Refer to~~ As stated in the answer to question 2 of Senator Chafee's questions, Repeat answer here.

Responses to Senator Chafee's Questions

1. The President and his Administration are still going through a process of hearing the opinions of the many interested parties on this issue. This process will culminate with a White House Conference in October on the climate change issue.

However, the framework for the Administration's policy has been largely settled. For example, we support the use of flexible approaches, such as ~~joint implementation and~~ international emissions trading. We support the requirement that non-Annex I countries, as they become wealthier, abide to binding emissions goals. For domestic implementation, we support the use of flexible, market based approaches. Although the President has spoken of the need for realistic achievable targets, the Administration is still deciding the details on targets and timetables and domestic implementation.

2. No one model, or even a small set of models, can give a definite estimate of the effects of a policy on the economy 20 or 30 years into the future. However, a vast array of economic tools exists to provide us with a basis for informed judgment about the likely effects of different climate policies. For example, we know that a market based approach to reducing carbon emissions will be less costly than a command and control approach. The Administration intends to bring to bear on the climate issue many analytic tools and perspectives. Some of these may have strengths on issues where the models used in the IAT analysis were weak. I am confident that the analytic tools and perspectives available to the Administration can provide us with sufficient information to generate ranges of economic effects so that the Administration can make informed policy decisions.

3. The Administration is considering an array of market based approaches to implement climate policy.

4. Tradeable emissions permits and energy taxes share several important characteristics. First, they both send a price signal to markets that would stimulate the development and adoption of energy efficient technologies. Second, they both provide flexibility to achieve emissions goals. In the case of tradeable permits, firms that find it very costly to reduce emissions may purchase permits from firms that find it less costly. In the case of taxes, firms would reduce their energy use until it became more costly than the tax. These both achieve emissions reductions at substantially lower costs than through command and control approaches.

Tradeable emissions permits would provide greater certainty than energy taxes of attaining a specified emissions cap. By specifying a number of permits and allowing firms to trade these permits, the country can ensure that it is meeting an agreed upon carbon emissions goal. A tax, on the other hand, would provide greater certainty than a cap-and-trade approach of limiting costs, since the increase in unit costs would be determined by the tax.

5. For international emissions trading, all countries participating in the trading scheme will need to have their emissions capped.

International emissions trading can significantly decrease the costs of meeting an emissions goal. It would provide greater opportunities to reduce emissions at low costs. If some of the emissions reductions necessary to achieve the U.S. goal can be undertaken in other countries at lower costs, then U.S. emissions control costs will fall. In both the IAT analysis and other modeling efforts, the costs of achieving a variety of emissions goals could decrease by more than half.

For joint implementation, all countries may participate, regardless of when their emissions will be capped. Lower cost abatement opportunities abroad again suggest substantial savings to the U.S. could result if U.S. companies could receive credit for incremental abatement efforts in other counties.

6. Some innovation surely occurs in the absence of a price signal. Many studies suggest that energy use relative to GDP falls each year regardless of the price signal by 0.5 to 1.25 percent. To the extent that energy use is associated with climate change effects, and this causes damages not reflected in market prices, this innovation is unlikely to be sufficient. Additional incentives to innovation, such as price signals, or support for R&D may be needed.

7. As the question notes, some observers of the climate change issue have claimed that capping only developed countries' emissions will result in "leakage": the escape of jobs, capital, and polluting activity to developing countries. Any time countries negotiate international treaties that would apply different rules to different countries, there is a concern about some countries gaining a competitive advantage. However, the economic evidence does not support the argument that climate policy will adversely affect U.S. economic competitiveness. First, non-tradeable sectors account for a substantial share of carbon emissions. Transportation and residential and commercial buildings account for approximately two-thirds of U.S. carbon emissions. For these sectors, the "competitiveness" argument does not appear applicable. Second, energy costs comprise only a small percentage of total manufacturing costs. According to the 1995 Annual Census of Manufactures, energy costs for manufacturing industries averaged just 2.2% of total costs. Given the small share of energy in total costs, differential shifts in existing energy prices are unlikely to have substantial effects on location decisions and trade flows. Third, our experience in this country with environmental regulation has been that it does not cause significant leakage. Firms that decide to relocate to other countries do so because of international differences in labor costs, capital costs, material costs, and exchange rate changes that all swamp the costs of complying with environmental regulations.

To address the possibility of leakage occurring, we should do climate policy smart. If we do it dumb, it will cost our economy a lot. By doing it smart, through flexible, market-based approaches, we will make the costs of complying with an emissions goal much lower. In addition to using market-based approaches domestically, joint implementation and international emissions trading would also lower the costs of climate policy. These lower costs associated with a smart climate policy would decrease the economic rationale for industries to move to developing countries.

Responses to Senator Boxer's Questions

1. As stated in my answer to question 7 of Senator Chafee's questions, some observers of the climate change issue have claimed that capping only developed countries' emissions will result in "leakage": the escape of jobs, capital, and polluting activity to developing countries. Any time countries negotiate international treaties that would apply different rules to different countries, there is a concern about some countries gaining a competitive advantage. However, the economic evidence does not support the argument that climate policy will adversely affect U.S. economic competitiveness. First, non-tradeable sectors account for a substantial share of carbon emissions. Transportation and residential and commercial buildings account for approximately two-thirds of U.S. carbon emissions. For these sectors, the "competitiveness" argument does not appear applicable. Second, energy costs comprise only a small percentage of total manufacturing costs. According to the 1995 Annual Census of Manufacturers, energy costs for manufacturing industries averaged just 2.2% of total costs. Given the small share of energy in total costs, differential shifts in existing energy prices are unlikely to have substantial effects on location decisions and trade flows. Third, our experience in this country with environmental regulation has been that it does not cause significant leakage. Firms that decide to relocate to other countries do so because of international differences in labor costs, capital costs, material costs, and exchange rate changes that all swamp the costs of complying with environmental regulations.

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2. The costs of reducing emissions in the U.S., and in Europe and Japan depend on how all of these countries implement their policies. If the U.S. employs a market based approach, the costs will not be that high relative to Europe and Japan. Regardless of the implementation approaches used in these countries, the costs of emissions reductions are not likely to affect U.S. competitiveness. As noted above, energy costs comprise a small share of total manufacturing costs (2.2%). Further, two-thirds of carbon emissions occur in non-tradeable sectors. The evidence on energy price differentials across countries suggests that they are not sufficient to spur firm relocation to other countries.

3. The IAT report did not focus on the benefits of reducing greenhouse gas emissions. Without a benefits assessment, the IAT could not provide estimates of the positive effects on human health and the environment. In addition, the IAT did not study the effects of the risks of climate change on economic activity. However, the report did assess the impacts of climate policy on the

economy. The IAT analysis confirms other economic research (for example, the recent report by the World Resources Institute) that smart climate policy can actually lead to net benefits in the long term. For example, the IAT analysis found that auctioning off tradeable permits and using the proceeds of the auction to lower income and corporate taxes would help the economy grow faster in the future than without climate policy.

4. The longer we wait to take any action can adversely affect the economic and environmental outcomes of climate policy. However, we do know that more gradual efforts to reduce our carbon emissions can lower the economic costs relative to very aggressive reductions efforts while still achieving the same carbon dioxide concentration goal. For example, some international proposals to reduce carbon emissions would have Annex I countries cutting emissions to 20% below 1990 levels by 2005. Such a target would have very substantial economic costs because it does not provide enough time for the capital stock to turn over. It is very expensive to scrap the existing capital stock, while much of it is in the prime of its life, and replace it with carbon-free technology. Further, such a target would require the economy to employ existing low-carbon and carbon-free technologies while longer-term targets would provide more lead time to develop and implement superior technologies. Given that it is the stock of carbon dioxide, not the annual emissions of carbon dioxide, that drive global warming, there is an opportunity to be flexible in the timing of emissions reductions. Less aggressive paths that 1990 -20% emissions level by 2005 could achieve the same carbon dioxide concentration stabilization goal in the year 2100 by increasing carbon reductions in the future when they are less costly to the economy.

5. It is very difficult to assess the nature of the economy, and especially specific industries, 20 or 30 years into the future. If the country embarked on a policy of reducing carbon emissions, obviously the firms and industries that can creatively and cost-effectively reduce their emissions will benefit relative to their competitors. To reduce carbon emissions, it is reasonable to envision that the products and services of industries that develop energy efficient technologies and industries that develop low-carbon based energy (such as renewable energy sources including wind, solar, and biomass) would be in greater demand.

Responses to Senator Lieberman's Questions

1. The Administration's analysis on the issue of climate policy has not occurred in a vacuum. In fact, climate change has been one of the more active areas of research in economics this decade. The economic literature on climate change, complemented by the IAT report, has already done quite a lot to inform the policy development process. Based on the economic research, we have identified some of the important characteristics of the climate policy we will develop: joint implementation, international emissions trading, developing country participation, emissions budgets, and market-based, flexible domestic implementation. My interpretation of the role of economics differs -- I believe economics has informed the process, and I am confident that it will continue to play an important role in our country's deliberations over a climate policy position.

2. As stated in my answer to question 2 of Senator Chafee's questions, no one model, or even a small set of models, can give a definite estimate of the effects of a policy on the economy 20 or 30 years into the future. However, a vast array of economic tools exists to provide us with a basis for informed judgment about the likely effects of different climate policies. For example, we know that a market based approach to reducing carbon emissions will be less costly than a command and control approach. The Administration intends to bring to bear on the climate issue many analytic tools and perspectives. Some of these may have strengths on issues where the models used in the IAT analysis were weak. I am confident that the analytic tools and perspectives available to the Administration can provide us with sufficient information to generate ranges of economic effects so that the Administration can make informed policy decisions.