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GCC [Global Climate Change] CEQ [Council on Environmental Quality] / NEC [National Economic Council] April/May 1997

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THE WHITE HOUSE
WASHINGTON

NEC PRINCIPALS' MEETING
April 1, 1997
5:00 p.m., Room 472

Agenda

I. Introduction

- a. Update on Budget
- b. Update on Financial Services Modernization
- c. Update on Comp Time
- d. Update on Welfare-to-Work CEOs
- e. Other Issues

Eric Ely Segal help create
9:30 wed. mtg.

Gene:
China for Ex O ngr
defin. reselected. Sect. 5

II. Process on Energy/Environmental

- a. PM/Ozone
- b. Electricity Restructuring
- c. Climate Change

Thurs. Apr. 10 mtg.

maybe
FR 3:45 Katzen VNEE
if next wk
C willman Deps group

III. Poverty Measurement Issues

Dominika

Frank R. OMB will chair. need to update measure

IV. China Bilat. deficit

V. Update on Denver Summit

VI. NAFTA Trucks

3 progress on trailers.
Small package issues remain.

OPTION 1 - 90% by 2010 and reduce thereafter: Reduce greenhouse gas emissions to 90% of 1990 levels by a multi-year period around 2010 and to lower levels thereafter.

OPTION 2 - Stabilize by 2010 and reduce thereafter: Reduce greenhouse gas emissions to 1990 levels by a multi-year period around 2010 and to lower levels thereafter.

OPTION 3 - 110% by 2010 and stabilize by 2020: Reduce greenhouse gas emissions to 110% of 1990 levels by a multi-year period around 2010 and to 1990 levels by a multi-year period around 2020.

White House Climate Change Task Force

duvr.

734 Jackson Place, NW • Washington, DC 20503

Meeting Notice

This Friday we will provide base-case climate science and economics briefings, and announce next steps for peer review and public release of modeling results.

Times and locations:

- **Congressional Brief:** 10 - 12 AM Friday, April 25 In S 116 (Open To House And Senate Climate Staff)
- **Public Brief:** 2 - 4 PM. Friday. April 25 In The Department Of Commerce - Auditorium

Presenters and agenda:

- **Dirk Forrister**, chair of the White House Climate Change Task Force, will provide an overview and introduce the presenters.
- **Dr. Rosina Bierbaum**, White House Office Of Science And Technology Policy, will provide a base-level analysis of past, present and future greenhouse gas emission levels and atmospheric concentrations.
- **Tom Karl**, NOAA National Center For Climatic Data Research, will provide analysis of past climate changes in the US in the context of increasing concentrations of greenhouse gasses, and discuss potential future climate changes. Much of Tom's work is published in the most recent issue of Scientific American.
- **Dr. Ev Ehrlich**, Under Secretary Of Commerce will present economic baselines for the US and its major energy-using sectors and key assumptions for the base case. He will also announce plans for peer review of action-based scenario results, and public release.

Contact: Tom Peterson (202) 343-1060

4/23 Draft

Messages

Without action to address greenhouse gas emissions, global emissions and concentrations rise significantly.

For our nation, rising concentrations offer signs of potential impacts that prompt our concerns for an enhanced greenhouse world.

The U.S. and most other countries will miss our aim of returning to 1990 levels by 2000, which is prompting us to push for an improved international policy framework in Kyoto.

We are engaged in a thorough economic analysis that begins with mainstream energy, environmental and economic baselines described today.

From this baseline information, we are running a comprehensive set of modeling scenarios to inform decisions on level, timing and flexibility of policy approaches.

This work is being reviewed by 12 independent economic modeling experts to ensure that it benefits from peer critique.

OUTLOOK AND PRIORITIES: CLIMATE CHANGE OUTREACH

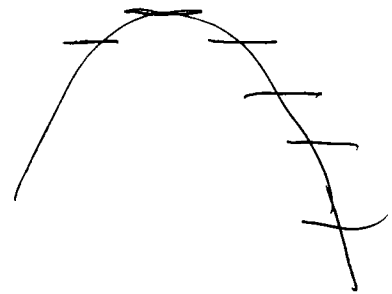
1. **Economic and Science Base Case Briefings.** Ev Ehrlich, Rosina Bierbaum and Tom Karl will brief congressional staff (10 am) and interest groups (2 pm) on Friday, April 25.
 - Science brief for farm groups on Thursday.
 - Science press availability for Tom Karl (also Albritton, Bierbaum?) on Thursday, due to interest following President & Vice President's remarks on Earth Day.
 - VP Op Ed offered to several major papers.
2. **Joint Implementation Recognition Ceremony.** Bob Dixon & USIJI team coordinating. No cabinet officials available because of conflicts with PCSD and Service Summit.
 - *Are agencies interested in sending Deputy or Assistant Secretaries to speak about importance as component of policy?*
3. **Climate Change Analysis Workshop.** Early June. Need a working group to plan and conduct the workshop.
 - *Should we begin with Gardiner proposal as basis for planning? Who is willing to be logistics lead?*
4. **Industrial Impacts: Strategic Focus.** Hunker effort needs "swat team" to gain closure. Interesting overtures from industry groups ready to offer constructive input.
 - *Should we have public involvement effort on strategic industries prior to finalizing draft?*
5. **Strategic Planning Session on Outreach.** The priority events above fit into a complex negotiating and issue management effort. A coordinated strategic planning "off site" could save us major time later. Our first attempt to schedule became infeasible, but we are interested in trying again with more notice.
 - *Who would like to participate in this type of planning session?*

Handouts

- President and Vice President Earth Day Remarks and Clips
- Ehrlich's Briefing Materials
- Calendar of Upcoming Events
- Notional Scope of June Workshop
- Vice President's Japan Speech
- Senator Chafee's Speech

CLIMATE CHANGE
Meeting Agenda -- April 23, 1997

7 x 3 hrs.



- I. Overview of Economic Modeling
- II. Overview of Outreach Activities
- III. Deputies Decision Memo
- IV. Frankel Proposal for Coal Subsidy Ban

Sendel Box Nil send
456(S46) cuts
 to all.

High probability of CE timing
we're enjoy you all.
but sometimes one hears "those EACC people
are just interested in"

~~if no unexp.~~

1. Leaving aside uncertainties + compliance, want a reasonable, practical path
2. Unforeseeably slow or rapid progress (e.g. techn.)
3. Compliance: when a country falls outside target path, want to preserve some incentives for them to get back in.

Date: Tue, 22 Apr 1997 12:23:49 -0500
From: Kelly Sims <ksims@ozone.org>
Subject: Clinton on Floods/Global Warming
To: uscan-talk@igc.apc.org
Sender: owner-uscan-talk@igc.org

>From CNN this morning:

WASHINGTON

(AllPolitics, April 22) --
Before he departed this morning for the flood-ravaged upper Midwest, President Bill Clinton called for intensifying the research into links between global climate change and destructive weather.

Clinton, who will tour devastated Grand Forks, N.D., by helicopter and meet with evacuees, said it will take more research to find if there is a link between weather disasters and global warming.

"We do not know ... for sure that the warming of the earth is responsible for what seems to be a substantial increase in highly disruptive weather events, but many people believe that it is," Clinton said. "And we have to keep looking into it. We have to find the best scientific evidence we have. And we have to keep searching for the answers to this."

Clinton and Vice President Al Gore used the occasion to mark the 27th observance of Earth Day, also announcing an expansion of the right-to-know law

that allows people to learn about toxic substances that industries release in their communities.

"We're giving them the most powerful tool in a democracy -- knowledge," Clinton said.

Federal authorities are expanding the 10-year-old law to cover seven new industries, including mining, electrical utilities and hazardous waste treatment.

Clinton said making the information available is "one of the best things we can do in Washington to protect the environment."

"In the decade that it [the law] has been on the books, citizens have joined with government and industry to reduce the release of toxic chemicals by 43 percent," the president said.

**Kelly Sims, Science Policy Director
Ozone Action
1636 Connecticut Avenue, NW
Third Floor
Washington, DC 20009 USA
Voice: (202) 265-6738
Fax: (202) 986-6041**

Date: 04/22/97 Time: 10:19
CClinton expands campaign against polluters

WASHINGTON (AP) Suggesting that global warming may be to blame for this year's severe floods, President Clinton today expanded an "early warning system" for detecting toxic chemicals in the environment.

Under new regulations in the decade-old "Community Right to Know" program, seven additional industries and 6,100 new facilities will be forced to disclose the levels of toxic chemicals they release into the air, water and land.

"By expanding community right-to-know, we're giving Americans a powerful, very powerful early-warning system to keep their children safe from toxic pollution," the president said. "We're giving them the most powerful tool in a democracy knowledge."

With Vice President Al Gore at his side on the White House lawn, Clinton timed the announcement to coincide with today's 27th annual Earth Day celebration. The president was to have unveiled the news at an environmental fair along Washington's endangered Anacostia River but instead decided at the last-minute to tour the flooded upper Midwest.

Gore was substituting for the president at the outdoor Anacostia celebration that was expected to draw 1,000 local schoolchildren to learn about the polluted river and cleanup efforts.

Speaking to reporters before his departure for Grand Forks, N.D., Clinton questioned whether global warming had anything to do with this year's severe floods.

"We do not know for sure that the warming of the earth is responsible ... but many people believe that it is and we have to keep looking into it," he said.

"Every American has noticed a substantial increase in the last few years of the kind of thing we're going to see in North Dakota today, and if there is a larger cause that can be eased in the future, we ought to go after that solution."

Clinton's right-to-know directive expanded the information required of companies already disclosing how much pollution they emit and increased by about 30 percent or 6,100 sites the number of industrial facilities required to file reports.

He also added seven industrial categories, including some which used mercury, lead and arsenic, to the 20 that already report on toxic releases. The new categories are metal mining, coal mining, electric utilities, commercial hazardous-waste treatment, petroleum bulk terminals, chemical wholesalers and solvent recovery services.

Gore said the plan will streamline the collection of data and reduce burdens on businesses.

"This measure probably has more support across all lines in America than any other thing that we do, because when you give the American people information they can use to protect themselves, people at the grassroots level find very creative ways to convince those sources of pollution to reduce the emissions into the air and water," Gore said.

APNP-04-22-97 1032EDT

EARLY BANKING

Issue. Should the U.S. support credit for early actions taken (or to be taken) by parties to the Kyoto agreement?

Background. The United States has a long, bipartisan history of encouraging voluntary early greenhouse gas reductions. Early voluntary early action benefits the environment in the most economically efficient way -- with no regulation except registry and tracking. In the Kyoto agreement, the U.S. should support credit for early action by the U.S. or other parties.

Numerous firms have entered partnerships with the U.S. and other governments to voluntarily reduce emissions. In entering these agreements with the U.S., firms were assured that they would receive proper credit against future obligations. In response to congressional questioning and industry letters, Under Secretary of State Tim Wirth and Assistant Secretary of State Eileen Claussen reiterated U.S. government intention to provide credit for early actions -- comments echoed recently by then Deputy Secretary of Energy Charles Curtis.

Unless these reductions are assured credit in the international agreement, there is higher likelihood that firms that undertook early action will be penalized in comparison to firms that took no action. If early actions are assured credit, firms that fail to take action will be penalized and those that act will be rewarded.

Industry/Environmental NGO Joint Recommendation. Last Thursday, major industry and environmental groups reportedly agreed in concept on a set of recommendations outlined in the attached paper. They propose to allow project-based crediting for international and domestic actions that generate tonnes during the pre-budget period.

They provided three ways in which parties would be permitted to add tonnes acquired early to their first budget accounts: (1.) approved joint implementation projects that are also reported on the host's national communication; (2.) domestic afforestation projects that are improvements from a baseline; and (3.) for international emissions trades where the tonnes are also subtracted from the transferring party's first budget. However, for domestic actions, they support deducting the tonnes from the first budget account of the country sponsoring the incentive program.

Needed Fixes. The international agreement needs to be more clear on two points:

1. Nations must be free to allocate their budgeted tonnes to firms as incentives for actions taken in the pre-budget period. The current U.S. protocol is silent on this, while it is explicit on other forms of temporal transfers (banking and borrowing), creating a possible reading of intentional exclusion.
2. Firms should receive credits (*tonnes of carbon equivalent emissions allowed*) for actions that reduce emissions early in another country (via joint implementation or international emissions trading). Again, the language is explicit on availability of these locational flexibility provisions with no timing constraints beyond the other timing provisions of the protocol -- which could be read as controlling in absence of explicit timing provisions.

Language.

[Insert in Article 2 Paragraph (2) (b) after "below" the following:]

"... or allocated or acquired prior to the first budget period for later use during the budget period under paragraphs 6 and 11 below."

[Insert in Article 2 after Paragraph 5 the following new paragraph 6 and re-number accordingly:]

"Prior to the first budget period, an Annex A or Annex B Party may allocate tonnes of carbon equivalent emissions allowed for a budget period that may be used during a budget period as incentives for pre-budget actions that reduce, avoid or sequester net greenhouse gas emissions."

[Add a new Article 2.11 as follows:]

"11. An Annex A or Annex B Party may include in its budget tonnes of carbon equivalent greenhouse gas emissions allowed for a budget period to provide incentives for actions to be taken prior to the beginning of the first budget period as follows:

"(a) Actions taken with Annex A or Annex B Parties reported according to Article 6 (International Emissions Trading); and

"(b) Actions taken with any Party that is in neither Annex A nor Annex B reported according to Article 7 (Joint Implementation)."



United States Department of State

*Assistant Secretary of State for Oceans and
International Environmental and Scientific Affairs*

Washington, D.C. 20520

May 27, 1997

*cc: 3 pages total
HWS
JAF
SS*

TO: Distribution
FROM: OES - Rafe Pomerance, Acting *RJP*
SUBJECT: Assistant Secretaries Group: Climate Change Meeting

The next Assistant Secretaries group meeting is scheduled for tomorrow, Wednesday, May 28, from 10:30 a.m. to 12:00 p.m., in Main State Room 7835. Attached please find new draft language for Annex C. On the basis of our decisions, additional simplified papers with proposed changes to our draft Protocol text will be prepared. These will be cleared through a paper process, and submitted to the Convention Secretariat in time to meet the June 1, 1997, deadline. Please call Lilly Roots-Wiggins (647-1554) to confirm your attendance at this meeting.

Attachment:
As Stated

Additional U.S. Proposals
(references are to the original U.S. submission)

Article 1 (Definitions)

- o Replace definition 3 ("Greenhouse gas") with the following:

"Greenhouse gas" means any greenhouse gas covered in Annex C of this Protocol."

- o Replace definition 4 ("Tonne of carbon equivalent") with the following:

"Tonne of carbon equivalent" means one metric tonne of carbon, or a quantity of one or more other greenhouse gases equivalent to one metric tonne based on the global warming potentials decided by the Parties in accordance with Annex C of this Protocol.

Article 2 (Emissions Budgets)

- o Delete paragraph 7

Article 3 (Measurement and Reporting)

- o Replace paragraph 2 with the following:

For the purposes of implementing paragraph 1 and promoting comparability, consistency, and transparency, the Parties shall, not later than their first Meeting, decide on agreed best available methods for the measurement by Parties of anthropogenic emissions by sources, and removals by sinks, of greenhouse gases, taking into account the best available methods determined by the IPCC. They shall also decide on appropriate adjustments to measurements of emissions and removals where agreed best available methods have not been used. The Parties shall periodically update agreed best available methods based on evolving scientific knowledge, including advice from the Subsidiary Body for Scientific and Technological Advice referred to in Article 12.

Annex C

- o Replace descriptive language with the following:

All greenhouse gases, their sources and sinks, with global warming potentials as decided by the Parties at their first meeting (taking into account the IPCC's global warming potentials for 100-year time horizons) and as subsequently updated by the Parties to reflect evolving scientific knowledge.

CLIMATE CHANGE DISTRIBUTION LIST

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United States Department of State

Bureau of Oceans and International
Environmental and Scientific Affairs

Washington, D.C. 20520

cc. JAH
JS
mm

Alicia out of
of 5/28

DATE: 5-22-97

NUMBER OF PAGES TO FOLLOW: 1

FAX TO: SEE DISTRIBUTION LIST

TELEPHONE: FAX:

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FAX FROM: EILEEN B. CLAUSSEN

TELEPHONE: FAX:

OFFICE:

MESSAGE: ASSISTANT SECRETARIES CLIMATE CHANGE MEETING
WEDNESDAY, MAY 28 from 10:30-12:00, Rm. 7835. Please RSVP
to Lilly Wiggins at 647-1554 by COB: Tuesday, May 27.
Thank you.

CLIMATE CHANGE DISTRIBUTION LIST


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AID	David Hales	875-4205	FAX: (703) 875-4639

**United States Department of State***Assistant Secretary of State for Oceans and
International Environmental and Scientific Affairs**Washington, D.C. 20520*

*cc: Am
JAF
JS*

May 22, 1997

TO: Distribution

FROM: OES - Eileen B. Claussen 

SUBJECT: Assistant Secretaries Group: Climate Change Meeting

The next Assistant Secretaries group meeting is scheduled for Thursday, May 22, from 10:00 to 11:30 a.m., in Main State Room 7835. It is my intention to use this meeting to take decisions on a series of issues related to joint implementation, Annex C (which gases/sectors should be included in the Kyoto agreement), and early banking (whether there should be any credit for early action prior to the beginning of the first budget period). On the basis of our decisions, simplified papers with proposed changes to our draft Protocol text will be prepared. These will be cleared through a paper process, and submitted to the Convention Secretariat in time to meet the June 1, 1997, deadline. Please call Lilly Roots-Wiggins (647-1554) to confirm your attendance at this meeting.

Attachment:
As Stated

PROPOSED AGENDA

May 22 Assistant Secretaries Meeting

- Annex C gases/sectors - Decision on comprehensive approach (with discounting) versus limited list.
- Early Banking - Decision on whether the international agreement should include provisions ensuring that early reduction efforts be credited against a future obligation; if so, what options should be developed.
- Joint Implementation -
 - are JI projects restricted to non-Annex A/B hosts?
 - when do credits from projects begin?
 - must guidelines for JI be adopted by Kyoto - if not, by when?
 - should final agreement in Kyoto on targets be contingent on inclusion of JI ?
 - how should additionality be addressed in the agreement?
 - what should be included in the JI review process?
- Emissions Trading - Distribution of paper; NOTE: This paper is an explanation and elaboration of existing U.S. proposals only.

Joint Implementation Issue Paper
(D R A F T 5/20/97)

Joint Implementation (JI) is one of the highest U.S. priorities in the negotiations. Along with emissions trading, it is a key flexibility element, providing an option for Parties to use reductions achieved through projects in other countries to offset domestic emissions. It also establishes a new form of currency for developing countries, allowing them to generate credits for sale or for future banking. However, a number of critical unresolved questions have been identified in the interagency process, and decisions must be taken on these in order to allow JI to proceed. These are detailed below.

1. Can JI projects be hosted in non-Annex A/B Parties only, or may projects be developed in Annex A and B Parties as well?

The existing text does not (legally) preclude any Party from hosting JI projects, although many in the Administration and in other countries have interpreted the U.S. proposal as allowing JI only in the territory of a non-Annex A/B Party. A number of advantages have been identified for allowing JI projects to be undertaken globally: if a country does not have the capacity to develop a national emissions monitoring program, or is not willing or able to adhere to an emissions budget, it could still participate in a JI regime (something that may apply specifically to the EIT countries); prior to the budget period, it may be desirable to allow reductions to be undertaken (see question #2 below); and, if emissions trading does not become part of the Kyoto agreement, we may want to preserve the option of JI between all Parties (noting in particular the EU proposal, in which there is no emissions trading, and JI is only allowed between Annex A/B Parties). Conversely, if JI is open to all Parties (and particularly if it is comparatively easy to develop, review and agree on the transfer of credits for reductions), there may be a lesser incentive for Parties to take on a budget obligations and join Annex A. As one of the "carrots" in the U.S. proposal is the ability to participate in low cost trading, this situation may set up a perverse incentive. Finally, if JI is to be allowed between Annex A/B countries, some modification of the existing text may be required to allow for debiting JI TCEs from the participating Annex A/B Party.

2. When may JI projects begin to generate TCEs (following the start of the first budget period, at any time, including prior to the beginning of the first budget period, only once guidelines have been approved by the MOP)?

The current text of the U.S. proposal does not stipulate when TCEs may be generated from JI projects. Allowing projects to generate TCEs immediately may ensure that project development proceeds without interruption, while removing the credit option until the first budget period may significantly reduce the number of projects undertaken. Inasmuch as projects are supposed to be credited only for "additional" actions, this would

mean a loss in global emissions reductions. It should be noted that a proposal has been submitted to the AGBM (by Norway) that would allow JI to begin after the pilot phase ends, and once modalities have been agreed.

Allowing JI projects to generate TCEs prior to the first budget period may create some difficult compliance issues – particularly if they are allowed prior to the development of review guidelines. There is the further specific question of whether projects should be “grandfathered” from the present, and whether these would need to be reviewed and approved again at the start of the budget period. Some of these questions may not be answerable until decisions have been taken on issues related to the review and approval process discussed later in this paper.

3. Should guidelines, criteria and other modalities for JI be included in the Kyoto agreement or be agreed upon later? If later, when?

- Option 1. Provide for an “Annex “D” in the agreement which would contain (1) an priori list of acceptable JI project types, as well as (2) general language on guidelines, criteria and other modalities for projects not included in the list. While possibly desirable, it is looking increasingly less likely that we can agree on the elements of such an Annex within the USG – or negotiate one internationally within the Kyoto timeframe.
- Option 2. Set a date no later than the end of the Activities Implemented Jointly (AIJ) pilot phase (i.e., not later than December 31, 1999), or one year later, for adoption of the guidelines. This option acknowledges a connection between the Berlin decision on Activities Implemented Jointly (AIJ) and ultimate progress on JI. However, it presumes a successful conclusion to the AIJ pilot phase, and that JI projects will be developed even if there is no clear incentive from the Kyoto language in the form of agreed procedures. It also presumes the Kyoto agreement has entered into force – since guidelines could only be adopted by the Meeting of the Parties.
- Option 3. Call for adoption of guidelines no later than one year after entry-into-force of the agreement. This sets a different date certain for guidelines, and does not tie itself to the AIJ program – which is a no-crediting effort and may bog down allowing TCEs to be generated or traded. However, entry into force may be a much delayed event – and will be independent of issues related to the adequacy of JI guidelines or criteria. Of course, if entry into force were delayed, there would be no need for any “credits” against the targets either.
- Option 4. Allow JI to proceed without guidelines specified in the agreement, presumably on the basis of MOP decisions. This option assumes that we do not need to specify guidelines at this time. Implicit in this choice is that guidelines would likely be developed at a later date, and that Parties have until the first budget period

(if "early action" is disallowed) before guidelines would need to be developed. However, it presumes that project developers would be willing to move forward with projects to allow the testing of various guidelines – even in the absence of international agreement. It also presumes that no projects would proceed without guidelines; if projects did get initiated, there would be no way to weed out bogus efforts.

4. Is it necessary to make our acceptance of the final agreement contingent on the successful negotiation of such guidelines? If the guidelines are held up, is the U.S. willing to allow JI to proceed without them?

JI is one of the critical flexibility issues proposed in the U.S. draft protocol. The economic analysis suggests that significant additional cost-savings are possible from JI over those available from emissions trading (presuming the latter is allowed in Annex A or B countries only, and the former in developing countries). If JI is not included in the agreement, such cost-saving opportunities will be lost. In such a case, the United States might choose to negotiate a lower target – although our ability to do this may be constrained by the form of the "package" deal negotiated in Kyoto.

The U.S. could also insert language into the agreement calling for conditions on entry into force pending resolution of any questions on JI guidelines, or we could not sign the agreement until such issues were resolved. If conditions were imposed, they could create some interesting problems. For example, in the absence of a new set of Parties, agreement on the guidelines would be undertaken by all FCCC Parties, not just those to the protocol, allowing countries not likely to join the new agreement to block the guidelines and delay the protocol's entry into force.

However, there is a strong concern that JI not be allowed to proceed without guidelines – and that setting entry into force contingent on agreement of guidelines will inappropriately delay global action on climate change. In this case, there would be no link between setting guidelines and agreement on a binding target in Kyoto.

5. How should "additionality" be treated in the agreement?

In the existing text, we stipulated that "projects must provide a reduction in emissions that is additional to any that would otherwise occur." There is general agreement that some form of additionality must be present to ensure that "bogus" emissions are not counted. However, additionality is not easily measured. Even the use of the word "additionality" has its supporters and detractors. The additionality issue has been among the most complex in the USJI panel deliberations; it has not been satisfactorily resolved for many projects, and both agencies and project developers disagree over the application of this criterion. Any decision is likely to have political opponents, either from the environmental community or the private sector, and it is

recognized that each would need to periodically be reviewed. Several approaches have been advanced; these need not be mutually exclusive:

- Do not attempt to resolve the additionality issue by Kyoto, but agree that the guidelines must more fully address the questions prior to allowing project derived TCEs to be exchanged between Parties.
- Develop a list of a priori acceptable project types (an "Annex D"). It seems unlikely that such an Annex could be negotiated prior to Kyoto; if this option were chosen, a placeholder may need to be inserted into the text.
- Redefine additionality as "an enhanced Greenhouse Gas Benefits", and require that net GHG emissions with the project be less than the GHG emissions associated with the reference case for that activity within a particular country and year. For example, a power plant retrofit will be 10% more efficient than some existing standard, and the GHG reduction associated with the 10% difference could be claimed in its entirety.
- Develop guidelines for determining additionality through a more stringent standard in which a determination would be made as to whether a project would have happened anyway (e.g., whether the utility planned to upgrade the power plant in its normal course of business), and that the project is over and above "no regrets" actions. Only those projects meeting this criteria would be allowed. While likely to generate more environmental benefit, there are concerns that such standards could not be readily defined, and could lead to a circumstance in which no projects would be undertaken.

6. Review Process

A number of issues have been raised on the form and structure required for an adequate review process. The fundamental conflict is between the extent of the review necessary to ensure verifiability and credibility versus the risk that excessive transaction costs will stifle JI activity.

- Extent of the Review. Upon submission of projects that have generated TCEs, should the FCCC Secretariat conduct only a "checklist" review (to determine whether all the requested information plus appropriate back-up materials have been provided) or conduct a more comprehensive review in which individual project reports are checked for accuracy and validity? The former allows for significantly more rapid turn-around, and does not require the Secretariat to call into question Parties' reports. However, because of its cursory nature, it will likely not cull out projects which do not meet all criteria, particularly in cases where issues of "additionality" are ambiguous. The latter alternative could impose a significant (and potentially costly) burden for project review on the Secretariat, and could delay allowing project TCEs to be recorded, likely increasing project transaction costs and limiting the number of

projects. It is possible that multiple stages of a review process could be agreed, in which the initial review could be more comprehensive, and subsequent reviews adhering to a simplified checklist – unless a Party objected to the allowing of TCEs.

- Frequency and Timing of Reviews. The nature and frequency of reviews will have a direct impact on transaction costs and the required Secretariat budget, as well as on the credibility of those projects with acceptable TCEs. In addition to the concept of random audits, and the existing provisions requiring annual reporting on emissions reductions generated or exchanged through JI, proposals have been made for the following (not necessarily mutually exclusive) options:
 - annual review of each project through the Party's required annual report on JI (to insure that TCEs claimed during any given year are legitimate);
 - review in the course of a National Communication review (presumably on a three-year cycle) of Annex A/B Parties, which would included any JI projects undertaken; and for
 - review only if requested by a Party (noting that any Party might, at any time, challenge the TCEs generated from a project – leading to an automatic review, and possible action by an implementation committee).
- Who conducts the review – the Secretariat? Annex A/B review teams? Independent auditors? With adequate financial support, the Secretariat could develop the expertise necessary to fully review projects. Using the existing procedures for review of Annex A/B communications may be viable in that teams include both Secretariat representatives and representatives of Parties; however, to date, review teams have not had much expertise in matters specifically related to JI activities, and might overlook problems in projects. While it is generally agreed that independent auditors (conducting reviews of all projects on a random basis) would be desirable, there is a question of who supervises them; it may be undesirable to have it done by the Secretariat, but difficult if not impossible to have direct oversight by the MOP or the SBSTA. Some do not believe that independent auditors would need supervision, but rather that the market would ensure high quality auditors (i.e., we can depend on the private sector's need to have accurate information for the validity of JI credits). Finally, it was generally agreed that the Secretariat would have the role of preparing a synthesis report at regular intervals to be considered by the MOP in assessing progress under JI.
- Approval of the Review. Once the review has been completed, other questions have been raised about approval of projects. One alternative is to make approval automatic if no concerns are raised, and allow it to be blocked if any objectionable practices are uncovered. However, this raises a question of whether the Secretariat should be allowed to reject non-complying projects, potentially opening the system to

accusations of too much centralized authority being vested in a UN body – and out of the control of Parties. Conversely, if the review must be approved by Parties (or a subset of Parties), considerable time may pass between project submission and review – significantly increasing transaction costs. Finally, it is clear that in some cases, there will be contested reviews; in this context, a number of agencies have proposed using an “Implementation Committee” to address unresolved issues. However, agreement on the establishment of such a committee would not be consistent with the earlier decisions adopted in the separate decision paper on compliance issues; this earlier decision may need to be reconsidered.

Annex C: Which Gases/Sectors to Include in the Kyoto Agreement?
(D R A F T 5/20/97)

The January 17, 1997 draft U.S. protocol text defines "greenhouse gases" to be those gases for which a global warming potential is set forth in Annex C; Annex C is to "list greenhouse gases not covered by the Montreal Protocol, with the exception of gases, or particular sources and sinks, for which there is insufficient knowledge of the GWP or inability to accurately measure emissions or removals. GWPs would be developed by the IPCC." This paper seeks to identify two possible options to complete Annex C: (1) a comprehensive approach (with some discounting), and (2) a limited list.

Option 1. Comprehensive Approach with Some Discounting

- All sources and sinks of greenhouse gases not included in the Montreal Protocol.
- Annex I Parties to use most detailed available agreed inventory methods (e.g., detailed IPCC method); if estimates are made using less rigorous methods (e.g., default IPCC), an uncertainty factor would be added to emissions estimates for budget years.
 - Uncertainty factors would be determined by IPCC or OECD/Annex I Experts Group and adopted by the Meeting of the parties (MOP); factors will be specific to gas/sector/source and estimation method.
- The base level is established using existing 1990 inventories; it is not modified as methods improve, except to recalculate based on new GWPs (as agreed by MOP).

Key Points

- Allows maximum flexibility across gases to comply with budget; U.S. already uses best method and could count all control efforts.
- Maximizes environmental protection through comprehensive coverage of GHGs, ensuring tracking and control even of gases with "uncertain" emissions.
- Provides incentive to use best methods for reporting (uncertainty factors are only a backstop if less rigorous methods are used).
- Accommodates GHG emissions trading and JI (does not require separate provisions to allow project-based JI in non-Annex C gases).
- No problem of adding gases/sectors; everything is already in.

Potential problems:

- Uncertainty of estimate for some gases may lead to offset of certain emissions with reductions from less certain sources (likely a relatively small component of most national totals, although for some, may be up to 30%); even with the best methods, some sources/sinks are only known to $\pm 50\%$ or $\pm 100\%$.
- Requires development/agreement of uncertainty factors (although a similar problem exists unless a blanket acceptance of gases is allowed).
- Generic (in contrast with Party-specific) uncertainty factors may reduce incentive for data improvement in some cases.
- May be opposed by Parties using less rigorous methods, who may have to improve or inflate inventory (particularly developing countries).

Option 2. Limited List

- Include only sources, removals and sectors that can be accurately estimated or measured in Annex C; others are omitted, and controlled only through general existing FCCC obligation.
 - Propose a threshold of $\pm 20\%$ for inclusion in Annex C (would include about 95% of the total US 1990 inventory; some excluded gases/sectors are now included in U.S. Climate Change Action Plan, including N₂O from fertilizer use and CH₄ from ruminants).
 - The following list includes those GHGs estimated by US agencies to be accurate to within $\pm 20\%$ now in the United States, or projected to attain that accuracy within 5 years:
 - All energy-related carbon dioxide (CO₂) emissions and above-ground forest sinks
 - All emissions of high GWP gases (HFCs, PFCs, and sulfur hexafluoride (SF₆),
 - Most methane (CH₄) emissions (e.g., about 76% of US 1990 CH₄ emissions)
 - Some nitrous oxide (N₂O) emissions (e.g., about 14% of US 1990 N₂O emissions)
- Review and update contents of Annex C every five years with input from SBSTA and/or IPCC, allowing for additions or deletions as methodologies are improved.
- Parties set goal of achieving accurate estimation and measurement of all GHGs by 2020.
- Baseline established on basis of included gases only.

Key Points

- Emphasizes verifiability, but is still (at least for U.S.) quite comprehensive and flexible.
- Simplifies and protects the rigor of compliance by restricting trading and offsets to the GHG sources/sectors that can be accurately measured/estimated.
- Avoids substitution of less certain reductions (about 3% of US 1990 inventory is not known to better than $\pm 100\%$) for more certain emissions.
- Provides incentive for improving sink and emissions methodologies in cases where actions in non-included gases/sectors are less expensive than Annex C actions.

Potential problems:

- Could require adoption of policies and measures to address non-included gases/sectors or leave those gases/sectors uncontrolled.
- May require special -- and potentially complex -- provisions for amending Annex C.
- Could establish disincentive to develop/improve non-Annex C gases/sector methods.
- Could set a bias against developing countries -- where a larger proportion of emissions will be in non-Annex C gases.

Conclusions

Both options leave some key decisions up to subsequent expert group agreement. This paper does not seek to identify what would happen in the case of a failed effort to gain agreement -- for example, in option 1 if there is no agreement on "uncertainty" factors, or in option 2, if there is no agreement on what sources are measurable within $\pm 20\%$.

ANNEX C PAPER

DRAFT 5/20/97

Page 4

Annex C Analysis**Business as Usual Emissions for the United States: 1990-2020 (MMTCE)**

	1990	2000	2010	2020
INCLUDED (under Option 2)	1508.7	1662.8	1822.0	1972.1
SINKS	125.0	-109.0	-108.0	-92.0
EXCLUDED (under Option 2)	73.4	75.1	79.4	82.8
TOTAL All Gases/Sources	1457.1	1628.9	1795.4	1962.9

Environmental Impact for U.S. under Annex C Options (MMTCE)

Scenario	1990	2010	2020
Business as Usual	1457	1795	1963
Option 1 - Comprehensive Annex C-Capped	1457	1457	1457
Uncontrolled	0	0	0
Total	1457	1457	1457
Option 2 - Including Sinks Annex C-Capped	1384	1384	1384
Uncontrolled	73	79	83
Total	1457	1463	1467
Option 2 - Excluding Sinks Annex C - Capped	1509	1509	1509
Uncontrolled	-52	-27	-9
Total	1457	1482	1500

EARLY BANKING: CREDITS FOR EARLY REDUCTION
(D R A F T 5/20/97)

Background

“Early banking” is the term used to describe actions that are taken prior to the beginning of the first budget period for credit against obligations in that period. The rationale for early banking is based on a presumption that it eases compliance costs; however, inasmuch as the costs of complying will be a function of the timing and level of the first budget period (as well as the domestic distribution of the obligations), it is unlikely that the true value of early banking can be conclusively resolved without knowing these constraints.

Advantages of early banking include creating an incentive for emission reductions prior to the start of carbon budget periods; potentially creating a fund of extra emission rights from early action that eases requirements in, and effectively lengthens the first control period; and encouraging early experience that may reduce resistance to complying with later binding obligations. Disadvantages include difficulty in negotiating (given that most other countries will perceive this effort as a ruse to allow U.S. emissions to continue to grow during the budget period); difficulty in compliance (there will be no budget against which reductions will be measured), and a perception that the entire issue can be accommodated through domestic allocation systems – in which early efforts can be credited by allowing extra emissions to those early reducers in out-years.

This paper suggests several options for treating the early banking issue: (1) rewarding early reductions by adding allowances in the budget period; (2) recognizing that countries may credit early actions domestically, but do not provide for an additional “pool” of international credits; (3) providing for early banking only in JI projects, and (4) rejecting early banking.

Several issues are raised in this paper that may warrant additional consideration. While each of these are addressed briefly here, they are also raised in other documents being considered in the interagency process – the first in discussions of the budget level and timing, and the second in the paper on JI.

- (1) The U.S. has specifically rejected a budget period which begins in 2005 or before. Some concern has consequently been expressed that there may only be weak incentives, if any, to reduce carbon emissions prior to the first control period – a concern that is exacerbated if the first period does not begin until 2010. Early banking has been proposed to address this late start. Furthermore, with a considerable delay prior to the initiation of the first budget period, some transition economies with “excess” reductions may be forced to forego the benefits from monetizing their reductions; early banking may to a certain extent also alleviate their concerns.
- (2) We have not yet taken a decision on the timing for allowing JI credits to be counted. If

tons can be generated prior to the first budget period, they may be banked for use in that first period.

Constituency Views

Domestic industries that have opportunities for early carbon reduction clearly favor early banking. This group includes both industries that have already claimed reductions and those who could make initial or further reductions prior to the first control period. These groups want assurance that their early reductions: will be rewarded; will not be the basis for tighter limits in the future; and will be compensated commensurate with costs incurred. However, most industry groups are significantly more concerned that early banking provisions would be interpreted as an early target – which they have flatly rejected.

Some environmental groups would like to see early banking provisions to create an incentive for early actions, but only if credits would not result in increases in cumulative emissions. However, most environmental constituencies would strongly prefer a 2005 target to any provisions on early banking.

Transition-economies' actual emissions are anticipated to lie well below the likely obligations set in the first budget period. These countries may favor early banking as a way to monetize the "underages". Environmental interests (and many in the OECD) believe that such reductions exist solely as a result of economic downturns, and trading them could result in a redistribution of wealth internationally but lead to no net environmental gain. While the transition economies' concerns could be met with an early target, they are likely to oppose a later target with no banking.

Option 1: Reward Early Reductions with Net Added Credits

In this option, the Kyoto agreement would provide for extra allowances to be granted to Parties in the first budget period equal to the number of early reductions taken prior to the beginning of the period. Essentially, this would compensate Parties which incur costs to achieve early reductions. A key concern is how to measure the extent of an early reduction. While a baseline is needed, neither the 1990 baseline nor the first control budget is necessarily the proper test; the right interim baseline could be some interpolation between the two. Imprecision in the benchmark for quantifying early reductions could open the door to later emissions that were not offset by real early reductions, and environmental loss. Of course, choosing any year will implicitly "reward" some for taking early action – although the domestic allocation of the reward is a matter that will still need to be determined through internal distributions of initial permits.

Pro:

- Added allowances maximize incentives for early action.
- Early reductions that reduce cumulative emissions can be given additional allowances without environmental loss.

EARLY BANKING

DRAFT 5/20/97

Page 3

- May contribute to a useful technology jump start.
- May reduce opposition/political barriers to adoption of more stringent target.

Con:

- Request for international approval for early banking invites a counter-demand for earlier adoption of binding targets.
- Proving real reductions requires an emissions benchmark. If additionality is not proven, then added allowances may increase net carbon emissions.
- Early reductions permit Parties to do less in the first control period by using early credits: this could make second period compliance more difficult.
- Would require a Party-by-Party interpolation of appropriate baselines.

Option 2: Domestic Implementation

Recognizing the advantages of early compliance, countries (including the United States) might choose to credit early action against future allowances. Providing such credit would, however, reduce the pool available for allocation during the budget period. Domestic decisions would determine how many future allowances would be so allotted, and how many would remain available for normal distribution. Of course, countries would need to consider how many credits to carve out, recognizing that some constituencies will not be willing to take early action, and will object to the effective increase in price attached to a reduction in the number of permits allocated later. No legal text would be required to allow this alternative. However, to provide some textual grounds in the agreement for countries to take such steps, hortatory language might be inserted urging early compliance; such an option might also address the desire for a near-term target. If this option were chosen, considerable thought would be needed in the development of any language.

Pro:

- Early reductions, if real, reduce cumulative carbon and reduce the entry emissions level at the start of the first period. Early actions may also stimulate technologies that reduce long term compliance costs.
- Successful early reduction experience could make full implementation easier by reducing uncertainty.
- Some problems of an interim emission baseline are avoided; the control period baseline still applies.
- Allowing this type of early banking extends the interval for the first control period compliance.
- This option would be entirely within our domestic purview; no treaty language would be required.

Con:

- Including this option will likely incite others to recommend an earlier start date for the budget period – a outcome we have already rejected.

EARLY BANKING

DRAFT 5/20/97

Page 4

- The national incentive to make early reductions is limited because there is no added emission right to offset either the cost of early reduction (compared to later implementation) or the real reduction in cumulative emissions resulting from reduction prior to the control period.
- Those who do not take early reductions will complain at the reduction in the size of the pool later; the more early actions that occur, the more the pool would have to be reduced.
- There is no guarantee Congress will follow Executive Branch proposals in developing carve-outs.

Option 3: Early Credits for JI Projects only

JI projects that meet established criteria for atmospheric carbon reduction and satisfy tests of additionality could be granted early reduction credits even if early banking for reduction of overall national emissions were not approved. This issue is particularly relevant with respect to economies in transition, which anticipate significant financial benefits from the sale of reductions in the pre-2010 period. It is clear that issues related to monitoring, measurement and additionality (all discussed in the separate JI paper) would need to be resolved prior to moving forward with this option.

Pro:

- Early JI captures environmental benefits that would be lost without credits for early action.
- Private financing for early JI will not appear without bankable credits.
- Successful JI early experience could reduce anxiety over adoption of the first period emissions budgets.

Con:

- Not all early reduction opportunities can meet the JI project definitions. For example, some valuable early reductions are domestic process modifications that could not be credited without early banking provisions.
- If early JI is allowed without agreement on criteria to ensure real reductions, adoption of this option may lead to granting of bogus credits.

Option 4: Reject Early Banking

Of course, a fourth alternative is always available – to reject early banking for inclusion in the U.S. draft Protocol. There is a clear concern that proposing any of the options listed above, particularly in light of our inability to also announce a stringent target, will be met with enormous skepticism. Such an announcement would likely be perceived as an effort to defer any action rather than as an effort to lower costs. Furthermore, while some flexibility advantages may accrue to adopting one of these alternatives, rejecting an explicit textual change to support early banking would not preclude allowing the United States to develop an early banking proposal at a domestic level.

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To: Alicia Munnell, Jeff Frankel, Mark Mazur,
Council of Economic Advisors
Fax #: 395-6958
Re: Climate Change Sectoral Paper
Date: April 30, 1997
Pages: 30, including this cover sheet.

FACSIMILE

Attached please find the Climate Change Sectoral Paper per the memorandum you should have received dated April 28 from Jeffrey Hunker and Judy Greenwald.

Please call 482-4127 to confirm receipt.

Thank you.

From the desk of...

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Outline: Sectors Paper

1. Sources and Trends of US Emissions

Needs:

breakout by key industries

2. Transportation

better discussion of Car Talk recommendations and impacts

Technology (PNGV) and other regulatory impacts

Other transportation sectors (eg: aircraft/air engine)

3. Electricity

Impact of deregulation/restructuring?

4. Industry Sectors That Will Benefit

? -- Needs analysis/

5. Energy Intensive Industry Sectors

All: tie analysis to the modeling results

All: final review by agency analysts

a. Aluminum

b. Petroleum refining

c. Steel

d. Cement

e. Pulp and paper

Needs to be prepared

f. Chemicals

Needs to be prepared

g. Others?

Identified?

6. Buildings/residential stock

?

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SECTOR EMISSIONS AND MITIGATION OPTIONS

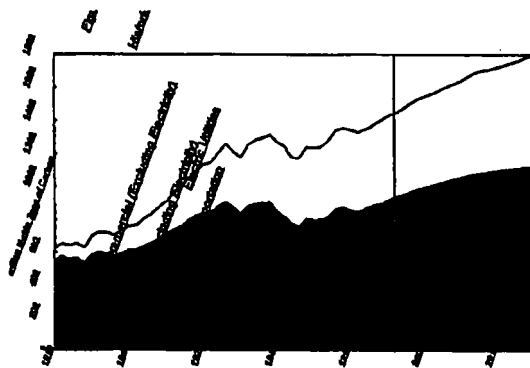
SOURCES AND TRENDS OF U.S. EMISSIONS

Total U.S. greenhouse gas emissions in 1995 were 1,557 MMTCe (million metric tons of carbon equivalent), with gross emissions of 1,674 MMTCe offset by 117 MMTC of carbon sequestered by the nation's forests. Emissions have increased by about 7% since 1990. Of the total, methane accounts for 11% (mainly from landfills and agricultural activities), nitrous oxides about 3%, and the various halocarbons 2%. While currently small in aggregate, these gases can play an important role in future warming because of the magnitude of their heat-trapping potential and their atmospheric lifetimes. The remaining 85% of U.S. emissions are carbon emissions from fossil fuel combustion and other industrial activities.

Annual U.S. fossil-related carbon emissions have grown by about 1.2% per year since 1950 and are projected to rise at almost the same rate over the next twenty years. There are three ways of viewing these emissions:

Primary fuel use: Coal's share of the total has fallen from 50% in 1950 to 35% in 1996; while oil's share has risen from 36% to 42% and natural gas' share has risen from 14% to 23%. However, these shares are now expected to remain fairly steady over the next quarter century.

First-tier energy users: The influence of the electric utility sector on total emissions has grown over time as the American economy has steadily increased its use of electricity. It now accounts for about 35% of total emissions – with over 85% of its total due to the combustion of coal.



Similarly, the transportation sector's share of fossil-related carbon emissions has grown from 28% in 1950 to 33% in 1996, with oil accounting for practically all of the fuel used in this sector. Thus, the transportation and utility sectors together currently account for 68% of U.S. fossil-related carbon emissions.

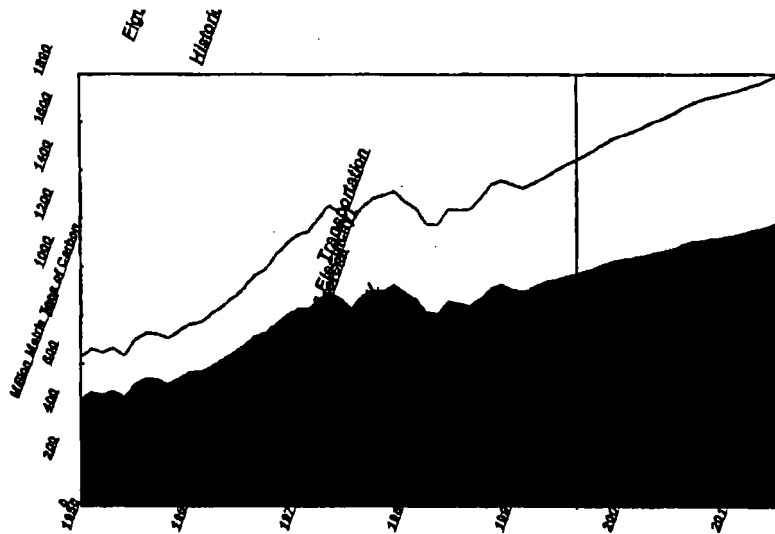
End-use sectors: It is also useful to attribute electricity-related carbon

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emissions to the sectors that consume the electricity rather than to the utility sector which produces it. Thus, viewed from the perspective of final energy demand, the importance of the residential and commercial sectors has increased since 1950, while industry's share of total emissions has fallen. This reflects the changing importance of the manufacturing and services sectors of the economy.

Emissions are now roughly equally distributed among households and commercial businesses (35%), transportation (33%), and industry (32%). These shares are projected to remain fairly constant over the next twenty to twenty-five years.

(NOTE: NEED TABLE SHOWING HISTORICAL AND PROJECTED ENERGY USE AND GREENHOUSE GAS EMISSIONS BY END - USE SECTOR -- HOUSEHOLDS, TRANSPORTATION, INDUSTRY, WITH SECOND TABLE BREAKING OUT INDUSTRY BY THE ENERGY INTENSIVE SECTORS AND ALL OTHERS -- CHEM, STEEL, ALUMINUM, GLASS, PAPER, ETC).



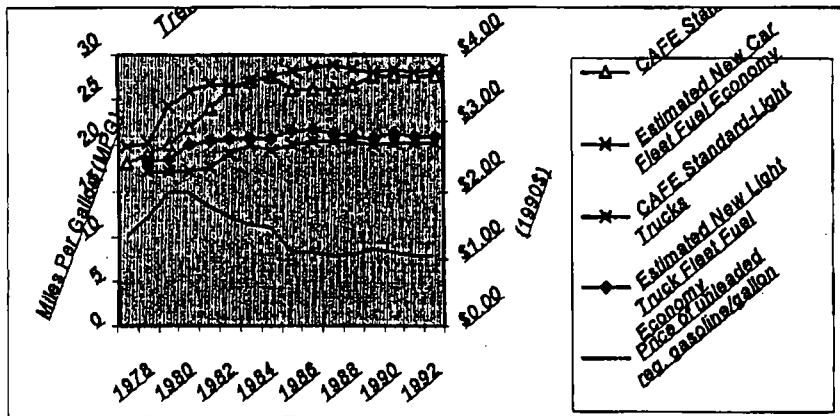
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TRANSPORTATION

Contribution to greenhouse gas emissions

Passenger cars and light duty trucks (light vehicles) contribute the majority of transportation emissions. Emissions from light vehicles alone accounted for 20% of total U.S. greenhouse gas emissions in 1990, and in the absence of new policy measures are expected to rise from about 250 million metric tons of carbon equivalent (MMTCe) in 1990 to 350-400 MMTCe in 2010.

The major factors underlying the rapid growth in emissions from light vehicles are growth in vehicle miles traveled, stagnant new fleet fuel economy levels, and growth in the relative proportion of light trucks sold, which have lower CAFE standards than cars.



Background on the automobile industry

Actual growth in vehicle miles traveled (VMT) since 1990 has averaged 2.4% per year. Growth in VMT is a function of a number of factors, including demographic changes (e.g., more women in the workforce; immigration), land use patterns, the cost of driving each mile (now at an all-time low on an inflation-adjusted basis), among others.

Corporate average fuel economy of new car fleets increased steadily along with increasing CAFE standards throughout the late 1970s until the mid 1980s. Since then, new car and light truck fuel economy has been stagnant as new more efficient technologies have been applied to performance (which has increased by 60% for all light vehicles in the last 15 years) and utility rather than to fuel economy. Absent a driving force such as policy changes or fuel price increases, no significant increase in new fleet fuel economy is expected to occur. Further, because new vehicle fuel economy has been

draft as of 4/14/97

stagnant for several years, the in-use fleet of cars and light-trucks has also nearly reached a fuel economy equilibrium.

In fact, the overall in-use fuel economy of the combined new light vehicle fleet (i.e., cars and light trucks such as minivans, sport utility vehicles, and pickup trucks) has already begun to *decline* due to higher sales of light trucks. These have gone from under 25% of the market in 1982 to almost 45% today. A key reason that this shift is important in terms of GHG emissions is that light trucks face lower CAFE standards than cars (almost 7 mpg lower). Moreover, since light trucks tend to last longer than cars, they are likely to be driven more miles over their lifetime than cars.

Possible Climate Change Policies

(NEED A BETTER MORE DETAILED BUT PUNCHY DESCRIPTION OF THE POLICY RECOMMENDATIONS AND DISAGREEMENTS FROM CAR TALK -- PLUS THEIR ESTIMATED EMISSIONS IMPACTS)

- REGULATORY
- TECHNOLOGY

In 1994, President Clinton convened a Federal Advisory Committee Policy Dialogue to assist in the development of measures to significantly reduce greenhouse gas emissions from personal motor vehicles ("CarTalk"). Although CarTalk ended without consensus among all members of the Committee, the process did result in a number of analyses and proposed policy options. The analyses concluded that there are essentially three ways to reduce carbon emissions from light vehicles: improve fuel economy; use fuels with lower life-cycle carbon emissions (such as alcohol fuels from certain biomass processes); or reduce miles driven. Historically, most government regulatory efforts have been directed at improving fuel economy although, as stated earlier, such efforts are proving less effective.

PNGV?

Another opportunity for addressing transportation related emissions is through the Intermodal Surface Transportation Efficiency Act (ISTEA). This Act establishes the rules for federal transportation funding to the states. In 1991, ISTEA authorized \$140 billion in transportation projects over six years. The Act expires in 1997 and Congress is now considering options for its reauthorization. These could include provisions that would indirectly reduce greenhouse gas emissions. Examples include the following:

draft as of 4/14/97

- **Congestion Mitigation and Air Quality Improvement Program:** Additional funds could be targeted to transportation projects that reduce air emissions and energy consumption on a long-term sustainable basis.
- **Brownfields Restoration:** Successful redevelopment of brownfields can help revive inner city areas and reduce sprawl, thereby reducing vehicle miles traveled. More funds could be made available for these projects.
- **Incentive Funds:** A new \$500 million Fuel Efficiency Incentive Fund could be established to reward the ten states that are able to reduce fuel consumption, on a per capita basis, by the greatest amount over the next five years.

Factors Shaping Industry Response

(To come -- need to discuss strategic risk of CAFE, vehicle standards versus market demand; shifting market demand? Foreign manufacturer responses or technologies?)

OTHER TRANSPORTATION SECTORS

(AIRLINES, RAIL, TRUCK -- HOW RELEVANT, ANY POLICES OR IMPACT?)

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ELECTRICITY

Contribution to greenhouse gas emissions

Electric generators are responsible for about 35% of national emissions of carbon dioxide, with over 85% of electricity-related emissions coming from coal combustion.

Background on Electric Generation

Fossil fuel power plants generated over 80% of U.S. electricity in 1970, but that share has fallen to about two-thirds as nuclear power's share has risen from virtually nil to about 22%; and it is expected to rise back to about 80% over the next twenty years as the existing stock of nuclear plants are phased out.

Although the overall efficiency of fossil generation – the rate at which fossil energy is converted to electricity – has barely changed in the past 35 years, modest improvements are expected over the next twenty years as natural gas-fired generation doubles its share of total generation from about 15% today to over 30%. New natural gas-fired "combined cycle" power plants – basically jet engines bolted to the floor – yield very high conversion efficiencies because they turn turbines both directly and indirectly using their waste heat.

Renewables are forecast to have high growth but remain a small part of the base. Excluding hydroelectric power, whose expansion possibilities are very constrained, renewable electricity generation is expected to double over the next twenty years but will still account for less than 2% of total electricity generation.

**STRUCTURE OF INDUSTRY/
ROLE OF COGEN/ SMALL PROVIDERS
FEDERAL/STATE POLICY**

FACTORS SHAPING INDUSTRY RESPONSE

Emissions can be reduced either by making generation and distribution less carbon intensive or by reducing the amount of electricity demanded. Efforts at the latter generally focus on making the electric system and electric customers more energy efficient.

draft as of 4/14/97

DEREGULATION

States are currently adopting retail competition for the electricity industry. This trend could be accelerated with federal legislation. Retail competition is expected to lower the price of electricity by as much as 20-25% in certain regions and change the fuel mix of generation. Preliminary EPA and DOE analysis indicates that utility greenhouse gas emissions could rise by as much as 2-6% as a result. To mitigate the environmental impacts of competition and maintain the environmental benefits of current state level renewable and demand side management programs, a number of options have been adopted at the state level (for states that have already adopted competition) or are under consideration for the rest of the nation. These include:

- A "portfolio standard" for renewable energy or greenhouse gas emissions: This would require that all generators meet a specified level of renewable generation or greenhouse gas emission reduction either by undertaking such projects themselves or purchasing "credits" from others who have.
- A social benefit fund: Revenues from a charge on transmission service are used to subsidize energy efficiency projects, renewables, R&D, or low income consumers. California has adopted this approach.
- Information disclosure requirements: Generators could be required to disclose the emission profiles of their generation, facilitating the marketing of "green" electricity.
- Additional air pollutant requirements: Many states are hesitant to adopt retail competition because they perceive that differing regional environmental requirements put their electric industry at a competitive disadvantage and will result in more pollution being transported into their states. Thus, additional environmental provisions to "level the playing field" - which could include greenhouse gas emission reductions - are currently being debated.

TECHNOLOGY OPTIONS

Technological options for reducing the emissions from electric generation include the following:

- Substitution of lower carbon emitting fuels such as renewable energy or natural gas for coal

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- Greater use of existing sources of nuclear generation by improving their reliability
- Use of more energy efficient generation equipment for fossil fuels, such as combined cycle gasification systems or fluidized bed technologies for coal, or high efficiency turbines for natural gas.

Many of these technologies are currently penetrating the market and their importance will grow in the future. The next generation of natural gas technologies (including gas turbines and fuel cells), for example, could achieve energy conversion efficiencies of 70% or more by 2005.

- High efficiency coal-fueled power plants, such as integrated gasification combined cycle perhaps combined with a fuel cell, could achieve efficiency exceeding 55%, with half the CO₂ emission of current plants.
- Renewable technologies—wind power, photovoltaics, biomass power, solar thermal, and geothermal—have seen sharp cost reductions in the past two decades, some by a factor of ten.

Further R&D, coupled with expanded deployment to achieve economies of scale and improvements in manufacturing, would likely make one of more these technologies competitive with fossil fuels in a large number of areas in the next two decades. (NEED MORE BACKUP ON THIS. WHAT WILL MAKE THIS HAPPEN?).

(WHAT DOES THIS MEAN?)

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INDUSTRY

Overview

Industry analysis needs to focus both on

- 1) those sectors facing structural and transitional pressures because of climate change policies; and
- 2) sectors which will more directly benefit.

The seven most energy-intensive industries—steel, aluminum, petroleum refining, chemicals, pulp and paper products, glass, and metal casting—may face significant structural adjustment pressures, which public policy needs to take into account. These sectors account for about 80% of the energy consumed in U.S. manufacturing and more than 90% of the hazardous waste.

Overall, the industrial sector directly emitted approximately 300 million metric tons of carbon in 1994 from the combustion of fossil fuels and industrial processes. In addition, electricity consumption by this sector is indirectly responsible for an additional 120 million metric tons of emissions.

The major manufacturing sectors and their CO₂ emission estimates are summarized below.

Sector	Direct Carbon Emissions Million Metric Tons
Primary Metals Industry (SIC 33)	38.9*
Chemical and Allied Products (SIC 28)	48.8*
Paper and Allied Products (SIC 26)	53.5 ^{**}
Petroleum Refining (SIC 2911)	13.0 [†]
Cement (including non-combustion CO ₂ emissions)	15.0 [†] Estimates are from 1991 MECS and net of electricity.

^{**}For paper mills, over 50% of energy input is from waste wood. The carbon estimate incorporates emissions from wood based fuels. Emissions would be considerably lower (19 MMTc) if the carbon emissions from wood (a renewable source of biomass) were assumed to be zero.

[†]Estimates are from CO₂ Trading

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*Issues, Volume 1, Decision Focus
Inc. (based on 1988 MECS).*

Manufacturing industry as a whole experienced dramatic improvements in energy efficiency (i.e. increases in output per unit of energy input) during the energy crisis of the late 1970s and early 1980s, as industries reduced their energy use and energy-intensive industries' share of total manufacturing output decreased. The energy-intensive industries discussed above all experienced significant energy efficiency improvements, with improvements between 1977 and 1985 ranging from about 14% for the Paper and Allied Products industry to more than 40% for the Chemicals and Allied Products industry. However, many of these industries actually experienced decreases in their energy efficiency (i.e. increases in their energy intensity per unit of output) between 1985 and 1991 after energy prices fell.

No single industry sector dominates in generating CO₂ emissions. Paper and allied products is the largest sector (including direct emissions from by-products), followed by chemical and allied products, primary metals, and petroleum refining.

(NEED TABLE)

(NEED DISCUSSION OF WINNING SECTORS -- NO DISCUSSION IN THIS DRAFT OF THESE).

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ALUMINUM INDUSTRY

Contribution to Greenhouse Gas Emissions

(to come)

Background on the aluminum industry

The industry has three major segments :

- primary aluminum, produced by electrolytically reducing alumina into aluminum;
- secondary aluminum from recycling aluminum, which is used mostly for castings for the auto industry; and
- semifabricated products, where primary aluminum is then processed into sheet, plate, foil, extrusions, etc.

In general, primary aluminum supplies about 45 percent of domestic aluminum consumption, secondary aluminum about 30 percent, and imports the remaining 25.

Total U.S. primary aluminum capacity is about 4.2 million tons, and employs about 21,500 persons; secondary aluminum employees (), and semifabricated products employees 39000 (?). Value-added is about equal in primary and semifabricated products.

Overall, the United States is globally competitive all parts of the industry, and is a net exporter of semifabricated aluminum products. Domestic primary capacity has remained competitive because of continuous upgrades in existing plants, and that the capital stock is fully depreciated. No new domestic smelting capacity has been added since 1980 and domestic primary aluminum production is not sufficient to meet domestic demand. The United States is a net importer of primary aluminum.

The corporate players differ by segment. Primary and semifabricated product aluminum is dominated by the large vertically integrated producers such as Alcoa, Alcan, Alumax, Kaiser, and Reynolds. A large portion of the trade in both products -- especially with Canada, the largest trading partner -- is actually intercompany transfers between facilities.

Secondary aluminum is a more fragmented industry. The metal produced is used principally by the foundry industry, and approximately two-thirds of the secondary metal produced is consumed by the auto industry. The majority of

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these facilities are in Southern California, and the Midwest.

Factors Shaping Industry Response

Primary aluminum is highly dependent upon the cost of electricity -- approximately one-third the cost of producing primary aluminum is the cost of electricity.

Utility restructuring may have a significant impact on competitiveness: The primary aluminum industry in the US purchases electricity at approximately half the price of other industries, in part because of hydro power (Pacific Northwest) and in part because of long term negotiated rates. Any change in pricing due to restructuring would have major impacts. (NB -- IS THERE ANY ANALYSIS ON THIS? WILL RESTRUCTURING HAVE AS BIG/BIGGER AN IMPACT AS CC?)

The locus of primary aluminum production already is shifting gradually to low energy cost countries abroad. The last greenfield smelter in the US was built in 1980, and there are no plans to build further. While on average, the U.S. primary aluminum industry is around the median in terms of the costs of production internationally new primary aluminum capacity is being added in countries with cheap energy. Globally, new capacity is being constructed in countries with cheap sources of energy to produce electricity. These include the Middle East (natural gas), South Africa (coal), and Canada (hydro). Canada and South America are particularly well-positioned because they have almost 100 percent hydro based power.

Japan's strategy is noteworthy. With only one small aluminum plant domestically, Japan has historically undertaken joint ventures worldwide, i.e. Brazil, Australia and Indonesia, where energy prices and quantities have been guaranteed over a long term. (NEED MORE DETAILS --WHICH COMPANIES?).

The future of U.S. primary aluminum will depend on differences (if any) in the price and availability of hydro and coal generated electricity. These differences will have substantial regional impacts. Almost all the smelters in the eastern part of the U.S. rely upon coal based electricity whereas the smelters in the northwest use hydro based electricity. Should a policy be implemented based on carbon emissions, the eastern smelters in the U.S. could be impacted more than western smelters. The impact on the western smelters would depend on the cost increases to hydro based electricity.

The location of semifabricated production is linked to primary aluminum production:

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There is a close relationship, both physically and economically, between primary production facilities and semifabricating facilities. Semifabricating facilities, generally, are located near their source of primary aluminum in order to reduce costs.

Secondary aluminum is less sensitive to climate policies, but its potential is limited.

Secondary aluminum continues to increase in significance as a component of the overall supply of aluminum, it is restricted in its growth potential by the amount of primary metal consumed, and it is not substitutable for primary aluminum in all of its end-uses. The recycling industry uses only 10 percent of the energy required by primary producers and recycling typically uses natural gas. The effects of energy price adds on this industry depend critically on how policy actions affect natural gas prices relative to coal based and hydro based electricity prices.

Technological and Investment Options

Technological change is incremental: The Hall-Heroult electrolytic process for producing aluminum has remained relatively unchanged in the hundred years since it was developed. This process has experienced continuous and gradual improvements that have reduced energy consumption per metric ton by about 25 percent from 1960 to 1994. No new process for producing aluminum is expected, but DOE analysis pointed to "semirevolutionary and retrofit modifications" that could benefit existing capacity in the U.S. and in OECD Europe.

In order to reduce energy consumption, and, thus costs, the domestic industry, and in some cases in conjunction with the Government, is working on improving the current electrolytic technology. These improvements would decrease energy consumption, and hence greenhouse gas reductions.

Analytical Results of Sectoral Impacts

(NOTE: NEED IAT MODELING RESULTLS TO REPLACE DOE ANALYSIS)

In DOE's analytical base case of no new environmentally-driven constraints on aluminum production, practically all new alumina reduction plants will be built in developing countries, with the only exceptions being a few developed countries with access to low cost hydro power.

draft as of 4/14/97

The aluminum industry purchases electricity at approximately half the price of other industries, primarily because of its use of hydro power. The effects of the assumed fuel price adders on this industry depend on the future structure of the electricity market and the degree to which the assumed fuel price adders were applied.

- If the fuel price adders were only half as large for aluminum as for other industries, the least competitive plants in the U.S. and in Europe would close, which would reduce capacity in these regions by about 20 percent and 8 percent respectively.
- If the aluminum industry were subject to the same fuel price adders as the industry average, the domestic industry could not compete with developing countries that can produce aluminum in the \$1,300 to \$1,550 range.

... the revised economics would cause all of the US capacity to be noncompetitive by 2010 and virtually all of OECD-Europe except that in Canada, Iceland and Norway ... The loss of employment would be about 23,000 directly from the aluminum smelters.

In contrast to the primary aluminum producers, the aluminum recycling industry would be positively affected by the assumed fuel price effects. The significant increase in costs of producing primary aluminum would encourage a shift to recycled aluminum. However, the U.S. recycling market has a limited capacity to expand; about 70 percent of the aluminum cans in the U.S. is currently being recycled, and the predicted likely maximum is 80 percent.

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PETROLEUM REFINING SECTOR

Contribution to US greenhouse gas emissions

(To come)

Background on the Petroleum Refining Industry

Refinery products include refinery gases, distillate and heavy fuel oils, and transportation fuels including gasoline, jet fuels, diesel and bunker fuels. The US industry is particularly geared to the production of transportation fuels.

The petroleum refining industry is unique in being both the producer of fuels used as inputs downstream, and also a significant consumer of these products (8% of its output).

During the last 20 years, the U.S. refinery capacity has been approximately stable, but has declined somewhat since 1980. The refinery capacity in Western Europe has declined during the last 20 years. The OECD countries have accounted for a declining share of world capacity during the last two decades, because of both the declining capacity from within the OECD and the expansion in capacity in the developing countries.

The rate of return on refinery investments is currently 6 to 7 percent, which is just over one-half of the industry average.

Factors Shaping Industry Response

Charting the industry's evolution is complex, and industry impacts will be very sensitive to the precise form of the policies adopted. Key sensitivities include:

Whether policies affect only downstream demand of refinery products, or also increase costs of fuel used in refining. In petroleum refining, fuels are an input of the refinery process in addition to being an output. Relative international competitiveness of US refineries will be affected more by the extent to which prices of fuel used as an input are increased -- since these may change relative costs versus overseas competitors -- as opposed to policies that affect the overall demand for the refinery products produced.

Also, policies to promote the use of non-petroleum fuels as substitutes will clearly have an impact.

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The extent to which marine transportation costs (the price of marine bunker fuel) are affected by climate policy: Transportation costs of crude oil and refined products are important in determining world trade flows and refinery location. Bunker fuel can account for 25 to 55 percent of transportation cost for a long haul voyage on a large crude oil carrier, and an increase in bunker fuel costs could affect -- and perhaps counter -- shifts in refining capacity offshore.

Other factors that will affect the response of the industry include:

-- *characteristics of individual refineries:* The refineries most vulnerable are located in highly competitive regions, they are typically old, and they produce a standardized product subject to a high degree of competition. Many of the old refineries are only marginally profitable under existing conditions. Less affected refineries will be those that have been renovated and modernized in the last five years, or produce specialized products.

The impact of increased fuel costs to refineries would also vary regionally. The large East Coast market is served by local refineries, by Gulf Coast refineries, and by foreign sources. The Gulf Coast refineries account for about 55 percent of U.S. capacity. DOE analysis highlighted differing views as to their vulnerability to cost increases that affected them but did not affect foreign suppliers. The Midwest and Rocky Mountain regions, which account for about 25 percent of U.S. capacity, are relatively geographically isolated and would be less impacted by energy price adders. The West Coast refineries are subject to stringent environmental controls and could also be undercut by lower import prices.

The conflict between refinery emissions and policies to produce environmentally enhanced fuels. Refinery emissions can be reduced by producing a larger share of lower grade heavier products, such as fuel oil. However, these products produce significant emissions when burned. Lighter, high grade products are environmentally cleaner when burned, but they result in more emissions in the refinery process.

Technology and Investment Options

The U.S. refinery sector relies significantly on natural gas in the refining process. In the short run, there is therefore little opportunity to improve emissions by switching to fuels with lower carbon emissions.

Longer term, radical breakthroughs in refinery technology are possible and would enable the refinery processes to operate at lower temperatures and atmospheric pressures. Such breakthroughs would be of major importance

draft as of 4/14/97

in reducing energy use in refinery operations. These advancements include improved catalyst technologies and biotechnology process.

Analytical Results of Sectoral Impacts

(NOTE: NEED IAT ANALYSIS TO REPLACE DOE ANALYSIS)

DOE examined the impact of exogenous increases in energy prices (fuel price adders) under two cases: included that the impact of the assumed fuel price adders on the global refinery industry would be "substantial, adverse, and complex with possibly unintended consequences." The impact of the assumed price effects depends on whether they apply only to refinery use of fuels or if they would also be applied to refinery products.

- If price increases (add factors) only applied to refinery products (ie -- the consumption of refined products), the demand for these products would decline substantially and so would refinery revenues and new investments.

Refineries in non-affected countries would bear part of the cost to the extent that they sell products in participating countries.

- If the add factors were levied also applied against fuel used in the refining process in OECD countries, the result would be a significant increase in the operating costs of refineries, while competing refineries in non-affected countries would not be subject to these cost increases. In this case, most OECD refining would be shut down.

Some minor segments of U.S. and OECD refining may remain, e.g., those in highly interior regions with local crude supplies or, possibly, those refineries whose production was focused on high-value non-fuel products.

draft as of 4/14/97

STEEL INDUSTRY

Contribution to US greenhouse gas emissions

(to come)

Background on the Steel Industry

The U.S. market accounts for about one-fifth of steel demand worldwide.

There are three sectors in the U.S. steel industry:

- *Integrated producers* (58% of shipments) produce steel starting with iron ore and coal.

- *Minimills* (40% of shipments) melt ferrous scrap in an electric furnace to produce steel. This sector has grown rapidly in the last 25 years, largely at the expense of integrated mills, and will be bringing on line huge increases in flatrolling capacity through the rest of the 1990's.

- *Specialty steel producers* (2% of volume, 10% of value of shipments) melt scrap with alloying elements nickel and ferrochromium to produce stainless steel, electrical steel, and alloy tool steel products.

Growth varies by product. The demand for carbon steel has still not rebounded to levels achieved in the early 1970's, while specialty steel demand has increased an average of 4 percent over the last 30 years.

The United States is one of the few markets in the developed world where there is not significant overcapacity. In fact, domestic producers presently do not have the capability to supply their own market. Foreign producers supplied 21.2 percent of apparent domestic consumption in 1995. In the last several months, comparatively strong U.S. market and high prices encouraged a near record levels of imports.

(EMPLOYMENT?)

Factors Shaping Industry Response

A. Competitive and Structural Factors

Integrated producers -- while profitable and highly competitive -- remain financially weak:

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Beset by catastrophic losses and some bankruptcies in the 1980's, since 1981 integrated producers have sharply reduced their capacity and invested heavily in new technologies. They are now considered highly efficient; many mills are now recognized as world class and quality is on a par with that of Japan and Germany.

While the integrated mills are now profitable, they remain weak financially -- with a return on assets have been well below that of minimills and S&P 500 firms as a whole, and face difficulties raising capital. Furthermore, integrated mills will have to spend billions to conform to the 1990 amendments to the Clean Air Act, in large measure to reduce air toxics from coke ovens. Shutdowns are certain to occur.

Minimills and specialty producers are in much better shape -- being generally more profitable than integrated producers. Capital expenditures to construct a greenfield minimill are only a fraction of that for an integrated mill. Technologically innovations that boost productivity and reduce costs are coming along continually.

Minimills are very sensitive to the price of scrap: Melting ferrous scrap in an electric furnace to produce steel has generally been less costly than making steel from iron ore and other raw materials via the integrated route. However, the recent rise in the price of scrap has narrowed the minimills' edge.

The integrated and specialty producers already face substantial import competition. The US market has been particularly susceptible to imports. Foreign producers captured a large share of the increased consumption during the 1990's. Exports are not very important to the U.S. steel industry.

U.S. steelmakers have faced a near constant problem of global overcapacity in the steel industry. When markets are weak overseas, this has resulted in periodic surges in imports and consequent filings of unfair trade petitions, alleging dumping and massive government subsidies. In the last 15 years industry has won numerous cases.

Measures that increase coal prices will have a far more dramatic impact on integrated mills than on minimills, while all of the industry will be affected by electricity price increases: About 60 percent of the energy required to produce steel is derived from coal, and most of that is needed to produce coke. However, only integrated producers use coke. Steel companies from all sectors are very large users of electricity and consequently would all be adversely affected by higher electric rates.

draft as of 4/14/97

B. Technology Options

After a historical record of lagging technologically, the domestic steel industry has begun to exhibit a high rate of technological change, including:

-- *thin slab casting*, enabling minimills to produce flat rolled sheet at a minimill scale. Capital costs are low; productivity is high, and quality is improving. Since Nucor Corporation's initial mill was constructed in 1989, more than 7 million tons of (annual) flat rolled capacity have been built in the United States; 12 million tons more are expected to be added by 2000.

-- *new processes to extract iron from iron ore without using coke*. At least four facilities are now under construction in the United States to produce steel scrap substitutes. Typically they will use coal or natural gas as a reductant to produce iron. To replace antiquated (1940's era) coke ovens, Geneva Steel is expected to build a Corex direct reduction project in Utah. The facility, which will receive a \$150 million grant from the Department of Energy's Clean Coal Technology Development Program, will include power and oxygen facilities.

Analytical Results of Sectoral Impacts

(NOTE: NEED IAT ANALYSIS TO REPLACE DOE ANALYSIS)

Based on the DOE roundtable, at present energy costs are about \$54/ton for integrated producers (using the Basic Oxygen Furnace) and about \$44/ton for minimills (using the electric arc furnace). Integrated mills rely primarily on coal for energy; minimills are primarily electricity users.

Without new polices, energy costs for producing steel are projected to decline over the next two decades; domestic shipments will increase and imports decline.

With the assumed increase in energy prices, shifts from US producers could be reduced by about 30% and employment reduced by about 65%.

- the major effect would be on integrated mills in the Pittsburgh-Chicago corridor;

- hot and cold rolled steel would be the most affected product category;

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- there would be a large increase in imports of steel slabs, while downstream processing could remain in the US.

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THE CEMENT INDUSTRY

Contribution to US greenhouse gas emissions

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

Background on the Cement Industry

Over the last two decades, cement demand has grown less rapidly than GNP because construction growth has not kept pace with GNP growth and cement has grown at a slightly slower rate than overall construction.

The cement industry ships over \$5 billion from 120 firms employing about 17000 workers. Domestic shipments and consumption of cement have remained at about the same level for the last two decades.

The manufacturing process of cement is standardized world wide in terms of both process and use of raw materials. The raw materials (chiefly limestone) are burned inside a cement kiln at a temperature of around 2700°F to produce a hard granular intermediate product termed "clinker". This product is then finely ground into cement.

The cement industry is energy intensive, with energy costs being about 30 percent to 40 percent of total manufacturing costs. The domestic industry switched to coal as the principal energy source during the 1970's.

Although overland transportation of cement limits production and use to within a few hundred miles, the fact that it can be transported by water world wide at low cost makes it a international industry.

US cement capacity peaked in the early 1980's, and has since declined. This has been accompanied by significant restructuring. Since 1975, 54 plants have been shut down and the industry has lost about half of its labor force. The number of cement kilns has similarly decreased by 50 percent. Most US plants are located in rural areas, and are oftentimes the major employer.

No new greenfield plants have been built in the US in 10 years.

Factors Shaping Industry Response

A. Competitive and Structural Factors

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Domestic production is susceptible to increased import penetration: Almost all the large US markets are accessible by water, and hence to imports.

Furthermore, 65-70% of US cement capacity is foreign owned -- with three of the top five firms foreign. About 90% of cement imports are handled by domestic producers, who use imports to supplement domestic capacity. *Hence, corporate profitability is not necessarily linked to the health of the domestic industry.*

B. Technology and Investment Options

The manufacture of cement uses a process that is standard worldwide, with no apparent new manufacturing technologies which could dramatically increase energy efficiency.

Rather, opportunities are incremental:

Replacement of inefficient capacity: Scale economies, incremental improvements, and operating practice affect energy efficiency -- with US plants less efficient than others (see table). Japanese kilns, for example, are on average larger than the largest US kiln.

(Table -- US energy efficiency versus Japanese and European)

Incentives for this investment are unclear. The market is growing slowly; there is no need for additional capacity, and many investment decisions are made by non-US firms.

Potential for fuel switching: The extremely high burning temperatures permit the use of waste fuels such as sludge, old tires, and even some hazardous wastes. The cement industry is in the unique and enviable position of making an effective use of waste fuels. Almost anything that burns can be used to fuel a cement kiln, and typically without additional air quality problems. It is unclear as to the potential for significant expansion of low grade because: (1) permits are hard to obtain, (2) it is difficult to find waste that is suitable and accessible and (3) the industry is unwilling to burn municipal waste.

. Similarly, it would not be feasible to switch to natural gas. The industry switched to coal during the 1970s and is now better equipped to burn coal than gas. (NB -- WHY IS THIS? DOES IT MAKE SENSE?)

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Allow the use of blended cement. Cement blended with fly ash, blast furnace slag, or other pozzolans could reduce overall costs while not compromising quality. Existing building codes, state highway departments and other standards (STM standards) effectively preclude this cost saving measure.

Analytical Results of Sector Impacts

(NOTE: NEED IAT ANALYSIS TO REPLACE DOE ANALYSIS)

Based on the DOE roundtable analysis, the initial impact of higher energy prices would be to increase the price (NB -- OR COST?) of domestically produced cement by 13-20% by 2010, creating a large gap between the price of U.S. produced cement and cement produced by non-OECD countries whose energy prices are assumed to remain at baseline (no mitigation) levels.

- Cement imports would displace domestic production. Imports were estimated to increase from the 1994 level of 13.1 percent to capture 45.9% percent of the market in the year 2010 in one scenario case, compared to 19.8% in the base case.
- The result of lost market share would be the closure of domestic cement plants and foregone capital investments that would have been made to take advantage of growing demand.
- Approximately 26 million metric tons of clinker capacity would be shut down by 2010 in scenario 1 and 17 million metric tons in scenario 2. The plant closures would cause job losses: 5,800 and 3,700 in scenario 1 and 2 respectively by 2010. These losses are significant because cement plants are often located in small communities where the plant is one of the major employers.
- The most likely outcome of the assumed energy price increases in OECD countries would be the development of new cement production capacity in countries not subject to the price increases. The purpose of these plants would be to supply the U.S. market. These plants would use the same technology and emit the same amount of carbon dioxide as new capacity installed in the U.S.

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NEEDED:

DISCUSSIONS OF PAPER/ CHEMICAL/GLASS SECTORS

PLUS DISCUSSION OF 'WINNERS' SECTORS

RESIDENTIAL AND COMMERCIAL SECTORS

These sectors, sometimes called the "buildings" sector, account for 35% of final energy demand. The major components of energy use are the following:

End Use	Shares of Total
Space heating	26.8%
Air conditioning	9.8%
Water Heating	10.8%
Refrigeration	5.0%
Lighting	14.7%
Cooking	2.6%
Other Appliances/Uses	30.3%
Total	100%

Although the commercial sector's total energy use has risen over the past twenty years, the sector has experienced dramatic improvements in energy efficiency in terms of energy use per square foot of building space, on the order of 30% between 1979 and 1992. Commercial energy use per square foot is expected to decline modestly – by about 0.2% per year or 4% in total – over the next twenty years.

Residential energy use per household has declined by about 25% since 1978, while residential energy use per capita has declined by about 18%, despite an increase in the amount of residential space per person that must be heated, cooled, and lit. Residential energy use per square foot is expected

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to decline by about half a percent per year over the next twenty years.

Major technologies for improving end-use efficiency and/or reducing emissions:

- Better insulation of building shells, water heaters
- Better control systems for regulating the use of energy consuming equipment (time and temperature controls by zone, energy-use optimizers, energy management systems)
- High efficiency heat pumps
- Heat pump water heaters
- Decreased hot water requirements through low flow shower heads, better designed clothes washers and dishwashers
- Increased motor/compressor efficiencies for refrigerators
- High efficiency lighting – fluorescent fixtures, electronic ballasts, control systems
- Substitution of lower-carbon fuels (on a full fuel-cycle basis)

DOE operates a program of test procedures, energy conservation standards, and labeling for certain major energy using equipment in the residential and commercial sectors. These include refrigerators, freezers, air conditioners, water heaters, furnaces, dishwashers, clothes washers, clothes dryers and kitchen ranges, ovens, commercial heating and air-conditioning equipment, certain incandescent and fluorescent lamps, distribution transformers, and electric motors. The Energy Policy Act of 1992 (EPACT) also established maximum water flow-rate requirements for certain plumbing products and provided for voluntary testing and consumer information programs for office equipment, luminaires, and windows.

DOE estimates that the federal appliance standards implemented to date will reduce carbon emissions by 14 million tons in the year 2000. Further development of standards could result in additional reductions, although recent bipartisan attacks on implementing new standards under EPACT have stalled recent efforts to make progress in the appliance standards area.



Am in Boston

United States Department of State

Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

*cc: JAF
JS*

April 28, 1997

TO: Distribution
FROM: OES - Eileen B. Claussen *Eileen*
SUBJECT: Climate Change Papers

*RAF
Action
will be met
on this day
JFC*

The next Assistant Secretaries group meeting is scheduled for Friday, May 2, at 1:00 p.m., in Main State Room 7835. It is my intention to use this meeting to review and approve a series of papers which will already have been vetted through the interagency process at the staff level. After that, we will have one week for general consultations with the public and the environmental community to seek informal comments. Following those meetings, there will be a further revision of the papers, taking into consideration the comments received.

Papers will then be cleared by the Assistant Secretaries group, and given to the Deputies for approval prior to submission to the Climate Convention Secretariat in time to meet a June 1 deadline.

Where possible, Assistant Secretaries should help provide agency input toward staff-level work on these papers. Only through this input will it be possible to narrow the range of issues which may require Assistant Secretary-level decisions.

Please call Lilly Roots-Wiggins (647-1554) to confirm your attendance at this meeting. We hope to have all the papers distributed by Wednesday, April 30.

Attachment: List of climate change papers

*4/28
called
accept*

List of Papers for Review/Approval at May 2 Assistant Secretaries Meeting

- Emissions Trading - No new text for the U.S. protocol; this paper would explain and elaborate on implementation of existing U.S. proposals.
- Joint Implementation - The decision will not be on text; rather, on elements for elaboration on the existing text (i.e. a focus on credit determination, verification, review and reporting). New text will be required by June 1.
- Annex C gases/sectors - Significant issues regarding the possible exclusion of either greenhouse gases or sectors. Text for the U.S. protocol proposal is required by June 1.
- Developing Country Initiatives - Decisions will not be taken with respect to new text; instead discussions will focus on the level of financial contributions for the country studies program, USJI, etc.
- Early Banking - (Draft paper is being circulated at the staff level.) The issue is whether the international agreement should include provisions ensuring that early reduction efforts be credited against a future obligation. If yes, the text will be required by June 1.
- Reporting / Compliance - While this paper has already been approved at the Deputy level, decisions on other papers may lead to modification of the text (new text is required by June 1).

Please note that other papers may be developed; however, none are expected to require new text by June 1.

PROPOSED AGENDA

May 2 Assistant Secretaries Meeting

1. PAPERS TO BE REVIEWED/APPROVED

- Emissions Trading - Explanation and elaboration of existing U.S. proposals only.
- Joint Implementation - Decision on elements for elaboration on the existing text (i.e. a focus on credit determination, verification, review and reporting).
- Annex C gases/sectors - Significant issues regarding the possible exclusion of either greenhouse gases or sectors.
- Developing Country Initiatives - Discussions to focus on the level of financial contributions for the country studies program, USIJI, etc.
- Early Banking - Should the international agreement include provisions ensuring that early reduction efforts be credited against a future obligation.
- Reporting / Compliance - Paper has already been approved at the Deputy level.

2. OTHER BUSINESS

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THE WHITE HOUSE
WASHINGTON

April 25, 1997

cc: JAF
JS

MEMORANDUM FOR DISTRIBUTION

FROM: Mark Mazur
David Sandalow

SUBJECT: Climate Change

1. Our next meeting will be Wednesday, April 30 from 2:00-3:30 in OEOB Room 472. We will discuss the deputies decision memo.

Attendance is invitees only. Everyone on the attached list has been cleared into the building. For questions concerning clearance, please call Wendy Philleo (456-6224)

2. The next deputies meeting is being scheduled for early in the week of May 12. An announcement will go directly to the deputies.

3. Draft attachments to the decision memo are attached to this memo, as follows:

- Technology Policies (Rosina Bierbaum)
- Emissions, Concentrations and Their Consequences (Rosina Bierbaum)
- Overview of Domestic Greenhouse Gas Emissions Trading Programs (David Gardiner)

In addition, State Department (Eileen Claussen) has distributed an attachment on the international negotiations. Two other attachments (one on the economic modeling, the other on transition issues) are being prepared and will soon be circulated.

Please provide any comments on the three attached papers, or the State Department paper, to the contact listed above by COB Tuesday, April 29.

Total number of pages including cover: 20

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The Role of Technology Policies in Limiting Greenhouse Gas Emissions

"Economics studies have found that there are many potential policies to reduce greenhouse gas emissions for which the total benefits outweigh the total costs. For the United States in particular, sound economic analysis shows 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 long run."

-- The Economists' Statement on Climate Change, Feb. 13, 1997 (signed by more than 2,000 economists, including six Nobel Laureates)

A strategy to accelerate the diffusion of existing technologies and the research, development and deployment of more advanced technologies is a critical component of any U.S. policy to stabilize greenhouse gas emissions. Any emissions control program — without such a technology strategy — would result in higher prices for carbon allowances than would otherwise be the case. Analysis suggests that an accelerated technology effort has a large potential for bringing down this price, and thus the cost to the economy. In addition to major studies in the early 1990s, forthcoming analysis by five leading National Laboratories finds that a large potential remains for reducing U.S. energy consumption and greenhouse gas emissions while meeting the full energy needs of U.S. businesses and families.

The next 50 years may see a doubling of global population and a four-fold increase in GDP/capita. Merely stabilizing greenhouse gas concentrations at twice pre-industrial levels, requires technology (i.e. emissions/GDP) to improve by more than a factor of ten during the next few decades and then be rapidly deployed throughout the world. Leadership in the environment and international trade will go to the nation that first develops these leapfrog technologies.

In 1980, we devoted \$2 billion to energy efficiency and renewable energy. Today, we spend well under half that. Key underfunded areas include low-carbon power generation (including clean fossil technologies and renewable energy) and energy efficiency in transportation, buildings, and industry. The technology RD&D strategy will focus on the most promising RD&D for mitigating CO₂ - focusing on four strategic thrusts: (1) clean power generation, (2) energy efficiency, (3) carbon sequestration accompanying a transition to a hydrogen-based economy, and (4) basic and very advanced research. Responding to the climate problem may require breakthroughs in all of these areas. The actions described herein capture the key opportunities beyond those contained in the Administration FY 1998 budget request in the areas of energy efficiency and clean power generation.

Investment in this technology strategy are estimated to reduce 2010 carbon emissions by 30 - 60 million metric tons (per year).. Beyond 2010, resulting reductions would be greater as old stock is replaced with zero and low-carbon technologies and another generation of advanced technologies begin to enter the marketplace. Key elements in this strategy are summarized below.

Advanced Industrial Turbines – an aggressive 5-year RD&D program could substantially reduce the carbon intensity of and pollution from industrial energy consumption. Accelerating the current RD&D effort in advanced gas turbine cogeneration and biomass gasification could allow significant market penetration by 2010 of distributed power plants with total efficiencies in excess of 85% and efficient use of natural gas and biomass fuels. The efficiency improvements

Pre-decisional Draft – Do Not Cite or Quote

alone could yield a carbon drop of 6 MMT in 2010, with biomass gasification yielding much more.

Advanced Industrial Process Technologies -- the Industries of the Future process can be accelerated, resulting in successful development of new technologies sooner. The investment, matched 50-50 with industry, will focus on technologies with the greatest greenhouse gas reduction potential. Such technologies include carbon-free aluminum production cell cathodes, separations in chemical processes, novel membranes and "green" chemicals, and dilute oxygen combustion.

Fuel Cells for Buildings -- With an aggressive 5-year R&D effort aimed at fuel cells (running on hydrogen converted from natural gas), such as proton-exchange membrane (PEM) fuel cells, this technology could become the most cost-competitive energy provider for buildings (and light industry). If successful, a building in 2010 using efficient technologies with electricity and hot water provided by an 80-90% efficient fuel cell could have no first-cost penalty with well under half the energy bill of a typical 1990 building and one-quarter the greenhouse gas emissions.

Advanced Diesel Engines -- A 55% efficient diesel for heavy trucks (and 45% efficient for cars, sport utilities, and light trucks) is a plausible near-term outcome of expanded research. This is an efficiency that no other engine can surpass or even match before 2010. Additional RD&D could accelerate development of the "clean diesel" - 50% more efficient than conventional gasoline vehicles and without the particulate and NOx emissions problems of the current technology. While vehicle turnover is quite slow, this initiative could result in carbon savings of 10 MMT by 2010 and substantially more thereafter.

Enhanced PNGV Initiative -- sustained funding for the PNGV (Partnership for a New Generation Vehicle) initiative will accelerate development of advanced vehicles and allow them to be commercially introduced in 2005 at a lower cost increment over conventional vehicles. The funding will be targeted to reducing costs for key components such as the power electronics building block, ceramic materials, and lightweight materials - as well as manufacturing techniques for producing PNGV vehicles.

Transportation Biofuels - Ethanol is a prime candidate for an intense RD&D effort. Federal R&D has brought the cost of ethanol from \$3.60 per gallon in 1980 to \$1.20 per gallon. With continued R&D in bio-engineered organisms and fast-growing crops, the current biofuels program is expected to produce ethanol from cellulosic waste and herbaceous or woody crops for under \$0.70 per gallon by 2005, competitive with oil at its current. Use of ethanol from woody-biomass-derived-E85 (85% ethanol) results in a 90% reduction in greenhouse gases. Estimated carbon savings from use of ethanol largely as a gasoline blend is 20 MMT in 2010.

Biomass Combustion for Power Generation - Much progress has been made in both co-firing biomass fuels with coal and direct biomass gasification and combustion. A huge potential exists in the near- to mid-term to reduce air emissions through co-firing. An aggressive RD&D program could result in up to 15% co-firing of biomass with coal at zero- to very low capital cost cutting carbon emissions by 40 MMT per year in 2010.

Next Generation of Wind Turbines - The cost of wind power has dropped from 25 cents per kWh in 1980 to 5 cents today. Acceleration of the current RD&D effort for the next generation of wind turbines will result in a 2.5 cents/kWh wind turbine in good wind sites - competitive with advance gas technologies. This effort could result in a 5-10 MMT/year reduction in carbon by 2010 and 25-35 MMT/year by 2020.

Photovoltaics - Photovoltaic (PV) cells, which convert sunlight into electricity, have dropped from 90 cents per kilowatt-hour in 1980 to well under 20 cents today. An accelerated RD&D effort, together with through economies of scale and improvements in manufacturing from increased production, will ensure continued drops in cost. This acceleration could result in rooftop PV applications on 1 million buildings across the U.S. by 2010.

Advanced Power Generation Technologies - Accelerated RD&D on several fossil energy power generation technologies is another critical component of the strategy. These technologies include large stationary fuel cells for utility power generation, advanced turbines and coal gasification.

In addition to the portfolio of R&D options related to less CO₂-intensive technologies for energy supply and use, capture and disposal of CO₂ offers an additional alternative for reducing atmospheric concentrations of CO₂. If major reductions in CO₂ emissions are necessary, and global reliance on fossil fuels continues beyond the middle of the next century, then some form of CO₂ sequestration will almost certainly be needed. A long-term R&D strategy would include demonstration of a number of sequestration options and research into their possible environmental impacts; converting CO₂ into an industrial chemical feedstocks; other novel sequestration options, such as CO₂ fixation by micro-algae; selectively permeable membranes for CO₂ capture; processes for converting fossil fuels and biomass into CO₂ and hydrogen; development of hydrogen infrastructure technology, including transportation and storage; and PEM fuel cells.

Another long-term area for expanded R&D is superconductivity. Superconductors offer the possibility of storing and transmitting electricity with virtually zero loss, with potential savings of 5% to 10% of all electricity presently generated by utilities. Highly efficient superconducting motors could have an even larger impact since motors currently consume 60% of all electricity. While U.S. and German funding is roughly \$40 million annually, Japan spends nearly \$70 million, not including their superconducting MagLev train program, with some \$3.5 billion being spent over five years. Significant increases in both basic and applied research in superconductivity should be an essential part of a low-CO₂ R&D strategy

A number of areas of basic research could prove crucial to responding to climate change, including biotechnology, fermentation microbiology, combustion research, polymer and ceramic science, process engineering, supercritical CO₂, new materials synthesis, and nanotechnology. We need to better understand the underlying biochemistry of the bioconversion of carbon dioxide to methane or to other potential fuels and feedstocks. This new research includes the ability to sequence the genetic material of microorganisms and plants, to develop new molecular genetic engineering techniques, and to understand biophysical and biochemical pathways of photosynthesis.

Emissions, Concentrations, and Their Consequences

Concerns about the potential effects of human induced climate change lead to the signing of the Framework Convention on Climate Change (FCCC), whose ultimate objective is to achieve "... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." Concentrations of greenhouse gases have already risen significantly above those of the preindustrial era as a result of past emissions: concentrations of carbon dioxide (CO₂) have risen 30%, methane (CH₄) has more than doubled, and nitrous oxide (NO_x) has risen by about 15%. Global temperatures have increased about 1 degree F. over the last century and are expected to increase another 2 to 6 degrees over the next century. This rate of warming is greater than any sustained rate of warming of the last 10,000 years, or since the innovation of agriculture (IPCC, WG I Summary for Policy Makers, 1995).

In the absence of emissions control policies, concentrations in the atmosphere are projected to reach a tripling of pre-industrial carbon dioxide levels over the next century (See Figure 1)—levels that have not been seen on the earth for 50 million years.

Most estimates of the effects of climate change are those associated with a doubling of the preindustrial concentration of carbon dioxide to approximately 550 parts per million (ppm), or an increase in all greenhouse gas concentrations that together would have an equivalent capacity to trap heat.

The climatic changes that would result from an equivalent doubling of carbon dioxide would have pervasive effects, some of them irreversible, on the environment and human societies.

Health Effects

Effects of climate change on the health of human populations (WHO, 1996) will vary across populations depending on environmental circumstances, social resources, and preexisting health status. The risk of adverse health impacts is considered to be greatest in the world's less developed regions (IPCC, 1995).

Climate change can directly affect health by increasing heat stress. A study of deaths associated with summer time heat stress and winter time illnesses in 44 US cities estimated that climate change could double the number of weather related deaths (See Figure 2). The elderly are at greatest risk in the US and urban populations in developing countries are also especially vulnerable to heat stress.

The incidence of infectious diseases, which are still the world's leading cause of fatalities, may increase as a result of climate change. Climate change may extend the

geographic ranges of disease-carrying vectors such as mosquitos, which can increase the populations exposed to diseases such as malaria, dengue and yellow fever. Globally, the population potentially exposed to malaria could increase by one-third, with a possibility of 50-80 million additional malaria cases per year.

Climate change can reduce air quality and increase levels of air borne pollen and spores which exacerbate respiratory disease, asthma, and allergic disorders.

Water Resources

Changes in precipitation and increased evaporation due to higher temperatures can be expected to cause large changes in water runoff in some regions, affecting the quantity and quality of water supplies for domestic and industrial uses, irrigation, hydropower generation, navigation, stream ecosystems and water based recreation. Increased variability in the hydrologic cycle is expected to result in more severe droughts and/or floods in some places but less severe in others (IPCC, WG I Report, 1995).

Areas of greatest vulnerability are those where water supplies and quality are already problems, such as arid and semi-arid regions of the world and some low lying coastal areas, deltas and small islands. In some cases these areas coincide with conflict prone areas which are highly dependent on water originating in areas outside their borders such as Cambodia, Syria, Sudan, Egypt and Iraq (IPCC, WG II Report, 1995).

In the United States, the Colorado River Basin would suffer decreased summer runoff, coinciding with peak demand for irrigation, unless precipitation also increases substantially. Reductions in runoff of up to 25 percent in the basin are projected under some scenarios of 2xCO₂ equivalent climate change. Runoff losses of this magnitude in water short regions such as the Colorado River basin are likely to adversely affect water deliveries, exacerbate salinity problems, reduce hydropower generation, and reduce water storage in reservoirs (Nash and Gleick, 1993).

Forests and Natural Areas

Climate change can dramatically alter the geographic distributions of individual tree species and of forest and vegetation types (Figure 3). One-third of the Earth's forests would undergo a major change in the type of vegetation that could be supported as a result of an equivalent doubling of CO₂. In boreal forests, which are the forests most vulnerable to climate change, two-thirds of the currently forested area may undergo a change in vegetation type. In some instances, a change in vegetation type will result in a loss of forest area as the land converts to grassland or shrubland. Globally, forested areas may decline 10 percent after forests reach a new equilibrium under a new 2xCO₂ equivalent climate (IPCC, WG II Report, 1995).

In the United States, western conifer forests could decrease in area and be replaced by broadleaf forests; eastern deciduous forests may be replaced by grasslands along their western boundary

Wetlands represent another critical set of ecological systems at risk from climate change. For example, the IPCC found that precipitation changes and salt water intrusion from sea level rise could adversely affect the ecological communities of the Florida Everglades and degrade the habitat for many species of wading birds. The wetlands of the prairie pothole region of North America, which supports half the waterfowl population of this continent, could diminish in area and change dramatically in character in response to climate change according to the IPCC.

Coastal Areas

In the next century, average global sea level is projected to rise about 20 inches. The IPCC estimates that a 20 inch rise in average global sea level and population growth along coasts would double the population at risk from storm surges from roughly 45 million at present to over 90 million world wide.

Rising sea level erodes beaches and coastal wetlands, causes the gradual inundation of low lying areas and increases the vulnerability in coastal areas to flooding from storm surges and intense rainfall. Along US coasts, a one foot rise could erode ocean beaches 100-150 feet. A two foot rise would inundate 3000 to 7000 square miles of coastal lowlands and 20-60 percent of U.S. coastal wetlands. Figure 3 shows how a 1 meter rise would affect Florida.

Even if concentrations of greenhouse gases are stabilized in the future, sea level would continue to rise long after, perhaps for several centuries, and reach levels much higher than projected for the next 100 years. For example, after an equivalent doubling of CO₂, the equilibrium sea level rise several centuries in the future is estimated to be at least seven feet.

Agriculture and Food Supply

Climate strongly affects crop yields and projected changes in average yields under an equivalent CO₂ doubling can exceed 30 or 40 percent for some crops and locations. But despite the potentially large changes in yields, average global food production is not expected to change substantially. This is because farming practices are considered to be highly adaptable to different climates, because production of important food crops can shift to new locations in response to changes in climate, and because CO₂ has beneficial effects for plant photosynthesis and water use efficiency that can offset deleterious effects of changes in climate. Not taken into consideration in this judgment, however, are the potential effects of changes in climate variability on agriculture and the disruptions that may accompany adjustments of agricultural systems to climate change.

Impacts are likely to vary considerably across regions and, in contrast to global food production, some regions may suffer substantial reductions in agricultural production. Estimates of climate change impacts on agriculture indicate that developing countries are more vulnerable to losses than are developed countries (See Figure 5). Projected decreases in agricultural production in developing countries have been estimated to increase the population at risk from hunger by 5 to 50 percent, or 40 million to 300 million persons (Rosenzweig, Parry and Fischer, 1995).

In the United States, eastern and southern areas of the United States are projected to experience losses in agriculture under a number of scenarios, while northern and western areas are projected to benefit (Adams et al., 1995).

Catastrophic Events, Surprises and Rates of Change

There are various feedback effects between the atmosphere, oceans, and terrestrial systems that amplify or dampen changes in climate that are projected to result from human emissions of greenhouse gases. Uncertainties about these effects are largely responsible for differences in the warming projected by different models for a doubling of carbon dioxide. But because of the complexity and non-linearity of the processes and interactions, abrupt, large and unpredicted changes in climate and/or sea level are possible. Assessments of the potential effects of climate change have not examined the possible consequences of these types of changes.

There are also other potentially significant feedbacks not accounted for in climate and sea level rise projections. For example, the rates of warming projected to result if no further actions are taken to control greenhouse gas emissions would cause suitable climates for many tree species to move polewards at rates that are an order of magnitude greater than the species can naturally migrate (IPCC, WG II Report, 1995). This could cause significant losses of forest productivity and dieback of forests. As a result, enormous quantities of carbon could be released to the atmosphere and significantly amplify the warming and the environmental and social impacts of climate change. Though the probabilities of such events are considered to be low, they are expected to grow the more rapid is the rate of warming (IPCC, WG I Report, 1995).

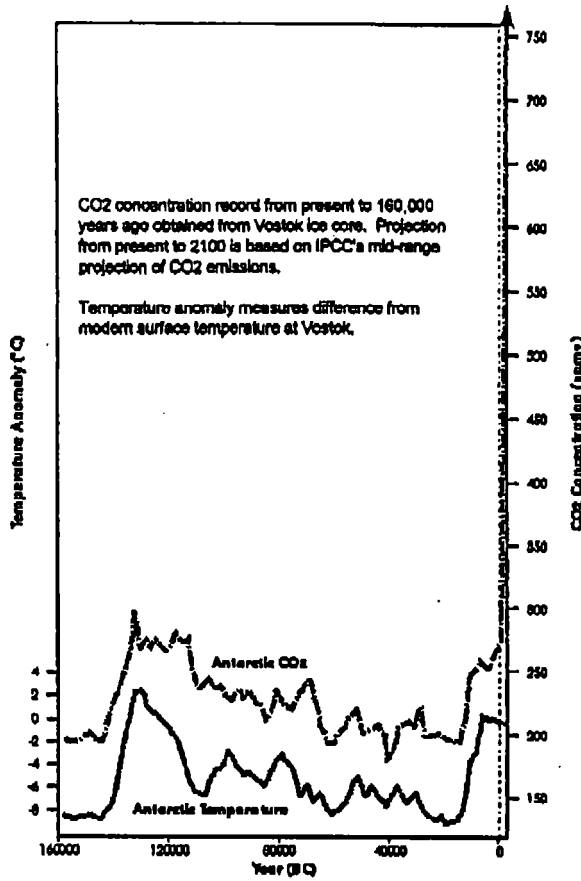


Figure 1 Projected rise in CO2 concentration is unprecedented.

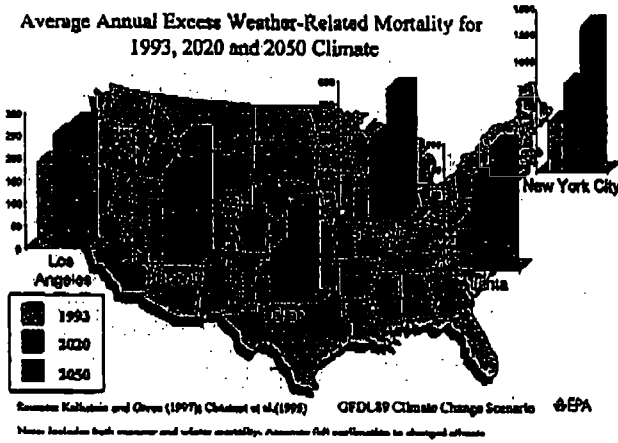


Figure 2 Weather related deaths projected to increase.



Present and future geographical range for sugar maple. A: Present range (from Fowells, 1945); B: 2XCO2 climate-space in 2050 A.D. under the GISS scenario. Black area is the predicted species range; stippled area is potential range. C: 2XCO2 climate-space in 2050 A.D. under the GFDL scenario. Black area is the predicted species range; stippled area is potential range. Source: USEPA, 1997

Figure 3 Southern boundary of sugar maple range projected to shift north.

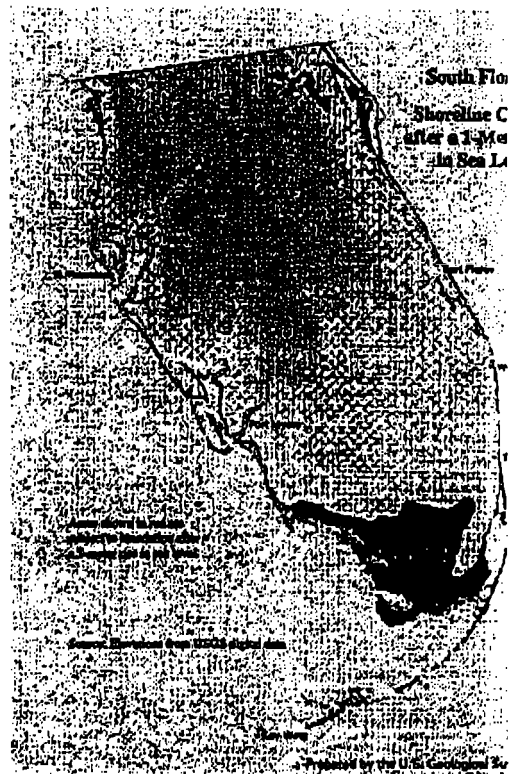
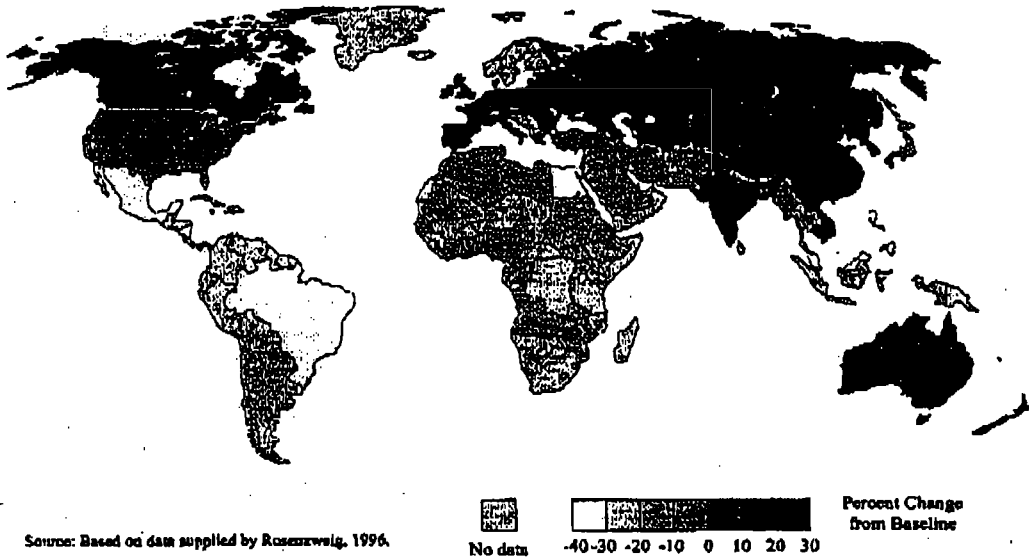


Figure 4 Potential inundation from 3 foot rise in sea level.



Source: Based on data supplied by Rosenzweig, 1996.

Figure 5 Estimated changes in average wheat yields for GISS 2xCO2 equivalent climate change vary by region.

Draft 4/22**Overview of Domestic Greenhouse Gas Emissions Trading Programs**

This paper describes options for a domestic emissions trading program to meet an international agreement on an emissions target for greenhouse gases. Emissions trading involves allocating or auctioning emissions allowances, and allowing the trading of allowances in a market. Emission trading creates new, marketable assets that can have substantial value, so distributional issues will be an important component of program design. Allocation designs or auction revenues can be used to address these distributional issues.

An emissions trading program, like any program designed to limit greenhouse gases, must contain certain elements. First, an agreed upon emissions budget, and any rules governing provision for the project-specific crediting of reductions made in activities not explicitly covered by the budget, must be established. A central authority must be given the domestic responsibility for verifying compliance and must be provided sufficient information to do so. Finally, noncompliance with allowance limitations or reporting requirements must generate real consequences, such as penalties or subtraction of allowances.

What types of Activities Should Require a Permit

The decision for determining permit holders should consider the following:

Coverage: While it may not be necessary to ensure that every ton of greenhouse gas is accounted for within an emission trading regime, the scope of coverage of the trading program should be sufficient to ensure compliance with targets set in accordance with an international agreement.

Administrative and compliance feasibility: The number of sources involved in the trading program should be small enough to be administratively feasible and large enough to ensure market competition.

Potential to Diffuse Low Greenhouse Gas Technologies: Alternative points of intervention should be evaluated for their ability to provide incentives for research, development, adoption and diffusion of low greenhouse gas technologies.

Market Impacts: Any program that limits emissions will affect the bottom line of firms. The permit program will have economic impacts that vary depending on program design. For example, exempting certain sizes or categories of sources from permit requirements because of administrative or equity concerns (e.g., small boilers or home heating oil) has competitive implications within the energy market.

Public Acceptance: The program must consider the ease or difficulty with which various allocation approaches would be accepted by the public.

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

Carbon dioxide currently accounts for about 85% of U.S. greenhouse gas emissions and number in the hundreds of millions since they include sources such as automobiles and residential gas water heaters. However, since virtually all of the carbon contained in fossil fuel extracted from the ground (with the possible exception of certain feedstocks) is eventually released to the atmosphere, a trading program need not focus uniquely on direct emitters, but can be implemented through other points in the energy market. These include fuel imports, fuel extraction, processing, refining, distribution, and secondary conversion (e.g., coal to electricity). In addition, these points could vary by sector. For example, an emission trading program could focus on the point of final combustion for coal, but on refining for oil, or distribution for natural gas. Given the wide variety of options available for including energy sources in a trading program, a few alternative programs are described below for illustration.

Carbon Sources

A Program Targeting Primary Fuel Producers

The primary fuel producing sector – extraction, processing, refining, and distribution – has many levels where a permit program could be implemented. One option would be to require permits at the point of first sale (a permit is surrendered with the first inter- or intra- company transaction). Such a system would include transactions between a coal company and an electric utility, between a natural gas producer and its marketing arm, between a natural gas producer and a broker, or between an oil extraction company and its refinery operations. Fuel importers would also require permits to import fuel. This would capture the carbon from fuel consumed in the refining process. The number of market

actors under this program design would be under 5000 and virtually all carbon in the energy sector would be included in the program.

A Program of Emission Trading at the Sectoral Level

An emissions trading program could also be applied at the point of combustion, allowing trading among affected sources. This system would be most comparable to the current SO₂ emission allowance trading system.

Targeting the six largest industrial CO₂ emitting sectors (electric utilities, cement, primary metals, pulp and paper, petroleum refining and chemicals) in a sectoral trading program could encompass as many as 20,000 market participants and 90 percent of industrial CO₂ emissions. Mobile source emissions could be indirectly included in the system by allocating transportation equipment manufacturers permits for emissions associated with their automobile fleets or by including refiners in the program. Residential and commercial emissions could be similarly addressed by focusing upstream in the energy system.

Emissions Trading Combined with other Approaches

In order to minimize increases in permit prices or to reduce the size of potential transfers, emissions trading options could be used in conjunction with existing voluntary (e.g., Climate Change Action programs), regulatory, or standards setting approaches (e.g., appliance efficiency standards). Alternatively, emissions trading could be used as the primary tool for most sectors, while others where trading might be less applicable, could be covered by alternative limitations.

Other Greenhouse Gases and Sinks

Other gases account for the remaining 15% of greenhouse gas emissions (on a carbon-equivalent basis). Most important among these is methane, which accounts for 11% of national emissions. Since gases differ in their lifetimes and in their potential to trap heat in the atmosphere, an "exchange rate" has been developed by climate researchers and could be applied here.

Several, although not all, of the many sources of non-carbon greenhouse gases could likely be included in a trading system. For example, methane emitting coal mines, landfills, livestock manure management facilities and potentially natural gas distribution systems

may meet the criteria described above for inclusion in a greenhouse gas trading program. These sources account for 7% of national greenhouse gas emissions. Similarly, emissions of some sources of other gases could potentially be included (e.g., magnesium production).

Forests in the United States currently remove an amount of carbon equal to 8% of national emissions from the atmosphere. Their inclusion in the trading program would theoretically enhance the system's flexibility. However, translating the potential of sinks into monitorable, verifiable, and cost effective emission reductions would require the development of a comprehensive national accounting system for sinks. The decision on whether to include sinks in the trading system will be influenced by the outcome of the international negotiations.

Allocating Permits

In an emission trading system, some mechanism must be provided for allocating permits to sources. This could be done on the basis of baseline/historical emissions (where permits are given to those currently emitting) or through an auction (where revenues accrue to the government). These two mechanisms might also be combined: a portion of permits could be allocated on the basis of historical emissions while the rest are auctioned. In any case, the value of these assets could be large depending on the permit price, which is determined by the emissions target and the costs of substitutes. Given that an auction could produce substantial revenues, some decision would have to be made with respect to what to do with the proceeds. These could be used to redress inequities in the distribution of control costs, fund R&D for less carbon intensive energy sources and end uses, or to reduce taxes or the deficit. Under one such option, a reserve of allowances or a portion of auction revenues could be set aside to encourage manufacturers of energy consuming equipment to produce equipment more efficient than the average in use or than required by current mandatory efficiency standards. Such a program could yield reductions in energy demand and help buffer the consumer from the impact of higher energy costs.

Allocation Based On Baseline/Historical Emissions

Under this approach, sources are given a number of permits based on baseline fuel production or emissions and an allocation formula. Various allocation formulae can be devised, weighted to greater or lesser degrees in favor of sources with high historical emissions. Emissions allowances are endowed to facility operators for no cost and would be transferable. Those receiving permits thus obtain assets of potentially large value from the government at no cost.

Such an allocation mechanism could create entry barriers. In a capital intensive sector like primary fuel production, where entry barriers are already substantial, new entrants

would be further disadvantaged if they had to purchase permits -- especially if existing holders hoard permits. This problem could be mitigated by withholding a number of permits for purchase by new entrants or by auctioning a portion on the open market. Such an auction would also facilitate price discovery in a new market. Although new firms will still be disadvantaged (as they will pay for all of their permits), they would be able to enter the market.

It may be desirable to design an allocation that would allow credit for early emissions reductions (those achieved prior to the start of the program, but after the baseline period) -- in particular for those that reduced greenhouse gas emissions as part of government sponsored voluntary programs. If credits for past actions are given, the total credits allowed would need to be deducted from the overall permit allocation in order not to exceed national greenhouse gas emissions target.

Auction

Alternatively, an auction could be used to allocate permits. In this case, permit holders would pay the market clearing price for every unit of greenhouse gas released. Auctions ensure that permits are available for trade, and would serve to inform potential traders about current price levels. All participants have equal access to permits, placing new entrants on the same footing as existing emitters. As discussed earlier, since an auction could produce substantial revenues, some decision would have to be made with respect to what to do with the proceeds.

Conclusion

Past experience with emission trading programs indicates that they can help significantly reduce the costs of meeting environmental objectives. This is due in part to the incentives they provide for developing and diffusing new environmental technologies. Thus, final compliance costs for the programs that have incorporated emissions trading have, in general, been dramatically lower than ex ante expectations. With careful attention to design, a system of emissions trading could be instituted for greenhouse gas emissions. Such a program would provide similar incentives to research, develop, and diffuse low greenhouse gas technologies and result in achieving targeted emission levels at the lowest possible cost.

ATTACHMENT: US Experience with Emissions Trading

The US has had more experience with emissions trading than any other country in the world. Specific programs include:

Sulfur Dioxide (SO₂) Allowance Trading: The Clean Air Act Amendments of 1990 required a 50% reduction in SO₂ emissions from electric utility boilers. To accomplish this goal, a fixed number of emission allowances were allocated to electric utilities based on a formula reflecting historic emissions. In addition, a small portion of allowances are auctioned every year to facilitate price discovery and new entrants. Participants need to conduct regular monitoring of emissions and make an annual accounting of their emissions. Penalties are imposed if emissions exceed the number of allowances held by a source.

A functioning allowance market now exists, involving both bilateral exchanges between companies and brokered exchanges through third parties. This market, along with other factors, has helped to dramatically reduce the costs of the abatement program. Initially, forecasters claimed that a 50% reduction in SO₂ would correspond to allowance prices in the range of \$400 - \$1,000. However, current market prices are around \$100. In addition, 1995 emissions were actually 40% below the legally required levels for that year.

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

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

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

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

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JS

CLIMATE CHANGE DISTRIBUTION LIST

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Climate Change – International Context

Background

There is international agreement that the climate change problem is significant and warrants additional near-term action. Further, there is a global recognition that the existing U.N. Framework Convention on Climate Change, signed in 1992, is inadequate to address this near term need. Current negotiations to develop next steps under the Convention began in April 1995 at the first meeting of the Parties to the Convention. At that session, the Parties agreed to begin negotiations toward a new legal instrument (a protocol or an amendment to the Convention) that would deal with next steps – in particular, how to address climate change in the post-2000 period. They agreed to conclude this effort by their third meeting, now set for Kyoto in December 1997.

In July 1996 at the second meeting of the Parties the United States called for an approach which would include three key elements: a legally binding target (instead of the voluntary aims of the existing Convention), flexibility in implementation (e.g., emissions trading and joint implementation), and the participation of developing countries. The U.S. call galvanized the negotiations, with ministers endorsing the objective of a legally binding instrument in the Geneva Declaration adopted by a large majority at the meeting.

U.S. Protocol Proposal

In January 1997, the United States tabled a framework protocol proposal that amplified the positions set forth in Geneva:

- developed countries would adopt binding emissions budgets covering specific periods, although no budget levels or timeframes were specified; provisions would be developed for detailed monitoring, review and compliance;
- countries with budgets would be able to trade emissions ^{among} ~~between~~ themselves, and jointly implement projects with countries that do not have budgets, so that the most cost-effective reductions can be taken;
- developing countries would be required to take measures that reduce emissions, measure the effects of these measures, and report on the actions taken;
- advanced developing/newly developed countries (e.g., Korea and Mexico) would agree, on a voluntary basis, to adopt binding emissions budgets that might differ from those for industrialized countries; and
- all Parties would agree to adopt binding GHG emissions budgets in a future, post-Kyoto negotiation, with provisions for automatic “graduation” from one category to another based on agreed indicators.

Views Abroad

The U.S. proposal has received mixed reactions abroad. Some view it as the most comprehensive and forward looking of any proposal yet tabled. Others criticize it for focusing on design features without providing any indication of the level of emissions reduction to which we are prepared to commit. Countries (and positions) fall within several different groups:

European Union: Strong domestic green politics drive many key players in the EU (Germany, Netherlands, Denmark), although differences with the southern tier (Italy, Spain, Portugal) as well as France split the EU on some issues. They have set a target of 15 percent reduction below 1990 levels by 2010 for all developed countries (with the EU to meet the target jointly rather than as individual countries). While all analyses suggest that this is an unrealistic goal, it provides the EU with the moral high ground. Nominally supporting flexibility, the EU largely limits this to members states. They also reject a strong call for developing country actions.

Non-EU Developed Countries (Japan, Canada and Australia, Eastern Europeans, NIS/FSU): Japan, as host (and chair) of the Kyoto meeting is anxious for its success, but has reached no internal agreement on a desired outcome. Both Japan and Australia have supported allowing each industrialized country to have a different reduction target based on national circumstances (an idea considered almost impossible to negotiate by Kyoto). Canada and Australia have supported including flexibility provisions and developing country obligations in next steps, while Japan is weak on both. Many Eastern European countries await their turn to join the EU and have been reluctant to challenge EU positions. Further, most have seen dramatic declines in their own emissions due to economic decline – and few anticipate even returning to 1990 levels until 2005 or 2010. Russia (the world's third largest emitter) is the most vocal in the NIS/FSU group and takes a line independent of the EU. Russia has supported flexibility provisions and developing country participation – largely the result of a successful Gore-Chernomyrdin process.

Developing Countries: Big countries (principally China, India and Brazil) drive the international developing country position; they argue that the developed world is responsible for global warming and should pay to redress the problem. Despite the public rhetoric, some (including China and Brazil) have been willing to engage constructively on a bilateral basis, and have significant domestic programs. OPEC, led by Saudi Arabia and Nigeria, fears that action to combat global warming will diminish oil revenues. They have called for developing countries to be "compensated" if their economies are affected, and have blocked adopting rules of procedure under the Convention. Small Island States, with an alliance 37 members strong, fears that sea level rise will inundate them. They have pushed for aggressive next steps (i.e., a 20 percent reduction in OECD emissions below 1990 levels by the year 2005).

The Kyoto Agreement: Key Elements

For us to reach an agreement that is in line with the framework we have proposed, and with a chance of Senate ratification, there are five elements that will be required:

1) **Intensive Diplomatic Efforts:** These are now underway at all levels and in various fora. Ultimately, they may require the personal involvement of the President and Vice-President. Opportunities such as the G-7, UNGASS, and APEC must be used to stress the importance we attach to reaching an agreement, to promote understanding of our position and to highlight what will be needed for the United States to sign on.

2) **Agreement on Emissions:** We cannot hope to convince others of the desirability of flexibility (the EU) or the need for greater commitment (developing countries) unless we have a serious emissions reduction target to put on the table. The bottom line number need not be announced until late in the negotiations – but a signal of the direction in which we intend to move must be given as soon as possible. For example, were we to indicate at UNGASS that we believe a reduction target in Kyoto must take us below 1990 levels, we may be able to prevent other countries from taking key elements of our position off the table.

3) **Negotiating Flexibility:** We will need to decide how much we can achieve in the Kyoto agreement itself and how much we could defer to subsequent discussions. For example, to win on some of our flexibility proposals, we may need to be willing to delay their implementation beyond Kyoto (e.g., subject to further agreement on guidelines). This could also be true with respect to emissions trading. In each case, we will need to consider precisely how much we must have in the agreement itself, recognizing that the commitments will not be implemented until well after the year 2000.

4) **Closer Partnership with Developing Countries:** For us to be successful, we must forge a closer partnership with developing countries. Already U.S. bona fides have been questioned (by developing countries and by other donors) because Congress has not appropriated the amounts requested by the Administration for the Global Environment Facility (GEF), the principal vehicle for implementing our financial commitments under the Convention (we pledged \$430 million in 1994, but have been able to contribute less than half this amount). If we cannot improve our record of meeting our commitments, we will not be able to persuade others to take on any serious obligation – particularly developing countries. We will also need to consider launching a new U.S. initiative to repackage and enhance existing U.S. bilateral efforts that support developing and transition countries in responding to the threat of climate change.

5) **A Comprehensive Domestic Strategy with Constituency Building:** An extensive effort will be required to develop support for Senate advice and consent to ratification, as well as for implementing legislation. Key members of Congress, as well as business, environmental, and state and local government representatives, must be found and cultivated to help carry the agreement forward. It will be critical that vocal support be

obtained well prior to Kyoto, or the Administration will be accused (inaccurately) of negotiating the treaty without adequate consultation. Key to this will be the release of information on the international process, and on the methods used to generate the agreement on an emission target. We must also develop a process to educate the public.



United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

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cc: JAV
SS
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THE WHITE HOUSE
WASHINGTON

April 17, 1997

MEMORANDUM FOR DISTRIBUTION

FROM: MARK MAZUR
DAVID SANDALOW

SUBJECT: Climate Change

There will be a meeting Wednesday, April 23 from 1:00 to 2:30pm in OEOB Room 472. We will review materials to support decisions by the deputies. Copies will be distributed prior to the meeting.

Attendance is invitees only. Everyone on the attached list has been cleared into the building. For questions concerning clearance, please call Wendy Philleo (456-6224).

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A:calendar.wpd

Draft 4/23

COMMON CALENDAR OF CLIMATE CHANGE ACTIVITIES

APRIL

- 25 Solar Energy Forum in Wash D.C.
- 25 Congressional staff and NGO briefing on basecase results
Contact: Tom Peterson
343-1060

MAY

- 5 - 6 G-7 Environmental Ministerial Meeting in Miami
- 5 - 8 AIJ Project development Workshop in Cairo
- 13 -15 Adapting to Climate Change and Variability in the Great Lakes conference in Toronto
Contact: Frank Quinn, NOAA
313/741-2254
- 20-22 ECOS Meeting in Wash D.C.
Contact: E. Haemisegar
202/260-5448
- 23 EIC/USCAN Town Meeting in Chicago
- 27- 29 Great Plains Regional Workshop in Colorado
Contact: J. Mellilo, OSTP
202/456-6202

JUNE

- 3 - 6 Alaska Regional Workshop in Fairbanks
Contact: J. Mellilo, OSTP
202/456-6202
- 4 Natural Gas and Climate Change Conference
by DOE and EPA with AGA and Enron
- 9 - 13 UN General Assembly Special Session on Environment
- 12-13 International Climate Change Conference in Baltimore
Contact: Kevin Fay
703/841-0626

- 18 Climate Change and the Business Community
by EPA with Business Council for Sus. Energy
- 20 - 22 G-7 Summit, Denver
- 24-7 South East Regional Workshop at Vanderbilt U. Contact: J. Mellilo, OSTP
202/456-6202
- 26 EPA Region 1 (Boston) Impacts Conference Contact: E. Haemissegar
202/260-5448

JULY

- 14-16 North West Regional Workshop in Seattle Contact: J. Mellilo, OSTP
202/456-6202
- 28 - 8/3 SBSTA and SBI in Bonn
- 29 -8/7 Aspen Regional Impacts Integration/Planning Meeting Contact: J. Mellilo, OSTP
202/456-6202

AUGUST

- 4 - 8 AGBM negotiating session in Bonn
- 5 - 14 Review of Regional Workshops in Aspen Contact: J. Mellilo, OSTP
202/456-6202

SEPTEMBER

- 3-5 New England Regional Workshop, U of New Hampshire Contact: J. Mellilo, OSTP
202/456-6202
- early Sept. South West Regional Workshop in Tucson Contact: J. Mellilo
202/456-6202
- 9-11 Mid-Atlantic Regional Workshop at Penn State Contact: Joel Scheraga
202/260-4029

OCTOBER

- 7-8 New York-New Jersey Coastal Impacts Conference in Ramapo, NJ
Sponsored by Climate Institute with NJDEP Contact: John Topping
202/547-0104
- 10-12 National Impacts Workshop at NAS in Washington Contact: J. Mellilo, OSTP
202/456-6202
- 27 - 29 Symposium on Climate Variability, Climate Change and Water Resource
Management in Colorado Springs organized by Corps, NOAA, EPA others
Contact: Eugene Strzepak
703/428-6370
- 20 - 26 SBSTA and SBI meetings in Bonn/Geneva
- 27 - 31 AGBM negotiating session in Bonn/Geneva

NOVEMBER

- 17-18 Climate Conference in Wash D.C. by Center for Environmental Information
Contact: Liz Thorndike
607/277-2604

DECEMBER

- 1-12 Kyoto Conference: Third Meeting of the Parties to Framework Convention

EVENTS IN THE EARLY PLANNING STAGES

Between July and Nov. EPA Regional Conferences on Climate Change in Atlanta,
Baltimore, Chicago, and San Francisco

DRAFT - March 10, 1997

Integrated Climate Change Analysis and Assessment

Objective: There is interagency agreement to present climate change policy information in a way that integrates climate change science, the effects of climate change, the benefits of action, and impacts of measures. The proposed report synthesizes and consolidates US Government work already completed or underway. This report will provide an integrated summary of climate change policy options, along with the results of the Interagency Analytic Team analyses, for public review and comment. This information will be combined with information on the science of climate change and the costs of inaction to provide a context within which decisions about appropriate short-, medium- and long-term strategies can be evaluated.

Proposed Outline:

I. Overview

General review of the science of climate change, the Framework Convention on Climate Change, the current international negotiations under the Berlin Mandate, and US positions to date. (CEQ lead)

II. Long-term Projections of Emissions and Concentrations

This chapter will present global projections of greenhouse gas emissions and atmospheric concentrations for business as usual and policy cases. This chapter could present: various global emission and concentration pathways; alternative emission allocation schemes to reach concentration targets; and, emission deflection points and points of global maximum emissions consistent with various trajectories. (OSTP lead)

III. Analysis of the Effects of Climate Change in the United States

This chapter will provide an assessment of the potential impacts of climate change on the United States, including effects on health, agriculture, forests, water resources, coastal areas, and species and natural areas if no actions are taken to mitigate greenhouse gas emissions. The regional distribution of impacts will be highlighted. Although the primary focus will be on the impacts in a 2xCO₂ world (*i.e.*, CO₂ concentrations of 550 ppm), available evidence of impacts beyond atmospheric concentrations of 550 ppm will be summarized. (EPA lead)

IV. International Negotiation Options

This chapter will reiterate the current US international negotiation positions. It will define the major points of contention in the negotiations and offer options under consideration. At a minimum, the chapter should lay out the range of targets and timetables under consideration, the issues of emission budgets, comprehensiveness, banking and borrowing, Annex I trading, and Joint Implementation. (DOS lead)

V. Domestic Policy Options

This chapter will provide the domestic options to control the growth in greenhouse gas emissions. Options to be discussed include: technology diffusion programs, standards and regulations, emissions trading, sectoral policies (e.g. transportation and energy market reform), research and development. (EPA/DOE leads)

VI. Economic Impacts of Domestic Policy Options

This chapter will cover the following issues: model selection, baseline emissions projections, domestic policy scenarios, key assumptions, and results of the Interagency Analytic Team analyses including the effects on specific sectors and economic opportunities. (DOC lead)

VII. Analysis of Co-Control Benefits of Domestic Policy Options

This chapter is identify other benefits of specific policy options, including other environmental effects (e.g. reductions in criteria air pollutant emissions), energy security, and enhanced international trade opportunities and environmental technology exports. (EPA/DOE leads)

Target Dates:

- Initial chapter drafts: April 30
- Interagency comments: May 7
- Release of drafts for public comment: May 15

Today's Topics

- Goals of the IAT process
- Models we'll use
- Our energy-economy baseline (before policy)
- The dimensions of the climate change policy "problem"
- IAT Reviewers

Goals

- Combine different agency perspectives into single Administration-wide view of the problem
- Develop a credible, replicable, and straight-forward analysis of the policy options for:
 - Administration decision-making
 - Communicating to important stakeholders
 - Educating the public
- Provide outcomes for a wide range of variables
 - Macroeconomic
 - International
 - Sectoral and regional

Models We'll Use

- **Criteria:** must be established, widely-understood, available to the public, and each must bring some distinguishing feature that adds to the analysis
- **Constraints:** time, cost, and staff availability.
Academic literature has already broadly swept the field.
- **Our choices:**
 - DRI (disequilibrium)
 - Second Generation Model (general equilibrium)
 - Markal-Macro (technology driven)

DRI Model

- Large macroeconomic model of domestic U.S. economy
- Merges aspects of Keynesian, neoclassical, monetarist, and supply-side analysis
- Short-run behavior embedded in a long-run growth model
- Modeled relationships reflect historical developments
- Linked to energy, regional and sectoral submodels

DRI Model (con't)

Strengths

- Detailed representation of the economy's adjustment to short-term shocks
- Broad detail in energy, regional, and sectoral submodels
- Role of fiscal and monetary policies during transition

Limitations

- Difficulty in managing forward-looking behavior, including innovation
- Long-term transitions represented as a series of short-run adjustments

Second Generation Model

- “Computable general equilibrium” model presumes that economies adjust and then identifies outcomes
- Includes 12 global regions, developed in international collaborations
- Detail on energy technology and oil, greenhouse gases
- Linked to models that can calculate environmental outcomes

Second Generation Model (con't)

Strengths

- CGE structure allows users to characterize long-term adjustment path
- 12-region structure identifies who gains or loses in any policy setting
- Provides details on greenhouse gas emissions and energy technology

Limitations

- Short-term adjustment issue fly-by
- Little detail on sectors or regions, or energy level-use detail

Markal-Macro Model

- Model allows for direct input of technology assumptions regarding end-use demand
- Penetration rates (implied hurdle rates) can be varied
- Model solves for those technologies that satisfy energy demands at minimum costs
- Cost savings flow through to macro model

Markal-Macro (con't)

Strengths

- Ability to vary technological and hurdle rate assumptions as inputs
- Provides energy-use detail and emissions information
- Provides implicit values for CO₂, NO_x, and SO₂ emissions

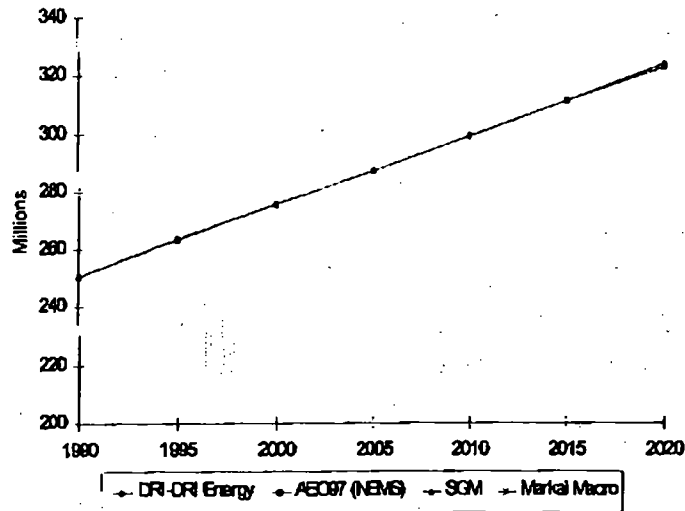
Limitations

- Limited detail on macroeconomic, sectoral, and regional effects
- Model may “over-optimize” the system or provide “knife-edge” solutions, as well as assuming perfect foresight

Baseline Projections

- Domestic baseline projections from EIA's 1997 Annual Energy Outlook
- International baseline projections from IEA's 1997 World Energy Outlook
- Models calibrated to baseline
- Charts and data, including growth rates follow

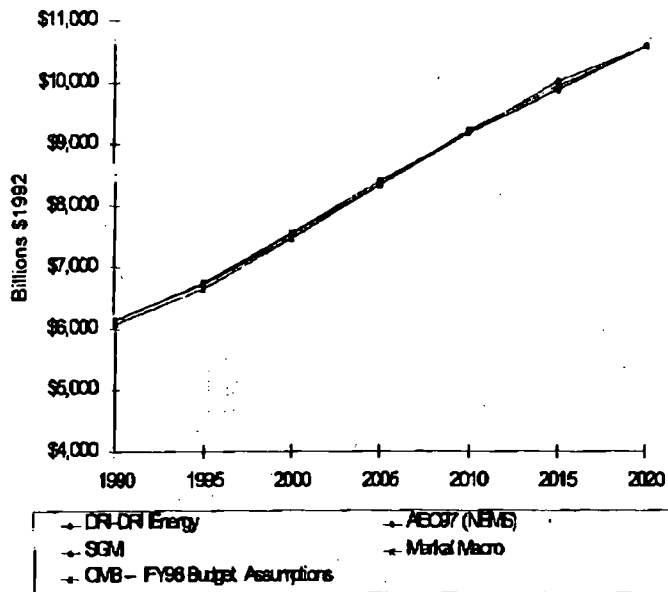
Population



Population	1990	1995	2000	2005	2010	2015	2020
DRI-DRI Energy	250	264	276	287	299	311	324
AEO97 (NEMS)	250	264	276	287	299	311	
SGM	250	263	276	287	299	311	323
Markal Macro	250	263	276	287	299	311	323
Average Annual Growth Rate (percent)							
		90-95	95-00	00-05	05-10	10-15	15-30
DRI-DRI Energy		1.0	0.9	0.8	0.8	0.8	0.8
AEO97 (NEMS)		1.0	0.9	0.8	0.8	0.8	
SGM		1.0	0.9	0.8	0.8	0.8	0.7
Markal Macro		1.0	0.9	0.8	0.8	0.8	0.7

- Population grows at a steady rate of about 0.8 percent annually, consistent with Census estimates.

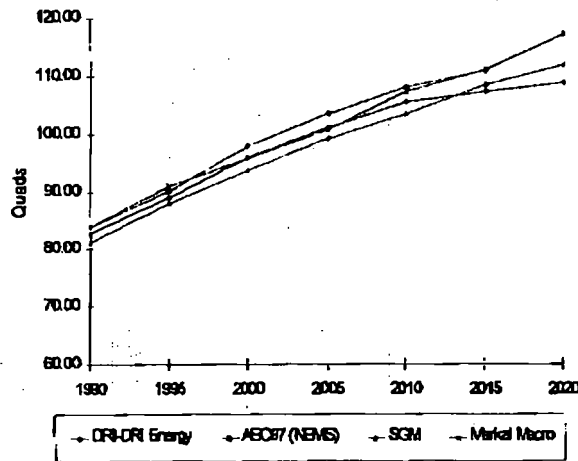
GDP



GDP (\$Billion 1992)	1990	1995	2000	2005	2010	2015	2020
DRI-DRI Energy	\$6,139	\$6,743	\$7,522	\$8,337	\$9,172	\$10,003	\$10,574
AEO97 (NEMS)	\$6,139	\$6,739	\$7,544	\$8,390	\$9,185	\$9,880	
SGM	\$6,077	\$6,635	\$7,484	\$8,324	\$9,172	\$9,873	\$10,563
Market Macro	\$6,139	\$6,739	\$7,554	\$8,383	\$9,181	\$9,889	\$10,576
OMB - FY98 Budget Assumptions	\$6,142	\$6,721	\$7,470	\$8,343	\$9,225	\$9,929	\$10,581
Average Annual Growth Rate (percent)							
		90-95	95-00	00-05	05-10	10-15	15-20
DRI-DRI Energy		2.0	2.3	2.2	2.0	1.6	1.1
AEO97 (NEMS)		2.0	2.4	2.2	1.9	1.5	
SGM		1.8	2.5	2.3	2.0	1.5	1.5
Market Macro		2.0	2.4	2.2	1.9	1.5	1.4
OMB - FY98 Budget Assumptions		1.9	2.2	2.3	2.1	1.5	1.3

- Aging population reduces labor force, lowers long-term growth potential by 2020.

Total Energy Consumption

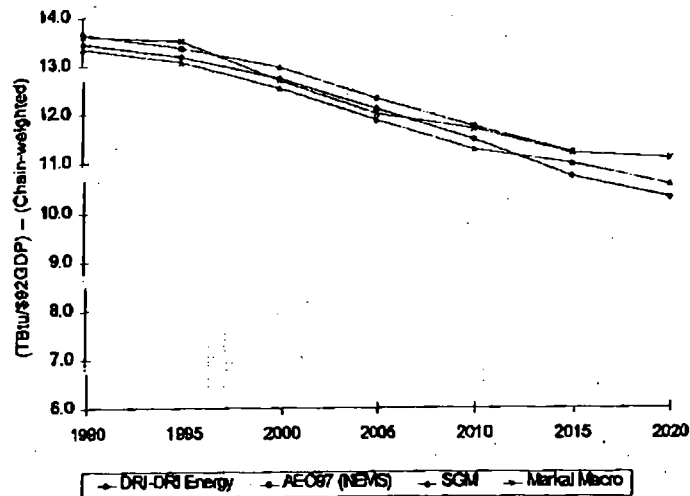


Total Energy Consumption (Quads)	1990	1995	2000	2005	2010	2015	2020
DRFDRI Energy	82.60	88.90	95.80	101.00	105.40	107.30	108.90
AEO97 (NEMS)	83.73	90.03	97.85	103.40	107.90	110.90	
SGM	81.06	87.89	93.63	99.05	103.37	106.44	111.85
Market Macro	83.73	90.90	95.60	100.70	107.30	111.00	117.10
Average Annual Growth Rate (percent)							
		90-95	95-00	00-05	05-10	10-15	15-20
DRFDRI Energy		1.5	1.6	1.1	0.9	0.4	0.3
AEO97 (NEMS)		1.5	1.7	1.1	0.9	0.6	
SGM		1.7	1.3	1.2	0.9	1.0	0.6
Market Macro		1.7	1.0	1.1	1.3	0.7	-1.1

SGM Projections do not include: geothermal, wind, biomass waste, and other municipal waste

- Energy consumption growth rates decline in response to slow growth and enjoy efficiency improvements.

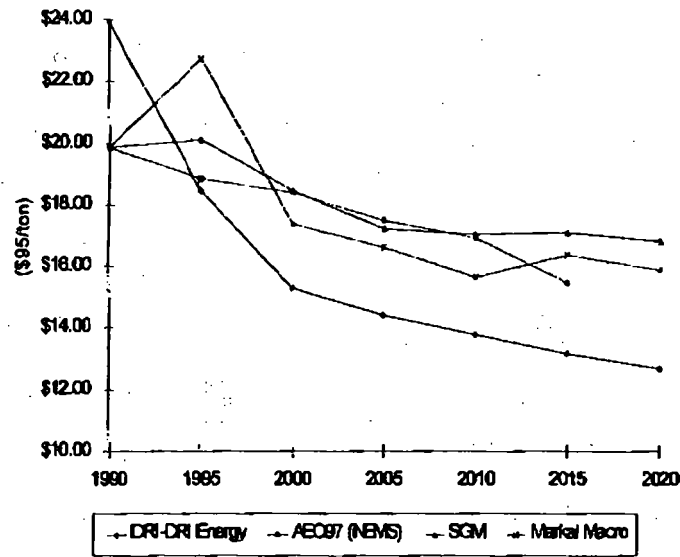
Energy Intensity



Energy Intensity (TBU/\$2GDP)	1980	1995	2000	2005	2010	2015	2020
DRHDRI Energy	13.5	13.2	12.7	12.1	11.5	10.7	10.3
AEO97 (NEMS)	13.6	13.4	13.0	12.3	11.7	11.2	
SGM	13.3	13.1	12.5	11.9	11.3	11.0	10.6
Markal Macro	13.6	13.5	12.7	12.0	11.7	11.2	11.1
Average Annual Growth Rate (percent)							
		90-95	95-00	00-05	05-10	10-15	15-20
DRHDRI Energy		-0.4	-0.7	-1.0	-1.0	-1.3	-0.8
AEO97 (NEMS)		-0.4	-0.6	-1.0	-0.9	-0.9	
SGM		-0.4	-0.8	-1.1	-1.0	-0.5	-0.8
Markal Macro		-0.1	-1.2	-1.1	-0.5	-0.9	-0.2

- Energy intensity falls, reflecting ongoing technical improvements.

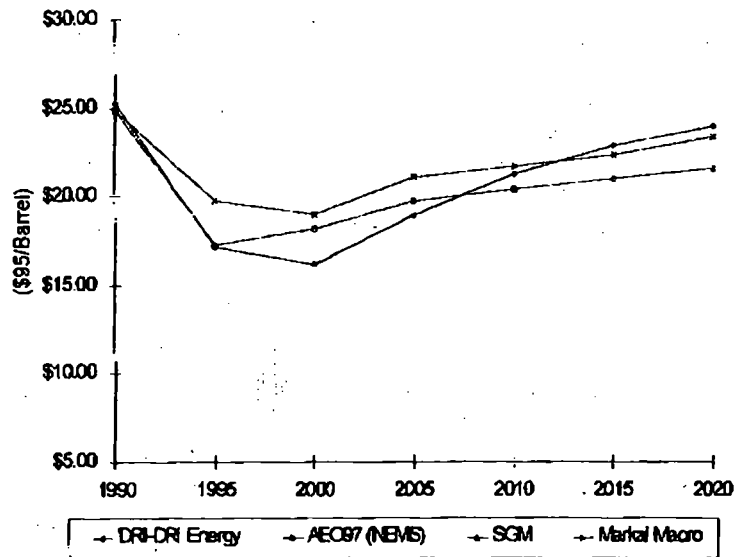
Minemouth Coal Prices



Minemouth Coal Price (\$95/ton)	1990	1995	2000	2005	2010	2015	2020
DRI-DRI Energy	\$23.92	\$18.45	\$15.28	\$14.41	\$13.76	\$13.16	\$12.70
AEO97 (NEMS)	\$19.88	\$20.10	\$18.44	\$17.21	\$17.04	\$17.08	\$16.81
SGM	\$19.88	\$20.10	\$18.44	\$17.21	\$17.04	\$17.08	\$16.81
Market Macro	\$19.88	\$22.73	\$17.35	\$16.62	\$15.64	\$16.37	\$15.88
Average Annual Growth Rate (percent)							
		90-95	95-00	00-05	05-10	10-15	15-20
DRI-DRI Energy		-4.6	-3.4	-1.1	-0.9	-0.9	-0.7
AEO97 (NEMS)		-1.1	-0.5	-1.0	-0.6	-1.7	
SGM		0.2	-1.7	-1.3	-0.2	0.0	-0.3
Market Macro		2.9	-4.7	-0.8	-1.2	0.9	-0.6

- Coal prices decline as low-cost sources gain prevalence in the market.

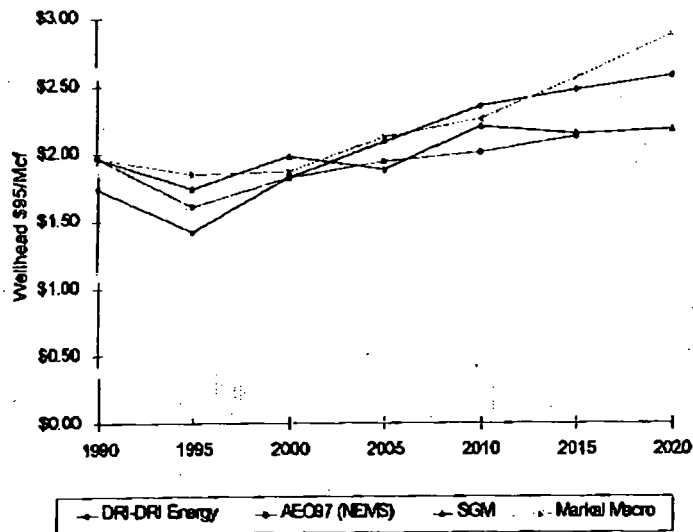
World Oil Prices



World Oil Price (\$95/Barrel)	1990	1995	2000	2005	2010	2015	2020
DRI-DRI Energy	\$25.23	\$17.14	\$16.18	\$18.93	\$21.24	\$22.86	\$23.95
AEO97 (NEMS)	\$24.87	\$17.26	\$18.20	\$19.72	\$20.41	\$20.98	\$21.57
SGM	\$24.87	\$17.26	\$18.20	\$19.72	\$20.41	\$20.98	\$21.57
Markal Macro	\$24.87	\$19.73	\$18.98	\$21.08	\$21.70	\$22.32	\$23.34
Average Annual Growth Rate (percent)							
		90-95	95-00	00-05	05-10	10-15	15-20
DRI-DRI Energy		-6.4	-1.1	3.4	2.4	1.5	1.0
AEO97 (NEMS)		-6.1	1.1	1.7	0.7	0.6	0.6
SGM		-6.1	1.1	1.7	0.7	0.6	0.6
Markal Macro		-4.1	-0.8	2.2	0.8	0.6	0.9

- World oil prices rise slightly in real terms as supplies tighten and level grows.

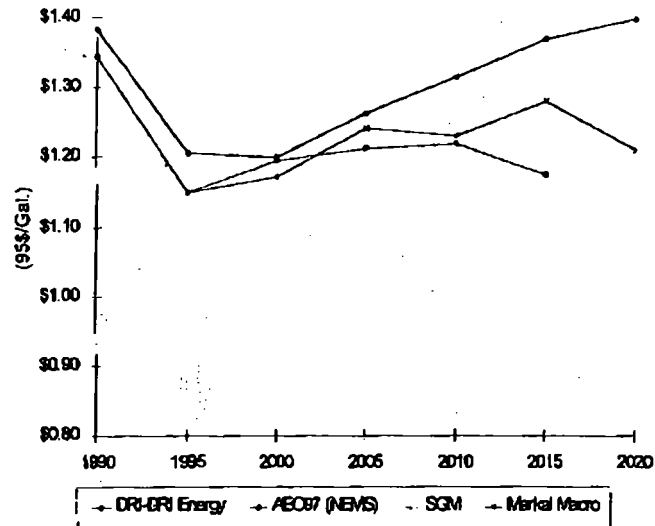
Natural Gas Prices



Natural Gas Price (wellhead \$95/Mcf)	1990	1995	2000	2005	2010	2015	2020
DRI-DRI Energy	\$1.74	\$1.42	\$1.82	\$2.09	\$2.35	\$2.47	\$2.58
AEO97 (NEMS)	\$1.97	\$1.61	\$1.82	\$1.84	\$2.01	\$2.13	
SGM	\$1.97	\$1.74	\$1.88	\$1.88	\$2.20	\$2.15	\$2.18
Market Macro	\$1.97	\$1.85	\$1.87	\$2.12	\$2.26	\$2.56	\$2.88
Average Annual Growth Rate (percent)							
		90-95	95-00	00-05	05-10	10-15	15-20
DRI-DRI Energy		-3.7	5.6	3.0	2.5	1.0	0.9
AEO97 (NEMS)		-3.7	2.6	1.3	0.7	1.2	
SGM		-2.3	2.8	-1.0	3.4	-0.5	0.3
Market Macro		-1.2	0.2	2.7	1.3	2.7	2.5

- Natural gas prices rise as natural gas moves into higher-value uses.

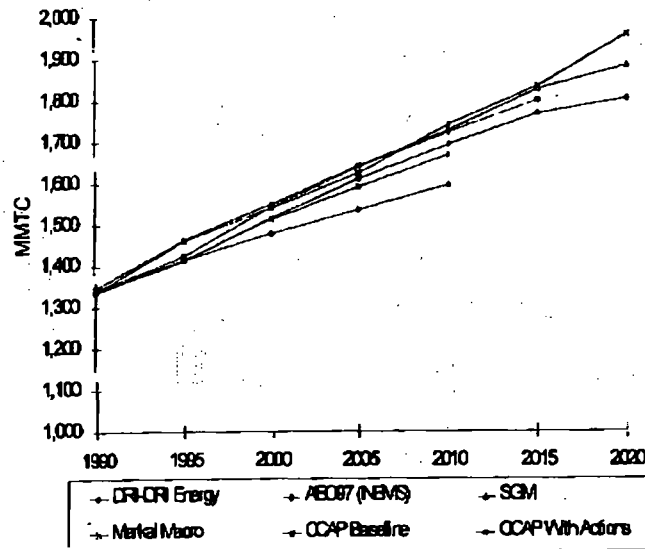
Gasoline Prices



Gasoline Prices (\$95/Gal.)	1990	1995	2000	2005	2010	2015	2020
DRI-DRI Energy	\$1.38	\$1.21	\$1.20	\$1.26	\$1.31	\$1.37	\$1.40
AEO97 (NEMS)	\$1.34	\$1.15	\$1.19	\$1.21	\$1.22	\$1.17	
SGM							
Markal Macro	\$1.34	\$1.15	\$1.17	\$1.24	\$1.23	\$1.28	\$1.21
Average Annual Growth Rate (percent)							
		90-95	95-00	00-05	05-10	10-15	15-20
DRI-DRI Energy		-2.8	-0.1	1.1	0.8	0.8	0.4
AEO97 (NEMS)		-2.9	0.8	0.3	0.1	-0.7	
SGM							
Markal Macro		-2.9	0.4	1.2	-0.2	0.8	-1.1

- Price projection differences reflect different treatments of transportation demand technology.

U.S. Carbon Emissions



Carbon Emissions (MMTC) -							
Total	1990	1995	2000	2005	2010	2015	2020
DRI-DRI Energy	1,338	1,413	1,516	1,612	1,693	1,767	1,805
AEO97 (NEMS)	1,339	1,424	1,543	1,639	1,722	1,799	
SGM	1,346	1,464	1,549	1,642	1,727	1,826	1,883
Market Macro	1,338	1,459	1,540	1,624	1,741	1,833	1,959
CCAP Baseline	1,344	1,414	1,512	1,589	1,667		
CCAP With Actions	1,344	1,414	1,477	1,535	1,593		
Average Annual Growth Rate (percent)							
		90-95	95-00	00-06	05-10	10-15	15-20
DRI-DRI Energy		1.13	1.45	1.27	1.01	0.88	0.43
AEO97 (NEMS)		1.26	1.68	1.24	1.02	0.89	
SGM		1.75	1.17	1.20	1.03	1.15	0.62
Market Macro		1.61	1.11	1.09	1.44	1.06	1.37
CCAP Baseline		1.04	1.38	1.03	0.98		
CCAP With Actions		1.04	0.90	0.79	0.78		

- Emission growth projected at (?) annually over the 1990-2020 period.

Non-CO2 Greenhouse Gas Emissions and Sinks

Gas/Source	1990	1995	2000		2010		2020	
			No CCAP Action	With CCAP Action	No CCAP Action	With CCAP Action	No CCAP Action	With CCAP Action
Methane	169	177	170	148	182	151	186	154
Nitrous Oxides	37	37	36	31	39	34	43	37
HFCs/PFCs/ SF6	24	N/A	62	42	132	91	183	133
Total	230	214	268	221	352	276	412	325
Sinks	-136	N/A	-121	-131	-119	-129	-103	-113

Foreign Baseline

Real Economic Growth
(Annual)

	1990-00	2000-10	2010-20
Australia	2.6	2.5	1.7
Canada	2.4	2.4	1.2
China	8.5	7.7	5.9
Former Soviet Union	-4.0	1.5	1.4
India	4.8	4.0	3.5
Japan	2.1	1.8	0.9
Korea	4.5	6.0	4.5
Mexico	3.9	4.0	3.2
Western Europe	2.9	2.2	2.4
Rest-Of-World	3.8	3.7	3.2

Energy Growth
(Quads)

	1990-00	2000-10	2010-20
Australia	1.8	1.2	0.8
Canada	1.7	1.0	0.4
China	3.9	2.8	2.1
Former Soviet Union	-3.5	1.8	1.2
India	4.7	2.4	2.9
Japan	2.2	0.8	0.1
Korea	3.9	3.0	2.4
Mexico	4.1	2.9	2.3
Western Europe	2.5	1.6	1.0
Rest-Of-World	3.0	2.3	2.3

Emissions Growth
(MMTC)

	1990-00	2000-10	2010-20
Australia	1.7	1.2	0.7
Canada	2.2	1.5	0.6
China	3.8	2.8	2.2
Former Soviet Union	-4.0	1.6	1.1
India	4.7	2.0	2.9
Japan	2.1	0.9	0.1
Korea	2.7	3.1	3.0
Mexico	4.2	2.9	2.4
Western Europe	2.2	1.8	1.0
Rest-Of-World	2.9	2.4	2.5

Dimensions of the Problem

- Emission limits -- levels and timing
- International trading -- “Annex I” vs. “Joint Implementation”
- Innovation and diffusion
- Related revenue recycling
- Collateral benefits, but no climate benefits

IAT Reviewers

- Dale Jorgensen, Harvard, energy and environmental modeling
- William Nordhaus, Yale, economic effects of energy and environmental problems
- Larry Goulder, Stanford, taxation issues in climate modeling
- John Weyent, Stanford, head of the Stanford Energy Modeling Forum
- Ray Kopp, Resources for the Future, technical change and carbon policy
- Kerry Smith, Duke, trade consequences of environmental policy

IAT Reviewers (con't)

- Robert Repetto, World Resources Institute, capital markets and environmental policy
- Stephen DeCanio, U. of California, energy efficiency and technology change
- Tom Rutherford, U. of Colorado, energy and environmental modeling
- Rich Richels, Electric Power Research Institute, energy industry perspective
- Steve Bernow, Tellus Institute, energy and environmental modeling
- Robert Scott, Economic Policy Institute, labor issues

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release

April 22, 1997

**REMARKS BY THE PRESIDENT
AND VICE PRESIDENT
UPON DEPARTURE**

The South Lawn

9:05 A.M. EDT

THE VICE PRESIDENT: Good morning, ladies and gentlemen. Of course, as you know, the President is about to depart for North Dakota and the surrounding area to bring some additional help and encouragement and solidarity to the victims of the 500 Year Flood in that area.

Prior to leaving, the President is going to make an important announcement concerning a major new step forward in our effort to empower the American people with information needed to protect their environment. This new step being taken by the President vastly expands the community's right to know about pollutants being released into their neighborhoods and into their communities.

One important aspect of this announcement is the reinventing feature that streamlines the collection of information by the businesses affected by this new announcement and protects the environment in new ways, while at the same time reducing the burden of information collection on businesses. This measure probably has more support across all lines in America than any other thing that we do; because when you give the American people they can use to protect themselves, then people at the grassroots level find very creative ways to convince those sources of pollution to reduce the emissions into the air and water in the communities where these individuals live.

It is only one example of the broad-based effort led by President Bill Clinton to greatly improve the protection of the environment. Everything from emissions in the smallest community to the global issues, such as climate change. And, incidentally, our research effort is continuing to pin down what many scientists have said is a link between extreme weather events -- not only in this country, but in other nations as well -- that have long been predicted to become more common in a world where temperatures are

rising even slightly.

I preceded the President to the north central area two weeks ago and talked with one mayor who said his community had had six hundred-year floods in the last 10 years. The scientific community cautions that no one can ever say that a particular event, even a 500 hundred year flood, is connected to global climate change. But they do say and have said for two decades that the probability that such events will occur increases along with climate change.

This announcement, again, on the community's right to know is a major advance, emblematic of this President's leadership on the environment. Therefore, on this Earth Day, it is a particular privilege and pleasure for me to present President Bill Clinton.

THE PRESIDENT: Thank you very much, Mr. Vice President. Good morning, ladies and gentlemen. As all of you know I am about to leave for North Dakota, where the people are quite literally in the fight of their lives. What they have endured is enormous. How they

are enduring it is remarkable. I am going to view the flood damage to pledge our nation's support to see that we are doing everything we can do to help them.

You know, Americans have a habit of joining together at times like this and I think all Americans have been very deeply moved by the pictures we have seen of a town being flooded and burning at the same time, the people in North Dakota losing everything they have. I, personally, can't remember a time when a community that large was entirely evacuated. And we have to stay together.

I think it is appropriate, for the reasons the Vice President said, that coincidentally this trip is occurring on Earth Day, because since 1970, the first Earth Day, Americans have stood side by side against a rising tide of pollution and for the proposition that we have to find a way to live in harmony with and grow our economy in a way that is consistent with preserving our environment.

Earth Day started at the grassroots. Soon the force of neighbor joining with neighbor grew into a national movement to safeguard our air, our land and our water. The movement led national leaders of both parties to put in place the environmental safeguards that protect us today: the Clean Air Act, the Clean Water Act, the Environmental Protection Act. In 1995, an attempt to reverse this consensus and to radically weaken our environmental laws was strongly rebuffed here in Washington and, even more importantly, all across America. And in 1996, that consensus began to be restored again.

These environmental protections have done an awful lot of good. But one of the best things we can do in Washington to protect the environment is to give people in communities all across our country the power to protect themselves from pollution. That is

the mission of the Community Right to Know law. This law tells citizens exactly what substances are being released into their neighborhoods. In the decade its been on the books, citizens have joined with government and industry to reduce the release of toxic chemicals by 43 percent. Under our administration we strengthened Right to Know, nearly doubling the number of chemicals that must be reported, making it easier for Americans to find out what toxics, if any, are being sent into the world around them.

In 1995, I directed EPA Administrator Carol Browner to find ways to expand Community Right to Know even further. Today, we are making good on that pledge. Today, we increased by 6,100 -- 30 percent -- the number of facilities that need to tell the public what they are releasing into our environment. Today, seven new industries -- including mining, electric utilities and hazardous waste treatment centers that use substances like mercury, lead and arsenic -- will now be subject to the Community Right to Know law. Today, more information will be required from 700 companies already providing information under the law. It will be more accessible to Americans. And today we set in motion a process that will guarantee that all the stakeholders -- including citizens, community groups, environmental groups and businesses -- will have opportunities to work together from now on to continue to improve this law.

By expanding Community Right to Know we're giving Americans a powerful, very powerful early warning system to keep their children safe from toxic pollution. We're giving them the most powerful tool in a democracy: knowledge. We are truly living up to the promise of Earth Day.

I also want to say a special word of thanks to Katie McGinty for the work that she has done on this, and the White House. And I want to thank the Vice President for taking my place at the Earth Day celebration at Anacostia today, to talk about Community Right to Know and for all of his work on the environment.

And just let me say in closing, with regard to the comments he made about climate change and the possible impact it may have had on the enormous number of highly disruptive weather events that have occurred just since we've been here in the last four years and a few months, I think it is very important that we continue to intensify our government's research efforts in this regard and that we take the very best knowledge we have and bring it to bear on a lot of the decisions we'll be having to make together as a country over the next four years.

We do not know, as the Vice President said, for sure that the warming of the earth is responsible for what seems to be a substantial increase in highly disruptive weather events; but many people believe that it is and we have to keep looking into it. We have to find the best scientific evidence we have and we have to keep searching for the answers to this. I think every American has

noticed a substantial increase in the last few years of the kind of thing we're going to see in North Dakota today. And if there is a larger cause which can be eased into the future, we ought to go after that solution as well. Thank you.

Q Is a Marshall Plan appropriate? Your Chief of Staff suggested yesterday it may take a Marshall Plan to help North Dakota.

THE PRESIDENT: You know, we've had -- I suppose because North Dakota is not highly populated we may -- we've had disasters which have affected more people. But I believe that probably this is the highest percentage of people in any state or community that I have seen affected by this. And, you know, if you look at Grand Forks you see a place that literally has to be completely rebuilt, or people have to reconstitute their lives elsewhere. So I do believe that we're going to have to be prepared to be very creative here.

The Congress has shown in the past, even when it was quite costly -- after the earthquake in California, for example -- that we can unite across party lines to do what has to be done. We need to take a hard look at this. This situation in North Dakota is virtually unprecedented in many, many ways and I want to go out there, make sure that I have read all the information available, talk to the people there, see for myself and then I'll come back and, along with the Congressional delegation with Senator Dorgan and Senator Conrad and Congressman Pomeroy, we'll put our heads together and see where we go from here.

Q Any idea, Mr. President, on how much money it might take and will it be there when you need it?

THE PRESIDENT: I think, as I said, my experience in dealing with the flood in the middle west and all the disasters in California, the Pacific northwest, the floods in the southeast, is that Congress finds a way. And I think everybody in America has been totally overwhelmed by what we have seen on television and seen in the news reports -- these pictures of buildings completely surrounded by water, burning down. You know, I think it's been an overwhelming experience. I think the American people are with the people of North Dakota and I think we'll do what we have to do.

Q Mr. President, are you making any tangible headway on the Chemical Weapons treaty, on getting the votes for the Chemical Weapons treaty?

THE PRESIDENT: Well, I hope so. We're working hard on it. We are working very, very hard on it -- I am, the Vice President is, everyone in our administration is. I worked over the weekend some on it. We're doing the best we can to put together a strong case. I think the fact that we have come up with a package of 28 clarifying amendments that respond to 90 percent of the objections, even of the strongest opponents of the treaty, I think shows the good faith in which we have proceeded. And we've worked very hard on this

and I'm actually quite optimistic.

Q Have you talked to Senator Lott?

Q -- for Saddam Hussein and honoring the no-fly zone?

THE PRESIDENT: Well, my message is that we support people in exercising their religious liberties and in living out their religious convictions everywhere in the world. And we certainly support that in the Muslim world. But we don't want to see religion, in effect, used and distorted in a way to try to avoid the international obligations that are imposed. And we intend to continue to observe the no-fly zone and continue to support the embargo until he lives up to the conditions of the United Nations resolutions.

END

9:19 A.M. EDT

Message Sent To:

Kathleen A. McGinty/CEQ/EOP
Shelley N. Fidler/CEQ/EOP
Wesley P. Warren/CEQ/EOP
Dinah Bear/CEQ/EOP
Elisabeth A. Blaug/CEQ/EOP
Bradley M. Campbell/CEQ/EOP
Edward R. Clark/CEQ/EOP
Thomas C. Jensen/CEQ/EOP
Robert S. Kapla/CEQ/EOP
Linda Lance/CEQ/EOP
Keith E. Laughlin/CEQ/EOP
Carolyn D. Mosley/CEQ/EOP
David B. Sandalow/CEQ/EOP
Peter G. Umhofer/CEQ/EOP
Beth A. Viola/CEQ/EOP
Michael V. Terrell/CEQ/EOP

Possible scenarios for five-year periods centered on 2010, 2015, and 2020
(100% = 1990 levels of GHG emissions)

	2008-2012	2013-2017	2018-2022
A	100%	100%	100%
B	95%	95%	95%
C	90%	90%	90%
D	100%	95%	90%
E	90%	90%	80%
F	Above options with added limit of 110% of 1990 levels in 2005-2007		
G	Same as D but shift each period three years forward to 2005-2009, 2010-2014, and 2015-2019		

Comments:

Scenarios (a) - (d) in the draft memo present a number of difficulties:

- 1) They are not clear enough about what is to be assumed for the years between those mentioned in the scenarios. The modeling requires a constraint for each year.
- 2) They contain not only different levels but also cover different total time periods. Implicitly, they also have different length budget periods. The scenarios should be structured more comparably. Only one variable should be changed at a time.
- 3) Lines A, B, and E, below are attempts to make scenarios (a)-(d) more specific and comparable; different judgments could be made. They are ranked in order of increasing stringency.
 - Lines A and B correspond to scenario (a) and (b) in the memo, with the additional specificity that a five-year period around 2010 is assumed, and it is held constant for two subsequent five-year periods.
 - Line C is similar, a bit more stringent.
 - Line D is a new proposal by EPA. Note that it has the same net emissions as line C, with more in the first period and less in the third. EPA also proposes Line G, which is equivalent to Line D with the periods shifted forward to begin in 2005.


Predecisional deliberative draft -- do not quote or cite

- Line E corresponds fairly well to scenario (c) in the draft memo.
 - Scenario (d) in the draft memo is the least stringent, but is difficult to model and compare with the others because the models go out only to 2020, not 2030. For the period modeled, scenario (d) corresponds to Line A. How would we model the 2020-2030 period?
 - Line F is intended to represent modest additional reductions in 2005 as suggested in the draft memo.
- 4) None of these proposals simulates the benefit of multi-year averaging. It should be remembered that long-period averaging competes with bindingness/compliance considerations. We still need a way to simulate the savings potential of 3, 5, or 10 years.

**United States Department of State***Assistant Secretary of State for Oceans and
International Environmental and Scientific Affairs**Washington, D.C. 20520*cc: JAF
JS

March 26, 1997

TO: Distribution

FROM: Eileen B. Claussen 

SUBJECT: April 1 Climate Change Submission

The attached document, which was developed by the interagency working group at the staff level, contains compliance-related revisions and amendments to several of the articles in the U.S. draft text of January 17, 1997. This is the only text cleared by the working group and would therefore be the only piece we would submit. I need to know from you within 24 hours as to whether you would like this piece to be submitted as is. If the answer is yes, I would have to submit it to the Deputies. To enable this submission to be made prior to the deadline, clearance at the Assistant Secretary level must be provided no later than noon, Thursday, March 27. I will assume clearance unless I hear otherwise.

Attachment:

As Stated

Text to Be Submitted

(note that Article #s will need to correspond
to the new compilation text)

In Article 2 of the U.S. proposal (Emissions Budgets),
add a new paragraph 6.bis. as follows:

- 2.6.bis. At the end of a budget period applicable to a Party, any amount of tonnes of carbon equivalent emissions over its emissions budget shall be subtracted at a rate of [rate greater than that in paragraph 6] from the subsequent budget period.

In Article 4 of the U.S. proposal (Review and Compliance Process), substitute for paragraphs 3 to 6 the following text:

- 4.3 Reviews will be in connection with the review of communications conducted under Article 10.2(b) of the Convention and will be in accordance with guidelines to be adopted by the Parties at a meeting. These guidelines shall, inter alia, provide for how information will be made available to the public and define mechanisms by which observers and the public may provide comments, supplemental data or other information to facilitate and improve reviews. The guidelines shall be periodically reviewed by the Parties for appropriate revision.
- 4.4 Review teams will review all aspects of a Party's implementation of this Protocol, including the likelihood that a Party will achieve its emissions budgets obligations. They will be authorized, inter alia, to review pertinent information and consult with the Party in question and others as necessary. They will prepare a report assessing a Party's implementation of its obligations, identifying any areas of apparent non-compliance, as well as potential problems in achieving obligations.
- 4.5 Such reports will be circulated by the Secretariat to all Parties. In addition, the Secretariat will identify for further consideration any report indicating a question of implementation.

In Article 6 of the U.S. proposal (International Emissions Trading), substitute the following text:

- 6.1. Except as otherwise provided below, any Annex A or Annex B Party may transfer to, or acquire from, any Annex A or Annex B Party, any of its tonnes of carbon equivalent emissions allowed for a budget period, for the purpose of meeting its obligations under Article 2.

-2-

9 6.2 An Annex A or Annex B Party may not transfer or ~~require~~ any of its tonnes of carbon equivalent emissions allowed if it is not in compliance with its obligations under Article 3 (Measurement and Reporting) or if it does not have in place a national mechanism for certification and verification of trades.

OK.
OK. 6.3 An Annex A or Annex B Party may not transfer in a given budget period any of its tonnes of carbon equivalent emissions allowed if it has exceeded its emissions budget for that period.

6.4 If a question of a Party's implementation of the requirements referred to in paragraph 2 or 3 above is identified by either the review process under Article 4.5 or by the Secretariat under Article 11.2(b):

-- transfers and acquisitions of tonnes allowed (in the case of paragraph 2) and transfers of tonnes allowed (in the case of paragraph 3) may continue to be made after the question has been identified, provided that any such tonnes may not be used by any Party to meet its obligations under Article 2 until any issue of compliance is resolved. Issues of compliance shall be resolved as expeditiously as possible.

6.5 A Party may authorize any domestic entity (e.g., government agencies, private firms, non-governmental organizations, individuals) to participate in actions leading to transfer and acquisition under paragraph 1 of tonnes of carbon equivalent emissions allowed.

6.6 The Parties, at a meeting, may further elaborate guidelines to facilitate the reporting of emissions trading information.

In Article 10 of the U.S. proposal (Meetings of the Parties), for paragraph 4, substitute the following text:

10.4 The Parties:

- (a) shall periodically review the adequacy of this Protocol;
- (b) shall review the implementation of this Protocol, including the information submitted in accordance with Articles 3 and 5, reports received from the review teams referred to in Article 4, and any other reports and recommendations received from processes under this Protocol;

-3-

- (c) shall implement an appropriate regime to address cases of non-compliance with obligations under this Protocol, including through the development of an indicative list of consequences, taking into account the type, degree, and frequency of non-compliance;
- (d) may establish an implementation committee consisting of a subset of Parties to assist them, including by making recommendations, in carrying out functions referred to in subparagraphs (b) and (c) above.

In Article 11 of the U.S. proposal (Secretariat), for paragraph 2, substitute the following:

11.2 The functions of the secretariat shall be:

- (a) to maintain and administer records relating to the accounting of the emissions budgets of Annex A and Annex B Parties, including initial budget allocations, adjustments to budgets consistent with Articles 2, 6, and 7, annual emissions, and remaining budgets in a given budget period;
 - (b) to facilitate the review of implementation of this Protocol through, inter alia, coordinating the review of Annex A and Annex B implementation; coordinating the reviews under Article 5; identifying for the Parties questions of implementation, including whether individual reports are consistent with reporting criteria; and preparing an annual compilation and synthesis report that contains inventory and budget information, and notes any discrepancies in accounting.
 - (c) [other].
-