

# FOIA MARKER

**This is not a textual record. This is used as an administrative marker by the William J. Clinton Presidential Library Staff.**

---

**Collection/Record Group:** Clinton Presidential Records  
**Subgroup/Office of Origin:** Council of Economic Advisers  
**Series/Staff Member:** Alicia Munnell  
**Subseries:**

---

**OA/ID Number:** 10103  
**FolderID:**

---

**Folder Title:**  
Environment: Climate Change Vol. IV [2]

Stack:	Row:	Section:	Shelf:	Position:
<b>S</b>	<b>20</b>	<b>3</b>	<b>2</b>	<b>3</b>

# Withdrawal/Redaction Sheet

## Clinton Library

DOCUMENT NO. AND TYPE	SUBJECT/TITLE	DATE	RESTRICTION
001. memo	To Francine Obermiller, Thomas Rhoads from Lisa Branch re: Mtg w/ Robert Repetto, Tues, 2/25, 2pm [PII] [partial] (1 page)	02/19/1997	b(6)
002. memo	To Lisa Branch from Mail Link Monitor, re: Confirmation: Appt Request for Munnell, Alicia H [PII] [partial] (1 page)	02/21/1997	b(6)

### COLLECTION:

Clinton Presidential Records  
Council of Economic Advisers  
Munnell, Alicia  
OA/Box Number: 10103

### FOLDER TITLE:

Environment: Climate Change Vol. IV [2]

2017-1095-F

bg238

### RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

- P1 National Security Classified Information [(a)(1) of the PRA]
- P2 Relating to the appointment to Federal office [(a)(2) of the PRA]
- P3 Release would violate a Federal statute [(a)(3) of the PRA]
- P4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
- P5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
- P6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Personal record misfile defined in accordance with 44 U.S.C. 2201(3).

RR. Document will be reviewed upon request.

Freedom of Information Act - [5 U.S.C. 552(b)]

- b(1) National security classified information [(b)(1) of the FOIA]
- b(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
- b(3) Release would violate a Federal statute [(b)(3) of the FOIA]
- b(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
- b(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
- b(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
- b(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
- b(9) Release would disclose geological or geophysical information concerning wells [(b)(9) of the FOIA]

*Z  
Cms  
ADP  
MM  
DS*

List of Recipients for the  
Periodic Updates from the Climate Talks  
Bonn, Germany, 24 Feb. to 7 March 1997

<u>Name</u>	<u>Agency</u>	<u>Fax Number</u>
Eilsen Claussen	State	202 647-0217
Rafa Pomerance	State	202 647-0217
Bradford Johnson	State	202 647-0191
Erica Keen	State	202 647-0753
Susan Biniaz	State/L/OES	202 736-7115
Jack Shick	State	202 647-0191
Barbara Cates	State/EB	202 647-4037
Alisia Munnell	CEA	202 395-6947
Abraham Haspel	DOE	202 586-3047
Dirk Forrister	DOE	202 586-9987
Marc Chupka	DOE	202 586-0861
Mary Nichols/David Doniger	EPA	202 260-5155
David Gardiner	EPA	202 260-0275
Elaine Haemisegger	EPA	202 260-0290
Nancy Kete	EPA	202 233-9598
Charles Rawls	USDA	202 720-5437
Rosana Birbaum	OSTP	202 456-6025
Steve Seidel	CEQ	202 456-6546
David Sandalow	NSC	202 456-2710
Sally Kane	NOAA	301 427-2073
Jim Rubin	DOJ	202 514-4231

3

26 February 1997

Memorandum

To: Please See Attached List

From: USDEL/Geneva, Mark G. Hambley ~~VP~~

Subject: Negotiations under the Framework Convention on Climate Change  
Periodic Update No. 2 for February 25/26, 1997

This message transmits unofficial reflections on activities and developments during the climate negotiations which are being held in Bonn between February 24 and March 7, 1997. While the contents are unclassified, this report is intended for use by officials of the the U.S. Government, only. This report covers activities from the afternoon session on Tuesday, Feb 25, through the morning sessions on Feb 26. We are also including a report on the Feb 25 SBI meetings prepared by DOE's Linda Silverman, and a copy of "ECO", the NGO rag published with funding from the German and Danish Environment Ministries. The final paragraphs can be used as a DAR item as desired and appropriate..

Climate Talks, Update No. 2: "The Cauldron Heats Up as Subsidiary Bodies Attack Their Respective Issues"A Question of Dates

The good news is that all three subsidiary bodies are reporting progress in getting through their respective agendas. The bad news is that the cauldron is heating up with regard to certain decisive issues which will dictate the manner in which these negotiations are brought to finalization. Indicative of this latter point was the (at first glance) innocuous request made by both Tanzania (speaking for the G-77/China) and by China requesting that COP-4 be held in 1998 rather than in 1999 as had been recommended by the Bureau. The G-77 argued that this date is in conformance with the Convention which states that COPs will be held annually unless decided otherwise. We see ulterior motives (related to the review of annexs and of Annex I commitments -- both of which must be carried out "no later than" Dec 31, 1998), and are striving to find a compromise. Also indicative of the rough passage that our protocol framework faces were comments made by China's delegation indicating his strong misgivings with aspects of our proposal. ((I will leave it to our readers' intuitive sense to determine which ones (which he did not specify in any case.))

SBSTA and SBI Make Progress

Both the Subsidiary Body on Scientific and Technological Advice (SBSTA) and the Subsidiary Body on Implementation (SBI) reported forward movement on Feb 25 and 26. The SBSTA contact group on AIJ reports that good progress was achieved and that, despite some complicating maneuvers on the part of the Philippines, a reporting format had almost been agreed. National communications issues were disposed of smoothly on Feb 25, while a contact group on methodological issues continued to meet on Feb 26. The question of a new NGO consultative mechanism was passed from SBSTA to the SBI for consideration -- despite criticism from the EU that nothing tangible has been forthcoming on this matter and urging that the Secretariat undertake consultations with NGOs in the near future.

4

At the discussion of Annex I communications in the SBI on Feb 25, the British announced that they have completed their Second National Communications (the first Annex I Party to do so) and bragged about how they would continue to be below projected targets for the foreseeable future. Financial and technical cooperation and issues related to the Global Environment Facility provided for some tumultuous discussion during the Feb 26 debate. A paper is to be drafted by a contact group to evaluate the interim financial mechanism.

More vexing debate is expected in the SBI on Feb 27 when various budgetary issues are raised. The budget for 1998/99 is projected to increase substantially over the current one. We have asked the Secretariat to provide us with the details for the anticipated increase. Among the points of contention is a proposal to establish FCCC liaison offices in both New York and Geneva to assist in communicating with G-77 representatives. While sympathetic to their inability to remain as informed as we are in this process, we believe that a Canadian suggestion to ask Secretariat personnel to brief Missions in New York and Geneva on a periodic basis (as is done by the Biodiversity Secretariat) has some merit and would be much more cost-effective.

#### AG-13: Moving Towards a Paper

Meanwhile, Britain's Patrick Szell is moving his AG-13 working group towards consideration of an informal chairman's text outlining some tentative ideas concerning a multilateral consultative process (MCP). In both sessions of the group on Feb 25 and 26, discussion focused on the possible elements of a MCP. These include such matters as characteristics, objectives, institutional arrangements, and procedures. Szell indicated that he will have a paper available no later than Thursday, Feb 27.

#### More NGOs and Staffers Due to Arrive

As noted in Update No. 1, the current contingent of U.S. environmental NGOs is quite small. We understand that reinforcements will begin to arrive tomorrow. Business is already here in fairly substantial numbers and have come to us with a complaint or two or for general comments (for example, EEI has presented us with a detailed exposition on changes they would like to see in both the U.S. protocol proposal and in Chairman Estrada's "compilation" document.) Relations remain amicable, however. The scene will liven up by the arrival at the weekend by two Congressional staffers from the House energy subcommittee, Cathy Vay from the majority and Sue Sheridan from the minority. A staffer from Senator Lieberman's office is also scheduled to attend next week's AGBM sessions, as well.

5

The following paragraphs can be used as a DAR item as desired or appropriate:

Climate Talks Update 1:0.2: "The Cauldron Heats Up as Subsidiary Bodies Attack Their Respective Issues"

The good news is that all three subsidiary bodies are reporting progress in getting through their respective agendas. The bad news is that the cauldron is heating up with regard to certain decisive issues which will dictate the manner in which these negotiations are brought to finalization. Indicative of this latter point was the (at first glance) innocuous request made by both Tanzania (speaking for the G-77/China) and by China requesting that COP-4 be held in 1998 rather than in 1999 as had been recommended by the Bureau. The G-77 argued that this date is in conformance with the Convention which states that COPs will be held annually unless decided otherwise. We see ulterior motives (related to the review of annexes and of Annex I commitments -- both of which must be carried out "no later than" Dec 31, 1998), and are striving to find a compromise. Also indicative of the rough passage that our protocol framework faces were comments made by China's delegation indicating his strong misgivings with aspects of our proposal. ((I will leave it to our readers' intuitive sense to determine which ones (which he did not specify in any case.))

Both the Subsidiary Body on Scientific and Technological Advice (SBSTA) and the Subsidiary Body on Implementation (SBI) reported forward movement on Feb 25 and 26. The SBSTA contact group on AIJ reports that good progress was achieved and that, despite some complicating maneuvers on the part of the Philippines, a reporting format had almost been agreed. National communications issues were disposed of smoothly on Feb 25, while a contact group on methodological issues continued to meet on Feb 26. The question of a new NGO consultative mechanism was passed from SBSTA to the SBI for consideration -- despite criticism from the EU that nothing tangible has been forthcoming on this matter and urging that the Secretariat undertake consultations with NGOs in the near future. At the discussion of Annex I communication; in the SBI on Feb 25, the British announced that they have completed their Second National Communications (the first Annex I Party to do so). Financial and technical cooperation and issues related to the Global Environment Facility provided for some tumultuous discussion during the Feb 26 debate. A paper is to be drafted by a contact group to evaluate the interim financial mechanism.

Meanwhile, Britain's Patrick Szell is moving his AG-13 working group towards consideration of an informal chairman's text outlining some tentative ideas concerning a multilateral consultative process (MCP). In both sessions of the group on Feb 25 and 26, discussion focused on the possible elements of a MCP. These include such matters as characteristics, objectives, institutional arrangements, and procedures. Szell indicated that he will have a paper available no later than Thursday, Feb 27. (Hambley)

6

SBI 2/25/97

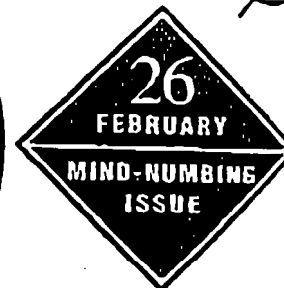
The first session of the SBI dealt primarily with administrative and financial issues; substantive issues were pushed to later in the week in order to give delegates time to read the just-received documents. The session began with adoption of the report of the 4th session of the SBI, which was held in December 1996. The Chair then explained that the election of vice-chairs would be delayed because the Latin Americans were still deciding who their candidate would be. National communications from Annex I parties were discussed; of the 34 submitted (only Belgium and Lithuania have not completed their first communications), 31 visits for in-depth reviews have taken place and 20 reports have been issued (and are available on the web). The UK proudly announced that it has submitted its 2nd national communication, and that it will be 4-8% below 1990 by 2000 (22% below for methane and 62% below for N2O).

The Executive Director of the FCCC, Michael Zammit Cutajar, provided a broad explanation of various financial and administrative matters. First, he indicated the need for predictability in the GEF replenishment process -- the GEF needs to receive a clear signal from the FCCC regarding what activities it should fund and there needs to be certainty with regard to the level of contributions to the GEF. He then explained that the FCCC has received 85% of its approved budget for 1996, with full contributions from only 61 countries out of more than 150 countries, including some Annex II countries (the US is fully paid up). On the program budget for 1998-99, the Secretariat has reconstructed a new work program, based on 2 major programs (science & technology and implementation), with subprograms below each -- the budget would be between 5-10 million DM, depending on how much UN conference services are used. He also explained that any new post-Kyoto ad hoc process would need a separate budget.

The only contentious issue raised came up at the end of the session regarding the date and venue of COP4. The G-77/China were insistent that COP4 be held in 1998, as explicitly stated in the Convention. It appears that for the G-77/China, this is related to the graduation issue, which must be settled before December 1998; delaying COP4 until 1999 would result in the graduation issue being put on the agenda for COP3. The second review of adequacy, which also must be addressed before December 31, 1998, would be treated similarly. The Secretariat requested that Parties interested in hosting COP4 indicate their interest at the July meeting. On future meetings, the Secretariat gave the Parties the choice of having 2 two-week blocks of meetings each year with the COP running concurrently or 2 two-week blocks of meetings with an additional one-week COP.

**CLIMATE NEGOTIATIONS BONN FEBRUARY '96 NGO NEWSLETTER**

# ECCO



*Eco has been published by Non-Governmental Environmental Groups at major international conferences since the Stockholm Environment Conference in 1972. This issue is produced co-operatively by CAN groups attending the Climate Negotiations in Bonn, February-March 1997*

## Canapé Crisis!

Eco has learned the truth about the apparent staleness of the canapés served at last night's reception. Sources deep within the Secretariat, who do not wish to be identified for fear of persecution, have exclusively revealed that the

food for the event was in fact left over from previous receptions in Geneva - some of it even going back as far as COP2. Apparently, during the move to Bonn it was loaded into unmarked filing cabinets, disguised as surplus

copies of national communications. The ruse was only spotted by our contact when he saw that, in an oversight, one of them had been labelled as emanating from Belgium, which he  
- continued page 3

### CONFERENCE REPORTS

*Owing to lack of interest, the rest of today's Eco consists entirely of conference reports and comment.*

#### SBSTA Tuesday Morning

SBSTA's first session began with the usual and unfortunately quite laborious task of getting through the organisational aspects. One particular concern expressed by delegates was the lack of effective distribution of relevant documentation in good time for the sessions. Following accreditation of 13 new NGOs, two contact groups were created: one on AJ, and another on methodological issues. On substantive issues, discussion focused on cooperation with relevant international organisations. WMO presented its summary report, on international co-ordinated research and systematic observations programmes. Included in the "possible actions" requested from SBSTA was to consider inviting the GEF to support the efforts of developing country parties to improve their systems for research and systematic observation of climate change. This caused some controversy. While some welcomed the suggestion, others expressed concern that GEF funds should not be used for "not such a high priority" issue. The SBSTA session closed with four delegations (Malaysia, Zimbabwe, Canada and Switzerland) asked to prepare draft recommendations.

#### SBSTA Tuesday Afternoon

SBSTA took up several agenda items in the afternoon but emphasized cooperation with relevant international organizations. Prof. Bert Bolin, Chairman of the IPCC, delivered an oral report about the status of forthcoming IPCC reports. Two more technical papers have been completed on simple climate models, and on the stabilization of atmospheric greenhouse gas concentrations. It should be noted that SBSTA does not seem to intend to reflect on these significant reports - perhaps they will be considered by the AGBM next week. At the least, it is to be hoped that the distinguished delegates of these bodies will try to educate themselves from these important scientific documents before undertaking further political negotiations. Stay tuned for highlights.

Prof. Bolin urged Parties wishing to submit further comments regarding the planned structure and content of the Third Assessment Report of the IPCC to contact the Chairman-Elect or Secretariat as soon as possible. He also notified Parties that the special report on regional impacts will be available in September 1997.

Sparking yet another intense debate, Prof. Bolin reviewed the status of the fourth technical paper on the environmental implications (i.e. sea-level rise) of various emission limitation and reduction proposals. He stated that, taking into account the recent country submissions, the IPCC will complete this technical paper by Sep-

tember 1997 as directed by SBSTA in its last session. The IPCC will not conduct any new research for this paper, but merely synthesize existing data as required for any technical paper.

Kuwait, Nigeria, Venezuela and Saudi Arabia all insisted that this technical paper should be turned into a special report, but Prof. Bolin reminded them that the IPCC Plenary already decided that it would be a Technical Paper in Mexico City.

The Netherlands, USA, Australia and AOSIS all urged for the completion of the technical paper, using the country submissions as guidance. The Marshall Islands contended that "[further] delay is political interference in scientific discourse."

Kuwait, using an unwieldy analogy from an Arabic phrase that apparently reads, "Don't go to prayers while you are drunk" accused Prof. Bolin's oral report to SBSTA of being "biased, partial and misleading."

The Chairman chided Kuwait for not being polite. He also proposed that SBSTA should make a recommendation to the IPCC that authors take into account the country submissions, as Prof. Bolin promised to do. Kuwait suggested that debate be continued after they consult with their "colleagues."

On national communications, the Secretariat made a presentation on country submissions.  
- continued over

# CLIMATE NEGOTIATIONS | BONN FEBRUARY '97 | NGO NEWSLETTER

*- continued from front*  
sions, noting that the UK had already submitted their second communication. Then, the UK made an intervention confirming that they will meet their stabilization goal of 1990 levels by the year 2000.

Next came methodological issues, which the Secretariat suggested be dealt with in a smaller group. SBSTA then moved on to discover that the report on "Mechanisms for Consultation with NGOs" was not ready, so agenda item was deferred to a later session.

In the most surprising development of the day SBSTA ended twenty minutes early. The next session will be Thursday morning.

### AG13

The theme of Tuesday's AG13 meeting was office furniture. Building on the December meeting's discussion of rotating seats, yesterday's debate focused on desks.

At the outset of the meeting, the Chair shocked the meeting by radically proposing that the Group try to decide something this time. He further recommended that this "something" might be the "character" of a multilateral consultative process. Should it be advisory or supervisory or, for that matter, good or bad? Chile, compounding the complexities faced by delegates, then made the revolutionary proposal that the Group might consider what an MCP should actually do.

Entering into the free and easy atmosphere encouraged by the Chair, China and the EU launched a joint initiative on help desks. Given tacit approval by the meeting on the concept of desks, this Sino-European alliance began a debate on the nature of the help that desks might give, whom they might give help to, and under what circumstances.

It is anticipated that the furniture theme will continue tomorrow, stimulated by today's discussion between the Chair and the USA on telephones and how they might be allocated to desks, how they might be used etc.

### SBI Report

Mr Zammit Cutajar discussed the review of the financial mechanism of the Convention, which he described as the "most important policy issue on the SBI agenda." He stressed the need for both the flow of funds from the GEF and

the demand for funds to the GEF to be predictable if replenishment is to be successful (see article below). He went on to discuss communications from non-Annex I countries, and described a suggested support arrangement which the Secretariat had been discussing with the GEF secretariat.

Finally, Mr Zammit Cutajar urged countries to pay their contributions to the core budget of the Convention, pointing out that only 61 out of 150 plus countries paid up in 1996. Shockingly, contributions are still awaited from some Annex II countries - the richest countries in the world. Go on, pay up or we'll name names (we only have to look in SBI/1997/CRP.1...).

After a brief statement by the Executive Secretary on Annex I communications (34 received so far, but Belgium (!) and Lithuania still pending), the UK took the floor to say that it had already submitted its second national communication to the Secretariat (where is my personalised copy? *Eco Reporter*), and that its CO<sub>2</sub> emissions would be 4-8% below 1990 levels in 2000. Well done, well done, well done.

well done, well done...

The secretariat is looking at ways to cut the volume of documentation, and was given a mandate to explore with the UN Office in Geneva whether time sensitive documents could be distributed before they were available in all six languages without contravening the 1981 General Assembly decision.

The most lengthy item discussed was the programme budget for 1998/9. As the budget depends notably on the schedule of sessions, Parties were asked to provide a schedule for 1998/99 ASAP. No decision was taken on the budget, as Parties wanted to consider the document at more length. A debate ensued over the question whether COP4 should be in 1998 or 1999, the G77 and China requesting 1998 to allow the reviews specified the Convention to take place; the Secretariat, for cost reasons, preferring 1999. An interesting presentation was the one on the Agenda for COP3. The Secretariat proposes to have the meeting from 1-10 December, with the ministerial segment from 3-5 December. There would be no general statements, to streamline negotiations.

## Remember the Memorandum

With little fanfare, Parties at the last meeting of the Subsidiary Body on Implementation (SBI 3) adopted an Annex to the Memorandum of Understanding between the COP and the GEF Council, that significantly develops a critical part of the relationship between the Convention and the interim operator of its Financial Mechanism.

The Annex spells out a process by which the COP and the Council will jointly determine the amount of GEF funding that will be required by developing country Parties to implement the Convention. A unique opportunity for the Parties to test the GEF's responsiveness to its needs but an opportunity that may be missed. Delays in the conclusion of MOU may allow the GEF replenishment negotiations to move towards a conclusion before the COP and its subsidiary bodies can make an assessment of the amount of funds necessary to assist developing countries. In the absence of such an assessment, GEF replenishment negotiations will be based, as they were in the first GEF cycle, on how much the Annex II Parties care to contribute, rather than the level of funding the Convention needs. Under these circumstances the commitment to meet the agreed full incremental costs of implementing measures undertaken by developing countries is greatly undermined.

This is not to suggest that the assessment of

developing country needs will be an easy task. Some inspiration could be taken from the Multilateral Fund for the Montreal Protocol, which was recently replenished on the basis of work undertaken by a Technical and Economic Advisory Panel (TEAP), which estimated developing country demand for relevant investment and technology transfer over coming years. Clearly climate change offers an unlimited range of investment opportunities considerably more challenging to calculate than in the ozone context. But the process of estimating developing country needs over a specific period of time could help to focus the work of the SBI in determining programme priorities and eligibility criteria for Convention funding, and might encourage developing countries to develop more concrete measures for their national programmes.

Despite the adoption of the Annex, and the rapid approach of GEF replenishment negotiations, there is little sign of the subsidiary bodies or the secretariat, preparing an assessment of needs. Thus far the snail's pace of the GEF project cycle has maintained a healthy balance in the GEF's accounts. However, as the GEF operations begin to operate more smoothly and to process the project proposals in its pipeline the Parties may have no one to blame but themselves if funds are exhausted before legitimate needs are met.

## THANKS

The Climate Action Network would like to thank the Environment Ministries of Germany and the Netherlands, who have provided funds and facilities for Eco.  
With resources contributed by: APC Networks and EuroFax.

*Copy to  
OMB  
JS*

February 26, 1997

MEMORANDUM FOR DISTRIBUTION

FROM: ROBERT S. KAPLA  
COUNCIL ON ENVIRONMENTAL QUALITY

SUBJECT: CLIMATE CHANGE DEPUTIES MEETING

---

Attached is the agenda for the climate change deputies meeting scheduled for this **Thursday, February 27th at 4:00pm in room 472 OEOB**. Also attached is a paper on domestic policy options prepared by the Assistant Secretaries.

DISTRIBUTION:

- Charles Curtis, DOE
- Mort Downey, DOT
- Everett Ehrlich, DOC
- Leon Fuerth, OVP
- John Garamendi, DOI
- Jack Gibbons, OSTP
- Jamie Gorelick, DOJ
- David Hales, AID
- Fred Hansen, EPA
- Jeff Lang, USTR
- Jack Lew, OMB
- Ira Magaziner, DPC
- Cynthia Metzler, DOL
- Richard Rominger, USDA
- Alicia Munnell, CEA
- Jim Steinberg, NSC
- Larry Summers, Treasury
- Tim Wirth, DOS

CLIMATE CHANGE DEPUTIES MEETING

Thursday, February 27

4:00-6:00pm

OEOB Room 472

AGENDA

- I. International Negotiations
  - current status
  - key upcoming decisions/dates
- II. Economic Modeling Analysis
  - initial output from benchmark runs
  - next steps
- III. Domestic Policy Options
  - Overview Paper
  - next steps
- IV. Outreach Strategy
- V. Relationship of Emissions, Concentrations and Impacts

# Overview of Greenhouse Gas Mitigation Options

## Introduction

Over the next century, important shifts in the global economy would be required to address climate change. (See attachments 1 and 2). While many mitigation options exist, these policies entail costs (e.g. increases in energy prices or additional federal spending). Taking no action also involves costs, since global warming can adversely affect both humans and ecosystems.

This paper lays out the broad policy options available for limiting emissions, but does not analyze the costs and benefits of particular options. The options fall into three general categories:

- Those that seek to increase the rate at which existing energy efficient technologies are deployed in the marketplace by overcoming information and other barriers to their use. The Administration's efforts in the Climate Change Action Plan were designed to use technology diffusion to reduce emissions to 1990 levels and may reduce as much as one-fourth of the amount of projected growth to the year 2010.
- Those that create new government requirements to internalize the costs of greenhouse gas emissions in the marketplace. These could take the form of additional standards and regulations, changes in other government policies that indirectly affect energy use, and/or an emissions trading program. Such programs typically involve government imposed limits on emissions that increase the costs of energy or restrict consumer choice.
- Research and Development (R&D). R&D can reduce costs in all periods. However, it is particularly important in the long term, since controlling warming ultimately requires adopting an energy system that does not rely primarily on fossil fuels. This would involve stepping up and refocusing the federal government's R&D program and reversing the long-term trend of declining government and private R&D expenditures.

## ***Technology Diffusion Programs***

As noted by the National Academy of Sciences (NAS) and the Office of Technology Assessment, many energy saving technologies already exist, but are not being implemented. The NAS, for example, stated that the total diffusion of existing energy efficiency technologies in "reasonable applications" could reduce current carbon emissions by almost one-fourth.

For an energy efficient technology to be more fully employed, however, potential buyers of products need to know of the technology, as well as its performance and

economic benefits. Service providers must have the expertise to appropriately design, install and operate the technology. Yet, given the transaction costs associated with obtaining reliable information, potential users may not fully appreciate the potential long-term net benefits of more energy-efficient technologies.

A number of technology diffusion programs to address these problems are currently underway. The Administration's CCAP launched over 40 initiatives in 1993. Their goal was to return U.S. greenhouse gas emissions to 1990 levels by the year 2000. The Administration currently projects that if funding at current annual levels (\$183 million) continues, these programs will eliminate as much as one-fourth of the total growth in emissions through the year 2010 and save over \$35 billion in energy expenses in that year. The Administration proposed higher spending levels years (\$305 million) for each of the past two years. However, Congress cut the requests by 40%.

The following illustrate the kinds of programs underway or that could be pursued in this category:

- Fully funding existing CCAP programs, adding initiatives to further reduce emissions beyond the year 2000.
- Establishing additional information and energy labeling programs for buildings (e.g., to redress the asymmetry of information between builders and occupants). This sector consumes one-third of the nation's energy.
- Should a domestic emissions trading system be created, setting aside a reserve of allowances or a portion of auction revenues to reward new R&D investment and the production of efficient and renewable technologies. Alternatively, a voluntary early banking program could be designed to encourage early action.
- Creating a secondary market for energy efficiency financing.
- Expanding sector-wide compacts in which entire industries could pledge improvements in emissions and benefit from shared information or R&D on technologies.
- Extending government procurement efforts for energy efficient technologies to state and local levels.
- Mandating through Executive Order the purchase of "green" power by federal facilities where available.

## ***Standards and Regulations***

Limitations on greenhouse gas emissions could also take the form of standards and regulations. These would have to be imposed on a wide array of consumer goods and energy consuming equipment, involving many government actions in which the tradeoffs among costs, emission reductions, and other product attributes would be contested. The resulting level of emissions would have to be consistent with the targets established by international agreement. Since total national greenhouse gas emissions would not be capped, such compliance would have to be projected based on an analysis of the impacts of the standards program. Such standards could include:

- *Direct limits on greenhouse gases:* Standards could specify allowable greenhouse gas emission levels per unit of output (or some other factor). For example, methane from some landfills is already controlled due to limits on emissions of volatile organic compounds.
- *Minimum energy efficiency standards for energy consuming equipment:* Historically, these have targeted appliances and other residential and commercial equipment, as well as personal transportation (i.e., the Corporate Average Fuel Economy (CAFE) program). 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 the 1992 Energy Policy Act have stalled recent efforts to make progress in the appliance standards area.

Emissions of greenhouse gases from the transportation sector account for about one-third of total U.S. GHG emissions and are expected to grow by about 25% by 2010. 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 begun to *decline*. 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 members of the Committee, the process did result in a number of proposed policies that could be pursued.

### ***Other Policies Relevant to Emissions***

In addition to the standards it sets, government indirectly affects the levels of greenhouse gas emissions through its policies towards transportation and energy market regulation. These also offer opportunities to generate reductions in greenhouse gas emissions. Most prominent among these are:

*Electricity Restructuring:* 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.

*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:

- 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.

## ***Emissions Trading***

Emissions trading is a tool for meeting a total quantity limit on emissions. It involves allocating or auctioning emissions allowances, and allowing the trading of allowances in a market with sufficient mechanisms to ensure compliance with targeted levels. Since emission trading involves the creation of new, marketable assets that can have substantial value, addressing distributional issues will be an important component of program design. Allocation rules or auction revenues can be used to address these distributional issues.

Emission trading systems can offer both static and dynamic efficiency advantages over more traditional forms of regulation. The potential for static efficiency gains exists because emitters face different abatement costs. Emissions trading allows those with high abatement costs to purchase allowances from those whose costs are lower. Total costs would therefore be lower than through traditional regulations, which require all polluters to comply with a specific standard. However, it should be noted that such a program involves people and firms adjusting to higher energy prices.

Under traditional regulation, firms have little incentive to investigate ways of abating pollution by more than the minimum required to comply with regulatory requirements. Firms under-invest in pollution control R&D since they can capture neither the full market benefits from such spending (since others benefit from learning of their successes), nor the full value of any resulting environmental improvements. Here, trading offers efficiency gains because of the incentive to continuously improve pollution abatement technologies in order to create "surplus" allowances for sale.

Experience in the United States has shown that final compliance costs for the programs that have incorporated emissions trading have, in general, been lower than predicted – often dramatically lower. While emissions trading is not the sole cause of this phenomenon, it has contributed to lower abatement costs in the acid rain program, the phase-out of Chlorofluorocarbons (CFCs), the "criteria" air pollution program, and the phase-out of lead in gasoline.

An emissions trading program, like any program designed to limit greenhouse gases, must contain certain elements. First, an agreed upon emissions 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.

A program would have to establish permit lifetimes, monitoring and enforcement provisions, as well as rules for permit banking, borrowing, and trading. Consideration should also be given to transaction costs, which should be kept as low as possible.

However, particularly difficult issues involve determining what types of activities require a permit and how permits should be allocated. The decision for the former 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. In addition, monitoring and verification of permit compliance must be possible for those included in the program.
- *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.

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.

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: some 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.

## **Research and Development (R&D)**

One of the key issues in developing a domestic climate change policy will be the emphasis placed on potentially expanding the Federal R&D effort into technologies that reduce future greenhouse gas emissions and/or lower the cost of achieving a given greenhouse gas reduction target. Achieving greenhouse gas emission reductions that would stabilize atmospheric concentrations at "safe" levels will require major advances in technology in virtually every sector of the economy. These goals will be difficult to achieve during a time of constrained federal spending and sharp reductions in long-term private sector R&D. Since 1978, federal investment in energy R&D has declined 75%. Investment by industry fell 33% from 1983 to 1993.

The President's Fiscal Year 1998 budget requests an increase of \$200 to \$300 million in relevant R&D over the current level of approximately \$1.3 billion. Such an increase was rejected by Congress last year, and achieving it may require raising the issue to a higher level in budget negotiations. In the Fiscal Year 1999 budget and beyond, further increases will be needed, as will a more coordinated effort to target the R&D on the biggest opportunities for CO<sub>2</sub> mitigation.

Achieving greenhouse gas levels that are not harmful to humans or the environment will require major advances in technology as can be seen from the following equation:

$$\text{Emissions} = \text{Population} \times \text{Affluence (GDP/capita)} \times \text{Technology (Emissions/GDP)}$$

From 1990 to 2060, we may well see global population double and affluence increase by a factor of four. At the same time, the world may ultimately need to *lower* emissions from 1990 levels, requiring the average emissions-related technology to improve by more than a factor of ten during the next few decades and be rapidly deployed throughout the world. The benefits could be enormous, in part because of these technologies serve a number of other national goals, including reducing the emission of the criteria air pollutants and decreasing dependence on foreign oil.

Because of the high risk nature of R&D, a number of pathways could be pursued simultaneously:

### **Clean Power**

- The next generation of natural gas technologies, including gas turbines and fuel cells, could achieve energy conversion efficiencies of 70% or more by 2005.
- The next generation of 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 CO<sub>2</sub> 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.
- Nuclear fission and fusion remain options that could benefit from further R&D, though these raise significant environmental issues regarding waste handling and disposal.

## **Energy Efficiency**

### *Transportation*

The Partnership for a New Generation of Vehicles (PNGV) is a public-private partnership to design and build a triple-efficiency clean car by 2004. Multiple technology paths are being pursued to build a hybrid vehicle that has both an advanced engine (such as a clean diesel, Stirling or gas turbine) and an energy storage device (such as a battery, fly-wheel or ultracapacitor). Supporting R&D includes lightweight, super-strong materials such as composites; high-temperature ceramics; regenerative braking; and advanced power electronics. Proton-exchange membrane (PEM) fuel cells have perhaps the greatest long-term potential for reducing transportation CO<sub>2</sub>.

Biofuels also lower transportation CO<sub>2</sub>. Continued R&D in bio-engineered organisms and fast-growing crops is expected to produce ethanol from waste paper, crop waste, and dedicated crops for under 70 cents a gallon by 2005, competitive with oil at \$25 a barrel.

### *Industry*

The seven most energy-intensive industries—steel, aluminum, petroleum refining, chemicals, pulp and paper products, glass, and metal casting—account for about 80% of the energy consumed in U.S. manufacturing and more than 90% of the hazardous waste. They represent the largest opportunity for reducing industrial CO<sub>2</sub> emissions, and the Energy Department is partnering with them because they significantly underinvest in R&D compared to the industry average. Key areas that would benefit from expanded R&D include advanced materials development; separation technology; catalysis; bioprocessing, biocatalysis, and renewable feedstocks; sensors and controls; and industrial cogeneration of electricity and heat, which can achieve overall efficiencies of more than 80% and ultimately utilize biomass.

### *Buildings*

The buildings sector consumes one-third of the nation's energy and two-thirds of its electricity. Key near-term R&D opportunities include improvements in lighting, windows, design software, high-efficiency appliances, gas heat pumps, insulation and duct systems,

cooling including gas cooling, solar heating and cooling, daylighting, and urban heat island mitigation (reflective roofing and road materials). Longer term R&D needs include electrochromic glazings for windows, building-integrated PV systems, and PEM fuel cells.

### **Capture and Sequestration**

If major reductions in CO<sub>2</sub> emissions are necessary, and global reliance on fossil fuels continues beyond the middle of the next century, then some form of CO<sub>2</sub> sequestration (i.e. capture and disposal) will 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 CO<sub>2</sub> into industrial chemical feedstocks; selectively permeable membranes for CO<sub>2</sub> capture; processes for converting fossil fuels and biomass into CO<sub>2</sub> and hydrogen; development of hydrogen infrastructure technology, including transportation and storage; and PEM fuel cells. Capture and sequestration has received only limited funding to date.

### **Advanced Research**

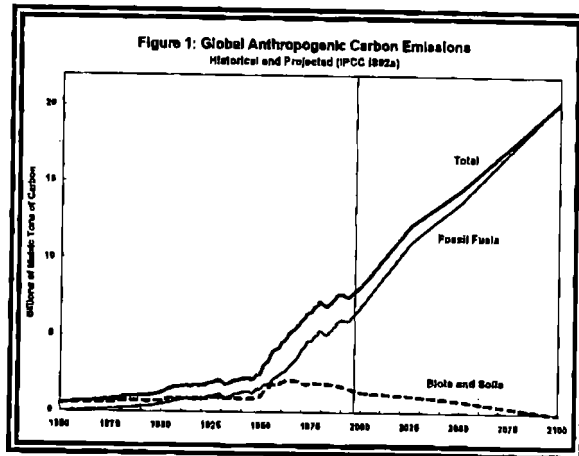
A number of areas of advanced research could prove crucial to responding to climate change, including photosynthetic mechanisms, biotechnology, fermentation microbiology, combustion research, polymer and ceramic science, process engineering, supercritical CO<sub>2</sub>, new materials synthesis, and nanotechnology. One essential area for expanded basic and applied R&D is superconductivity, which offers the possibility of nearly loss-less energy storage and transmission and of highly efficient superconducting motors.

### **Conclusion**

A number of mitigation options exist for controlling greenhouse gas emissions. These can be organized in three general categories. First, greater efforts could be made to diffuse underutilized energy efficiency technologies. This could be accomplished through programs, such as those in the Climate Change Action Plan, to address lack of information and other market barriers. Second, new government interventions, either in the form of emissions trading and/or expanded regulatory programs, could be used to limit greenhouse gas emissions. Finally, additional incentives could be provided for (both government and private) research and development, since stabilization of atmospheric concentrations of greenhouse gases can only be accomplished if new non-fossil technologies are available and adopted.

## Attachment 1: Global Trends in Emissions and Concentrations

Growing emissions of greenhouse gases (GHGs) from industrial activity and land-use changes are rapidly raising the concentrations of these gases in the atmosphere, making some degree of climate change virtually certain. Although greenhouse gases come from many sources, carbon dioxide (CO<sub>2</sub>) from fossil fuel use is the source of



greatest concern because of its rapid historical and projected growth.<sup>1</sup>

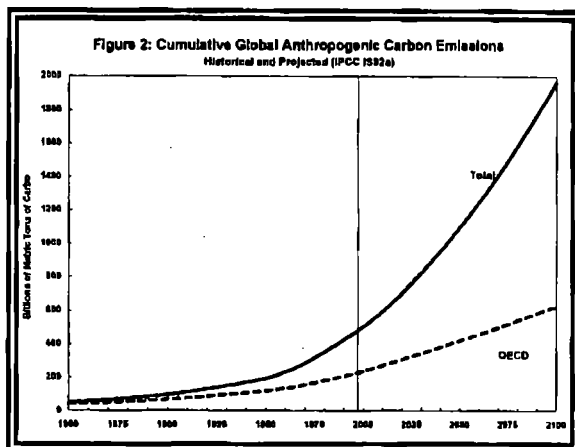
Atmospheric carbon concentrations are already over 30% higher than their pre-industrial levels and rising at about 4% per decade. The further potential for human activities to disrupt the natural balance is enormous because hundreds of years' worth of carbon (at current rates of use) are currently available in proved fossil fuel reserves that could be exploited under current economic and technological conditions – and even

larger “ultimately recoverable” reserves. In the absence of controls, emissions are projected to grow quickly as the developing countries experience rapid population growth and industrial development. These trends are expected to lead to ongoing atmospheric accumulation and climate change into the indefinite future, with a doubling of atmospheric carbon concentrations sometime during the second half of the next century and a resulting long-run increase in average global temperatures by an estimated 1.5° to 4.5°C. Even stabilizing global emissions at 1990 levels *permanently* will lead to a near doubling of atmospheric carbon concentrations by the end of the next century.

Climate change is truly a global problem in the sense that emissions from anywhere will affect everyone everywhere. As a consequence, concerted international action will be needed to induce all countries to cooperate in reducing emissions. Nevertheless, cooperation will be hampered by the uneven distribution of past and future emissions. Simply put, the developed industrial nations have relatively high levels of per capita emissions and are largely responsible for past emissions, while the developing nations, whose per capita emissions are currently very low, will be responsible for the

<sup>1</sup> In total, human activities have already resulted in roughly 250 billion tons of carbon (gigatons of carbon or GtC) emissions from fossil fuel combustion and perhaps 200 GtC from net deforestation since 1700. In terms of carbon equivalent, cumulative anthropogenic greenhouse gas emissions since the beginning of the Industrial Revolution have been roughly 570 billion metric tons of carbon equivalent (GtCe), of which about 450 GtC have been carbon. (Deforestation and other changes in land use have reduced the amount of carbon stored in biota and soils by perhaps 275 GtC, or around 10%, since the beginning of agriculture.) More than 75% of all fossil emissions in history have occurred since 1945, and 50% have occurred since 1970. About 40% of total carbon emissions have accumulated in the atmosphere, raising the stock of atmospheric carbon by nearly 30% from 280 ppm (parts per million) to over 360 ppm. Somewhat less than half of current emissions are accumulating in the atmosphere, while the rest is absorbed in natural sinks (the oceans and biosphere) through processes that are as yet only poorly understood. Although most of the increased carbon will ultimately be absorbed by the oceans, the increased atmospheric concentrations of carbon dioxide and other greenhouse gases will affect the climate for centuries to come.

bulk of emissions in the future.<sup>2</sup> Since the developed countries have enjoyed high levels of emissions now and bear the greatest responsibility for current atmospheric concentrations, the developing countries have been reluctant to undertake any emissions reductions at all in the absence of significant emission controls on the part of the developed countries.



Yet, actions taken by the developed countries alone are likely to have little effect on cumulative global emissions or on atmospheric concentrations. Based on the projections shown in Figures 1 and 2, stabilization of Annex I country<sup>3</sup> emissions at 1990 levels from 2000 through 2100 would reduce cumulative carbon emissions by around 8%, and would reduce atmospheric CO<sub>2</sub> concentrations in 2100 by less than 5%. In other words, Annex I emissions stabilization will still lead to

well more than a doubling of atmospheric CO<sub>2</sub> concentrations by 2100. Even stabilizing total global emissions – which, given anticipated population growth, would require dramatic reductions in global per capita emissions – will not lead to stabilized concentrations. *Stabilization of concentrations requires global emissions to fall well below current levels, and ultimately to decline to near zero.*

Target	Carbon Budget 1991-2100 (GtC)	Reduction from 1500 GtC
450 ppm	630 - 650	-57% to -58%
550 ppm	870 - 990	-34% to -42%
650 ppm	1030 - 1190	-21% to -31%
750 ppm	1200 - 1300	-13% to -20%

Researchers have examined in some detail the annual emissions paths required to meet atmospheric carbon concentration targets of 450 to 750 ppm.<sup>4</sup> As shown in Table 1, all of these targets require significant reductions in cumulative

<sup>2</sup> Historically, fossil carbon emissions have come mainly from the U.S. (27% of the postwar total), the rest of the OECD (22%), and the former Soviet Bloc (24%). The rest of the world, with nearly 80% of the population, is responsible for a mere 27% of cumulative emissions. On a per capita basis, U.S. emissions are over 5 tons per person per year; the industrial nations of Western Europe and Japan emit about 2 to 2.5 tons per person; and the nations of the former Soviet Bloc, whose per capita emissions used to be very high due to the inefficiencies of central planning, have fallen to about 2.5 tons per person. At the other end of the spectrum, the developing countries of the Americas, Africa and Asia have emissions on the order of 0.2 to 0.6 tons per person.

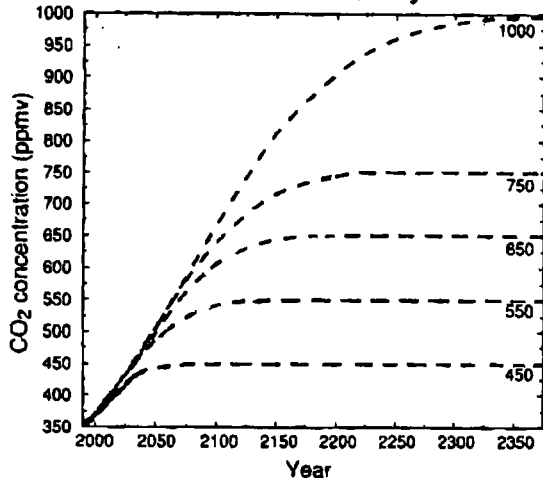
Despite their relatively low emission levels, developing countries' emissions are growing very rapidly. (Developing country emissions grew by 21% between 1990 and 1995, and global fossil fuel emissions have been roughly stable during this period only because of the 30% reduction in former Soviet Bloc emissions associated with the collapse of the centrally planned economies.) Given current projections of population growth and economic activity, developing countries' share of annual global fossil emissions should surpass that of the developed countries during the second quarter of the next century. However, their share of cumulative fossil emissions will remain below that of the developed countries for many years to come, as will their per capita emissions.

<sup>3</sup> The OECD nations plus the former Soviet Bloc.

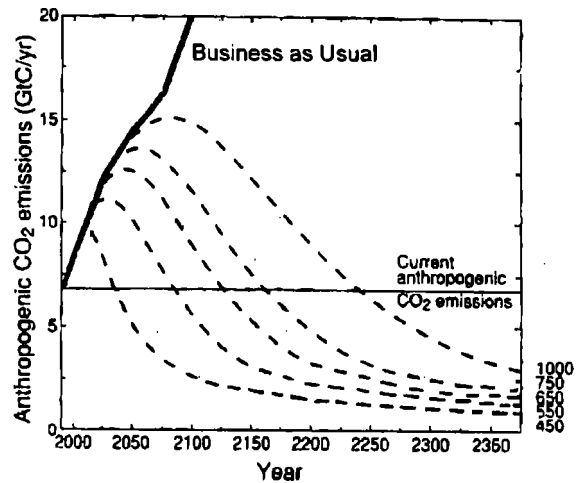
<sup>4</sup> The lower target would limit the projected average global temperature increase to roughly between 0.6°C to 1.75°C; the higher target would limit the increase to between 1.4°C to 3.5°C.

projected global carbon emissions; and as shown in Figures 3 and 4, all of them require dramatic reductions in annual emissions rates sometime during the next century. To achieve a 450 ppm target – which still represents a two-thirds increase in atmospheric

**Figure 3: Alternative Atmospheric Concentration Pathways**



**Figure 4: Emission Scenarios to Meet Alternative Atmospheric Concentrations**



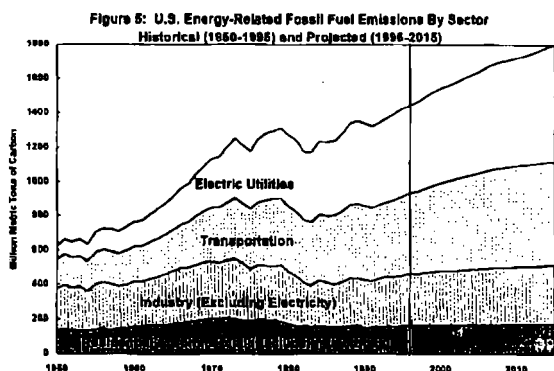
concentrations over preindustrial levels – annual emissions must begin declining steeply within the next quarter-century and must fall to less than half the current rate by 2100. To achieve a 550 ppm concentration target – which represents more than a doubling in atmospheric concentrations – annual emissions must begin declining steeply during the second quarter of the century. Furthermore, these budgets must be distributed both across countries and across time. And while emissions can increase in the near term, higher growth in emissions in the near term must be offset by increasingly dramatic reductions later on.

## Attachment 2: U.S. Emission Trends

In 1995, gross greenhouse gas emissions in the U.S. were about 1,674 MMTCe (million metric tons of carbon equivalent), of which more than 85% were carbon emissions from fossil fuel combustion. Methane emissions (mainly from landfills and agricultural activities) accounted for 11%, nitrous oxides 2% and various halocarbons 2%. These emissions were offset by roughly 100 MMTCe of carbon sequestered by the nation's forests. U.S. greenhouse gas emissions have risen nearly 7% in the past five years.

Annual U.S. fossil-related carbon emissions have grown from around 620 MMTC (million metric tons of carbon) in 1950 to about 1430 MMTC in 1996, and are projected to rise to around 1800 MMTC over the next twenty years. 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%. These shares are expected to remain fairly steady over the next quarter century.

The electric utility sector's share has grown from 12% in 1950 to 35% in 1996 (500 MMTC), as the American economy has steadily increased its use of electricity. Over 85% of electric utility sector carbon emissions come from burning coal. Similarly, the transportation sector's share of fossil-related carbon emissions has grown from 28% in 1950 to 33% in 1996 (470 MMTC),

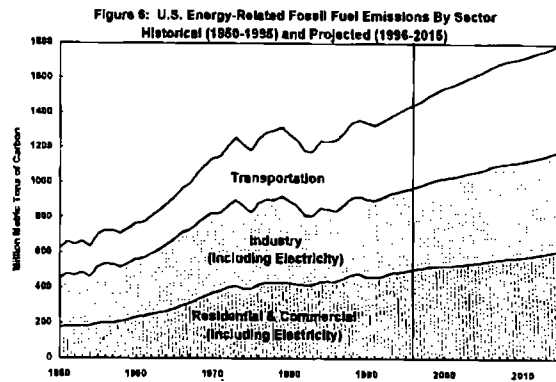


with oil accounting for practically all of the fuel use in the transportation sector. Thus, the transportation and utility sectors together currently account for 68% of U.S. fossil-related carbon emissions.

In contrast, carbon emissions from the residential and commercial sectors' direct energy use have fallen from 22% of the total in 1950 to 12% in 1996; while emissions from industrial direct energy use

have fallen from 38% to 20%. However, if electricity-related carbon emissions are attributed to the sectors that consume the electricity (rather than to the utility sector which produces it), the residential and commercial sectors' share has risen from 28% in 1950 to 35% in 1996. In contrast, the industrial sector's share has fallen from 44% in 1950 to 32% in 1996, as industry's share of economic activity has declined and services' share has risen.

Attributing electricity-related emissions to end-use sectors, then, 35% of carbon emissions are related to households and commercial businesses; 33% are related to transportation, and 32% are related to industry. These shares are projected to remain fairly constant over the next twenty to twenty-five years, although transportation's share of carbon emissions will increase slightly, while electricity generation will account for a slightly increasing share of primary energy consumption.



# Withdrawal/Redaction Marker

## Clinton Library

DOCUMENT NO. AND TYPE	SUBJECT/TITLE	DATE	RESTRICTION
001. memo	To Francine Obermiller, Thomas Rhoads from Lisa Branch re: Mtg w/ Robert Repetto, Tues, 2/25, 2pm [PII] [partial] (1 page)	02/19/1997	b(6)

### COLLECTION:

Clinton Presidential Records  
Council of Economic Advisers  
Munnell, Alicia  
OA/Box Number: 10103

### FOLDER TITLE:

Environment: Climate Change Vol. IV [2]

2017-1095-F  
bg238

### RESTRICTION CODES

#### Presidential Records Act - [44 U.S.C. 2204(a)]

- P1 National Security Classified Information [(a)(1) of the PRA]
- P2 Relating to the appointment to Federal office [(a)(2) of the PRA]
- P3 Release would violate a Federal statute [(a)(3) of the PRA]
- P4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
- P5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
- P6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Personal record misfile defined in accordance with 44 U.S.C. 2201(3).

RR. Document will be reviewed upon request.

#### Freedom of Information Act - [5 U.S.C. 552(b)]

- b(1) National security classified information [(b)(1) of the FOIA]
- b(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
- b(3) Release would violate a Federal statute [(b)(3) of the FOIA]
- b(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
- b(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
- b(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
- b(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
- b(9) Release would disclose geological or geophysical information concerning wells [(b)(9) of the FOIA]

*B. Adams*

EXECUTIVE OFFICE OF THE PRESIDENT

19-Feb-1997 10:08am

TO: Francine P. Obermiller  
 TO: Thomas A. Rhoads

FROM: Lisa D. Branch  
 Council of Economic Advisers

CC: Jason F. Shogren (b)(6)

SUBJECT: Mtg w/Robert Repetto, Tues, 2/25, 2pm

The mtg w/Bob Repetto (World Resources Inst) has been scheduled for next Tues, 2/25, @ 2pm, Rm. 314. Topic: Global Climate Change modelling efforts

*at the same time (from above)*

(b)(6)

*SS#*

(b)(6)

*100 - 110438 - 662 - 2599*

E X E C U T I V E   O F F I C E   O F   T H E   P R E S I D E N T

19-Feb-1997 07:47am

TO:            Jason F. Shogren

FROM:         Alicia H. Munnell  
              Council of Economic Advisers

CC:            Jeffrey A. Frankel

CC:            Lisa D. Branch

CC:            Francine P. Obermiller

SUBJECT:      RE: possible GCC meeting with bob repetto

let's do it.

E X E C U T I V E   O F F I C E   O F   T H E   P R E S I D E N T

18-Feb-1997 04:55pm

TO:            Jeffrey A. Frankel  
TO:            Alicia H. Munnell  
TO:            Lisa D. Branch  
TO:            Francine P. Obermiller

FROM:          Jason F. Shogren  
                Council of Economic Advisers

SUBJECT:      possible GCC meeting with bob repetto

robert repetto from world resources institute has called to say that they have done a meta analysis on the GCC modelling efforts. he wants to set up a half hour meeting to discuss their findings next tuesday or wednesday. jeffery hunker from commerce suggest that he contact us.

are you interested in meeting with him about this or do you want me to talk with him?

if you do not know him, he has been a local dc policy economist working on environmental issues for the last 20 years. he led a lot of the work on green gdp during the 80s and 90s.

# Withdrawal/Redaction Marker

## Clinton Library

DOCUMENT NO. AND TYPE	SUBJECT/TITLE	DATE	RESTRICTION
002. memo	To Lisa Branch from Mail Link Monitor, re: Confirmation: Appt Request for Munnell, Alicia H [PII] [partial] (1 page)	02/21/1997	b(6)

### COLLECTION:

Clinton Presidential Records  
Council of Economic Advisers  
Munnell, Alicia  
OA/Box Number: 10103

### FOLDER TITLE:

Environment: Climate Change Vol. IV [2]

2017-1095-F  
bg238

### RESTRICTION CODES

#### Presidential Records Act - [44 U.S.C. 2204(a)]

- P1 National Security Classified Information [(a)(1) of the PRA]
- P2 Relating to the appointment to Federal office [(a)(2) of the PRA]
- P3 Release would violate a Federal statute [(a)(3) of the PRA]
- P4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
- P5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
- P6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Personal record misfile defined in accordance with 44 U.S.C. 2201(3).

RR. Document will be reviewed upon request.

#### Freedom of Information Act - [5 U.S.C. 552(b)]

- b(1) National security classified information [(b)(1) of the FOIA]
- b(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
- b(3) Release would violate a Federal statute [(b)(3) of the FOIA]
- b(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
- b(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
- b(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
- b(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
- b(9) Release would disclose geological or geophysical information concerning wells [(b)(9) of the FOIA]

EXECUTIVE OFFICE OF THE PRESIDENT

21-Feb-1997 10:43am

TO: Lisa D. Branch  
FROM: Mail Link Monitor  
Office of Administration, IST  
SUBJECT: CONFIRMATION: APPT. REQUEST FOR MUNNELL, ALICIA H

FROM: WAVES OPERATIONS CENTER - ACO: (b)(6), (b)(7)c, (b)(7)f  
Date: 02-21-1997  
Time: 10:38:22

This message serves as confirmation of an appointment for the visitors listed below.

Appointment With: MUNNELL, ALICIA H  
Appointment Date: 2/25/97  
Appointment Time: 2:00:00 PM  
Appointment Room: 314  
Appointment Building: OEOB  
Appointment Requested by: BRANCH LISA D.  
Phone Number of Requestor: 55879  
Comments:

WAVES APPOINTMENT NUMBER: U99364

If you have any questions regarding this appointment, please call the WAVES Center at 456-6742 and have the appointment number listed above available to the Access Control Officer answering your call.

\*\*\*\*\*  
TOTAL NUMBER OF NAMES SUBMITTED FOR ENTRY : 2  
TOTAL NUMBER OF NAMES OF CLEARED FOR ENTRY: 2  
\*\*\*\*\*

AUSTIN, DUNCAN  
REPETTO, ROBERT

(b)(6)

INSEL HOTEL BONN

cc: JAF 2  
JS

List of Recipients for  
 Periodic Updates from the Climate ~~101115~~  
 Bonn, Germany, 24 Feb to 7 March 1997

<u>Name</u>	<u>Agency</u>	<u>Fax Number</u>
Eileen Claussen	State	202 647-0217
Rafe Pomerance	State	202 647-0217
Bradford Johnson	State	202 647-0191
Erica Keen	State	202 647-0753
Susan Biniaz	State/L/OES	202 736-7115
Jack Shick	State	202 647-0191
Barbara Cates	State/EB	202 647-4037
Alicia Munnell	CEA	202 395-6947
Abraham Haspel	DOE	202 586-3047
Dirk Forrister	DOE	202 586-9987
Marc Chupka	DOE	202 586-0861
Mary Nichols/David Doniger	EPA	202 260-5155
David Gardiner	EPA	202 260-0275
Elaine Haemisegger	EPA	202 260-0290
Nancy Kete	EPA	202 233-9598
Charles Rawls	USDA	202 720-5437
Rosina Birbaum	OSTP	202 456-6025
Steve Seidel	CEQ	202 456-6546
David Sandalow	NSC	202 456-2710
Sally Kane	NOAA	301 427-2073
Jim Rubin	DOJ	202 514-4231

INSEL HOTEL BONN

0049 228352878 25-02-97 18:49

S01

3

25 February 1997

Memorandum

**To:** Please See Attached List

**From:** USDEL/Geneva, Mark G. Hambley ~~MA~~

**Subject:** Negotiations under the Framework Convention on Climate Change  
Periodic Update No. 1 for February 24/25, 1997

This message transmits unofficial reflections on activities and developments during the climate negotiations which are being held in Bonn between February 24 and March 7, 1997. While the contents are unclassified, this report is intended for use by officials of the the U.S. Government, only. This report covers activities from Monday, Feb 24, through the morning sessions on Feb 25. The final paragraphs can be used as a DAR item as desired and appropriate..

Climate Talks, Update No. 1: "Learning the Ropes" Takes Precedence Over Substance as Subsidiary Bodies Start their First Deliberations in Bonn

Monday Consultations with JUSCANZ and the Europeans

Most of the action on Monday, Feb 24, took place in three meetings. The first was one involving the officers of both the IPCC and the UNFCCC in what is called the "Joint Working Group." Topics discussed included the status of the IPCC's technical papers, including the technical paper on the implications of different emission limitation proposals by Annex I Parties; the division of labor between the IPCC and the bodies of the convention related to methodologies; the status of IPCC workshops; and cooperation with the Convention on Migratory Species..

Perhaps the point of greatest general interest was the summary provided by IPCC Chairman, Dr. Bert Bolin, on the information to be contained in the technical paper on the implications of different emissions limitations proposals by Annex I Parties on projected temperature increases, sea level rise, and other changes. The technical paper will be made available after approval by the Bureau of the IPCC in September 1997. (More on this follows below.)

The second meeting, one involving the members of JUSCANZ, dealt primarily with the key process issue faced by the forthcoming AGBM meeting: what kind of document is to be prepared for circulation by the June 1st deadline? One option being considered (which is attractive to many JUSCANZ members but not to the Europeans for the most part) is to use the compilation paper on proposals, as revised at this meeting, as the formal text, with the Secretariat being given the task of providing a more stream-lined version for use as the basis for negotiation. More off-line discussions of this issue will continue throughout the two weeks ahead.

Aspects of the negotiations and various government reactions to outstanding proposals was the focus of the Feb 24 meeting of the Common Interest Group ((chaired by Canada and including JUSCANZ, the EU, and --in climate-- the economies in transition (only Hungary appeared to be present, however)). On the question of joint implementation, both Germany and the Netherlands insisted that there is not enough time to work out JI with credit prior to Kyoto. Our position was strongly supported by Canada

4

and Norway. Most other countries remained silent on this issue. On emissions trading, the Germans (Cornelia Quenett-Thielan) again expressed misgivings about our emphasis on trading (similar to her comments in Tokyo in January). This time, her remarks were echoed by the Netherlands. Speaking for the latter, Bert Metz also repeatedly failed to make a distinction between emissions trading and JI -- an oversight which could easily have been quite deliberate on his part.

The Australians made their now familiar pitch for differentiation. In response, Metz dismissed the concept as "too complicated," and said there is not enough time to work out an effective and equitable differentiation scheme by next December. On Article 4.1, Canada raised the issue of compensation (which is being pushed by Iran). Speaking for the EU, Bert Metz initially indicated that to open a debate on this topic would be absurd. However, upon reflection, he indicated that the matter is worth considering and that a more reasoned response may be appropriate.

On the technology front, it was apparent from the discussion that the EU has given little thought to this important topic. However, it also appears that the Japanese have done so. They have suggested several different proposals which we will be discussing with them. More on this in due course.

#### Opening Joint Plenary Contains Warm Words of Welcome from the Lord Mayor and a Restatement of Germany's Position from Merkel's Representative

The Lord Mayor of Bonn issued a warm word of welcome at the short, opening plenary. Apologizing for the "informal" nature of the hall in which the meetings are being held, she indicated that Bonn is striving to become another UN city with a focus on the environment and development. German Environment Minister Merkel's representative (the Permanent Parliamentary Secretary for the Environment) restated Germany's call for 10 percent CO<sub>2</sub> reductions by 2005 and for 15/20 percent reductions by 2010. Remarking on the cramped facilities and the tent being used for this meeting, the Permanent Secretary claimed that the atmosphere should make negotiations "easier."

(Comment: One delegate, remarking on the increased warmth and stuffiness in the main plenary hall, noted that it will be even "warmer" next week during the AGBM talks. In any event, Bonn is certainly striving to be a good host. Aside from a wide range of materials on the city and the vicinity which is available at the "Bonn Info Center" outside the main hall, Bonn is also offering bus/subway tickets at a bargain rate of DM 11 marks for the two weeks of the conference. Considering it costs DM 3.20 for the train trip from Bonn to Bad Godesberg, where the conference is being held, this is a real bargain. End Comment.)

#### SBSTA Begins its Deliberations -- At Its Usual Pace

The Subsidiary Body for Technical and Scientific Advice (SBSTA) began its deliberations on Feb 25. With Kuwait insisting that decisions not be gavelled through (as the delegate intimated, had occurred in the past) without giving delegations a time to reflect on the issue at hand, the meeting began discussing the item on its agenda dealing with relations with other relevant international bodies ((including the World Meteorological Organization (WMO) and the Intergovernmental Panel on Climate Change (IPCC)). IPCC Chairman Bert Bolin, in his report to the session, commented on the technical paper on the implications of emissions limitations and reduction proposals which will be prepared by September, based on submissions on this issue made by January 15 of this year.. Bolin noted that it is possible to illustrate some of the aspects of the outcome of such an analysis relying on information received by the IPCC to date. He concludes, from a graph compilation of this data, that it is "obvious" that no reasonable future reductions by Annex I countries would stabilize global emissions.

SBSTA Chair, Tibor Farago of Hungary, also announced that the two contact groups established in December to deal with activities implemented jointly (AIJ) and with methodological issues will be reconvened to continue their work (progress in both was stymied by the G-77/China in the former and by

5

the OPEC countries in the latter). The AIJ group will be co-chaired by Argentina and the Czech Republic (both are good choices), while the methodologies group will be co-chaired by Mauritius and Norway.

#### AG-13 Also Re-Activates

Meanwhile, AG-13 chairman, Patrick Szell, started off his Feb 25 meeting on his quest to define a role for this working group as some kind of a "consultative mechanism." Szell suggested, in a discussion on Feb 24, that it would be unlikely that the working group can finish its work this year. He indicated that it might only be possible to complete a status report by COP-3 in December. He said his goal is to table a framework compiling the views of Parties in Kyoto (although, as one wag remarked after hearing the morning's first round of turgid discussion, Mr. Szell is more likely to compile a series of "non-views" on this topic).

#### NGOs Here in Strength (At least on the Industrial Front)

Thus far, there are only a handful of U.S. environmental NGOs present in Bonn. More are expected for the AGBM talks next week. However, the Global Climate Coalition and its more moderate business associates appear here in good numbers. The Climate Council's Don Pearlman appears to be actively courting the Russians again, although his particular spin is not known. We will endeavor to find out!

Our first meeting with the NGOs is scheduled for Thursday evening. Industry has suggested that we hold a joint briefing with both them and the environmentalists. The latter have balked at this proposal in the past and bitched when it has been done for reasons of expediency. On balance, it is probably better to keep the groups separate if it sustains the environmental groups' belief that they have our undivided attention -- which, of course, they do -- at least during these briefings.

*Handwritten notes:*  
cc: AM  
JAF  
JS

**White House Climate Change Taskforce**

---

February 24, 1997

MEMORANDUM FOR DISTRIBUTION

FROM: DIRK FORRISTER

SUBJECT: CLIMATE CHANGE OUTREACH

*Handwritten note:*  
11 M. [unclear] attend

There will be a meeting on climate change outreach on Wednesday, February 26 from 2:00 to 3:00 in the new offices of the White House Climate Change Taskforce at 734 Jackson Place. The agenda will be:

1. Communication Plan for Interagency Analysis Effort
2. Initial Draft Outreach Workplan for the year

Due to space constraints, attendance will be "principals plus one." Please call Mary Washington at 343-1060 to RSVP -- although no clearance is required for this building.



**United States Department of State**

*Bureau of Oceans and International  
Environmental and Scientific Affairs*

*Washington, D.C. 20520*

*AM  
JAF  
SS  
JRC*

February 21, 1997

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

Attached is a revised version of the work program that was agreed at the meeting held on Wednesday, February 19. Please note revisions to some of the agencies designated to lead the drafting efforts. Also note the addition of two new items: (1) on the issue of entry into force (which we did not discuss, but which will need additional fleshing out; and (2) on the issue of grandfathering of early actions. I do not believe either of these will need to be completed prior to the April 1 deadline.

I anticipate that specific drafting assignments on all of the recommended papers will be made in the IWG/GEA Climate subgroup; please direct staff in your agencies to complete drafting on these papers as expeditiously as possible. Also, I note that we agreed to defer publication of the U.S. Climate Action report until after the April 15 deadline; this will allow for a one-month public comment period. However, we can only meet this new timetable if all agencies are diligent in completing their drafting and reviewing of assigned chapters. Please insure that this work is given a high priority.

## **CLIMATE CHANGE: FURTHER WORK**

(Based on A/S discussion of 2/19/97)

1. \* **Budget** (White House with support of IAT)
  - Initial budget level and period?
2. **Emissions Trading** (DOE and EPA)
  - How to operationalize trading in the protocol (e.g., whether there will need to be a new international oversight group under the Protocol; the units in which trades might occur; how to address "problem" countries which may not be in domestic compliance or have inadequate monitoring capability)?
3. **Developing Country Initiative** (AID with State, DOE, EPA and CSP/USIJI)
  - U.S. carrot to encourage developing countries (funding of US program, including continuing/expanding the USIJI and the Country Studies program/Support for National Action Plan (CSP/SNAP) efforts; incentives to bring developing countries into the fold)?
4. \* **Joint Implementation** (EPA and DOE)
  - Additional provisions on calculation, measurement, monitoring, verification, review and reporting?
5. **Reporting/Compliance** (State with EPA, Justice, DOE and USTR)
  - \* Consequences of non-compliance (possible provisions on sanctions against non-Parties, non complying Parties or minimally complying Parties)?
  - National reporting, review mechanism, multilateral consultative process and compliance procedures
6. **Annex C gases/sectors** (OSTP with EPA, DOE, USDA and NOAA)
  - \* What GWPs will be used?
  - What gases/sectors will be included (requires an assessment of what can be monitored – may need to be considered on the basis of agreed criteria)
7. \* **Non-Annex C gases /sectors** (Article 2, para. 7) (EPA, DOE, USDA)
  - What measures will be proposed to address these?
8. \* **Annex B commitments** (State)
  - Candidate countries and potential commitment(s)?
9. **Borrowing** (State)
  - Possible additional constraints (e.g., limiting the amount allowed to be borrowed, limiting the countries which can borrow or phasing in/out the borrowing option)?

10. Entry into Force (State)

- What provisions should be made for the number of countries (or the percentage of global emissions they represent) required for the agreement to enter into force?

11. "Grandfathering" (DOE and EPA)

- Should the international agreement include provisions ensuring that early reduction efforts be credited against a future obligation? If so, how, and would such provisions be established differently in a domestic process?

\* INDICATES WORK THAT MUST BE DONE BEFORE APRIL 1

**Format for Work Products**

All papers should follow the following structure: Issue, Background, Options (if appropriate), Recommendation(s), and Draft Text (for inclusion in U.S. Protocol Proposal). Papers should be no more than 5 pages in length, shorter when possible.



United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

DATE: 2/24/97

NUMBER OF PAGES TO FOLLOW: 3

FAX TO: See Distribution List Attached

TELEPHONE: FAX:

OFFICE:

\*\*\*\*\*

FAX FROM: Eileen Claussen

TELEPHONE: 647-1554 FAX: 647-0217

OFFICE:

\*\*\*\*\*

MESSAGE: Memo on Climate Change Work Program

## CLIMATE CHANGE MEETING ASSISTANT SECRETARY EILEEN CLAUSSEN

Commerce	Everett Erhlich	482-0432 ✓
	Jeffrey Hunker	482-4636
OSTP	Rosina Bierbaum	456-6025
CEA	Alicia Munnell	395-6958
NEC	Elgie Holstein	456-2223
Treasury	Joshua Gotbaum	622-2633
Justice	Lois Schiffer	514-0557
Interior	Brooks Yeager	208-4561
NOAA	Terry Garcia	482-6318
OMB	T.J. Glauthier	395-4639
USTR	Jennifer Havercamp	395-4579
Agric	Charlie Rawls	720-5437
DOE	Dirk Forrister	586-9987
DOE	Mark Chupka	586-0861
EPA	Mary Nichols	260-5155
	David Gardiner	260-0275
DOT:	Frank Kruesi	366-7127
OVP	Pete Jordan	456-9500 ✓
CEQ	Steve Seidel	456-6546 ✓
NSC	David Sandalow	456-2710 ✓



1400 16th Street, NW  
Suite 330, Box 5  
Washington, DC 20036-2266  
Phone 202.797.6500

Fax 202.797.6501  
Email [eicinfo@acpa.com](mailto:eicinfo@acpa.com) or  
[first initial]+[lastname]@acpa.com  
Web <http://www.igc.apc.org/eic>

cc: JAF  
JS  
TR

Friday, February 21, 1997

Alicia Munnell  
Member  
Council of Economic Advisers  
OEOB Room 314  
17th St. and Pennsylvania Ave, NW  
Washington, DC 20502

Dear Ms. Munnell:

As you probably know, in January, five preeminent economists -- Kenneth Arrow, Dale Jorgenson, Paul Krugman, William Nordhaus and Robert Solow -- signed the enclosed "Economists' Statement on Climate Change," and circulated it to their colleagues. The Statement has now been endorsed by eight Nobel Prize-winning economists and over 2,300 economists around the country. Never before, even in the case of the Smoot-Hawley Tariff Act, have so many economists endorsed a consensus declaration.

This remarkable consensus has garnered significant attention in the press. For example, Peter Passel of the *New York Times* commented that "the nation's movers and shakers would do well to pay attention" to the statement. The *Washington Post* discussed the Statement in a Sunday editorial that concluded that a "near-term date" should be set for reducing greenhouse gas emissions and that the consequences of inaction on climate change "are likely to be dire." We have enclosed copies of these and other press reports on the Statement.

We expect that the same special interests who continue to dispute the science of climate change will also continue to claim that climate change cannot be mitigated without adversely impacting Americans' standard of living. We believe, however, that the consensus expressed in the Economists' Statement makes such claims untenable, and we hope that the Administration's consideration of mitigation strategies is based on sound economics, just as its consideration of climate science has been based on sound science.

We would welcome the opportunity to discuss any aspect of climate change mitigation with you in greater detail. Please call either of us at (202) 797-6500.

Sincerely,

  
George Abar

  
Doug Kendall

Enclosures

# ECONOMISTS' STATEMENT ON CLIMATE CHANGE

*Endorsed by Over 2000 Economists  
including six Nobel Laureates*

I. The review conducted by a distinguished international panel of scientists under the auspices of the Intergovernmental Panel on Climate Change has determined that “the balance of evidence suggests a discernible human influence on global climate.” As economists, we believe that global climate change carries with it significant environmental, economic, social, and geopolitical risks, and that preventive steps are justified.

II. Economic 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 longer run.

III. The most efficient approach to slowing climate change is through market-based policies. In order for the world to achieve its climatic objectives at minimum cost, a cooperative approach among nations is required—such as an international emissions trading agreement. The United States and other nations can most efficiently implement their climate policies through market mechanisms, such as carbon taxes or the auction of emissions permits. The revenues generated from such policies can effectively be used to reduce the deficit or to lower existing taxes.

*Sponsored By*

**REDEFINING PROGRESS**

One Kearny Street • 4th Floor

San Francisco, CA 94108

Phone: (415) 781-1191

Fax: (415) 781-1198

E-Mail: [info@RProgress.org](mailto:info@RProgress.org)

January 3rd, 1997

Dear Colleague,

As you may know, representatives of the world's nations will convene in Kyoto in December, 1997 to negotiate an international agreement addressing the threat of global climate change due to greenhouse gas emissions. This presents a significant opportunity for the United States to exercise a leadership role in ensuring our long-term well-being. Conversely, a failure on the part of the U.S. government to put forward a well-reasoned position would be a major environmental, economic, and diplomatic setback.

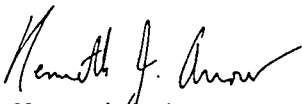
As the climate debate unfolds, it is imperative that public policy be guided by sound economics rather than misleading claims put forward by special interest groups. For this reason, we invite you to join us in endorsing the attached non-partisan consensus statement on the economics of climate change.

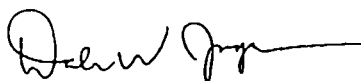
Once this statement has been signed by a large number of economists, it will be widely disseminated to leaders in the public and private sectors, and to the general media. This effort is being coordinated by Redefining Progress, a non-partisan, non-profit public policy organization.

Attached please find an endorsement form for your consideration. This letter and endorsement form are being sent to the membership of the American Economic Association. Please feel free to circulate it to your colleagues in case they are not on the AEA mailing list.

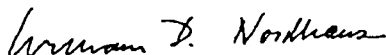
We thank you for your prompt attention to this critical issue.

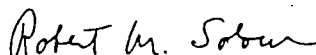
Sincerely,

  
Kenneth J. Arrow

  
Dale W. Jorgenson

  
Paul R. Krugman

  
William D. Nordhaus

  
Robert M. Solow

# **NOBEL LAUREATE SIGNATORIES**

**Kenneth J. Arrow**  
*Stanford University*

**Gerard Debreu**  
*University of California at Berkeley*

**John C. Harsanyi**  
*University of California at Berkeley*

**Lawrence R. Klein**  
*University of Pennsylvania*

**Wassily Leontief**  
*New York University*

**Franco Modigliani**  
*Massachusetts Institute of Technology (Emeritus)*

**Robert M. Solow**  
*Massachusetts Institute of Technology*

**James Tobin**  
*Yale University*

# ECONOMISTS' STATEMENT ON CLIMATE CHANGE

Among the over 2,300 economists who have endorsed the Economists' Statement on Climate Change are the following, they include scholars at top universities and economists from top corporations.

Michael C. Barth	ICF Kaiser	Laurence J. Kotlikoff	Boston University
William J. Baumol	New York University	Anne O. Krueger	Stanford University
Steven Neil Braun	Council of Economic Advisers	Mordecai Kurz	Stanford University
W.A. Brock	University of Wisconsin, Madison	Steven G. Lanning	Bell Labs-Lucent Technologies
Martin Bronfenbrenner	Duke University	Lester Lave	Carnegie Mellon University
John P. Brown	KPMG Economic Consulting Services	David Lui	Southern California Edison
R. Thomas Burge	Proctor & Gamble Pharmaceuticals	Paul W. MacAvoy	Yale School of Management
Dallas Burtraw	Resources for the Future	Gerald M. Meiser	Stanford University
Trudy Ann Cameron	University of Los Angeles California	John R. Meyer	Harvard University
Jian Cao	AT&T	Christopher J. Monroe	AT&T
Carl F. Christ	Johns Hopkins University	Richard R. Nelson	Columbia University
Gerard Debreu	University of California at Berkeley	Richard B. Norgaard	University of California at Berkeley
Stephen J. DeCanio	University of California at Santa Barbara	Charles Plott	California Institute of Technology
Robert Dorfman	Harvard University	Richard E. Quandt	The Andrew W. Mellon Foundation
Franklin M. Fisher	Massachusetts Institute of Technology	Roy Radner	New York University
Peter J. Francis	CNA Corporation	Gordon Rausser	University of California at Berkeley
Victor R. Fuchs	Stanford University	Kenneth Rogoff	Princeton University
Claudia Goldin	Harvard University	David Romer	University of California at Berkeley
Edward Gramlich	University of Michigan	Michael Rothschild	Princeton University
Jerry R. Green	Harvard University	Daniel Rubinfeld	University of California at Berkeley
Frances Hammond	General Motors Corporation	Vernon W. Ruttan	University of Minnesota
John C. Harsanyi	University of California at Berkeley	Jeffrey Sachs	Harvard University
Oliver Hart	Harvard University	Thomas Sargent	University of Chicago
James J. Heckman	University of Chicago	F.M. Scherer	Harvard University
Albert O. Hirschman	Institute for Advanced Study	T. Paul Schultz	Yale University
Jack Hirshleifer	University of Los Angeles California	M.M. Shahjahan	PEPCO
Robert Hunt	World Bank	Steven Shavell	Harvard University
Leonid Hurwicz	University of Minnesota	A. Michael Spence	Stanford University
Christopher Jencks	Harvard University	Robert Stavins	Harvard University, Kennedy School
Gale D. Johnson	University of Chicago	Bruce Stram	Enron Corporation
Carl Kaysen	Massachusetts Institute of Technology	James Tobin	Yale University
Robert Kirchner	PEPCO	Gordon Tullock	University of Arizona
Lawrence R. Klein	University of Pennsylvania	Hal R. Varian	University of California at Berkeley
J. Kmenta	University of Michigan	W. Kip Viscusi	Harvard Law School
		Oliver E. Williamson	University of California at Berkeley

## Staying Cool

**W**E NOW KNOW that the old saying attributed to Mark Twain—"We all grumble about the weather but nothing is *done* about it"—is not quite true. By virtue of the coal we burn and the gasoline we use and in a thousand other ways, we all have a great effect on the weather. The earth has grown warmer by about one degree, on average, during the last century, and scientists believe the process is accelerating. If nothing is done to slow global warming, the consequences in the next century are likely to be dire. Much turns on decisions the government must take this year.

After years of debate, few now dispute that the burning of fossil fuels releases gases into the atmosphere which then trap more of the sun's warmth than the planet would otherwise retain. The effects of this are more complex than the term "global warming" suggests. Some parts of the earth are likely to become colder, others drier; monsoon and hurricane paths may shift; storms may become more extreme; sea levels will rise. Many small islands and low-lying coastal areas, such as Maryland's Eastern Shore, are at risk. Relatively small temperature changes could have a dramatic impact on agriculture and even the spread of disease.

At the 1992 Earth Summit in Rio de Janeiro, the United States—which produces something like one-quarter of the world's greenhouse-gas emissions—vowed to reduce them to 1990 levels by the year 2000. It seemed a modest goal, but it won't be met. So last year the

administration accepted, in principle, the notion of binding targets. Now nations are negotiating those targets—amounts and dates—hoping to reach agreement at yet another conference in Kyoto in December.

Opponents of meaningful action, led by parts of the energy and utilities industries, have shifted their strategy from attacking the scientists to warning of dire economic consequences. But last week more than 2,000 economists signed a statement challenging the industry claims. The broad array of economists, led by Nobel-Prize winners Kenneth J. Arrow and Robert M. Solow, said that measures to reduce greenhouse-gas emissions need not harm the economy—and "may in fact improve U.S. productivity in the longer run." That's because there are many innovative and energy-efficient technologies just awaiting the right financial incentives to enter the market. In many such fields, U.S. industry leads the way.

The key, then, is for the United States to set a goal that's not pushed off to some distant date like 2020 or beyond. A near-term date would send the signal industry needs to begin seriously investing in more efficient technologies, and the commercialization of such technologies would offer an alternative path for development to giants like China and India. Their economies are sure to grow in coming decades; and if they follow the U.S. path to prosperity, we will all be doing more than just grumbling about the weather.

## Economic Scene | Peter Passell

Yawn. A global-warming alert.  
But this one has solutions.

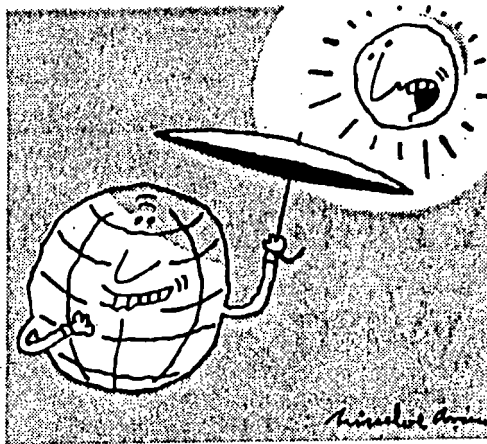
**S**TERNLY worded petitions and ringing screeds of principle are as much a part of campus life as grade inflation — which is why Washington rarely takes them seriously. But the nation's movers and shakers would do well to pay attention to a statement on global warming by some 2,000 mostly academic economists.

For one thing, the signatures collected by Redefining Progress, a group of policy-minded social scientists based in San Francisco, range from the newish left (Duncan Foley of Barnard College) to the skeptical center (James Heckman of the University of Chicago) to the libertarian right (Gordon Tullock of the University of Arizona). "Market-based approaches to coping with climate change generate as much consensus among economists as free trade," explains Paul Krugman of M.I.T., one of the organizers of the statement.

More important, the statement focuses on what is now regarded by insiders as a make-it-or-break-it issue in slowing atmospheric warming: designing an international system that permits rich economies to contribute cash in lieu of emissions reductions. "Allowing some to pay others to reduce greenhouse emissions could reduce the total cost by 80 to 90 percent," estimates William Nordhaus, an economist at Yale and another organizer of the statement.

Like any committee looking for consensus, the drafters of the climate statement cast their net widely. "We believe that global climate change carries with it significant environmental, economic, social and geopolitical risks, and that preventive steps are justified," the unshocking introduction reads.

Those who read on, however, will discover there is meat on these bones: "Sound economic analysis," the authors argue, "shows that there are



Niculae Asciu

policy options that would slow climate change without harming American living standards."

And what might these policy options be? Here, the drafters stake out a position that seems almost obvious to economists, but has barely entered the consciousness of environmental policy makers. "A cooperative approach among nations is required — such as an international emissions trading agreement," the statement asserts.

To understand where the economists really want the diplomats to go, consider where we are now. Current rates of deforestation and combustion of carbon-based fuels — coal, oil, gas — are adding carbon dioxide into the atmosphere faster than the oceans can absorb it. The higher carbon dioxide concentrations trap solar energy. Rising temperatures will likely change weather patterns radically and raise the level of the oceans.

Governments of all the major economies are vaguely committed to containing greenhouse gas emissions before once-a-century hurricanes become an annual event in the Caribbean, Kansas turns into a dust bowl and the Bay of Bengal doubles in size at the expense of Bangladesh. But the emphasis is on the vague: the process of setting emissions targets or creating political in-

stitutions to enforce the targets is in the talking stage.

That's where the economists' statement fits in. "We wanted to be there early," said Stephen DeCanio of the University of California at Santa Barbara, "before governments and politicians were locked into positions." Specifically, the statement is intended to give the Clinton Administration some help in pressing the idea of creating an international market in emissions permits at the next global meeting on climate change, set for Kyoto, Japan, in December.

The idea is simple. If and when world leaders start to deal with the practical issues, they are apt to set national targets for containing emissions that will be very expensive to meet in the rich industrial economies, and probably won't be honored in the large emerging economies like China, Russia, India and Indonesia.

Creating an emissions trading system that allows already rich economies to pay the emerging economies to use less energy and less carbon-intensive fuels as they develop offers a double dividend. It reduces the cost for developed countries, in turn reducing the chances their legislatures will balk. And it creates a pool of capital to be used as an incentive to push emerging economies toward environmentally benign growth.

Translation: Getting, say, China or India to switch from coal to natural gas, or to encourage energy conservation by charging world market prices at home would be a lot easier if they were paid billions of dollars each year to do it.

Not every economist who favors emissions trading signed the statement. "I'm worried it will be used at Kyoto to commit America to useless, expensive unilateral actions in reducing emissions," says Robert Hahn, an economist at the American Enterprise Institute.

But Mr. Nordhaus has very different worries. "Economists haven't been important players in environmental policy over the last 30 years," he said. "This time we could make a difference."

# FINANCIAL TIMES

4

FRIDAY FEBRUARY 14 1997

## Economists back call for new carbon taxes

By Mark Suzman in Washington

More than 2,000 US economists, including six Nobel laureates, yesterday endorsed an unprecedented statement calling for new taxes on carbon use and an international emissions trading agreement to help control global warming.

The economists argue that using such market-based policies to limit the growth in greenhouse gas emissions could ultimately prove beneficial for the economy.

"For the United States in particular, sound economic analysis shows there are policy options

that would slow climate change without harming American living standards, and these measures may in fact improve US productivity in the long run," the statement says.

Although there are still some sceptics, the overwhelming consensus among economists is a blow for energy companies and other lobby groups which have managed to derail previous attempts to introduce such a carbon tax on the grounds that it would be prohibitively expensive.

It will also put pressure on the Clinton administration to come up with concrete proposals on com-

bating global warming ahead of the international conference on the issue in Kyoto, Japan, next December.

The administration recently indicated its support for emissions trading but has backed away from the idea of a carbon tax.

The statement was drafted by five prominent economists, Mr Kenneth Arrow and Mr Robert Solow, both Nobel prizewinners, Mr Dale Jorgenson of Harvard University, Mr Paul Krugman of the Massachusetts Institute of Technology and Mr William Nordhaus of Yale University.

It was circulated to economists

across the country by Redefining Progress, a non-partisan, non-profit public policy organisation based in San Francisco.

The statement cites scientific evidence from the United Nations-sponsored Intergovernmental Panel on Climate Change in 1995 to argue that "preventive steps are justified" to combat the "significant environmental, economic, social and geopolitical risks" associated with global warming.

Specifically, it calls for the US and other countries to co-operate on reforms such as carbon taxes and the auction of internationally tradeable emission permits. "The

revenues generated from such policies can effectively be used to reduce the deficit or to lower existing taxes," it says.

Mr Stephen DeCanio, senior economic fellow with Redefining Progress, said the statement is aimed at persuading the US to take an international lead in combating global warming.

"Some groups have asserted that we cannot address the global climate change problem without incurring serious economic harm," he said. "These 2,000 economists have said essentially the opposite - that the greatest risks lie with inaction."

## *Group of Economists Seeks Treaty on Global Warming*

*By a WALL STREET JOURNAL Staff Reporter*

WASHINGTON — A group of 2,100 economists signed a statement calling for international controls to prevent global warming, asserting that such controls would not harm Americans' standard of living and "may in fact improve" the nation's economic productivity.

The statement—to be announced here today — takes issue with a letter by more than 100 chief executives of U.S. companies sent to President Clinton in December that warned that a global treaty "could have serious economic and competitive consequences."

The proposed treaty would control emissions of carbon dioxide and other "greenhouse gases" that many scientists believe are slowly warming the planet by trapping sunlight. In their letter, the CEOs also warned the president to avoid making "premature commitments" because of "scientific uncertainties" that require further study.

But Kenneth J. Arrow, a Nobel Prize-winning economist at Stanford University who helped shape the agreement among the economists, said they believe there now is enough scientific research to establish that man-made causes of global warming will have a "significant" detrimental effect on climate.

## Economists Urge Reduced U.S. Emissions

Reuter

More than 2,000 economists said in a statement yesterday that the United States would be able to reduce its industrial emissions to slow global climate change without damaging its economy.

Prepared by five leading economists, the statement said well-designed policies relying on market mechanisms "may in fact improve U.S. productivity in the longer run."

Spokesmen for industries that depend largely on fossil fuels such as oil and coal have argued that the threat of climate change from heat-trapping industrial emissions is overblown, and countries should wait for more scientific proof of global warming before implementing policies to slash emissions.

But the economists, who released the statement at a news conference, said climate change "carries with it significant environmental, economic, social and geopolitical risk," and that "preventive steps are justified."

They endorsed a system of "market mechanisms, such as carbon taxes or trading of marketable emissions permits among countries."

Revenues from carbon taxes or emissions credits could be used to reduce budget deficits or lower taxes to benefit the economy, said the statement drafted by Nobel laureates Kenneth Arrow and Robert Solow, as well as Dale Jorgenson of Harvard University, Paul Krugman of the Massachusetts Institute of Technology, and William Nordhaus of Yale University.

THE WHITE HOUSE  
WASHINGTON

February 20, 1997

MEMORANDUM FOR DISTRIBUTION

FROM: ELGIE HOLSTEIN  
DAVID SANDALOW

SUBJECT: Climate Change

There will be a meeting tomorrow, Friday, February 21 from 1:00-2:30 in OEOB Room 231. We will start promptly at 1:00.

The agenda is:

1. Next Steps on Economic Analysis
2. Next Steps on Domestic Policy Development
3. Hill Modeling Briefing
4. Concentrations/Emissions Paper

Everyone on the attached list has been cleared into the building. If you have questions concerning clearance, please call Wendy Philleo (456-6224).

Handwritten notes at top right:  
FH, 2/21/97  
ca: 10:00  
SS  
mm  
JAF

## DISTRIBUTION:

Organiz.	Name	Fax #
State	Eileen Claussen	647-0217
	Rafe Pomerance	
Commerce	Everett Erhlich	482-0432
	Jeffrey Hunker	482-4636
OSTP	Rosina Bierbaum	456-6025
CEA	Alicia Munnell	395-6958
	Jeff Frankel	
Treasury	Joshua Gotbaum	622-2633
Justice	Lois Schiffer	514-0557
Interior	Brooks Yeager	208-4561
NOAA	Terry Garcia	482-6318
OMB	T.J. Glauthier	395-4639
USTR	Jennifer Haverkamp	395-4579
Agric	Charlie Rawls	720-5437
DOE	Dirk Forrister	586-9987
	Mark Chupka	586-0861
	Joe Romm	
EPA	Mary Nichols	260-5155
	David Doniger	
	David Gardiner	260-0275
DOT	Frank Kruesi	366-7127
OVP	Pete Jordan	456-9500
CEQ	Steve Seidel	456-6546
USAID	David Hales	703-875-4639
DOL	Andrew Samet	219-5980

Fri, 3/24/97 1:20 pm

cc: JAF  
JS

**FAX TRANSMISSION**  
**U.S. ENVIRONMENTAL PROTECTION AGENCY**  
**OFFICE OF POLICY, PLANNING AND EVALUATION**  
401 M STREET SW  
WASHINGTON, DC 20460  
202-260-4332  
FAX: 202-260-0275

**To:** Assistant Secretaries Climate Change Group Group  
(see attached list) **Date:** February 20, 1997

**Fax #:** See attached list **Pages:** 10, including this cover sheet.

**From:** William N. White  
Special Assistant to David Gardiner

**Subject:** Emissions, Concentrations and Consequences paper

COMMENTS:

Please find attached the latest draft of the paper entitled "Emissions, Concentrations and Consequences". **This is the first part of a two part fax. The second part will be sent by Rosina Bierbaum of OSTP later today.** Please review this paper to prepare for a discussion at tomorrow's meeting of the Assistant Secretaries' Climate Change Group. Please call me or Diane Anderson at 260-4332 if you do not receive a complete transmission.

## 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, methane, and nitrous oxide have risen by about 30%, 145% and 15% respectively. Concurrently, global mean surface temperatures have increased 0.6 to 1.2°F since the late 19th century. In the absence of emissions control policies, concentrations are projected to rise further yet. For example, by 2100 the concentration of carbon dioxide is projected to be 30 to 150% higher than today's level. The projected increases in concentrations of carbon dioxide and other greenhouse gases are estimated to further warm the surface of the earth by an average of 1.6 to 6.3°F by 2100. This rate of warming is probably 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).

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. Little information is available on the effects associated with other concentration levels.

The climatic changes that would result from an equivalent doubling of greenhouse gases would have pervasive effects, some of them irreversible, on the environment and human societies. Unfortunately, the tools and information available to predict specific impacts and convert them into monetized damages are limited at this time, hampering the ability to undertake a more comprehensive cost-benefit assessment of climate change policies. Nevertheless, some impact analyses have indicated substantial possible costs associated with inaction, providing an important context for considering the economic costs associated with policies to reduce greenhouse gas emissions.

### *Health Effects*

Climate change will affect the health of human populations in diverse ways and adverse effects are likely to outweigh beneficial effects substantially (WHO, 1996). One source of adverse effects is illness and death from summertime heat stress. In 44 US cities, summer heat related deaths are estimated to increase 70-150% by 2050, even if people adjust physiologically and behaviorally to changing climate conditions and make some adjustments to urban infrastructure (Figure 1, Kalkstein and Greene, 1997). The

elderly are at greatest risk in the US and urban populations in developing countries are also especially vulnerable to heat stress.

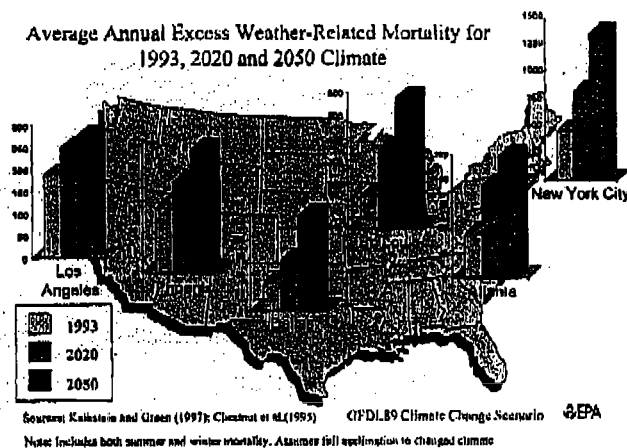


Figure 1

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 mosquitoes, which can increase the populations exposed to diseases such as malaria, dengue and yellow fever. In North America, the area of potential malaria transmission may expand as a result of 2xCO2

climate change (Figure 2). Globally, the population potentially exposed to malaria could increase by one-third, with a possibility of 50-80 million additional malaria cases per year relative to a baseline of 500 million cases (IPCC, WG II Report, 1995). The incidence of water borne infectious diseases such as cholera and diarrheal diseases may also increase due to the effects of climate change on water supply, water quality, and sanitation (WHO, 1996).

Climate change can reduce air quality and increase levels of air borne pollen

and spores which exacerbate respiratory disease, asthma, and allergic disorders. In addition, controls to reduce greenhouse gas emissions would simultaneously reduce atmospheric concentrations of air pollutants such as fine particles, NOx, ozone, and heavy metals including mercury. For example, capping CO2 emissions at 1990 levels has been estimated to yield co-control reductions of up to 2.3 million tons of NOx emissions and 0.9 million tons of SO2

Changes in Potential Malaria Transmission

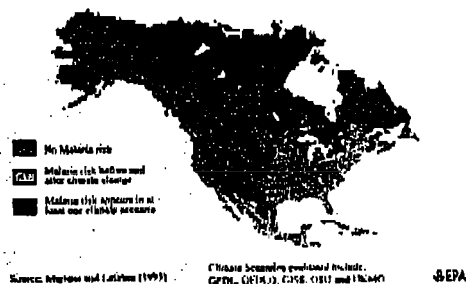


Figure 2

emissions in 2010. Co-control reductions in these pollutants would bring local air quality and health benefits that would add to and be more immediate than the climate related health benefits of greenhouse gas emission reductions.

### ***Water Resources***

Human welfare is also placed at risk by changes in the availability of fresh water that may result from climate change. Changes in precipitation and increased evapotranspiration due to higher temperatures from 2xCO<sub>2</sub> climate change 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).

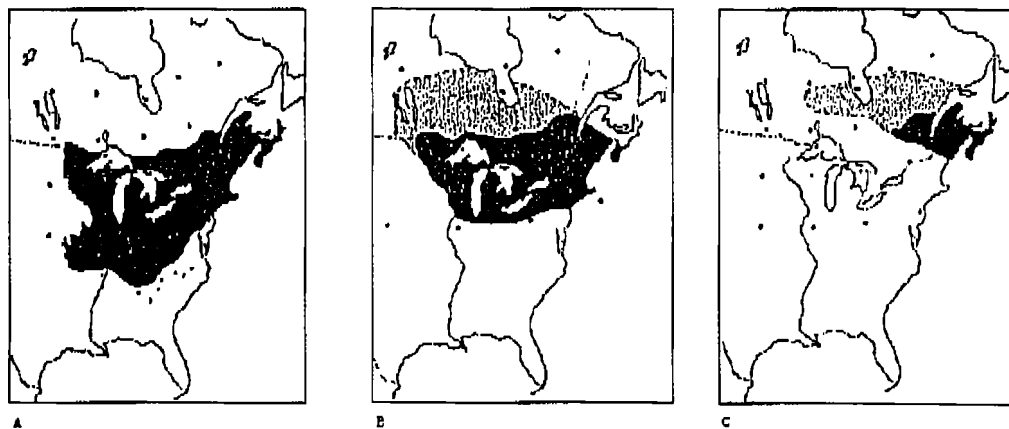
Areas of greatest vulnerability are those where water supplies and quality are already problems, such as arid and semi-arid regions of the world and some low lying coastal areas, deltas and small islands. In some cases these areas coincide with conflict prone areas which are highly dependent on water 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 2xCO<sub>2</sub> 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 (see 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 CO<sub>2</sub> doubling. 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 climate (IPCC, WG

II Report, 1995).



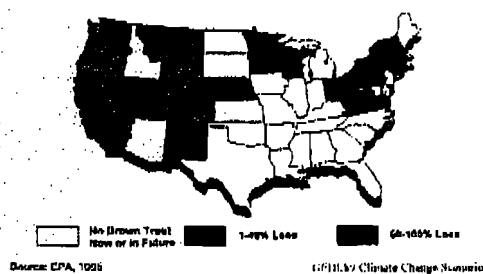
Present and future geographical range for sugar maple. A: Present range (from Powells, 1965). B: 2XCO<sub>2</sub> climate-space in 2090 A.D. under the OISS scenario. Black area is the predicted species range; stippled area is potential range. C: 2XCO<sub>2</sub> climate-space in 2090 A.D. under the OFDL scenario. Black area is the predicted species range; stippled area is potential range.

Source: USEPA, 1989

**Figure 3**

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. Total forested area in the United States could either increase or decrease after forests reach a new equilibrium with a 2xCO<sub>2</sub> climate. Projections of decreases are as high as 15 percent (VEMAP, 1995).

Loss of Habitat for Brown Trout from a Doubling of CO<sub>2</sub>



Source: EPA, 1995

CPRI, A Climate Change Scenario

**Figure 4**

could be supported and potentially result in losses of habitat for cold water fish species such as Brook, Brown, Rainbow and Cutthroat trout (Figure 4).

Wildlife habitat could be altered substantially with repercussions for wildlife abundance, local species survival, and global species survival. For example, a potential change from boreal forest to northern hardwood in the Boundary Waters Canoe Area would result in an area currently suitable for moose changing to one more suitable for white-tailed deer (Botkin, 1989). As another example, increases in water temperatures of rivers and streams would change the types of fish that

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

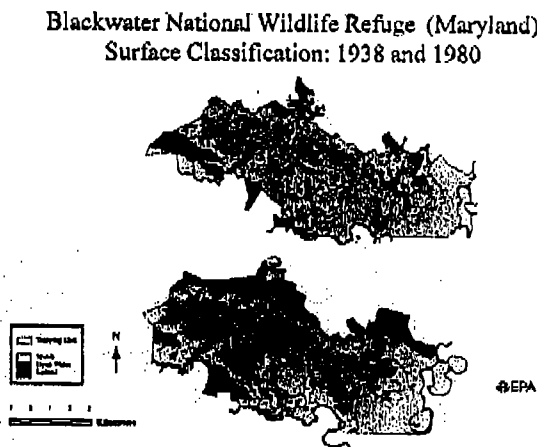
from sea level rise could adversely affect the ecological communities of the Florida Everglades and degrade the habitat for many species of wading birds. The wetlands of the prairie pothole region of North America, which supports half the waterfowl population of this continent, could diminish in area and change dramatically in character in response to climate change according to the IPCC. Although not specifically assessed by the IPCC, such changes could be devastating to migratory bird populations and species survival.

**Coastal Areas**

With a doubling of CO<sub>2</sub>, sea level would continue to rise for several centuries, with the best estimate of the equilibrium rise being at least seven feet. In the next century, sea level is projected to rise about 20 inches, which is over three times the 6 inch rise experienced over the last century. Along most of the U.S. Atlantic and Gulf Coasts, sea level is projected to rise one foot in the next fifty years and two feet in the next century. The IPCC estimates that a 50 cm rise in sea level would increase 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. A one foot rise could erode ocean beaches 100-150 feet over the next fifty years, which would threaten the first few rows of houses along many barrier islands and other resorts. A two foot rise would inundate 3000 to 7000 square miles of coastal lowlands and 20-45 percent of U.S. coastal wetlands. Rising sea level and lower river flows will increase salinity levels in aquifers and estuaries, tentially harming drinking water supplies in California's Central Valley, Philadelphia, New York, and Miami. Rising sea level could also change the character of coastal areas. For

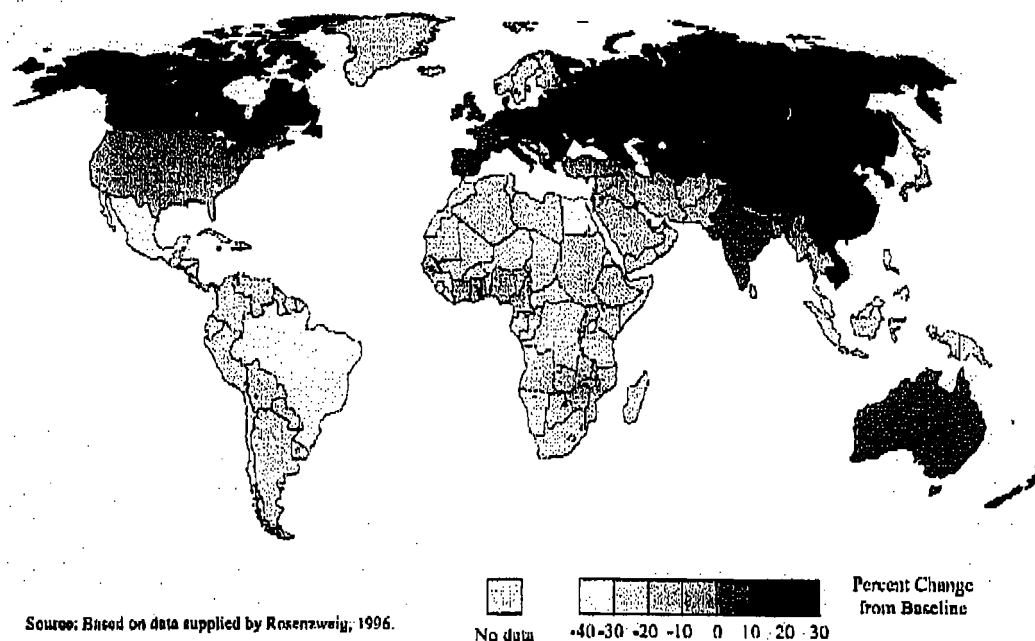
example, along the Chesapeake Bay and other estuaries, the small sandy beaches and wetland shores could gradually be replaced with walls of steel, rock, wood, and concrete.



**Figure 5**

### *Agriculture and Food Supply*

Climate strongly affects crop yields and projected changes under a CO<sub>2</sub> doubling can exceed 30 or 40 percent for some crops and locations (Figure 6). But despite the potentially large changes in yields, 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 CO<sub>2</sub> has beneficial effects for plant photosynthesis and water use efficiency that can offset deleterious effects of changes in climate. Regional food production, however, may be substantially affected. Agricultural production could decline significantly in developing countries while being only slightly affected in developed countries. Production decreases 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).



**Figure 6** Estimated change in average wheat yield for GISS 2xCO<sub>2</sub> scenario.

In the United States, total agricultural production and income generated in agriculture would most likely change only slightly under a doubling of CO<sub>2</sub>. The aggregate effects, however, mask regional differences in the impacts of climate change on agriculture. For example, 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.

There are also 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 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. 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).

### **Emissions**

While little can be said about the effects associated with concentrations other than 550 ppm CO<sub>2</sub> equivalent, it is likely that uncontrolled emissions will result in higher concentrations. While 550 ppm is approximately the concentration of CO<sub>2</sub> that would result if current global emissions were permanently capped at the current emission level of 6 billion tons, the mid-range estimate of the IPCC projects growth of CO<sub>2</sub> emissions to 13 billion tons by 2050 and 20 billion tons by 2100.

Greenhouse gases include carbon dioxide, methane, nitrous oxides, hydrofluorocarbons (HFCs), poly-perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). Gases differ both in their atmospheric lifetimes and in their ability to trap heat in the atmosphere. In addition, carbon is not only emitted through the combustion of fossil fuels, but is also absorbed by "sinks" such as trees and soils.

Although greenhouse gases come from many sources, carbon dioxide (CO<sub>2</sub>) from fossil fuel use is the source of greatest concern because of its rapid historical and projected growth. Human activities have already resulted in roughly 250 billion tons of carbon (gigatons of carbon or GtC) emissions from fossil fuel combustion and perhaps 200 GtC from net deforestation since 1700. In terms of carbon equivalent, cumulative anthropogenic greenhouse gas emissions since the beginning of the Industrial Revolution

have been roughly 570 billion metric tons of carbon equivalent (GtCe), of which about 450 GtC have been carbon.<sup>1</sup>

Historically, fossil carbon emissions have come mainly from the U.S. (27% of the postwar total), the rest of the OECD (22%), and the former Soviet Bloc (24%). The rest of the world, with nearly 80% of the population, is responsible for a mere 27% of cumulative emissions. On a per capita basis, U.S. emissions are over 5 tons per person per year; the industrial nations of Western Europe and Japan emit about 2 to 2.5 tons per person; and the nations of the former Soviet Bloc, whose per capita emissions used to be very high due to the inefficiencies of central planning, have fallen to about 2.5 tons per person. At the other end of the spectrum, the developing countries of the Americas, Africa and Asia have emissions on the order of 0.2 to 0.6 tons per person.

Despite their relatively low emission levels, developing countries' emissions are growing very rapidly -- 21% between 1990 and 1995. Global fossil fuel emissions have been roughly stable during this period only because of the 30% reduction in former Soviet Bloc emissions associated with the collapse of the centrally planned economies. Given current projections of population growth and economic activity, developing countries' share of annual global fossil emissions should surpass that of the developed countries during the second quarter of the next century (Figure 6). However, their share of *cumulative* fossil emissions will remain below that of the developed countries for many years to come, as will their per capita emissions.

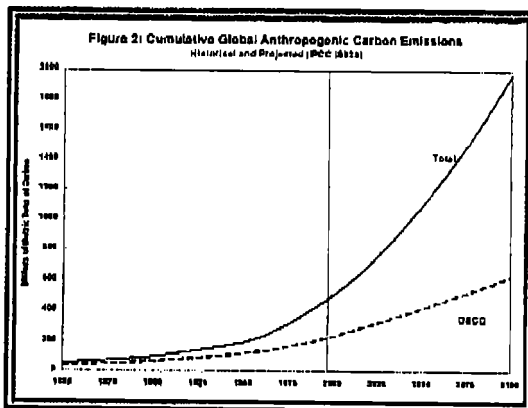


Figure 7

poorly understood. Although most of the increased carbon will ultimately be absorbed by the oceans, the increased atmospheric concentrations of carbon dioxide and other greenhouse gases will affect the climate for centuries to come. Once emitted, carbon dioxide will remain in the atmosphere for 150-200 years.

<sup>1</sup> Deforestation and other changes in land use have reduced the amount of carbon stored in biota and soils by perhaps 275 GtC, or around 10%, since the beginning of agriculture.

## DISTRIBUTION:

Organiz.	Name	Fax #
State	Eileen Claussen	647-0217
	Rafe Pomerance	
Commerce	Everett Erhlich	482-0432
	Jeffrey Hunker	482-4636
OSTP	Rosina Bierbaum	456-6025
CEA	Alicia Munnell	395-6958
	Jeff Frankel	
Treasury	Joshua Gotbaum	622-2633
Justice	Lois Schiffer	514-0557
Interior	Brooks Yeager	208-4561
NOAA	Terry Garcia	482-6318
OMB	T.J. Glauthier	395-4639
USTR	Jennifer Haverkamp	395-4579
Agric	Charlie Rawls	720-5437
DOE	Dirk Forrister	586-9987
	Mark Chupka	586-0861
EPA	Mary Nichols	260-5155
	David Doniger	
	David Gardiner	260-0275
DOT	Frank Kruesi	366-7127
OVP	Pete Jordan	456-9500
CEQ	Steve Seidel	456-6546
USAID	David Hales	703-875-4639
DOL	Andrew Samet	219-5980

*Fm:Rosina*

## **THE LONGER-TERM VIEW: THE RELATIONSHIP OF EMISSIONS TO ATMOSPHERIC CONCENTRATIONS**

Most discussions have focused on what steps might be taken in the medium term (2010-2020) to reduce emissions of greenhouse gases. Such actions represent only an initial step and, by themselves, would fall far short of significantly reducing the risks of climate change. Much more long-term planning will be necessary to achieve the goal of the Framework Convention on Climate Change:

*“stabilization of greenhouse gas concentrations . . . at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should . . . allow ecosystems to adapt naturally to climate change; ensure that food production is not threatened; and enable economic development to proceed in a sustainable matter.”*

This paper describes emissions paths that would be necessary to achieve various longer-term goals of stabilizing atmospheric concentrations of greenhouse gases. It also explores the implications that a longer term goal has for shaping near-term policy decisions.

Several aspects of the climate change issue underscore its long term nature, but also suggest a need for beginning action now:

- Once emitted, carbon dioxide will remain in the atmosphere for 150-200 years.
- Lags in the climate system result in temperatures increasing for several decades and sea level rising for centuries after greenhouse emissions have ceased to increase.
- Uncertainties in scientific understanding of climate change and its relationship to long-term costs and benefits make selecting any specific ultimate concentration goal somewhat speculative at this time.
- It has taken decades for the infrastructure of fossil-fuel based technologies to develop. A transition to alternative sources of energy will also require many decades, but will only begin in earnest if research and development is begun now and if proper incentives are provided.

### **I. GLOBAL EMISSIONS AND ATMOSPHERIC CONCENTRATIONS**

In the absence of any actions specifically to limit carbon dioxide emissions, the Intergovernmental Panel on Climate Change (IPCC), as shown in Figure 1, estimated that current emissions (as shown by the 2 upper lines labeled Business as Usual [BAU]) of 6 billion tons of carbon per year could grow to between 15-25 billion tons of carbon by 2050 and continue to

increase through the end of the next century.

## Global CO<sub>2</sub> Emissions & Concentrations

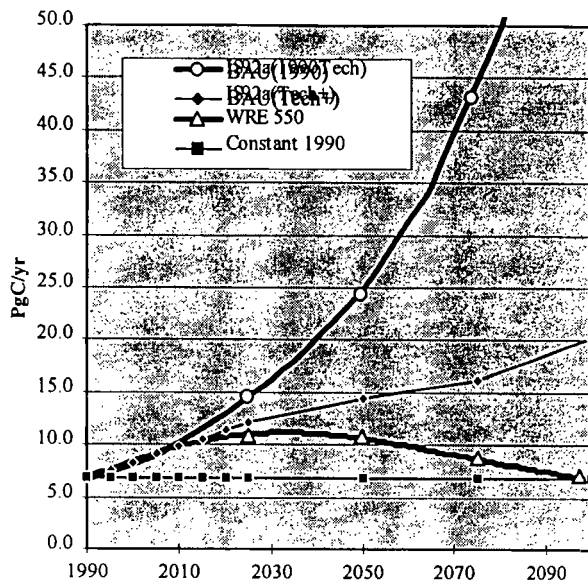


Figure 1

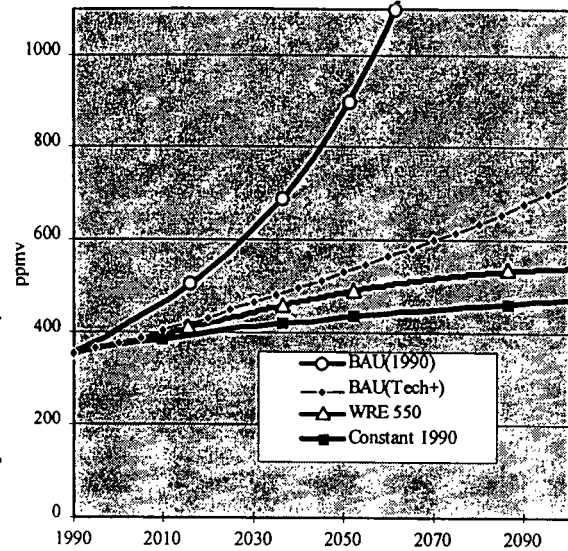


Figure 2

Figure 2 shows the impact of these emissions scenarios on atmospheric concentrations. For context, preindustrial levels of carbon dioxide were about 280 ppm, and have increased to today's levels of about 360 ppm. The BAU "1990 tech" scenario assumes technology remains constant at 1990 levels in the future. The BAU "tech+" scenario assumes technology improves substantially and results in lower costs for alternative fuels and enhanced energy efficiency; this latter scenario represents the "central case" developed by the IPCC and is sometimes referred to as "IS92a". In both of these scenarios, emissions grow substantially over time and concentrations far exceed a doubling of preindustrial levels before the end of the next century.

If it were possible to cap global emissions in both developed and developing countries at 1990 levels, figure 2 (line labeled "constant 1990") shows that concentrations would nonetheless continue to rise throughout the next century and beyond, eventually exceeding a doubling of preindustrial levels. (Note that the other greenhouse gases make the effective concentration about 20% higher than indicated by CO<sub>2</sub> alone.)

Figure 3 shows the projected long-term atmospheric concentrations if emissions were stabilized at different levels. The figure shows that if emissions were stabilized at current levels (6 PgC/yr), atmospheric concentrations would grow to almost 500 ppm by 2100 and continue increasing thereafter. It also shows that if worldwide emissions are frozen at 10 PgC/yr, roughly 33 percent higher than today's level, then atmospheric concentrations would more than double from pre-industrial levels by 2100, and continue to increase thereafter.

## CO2 Concentrations Associated with BAU(Tech+) and Alternative Energy Related Emissions Stabilization Levels

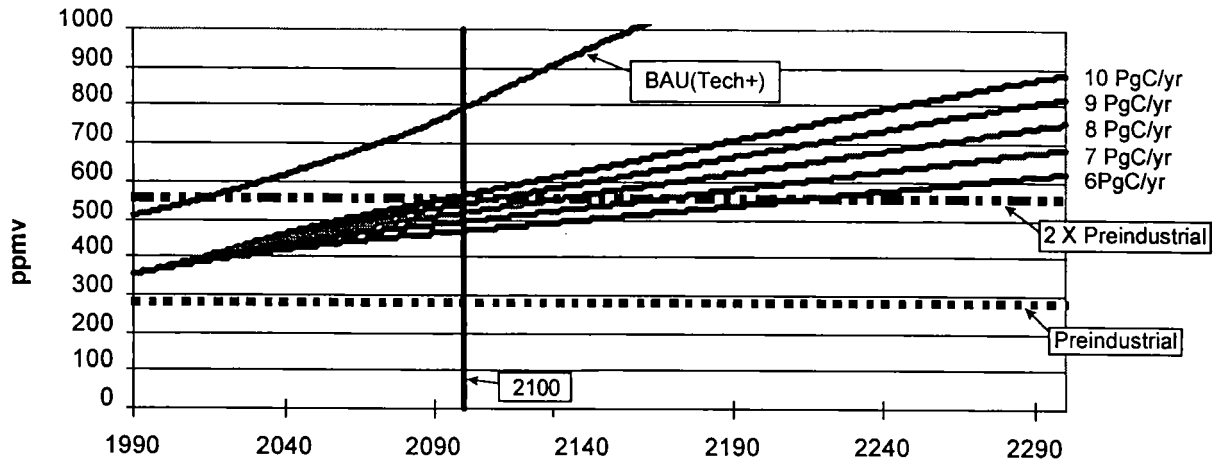


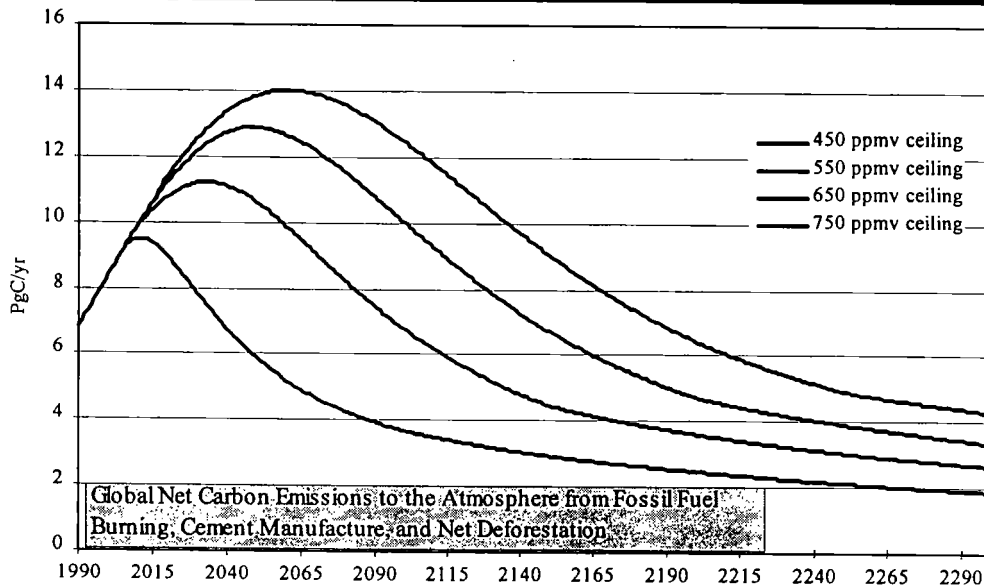
Figure 3

Table 1 shows how various concentration targets relate to emissions pathways. For example, to meet a 550 ppmv concentration goal, global emissions must begin to deflect from the business-as-usual curve by 2013. In this scenario, emissions would peak at 9.7 PgC/yr in 2033 and drop rapidly thereafter.

Researchers have examined in some detail the annual emissions paths required to meet atmospheric carbon concentration targets of 450 to 750 ppm. These targets require significant reductions in cumulative projected global carbon emissions; and as shown in Figure 3, all of them require dramatic reductions in annual emissions rates sometime during the next century. To achieve 450 ppm target – which still represents a two-thirds increase in atmospheric concentrations over preindustrial levels – annual emissions must begin declining steeply within the next quarter-century and must fall to less than half the current rate by 2100. To achieve a 550 ppm concentration target – which represents about a doubling in atmospheric concentrations – annual emissions must begin declining steeply during the second quarter of the century. Furthermore, these budgets must be distributed both across countries and across time.

The relationship between CO2 concentrations and emissions pathways (energy emissions only)*				
Steady-State Concentration →	450	550	650	750
	ppmv	ppmv	ppmv	ppmv
Deflection Date BAU (Tech+) <sup>a</sup>	2007	2013	2018	2023
Maximum Emission Date	2011	2033	2049	2062
Maximum Emission <sup>b</sup>	8.0	9.7	11.4	12.5

<sup>a</sup> The deflection date is the year in which emissions first fall below BAU emissions.  
<sup>b</sup> Maximum PgC/yr fossil fuel carbon emissions. If other greenhouse gases were included, emissions would be effectively 20% higher; thus, reductions would have to occur sooner than the deflection date noted to achieve a given concentration.



\* - note: the curves in the graph represent slightly different values than those in the table because the graph takes cement manufacture and deforestation into account in addition to energy emissions.

Figure 4

## II. DEVELOPED AND DEVELOPING COUNTRY EMISSION TRENDS

Figure 5 presents current and projected emissions of carbon dioxide for developed and developing countries. Of the current emissions of roughly 6 billion tons, approximately two-thirds are from developed and one-third from developing countries. The U.S. is currently the largest emitter of carbon dioxide, with China the second largest source. However, on a per capita basis, the U.S. emits about 5 tons of carbon per capita, compared to an average of approximately 4 tons per capita in Japan and Western Europe, and 0.4 tons per capita for developing countries. Figure 6 shows per capita emissions for the BAU case out to 2100. While per capita differences remain large over time, by the middle of the next century, developing countries would become a source for more than half of total global emissions.

### Annex I and Non-Annex I Fossil Fuel Carbon Emissions: BAU(Tech+)

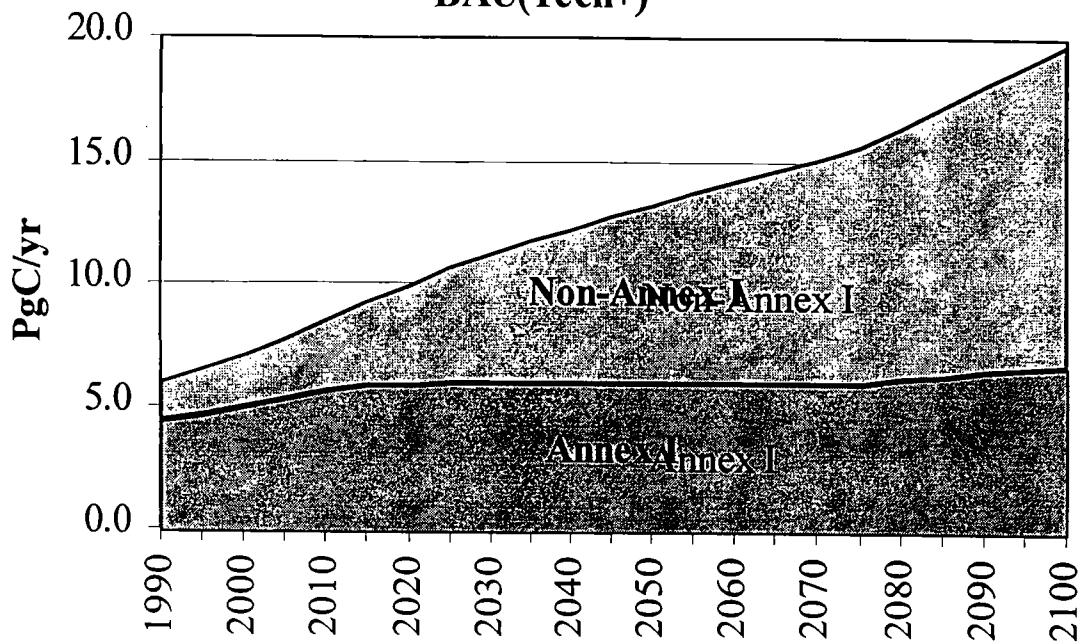


Figure 5

### Per Capita Carbon Emissions By Region: BAU(Tech+)

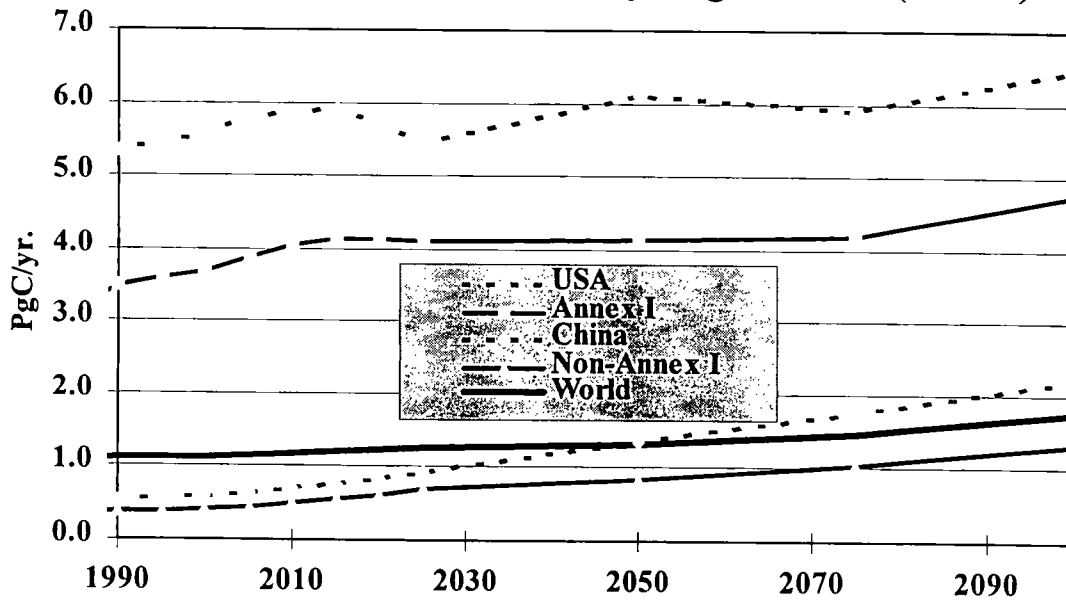


Figure 6

### III. ILLUSTRATIVE EMISSION REDUCTION SCENARIOS

Limited mid-term actions to reduce emissions by developed countries alone have little impact on shifting the atmospheric concentrations curve. The top line in Figure 7 shows the small change

in concentrations if Annex I (developed countries) freeze emissions at 1990 levels in the year 2010. Successive lines show what a coal ban in various parts of the world (beginning in 2020) might do to emissions and concentrations. Without the participation of developing countries, concentrations will not stabilize.

### Global Paths for BAU(Tech+), Annex I Emissions Stabilization, Coal Bans

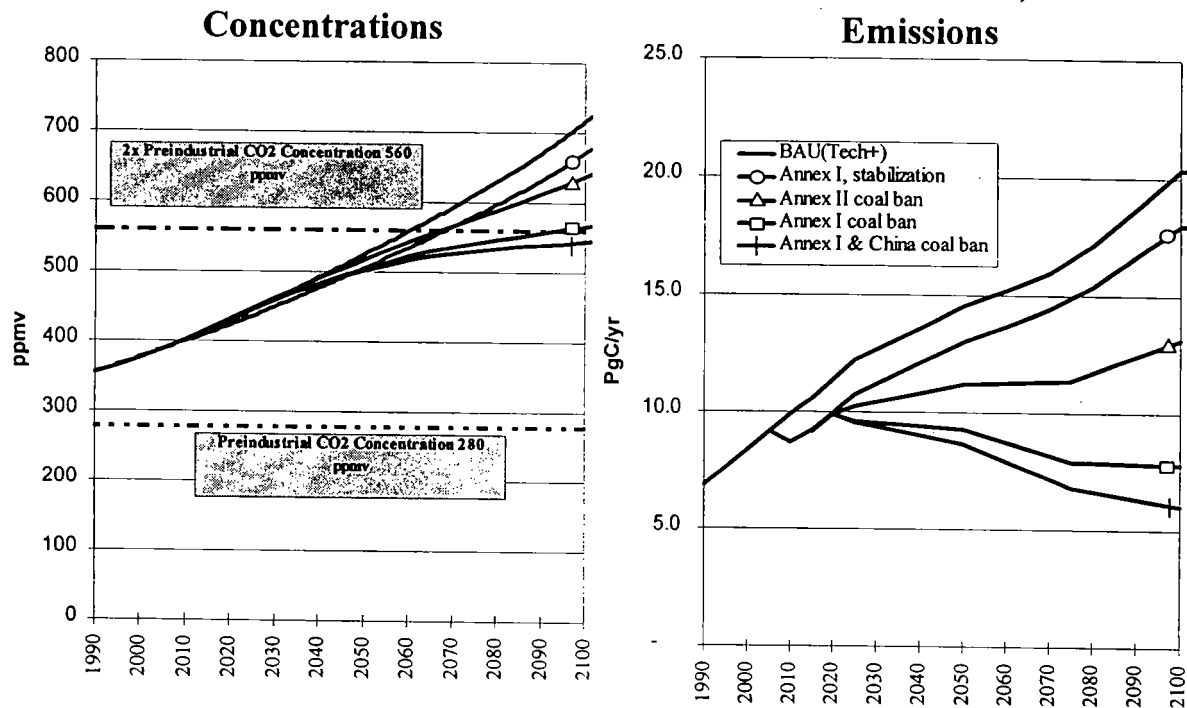


Figure 7

## Annex I Fossil Fuel Carbon Emissions: BAU(Tech+), and 2.5%/Decade, & 7.5%/Decade Reductions

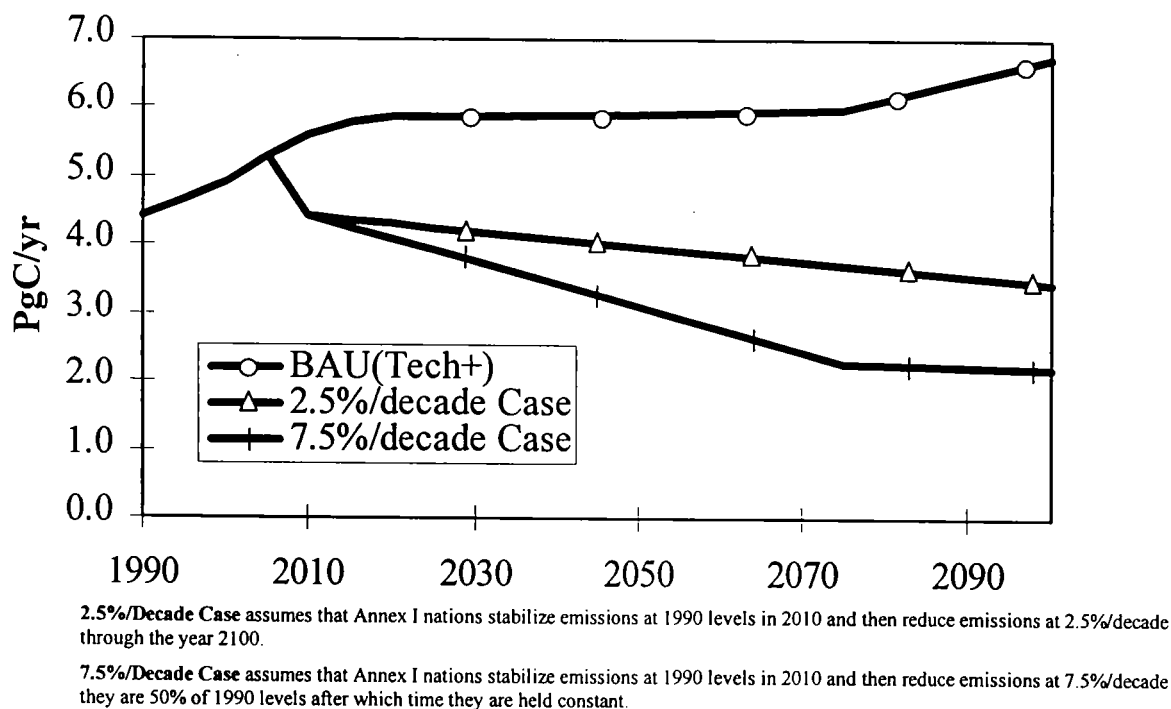


Figure 8

Figure 8 illustrates two possible emissions profiles for developed (Annex I) countries. Both scenarios assume a freeze in emissions at 1990 levels in 2010. On the hatched line, emissions are then reduced by 2.5% per decade and in the lower line they are reduced at 7.5% per decade. The highest line is the business-as-usual (TECH+) scenario from the IPCC.

Figure 9 is based on the Annex I pathways described in Figure 6. They show the pathway developing countries would need to follow to stabilize concentrations at 450 ppm, 550 ppm and 650 ppm. These figures show that to achieve stabilization at 550, developing countries would be able to emit on their currently projected path until about 2020 before significant reductions would be required.

Figures 10 and 11 show the **per capita** emissions for both developed and developing countries that result from the scenarios described in the previous two figures. They show that under these scenarios, developed country emissions stay substantially greater than those in developing countries (which rise to 1 TC/person only in the 650 ppm case).

**Allowable Non-Annex I Emissions if Annex I Countries Stabilize then Reduce Emissions: 450 ppmv, 550 ppmv & 650 ppmv CO2 Ceilings**

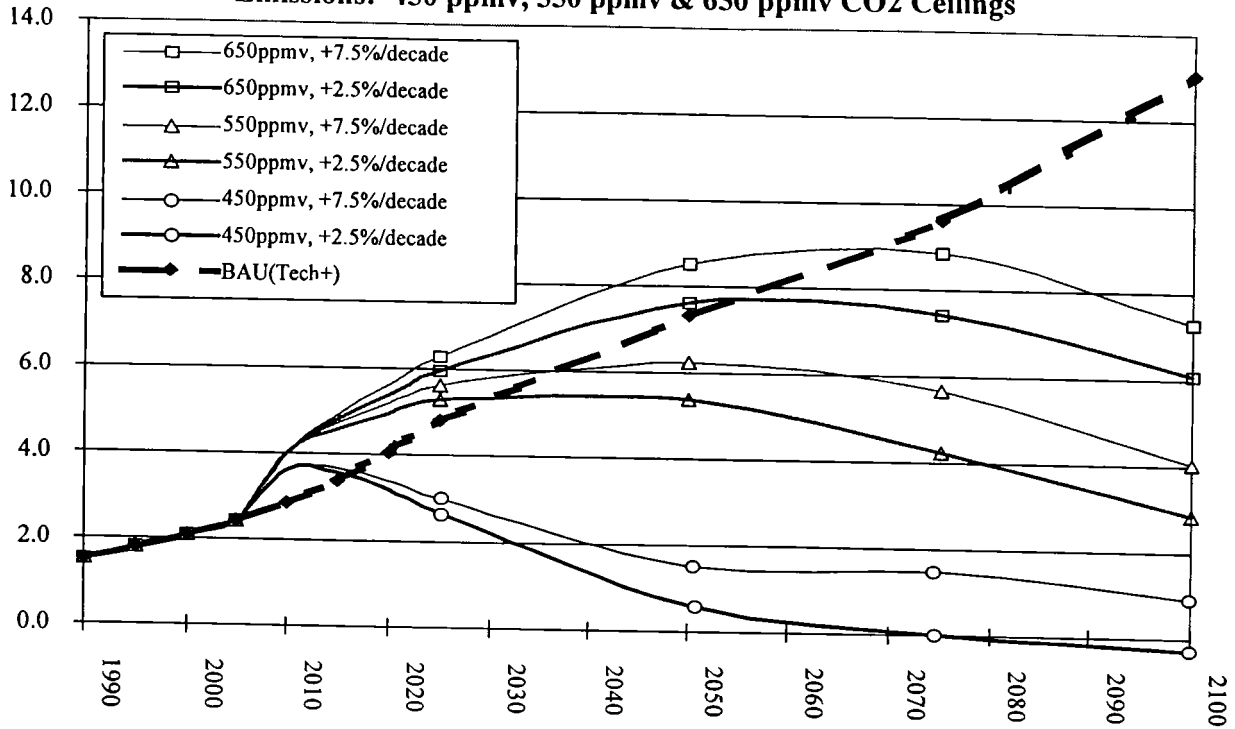


Figure 9

**Per Capita Emissions  
Various CO2 Concentration Ceilings--Annex I 2.5%/Decade  
Emissions Reductions**

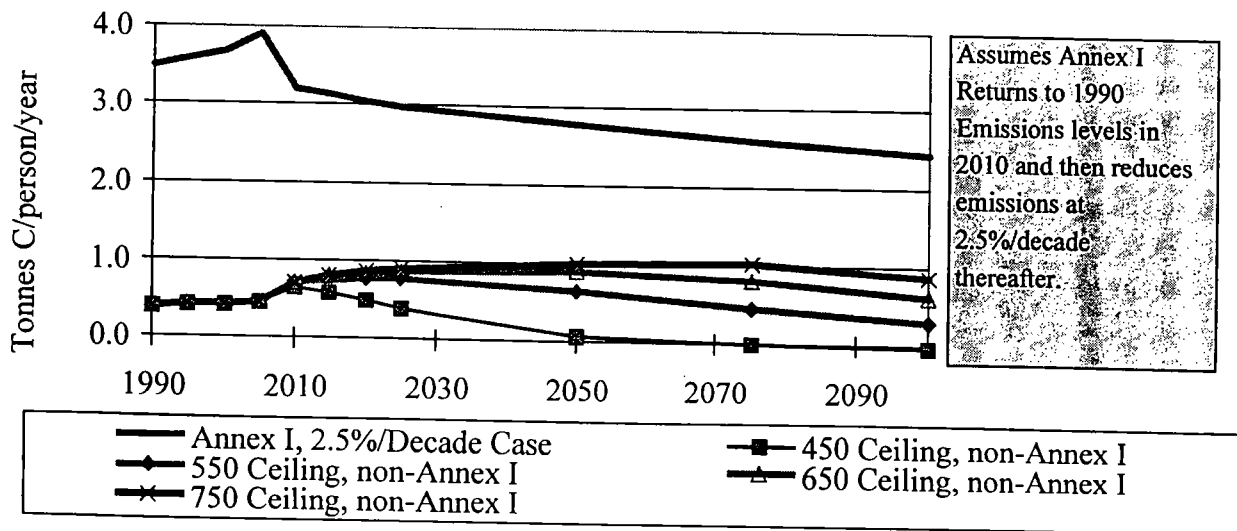


Figure 10

## Per Capita Emissions Various CO2 Concentration Ceilings--Annex I 7.5%/Decade Emissions Reductions

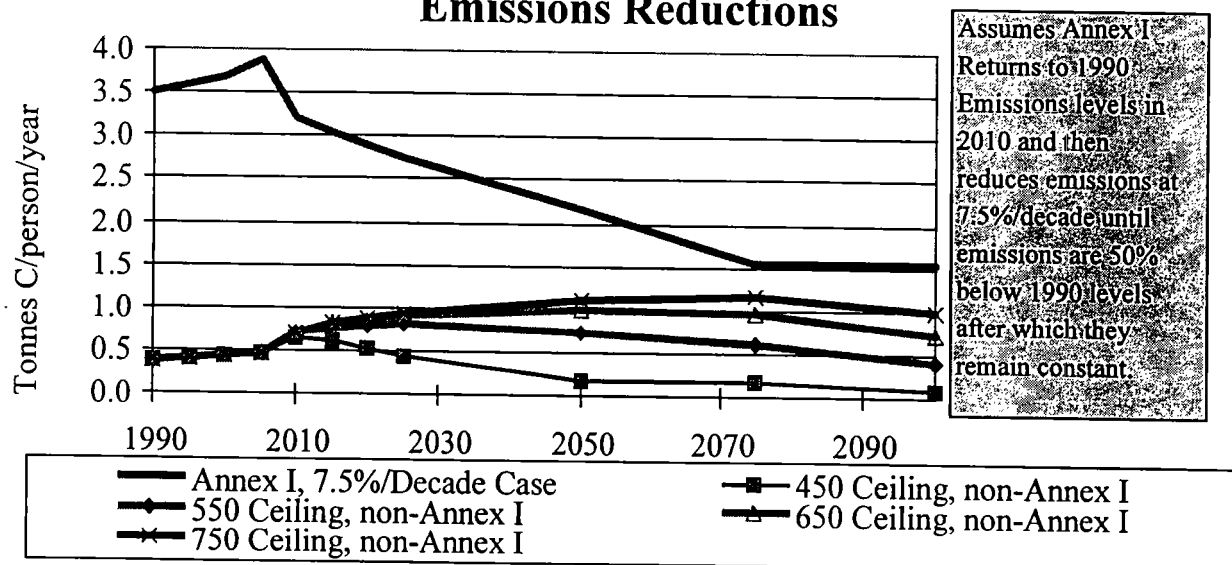


Figure 11

### IV. THE ROLE OF TECHNOLOGY AND IMPACTS ON COSTS

As suggested in Figure 1, the rate of technological change can play a very important role in determining the level at which atmospheric concentrations can be stabilized. Figure 11 looks specifically at the costs associated with different technology cases. It looks at three specific cases:

- 1990 tech: assumes no technological change from 1990
- 1990 tech +: assumes significant improvements in reducing the costs of alternative fuels and in improving efficiency;
- Advanced tech: assumes even further advances and cost savings.

A description of key assumptions for the latter two cases is included as Appendix 1.

Figure 11 shows for each of these technology cases, the total costs associated with achieving three different levels of atmospheric concentrations: 550, 650 and 750 ppm. The estimated costs under the assumption that no technological progress is possible were found to be about \$12 trillion or 1.2% of total world GDP, compared to \$1 trillion or 0.12% of GDP assuming substantial progress in reduction technologies. In the advanced technology case, which assumes very substantial non-fossil alternatives will be available by 2020, the costs are greatly reduced. However, the assumed cost and performance of the alternative technologies would only

become achievable with significant increases in research and development investments. For example, funding in conservation and renewables is about half of what it was 15 years ago, despite substantial proposed increases each year of the Clinton Administration.

## The Relationship Between Technology and Minimum Cost of Stabilizing the Atmosphere Below Various Ceilings

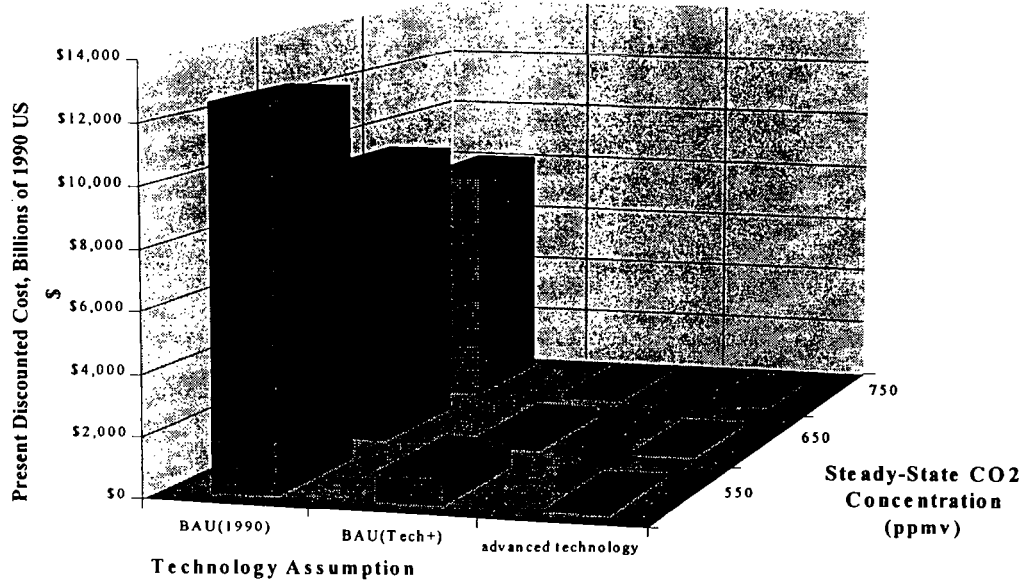


Figure 12

Substantial technological progress aimed at reducing the costs of emission reductions is critical for several reasons. It would result in lower costs to the U.S. economy, both in terms of reductions made domestically and in the costs of a reductions obtained abroad through any emissions trading regime. Reducing the costs of alternatives is also critical to limiting future emissions from developing countries, particularly those with large fossil fuel reserves. Finally, expanding the technological frontier offers U.S. industry significant potential opportunities for expanding our industrial base both at home and abroad.

## APPENDIX

### Key Assumptions about Technology Scenarios:

#### IS92a (Tech+)

- End-use (AEEI) Improves at 1%/yr.
- Conventional Fossil Fuel Power Generation Improves at 1%/yr.
- Non-Fossil Power Sources Improves at 4.5%/yr, 1990 to 2025, 1.25%/yr thereafter.
- Biomass Energy Improves at 1%/yr.

#### Advanced Energy Technology

- Advanced solar/wind/fusion
  - The cost of solar/wind power reaches a busbar cost of \$0.04/kWh by 2020 and
  - the cost decreases at 0.5 %/year thereafter.
- Low cost biomass
  - By the year 2020, 20% of the biomass resource is available at \$1.40/GJ and
  - 80% is available at \$2.40
- Advanced liquefied hydrogen fuel cells for transport

THE WHITE HOUSE  
WASHINGTON

*cc: JAF  
SS  
mm*

February 20, 1997

MEMORANDUM FOR DISTRIBUTION

FROM: ELGIE HOLSTEIN  
DAVID SANDALOW

SUBJECT: Climate Change

Please see attached for discussion at our meeting tomorrow.

2/20/97

## CLIMATE CHANGE WORKPLAN

The overview paper on domestic policies has now been circulated to the Deputies. The next step is to begin a more detailed assessment of the major policy alternatives described in that paper.

### I. DOMESTIC POLICY OPTIONS

1. Emissions trading program design: Develop and evaluate options for auctions, allocations and combinations of the two. Options should also include a comprehensive trading regime and one that is limited to sectors. Where feasible, options should be evaluated through the Interagency Analytical Team (IAT) models to assess economic impacts including impacts on key sectors.

LEAD: EPA with DOE, Commerce

2. Technology diffusion: Develop options for expanding technology diffusion programs, drawing on the experience of such programs to date and on existing analyses (e.g. post-2000 analyses). Efforts should focus on options that could result in significant reductions and should include estimates of costs and potential greenhouse gas reductions or enhancements of sinks by sector.

LEAD: EPA with DOE, USDA and Commerce

3. Regulatory and standards approaches: Develop and evaluate the costs and impacts of policies that would achieve substantial reductions in greenhouse gases in significant sectors. Analysis should not duplicate work already done (e.g. , options examined in the context of Car Talk) and should include options in areas where legislation is pending.

LEAD: DOE with EPA, USDA and Commerce

4. Auction revenue options: Develop and evaluate options related to the reflow of revenues that would be generated if an emissions trading regime were instituted and designed to include auctions. This work should be coordinated with the emissions trading design options and with the IAT modeling.

LEAD: Treasury with DOE and EPA

5. Sectoral impacts: This paper will draw from the work described above and present policy options, with estimated costs and emissions reductions, by sector.

LEAD: Dept of Commerce with OSTP, DOE, USDA, and EPA.

Timetable: Draft of papers with a first cut on costs and impacts of options by March 14 for Assistant Secretary review. Revised papers for Deputies by March 31. This schedule recognizes that detailed proposals will require a longer period to develop and would be prepared with guidance from the Deputies.

## II. TECHNOLOGY RESEARCH AND DEVELOPMENT

A range of options are being developed on climate technology research and development for possible inclusion on the agenda at the upcoming G-7 meeting. CEQ will be chairing a senior meeting on this topic next week.

## III. LONG-TERM CONCENTRATIONS/EMISSIONS AND IMPACTS

OSTP is completing a redraft of its paper on the emissions and concentrations and will present it at the Assistant Secretaries meeting on Friday, February 21. An initial paper on health and environmental impacts has been prepared and circulated by EPA. A more extensive paper reflecting additional work underway at a number of agencies in response to a request from the Vice President is being coordinated by OSTP and should be available in several weeks.

## IV. PUBLIC OUTREACH

EPA will circulate a draft Federal Register notice based on the overview paper, seeking public input in the form of written comments. Work is underway to prepare a Hill/NGO briefing on the economic analysis. A public outreach plan will be presented to the Assistant Secretaries in the near future.

## DISTRIBUTION:

Organiz.	Name	Fax #
State	Eileen Claussen	647-0217
	Rafe Pomerance	
Commerce	Everett Erhlich	482-0432
	Jeffrey Hunker	482-4636
OSTP	Rosina Bierbaum	456-6025
CEA	Alicia Munnell	395-6958
	Jeff Frankel	
Treasury	Joshua Gotbaum	622-2633
Justice	Lois Schiffer	514-0557
Interior	Brooks Yeager	208-4561
NOAA	Terry Garcia	482-6318
OMB	T.J. Glauthier	395-4639
USTR	Jennifer Haverkamp	395-4579
Agric	Charlie Rawls	720-5437
DOE	Dirk Forrister	586-9987
	Mark Chupka	586-0861
	Joe Romm	
EPA	Mary Nichols	260-5155
	David Doniger	
	David Gardiner	260-0275
DOT	Frank Kruesi	366-7127
OVP	Pete Jordan	456-9500
CEQ	Steve Seidel	456-6546
USAID	David Hales	703-875-4639
DOL	Andrew Samet	219-5980



cc: JAT  
JS  
JR

Capital Office  
1875 Connecticut Ave., N.W.  
Washington, DC 20009  
(202) 387-3500  
Fax: 202-234-6049

February 19, 1997

Dr. Alicia Munell  
Council of Economic Advisers  
OEOB - Room 315  
17th Street and Pennsylvania Avenue, N.W.  
Washington, D.C. 20500

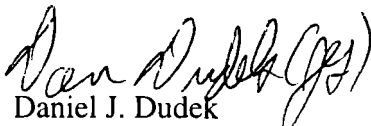
Dear Dr. Munell:


The Clinton Administration's January 17, 1997 proposal for the structure of an international protocol or other legal instrument for addressing climate change marks a significant and positive step in the effort to tackle the global warming problem. In the context of the January 17 proposal, we thought you might find of interest the enclosed recent paper, "Emissions Budgets: Building an Effective International Greenhouse Gas Control System".

As the evolving policy debate on an international agreement to reduce greenhouse gas emissions moves forward, we hope you will find this paper useful in considering the development of credible compliance and enforcement mechanisms, which we believe to be fundamental to the environmental effectiveness of the agreement. At the same time, we hope that the paper may be of assistance in the effort to elaborate further a number of the key elements of the U.S. January 17th proposal.

If you or your staff have any questions or would like to discuss this paper, please do not hesitate to contact us.

Sincerely,

  
Daniel J. Dudek  
Senior Economist

  
Joseph Goffman  
Senior Attorney

  
Annie Petsonk  
International Counsel

National Headquarters

257 Park Avenue South  
New York, NY 10010  
(212) 505-2100

5655 College Ave.  
Oakland, CA 94618  
(510) 658-8008

1405 Arapahoe Ave.  
Boulder, CO 80302  
(303) 440-4901

128 East Hargett St.  
Raleigh, NC 27601  
(919) 821-7793

1800 Guadalupe  
Austin, TX 78701  
(512) 478-5161

# EMISSIONS BUDGETS



## Building An Effective International Greenhouse Gas Control System



ENVIRONMENTAL  
DEFENSE FUND

February 1997

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b> .....	-1-
<b>INTRODUCTION</b> .....	-3-
<b>REVIEW OF THE EMISSIONS BUDGET POLICY FRAMEWORK</b> .....	-7-
<b>INTERNATIONAL GREENHOUSE GAS TRADING: COST-SAVING AND SOVEREIGN COMPLIANCE</b> .....	-9-
Reporting .....	-11-
Debt-Carryover and Discount .....	-12-
The Discount .....	-13-
<b>THE IMMUTABLE IDENTITY BETWEEN TRADING AND COMPLIANCE</b> .....	-16-
Setting the Budgets .....	-17-
Mechanics of Reporting, Accounting and Trading .....	-18-
Trading .....	-20-
Compliance .....	-22-
<b>JOINT IMPLEMENTATION AND PARTICIPATION</b> .....	-22-
<b>CONCLUSION</b> .....	-27-

## **EXECUTIVE SUMMARY**

For over a decade, the Environmental Defense Fund (EDF) has been engaged in the design, development, and implementation of markets for environmental protection. These activities have ranged from the creation of markets for water savings from conservation investments to reduce irrigation to the acid rain allowance trading system of the Clean Air Act Amendments of 1990. Since 1985, EDF has been concerned about the problem of global climate change and has been working to develop both a scientific understanding of the problem as well as practical solutions. This paper represents our current thinking concerning a framework for an international protocol that could deliver both the environmental and economic benefits desired.

The concept of emissions budgets were first introduced by EDF at the meeting of the Ad Hoc Group on the Berlin Mandate (AGBM) in February of 1996 in Geneva at the request of the Netherlands. The fundamental strategy of emissions budgets is to establish a dynamic framework of review and learning over time by harnessing in tandem a continual process of scientific and technical review to a process of emissions control within a legally binding framework which allows parties to trade extra emissions reductions. Of course, such a system must ultimately be gauged against the goals it aims to achieve. EDF believes that credible environmental goals would include:

- ◆ a first period of emissions reductions that begins by 2005 and ends not later than 2014
- ◆ an ultimate concentration objective of 450 ppmv (CO<sub>2</sub> equivalent), inclusive of all greenhouse gases (GHG)
- ◆ a transient constraint to limit the warming rate not to exceed 1° C per century.

The foundation of emissions budgets are legally binding obligations for OECD nations and economies in transition established on the basis of historic emissions baselines and set as a cumulative emissions budget for 10 years. For other nations, comprehensive GHG inventories and reporting would be required. Also critical to the foundation are the transparent and verifiable annual national reports covering all gases, sources and sinks by sector and including all transacted international GHG reductions by country and vintage. The plan for this construction is given by the continuing review and evaluation process to set new budget levels which on a 10 year cycle would:

- ◆ assess the science
- ◆ review the progress of the Parties
- ◆ review the development and adoption of technologies.

The bricks resting upon this foundation are the emissions reductions produced by Parties and their transaction through international greenhouse gas emissions reduction trading. Parties' performance in meeting their emissions obligations would be durable with savings for early reductions and automatic debt carryover for any shortfalls. Performance

would be evaluated for all GHG emissions by sources, uptake by sinks, and transactions in terms of 100-year global warming potentials (GWPs). Joint Implementation, for credit, is an essential element for addressing both graduation and economic competitiveness concerns. For nations that have not taken a budget, project-by-project crediting of reduction investments with the possibility of international review would be the primary trading path. For nations with a budget, full international trading of reductions is available. In addition, for those non-Annex I Parties that opt to take an emissions budget, an explicit growth allowance should be provided. Such growth allowances would be made available under a formula by which they would decline over time so as to reward early participation.

The mortar holding the system together is the incentives for sovereigns to meet their underlying emissions commitments. These include:

- ◆ All GHG reduction obligations remain until discharged
- ◆ For Parties with cumulative net emissions greater than the budget but less than 110%:
  - ❖ all emissions greater than budget automatically deducted from next budget
  - ❖ dispremium charged on emissions over budget (e.g., 1.2 to 1.0)
- ◆ For Parties with cumulative net emissions greater than 110% but less than 120%:
  - ❖ Above **Plus** automatic discounting of the non-complier's sold GHG reductions that have not yet been used by other countries for compliance beginning in the year of first occurrence (discounting to be in proportion to amount of non-compliance)
- ◆ For Parties with cumulative net emissions greater than 120%:
  - ❖ Above **Plus** mandatory COP review of Party's noncompliance
  - ❖ Prohibition on further sales of reductions as of the date of noncompliance

Under the emissions budget approach, each nation would be free to meet its budget and earn savings in any way, consistent with its own sovereign priorities, that it chooses. Each Party would determine whether it would participate in international emissions trading and who would be empowered to do so. The approach is designed to capitalize on our greatest asset in addressing the global threat of climate change -- human ingenuity. Emissions budgets reward early adopters, innovators, savers, and cost reducers. EDF believes that emissions budgets provide a straightforward, uncomplicated policy framework with clear environmental goals and easy to measure performance that is sufficiently flexible to consistently capture these assets over time.

## **INTRODUCTION -1-**

Under the “Berlin Mandate” adopted at the first Conference of the Parties (COP), signatories to the United Nations Framework Convention on Climate Change (FCCC) have committed to develop a protocol to control greenhouse gas (GHG) emissions by their third Conference, to be held in Kyoto, Japan in late 1997. In the atmosphere, these pollutants, the byproducts of fundamental economic activities like energy production, transportation and agriculture, can lead to accelerated warming resulting in dangerous changes to the earth’s climate system. Analyses produced by the Intergovernmental Panel on Climate Change (IPCC) indicate that failure to limit the emissions of these gases are expected to be damaging to natural ecosystems and costly to the many human societies that have developed during the 10,000-year period of relative climate stability leading up to the present.<sup>-2-</sup>

At the same time, because of the link between GHGs and activities fundamental to both industrialized and developing economies, many anticipate, or at least fear, that the costs of limiting their emissions will be high. For the same reason, others question the capacity of any international agreement to establish a truly durable and efficacious regime for limiting these emissions. This doubt is intensified by the fact that an international GHG regime could exist only as the artifact of a voluntary agreement between and among sovereigns, often in competition with each other, and representing the widest possible diversity of economic needs and resources and political and cultural aspirations. As a result, the tools that can be used to induce or enforce compliance by sovereigns with their GHG emissions obligations may be limited – and downright meager when contrasted with those that domestic authorities can bring to bear to ensure that private firms comply with domestic emissions limitation requirements.

In view of these circumstances, an international program must meet a set of exacting tests of equity, economic efficiency and responsiveness, durability in terms of legally binding commitments, flexibility and, above all, environmental efficacy – if it is to be credible. In addition, the international regime should function as a framework that can encompass the inevitable variety of domestic policies and measures – ranging from emissions taxes and technology standards to emissions cap-and-trade systems – that

---

<sup>1</sup> *This paper was written by Dr. Daniel J. Dudek, senior economist, and Joseph Goffman, senior attorney, of the Environmental Defense Fund’s New York and Washington offices respectively. EDF is a not-for-profit, non-governmental organization that combines science, law and economics to solve environmental problems. The authors can be reached at 257 Park Avenue South, New York 10010, telephone (212) 505-2100 or 1875 Connecticut Avenue, NW, Washington, D.C. 20009, telephone (202) 387-3500. In addition, EDF’s international counsel, Annie Petsonk, can be contacted at the Washington office.*

<sup>2</sup> *See Intergovernmental Panel on Climate Change, Science of Climate Change: Impacts, Adaptation and Mitigation of Climate Change: Scientific-Technical Analyses, Cambridge University Press, 1996.*

each nation will adopt in the exercise of its sovereign decision-making for the purpose of meeting its international obligations. Equally important, the protocol must be designed to create a reliable mechanism of accountability for nations' performance of their GHG emissions obligations.

Finally, the FCCC itself introduced and codified a distinction between nations characterized by advanced industrial economies (denominated as "Annex I Countries" in the parlance of the FCCC) and those at all other stages of economic development. It is all but certain that this distinction, or some form of it, will inform at least the initial structure of the commitments and obligations propounded in Kyoto, with few, if any, emissions limitations imposed on the developing countries. Nevertheless, because of rapid economic growth and other conditions, the latter category of countries are expected to contribute an ever increasing proportion of global anthropogenic emissions of GHGs. Consequently, the international regime must be sufficiently dynamic to induce those nations ultimately to participate in a worldwide effort to limit GHG emissions. This inducement is key both to an environmentally effective agreement and to limiting economic advantage from non-participation.

In response to these challenges, EDF first introduced the concept of emissions budgets at the February 1996, meeting of the Advisory Group on the Berlin Mandate (AGBM) in Geneva at the invitation of the Netherlands. Emissions budgets are the building blocks both of a verifiable and legally binding protocol and an effective international emissions trading regime. This paper builds on that earlier work to elaborate particularly on the critical reporting and compliance elements of this policy approach.<sup>3</sup>

In July, 1996, at a meeting of the second COP in Geneva, U.S. Undersecretary of State Tim Wirth announced U.S. support for negotiations that would lead to legally binding GHG emissions limitation and reduction obligations. Because it marked a watershed shift in U.S. position, Undersecretary Wirth's statement transformed the international debate on climate change by making the prospect of success for the Berlin Mandate plausible, perhaps for the first time. At the same time, Undersecretary Wirth's statement linked acceptance of such obligations to the availability of flexible, cost-reducing mechanisms of international emissions trading and joint implementation for credit.

During the December, 1996 meeting of the AGBM the U.S. government offered a document containing a preliminary description of a system of national emissions limits and international GHG emissions trading including the option of emission budgets. The U.S. followed its December submission with proposed draft protocol language on January 17, 1997 embodying the concepts included in the earlier document, but now focusing on emissions budgets. The proposed draft language provided further detail, but contains, as

---

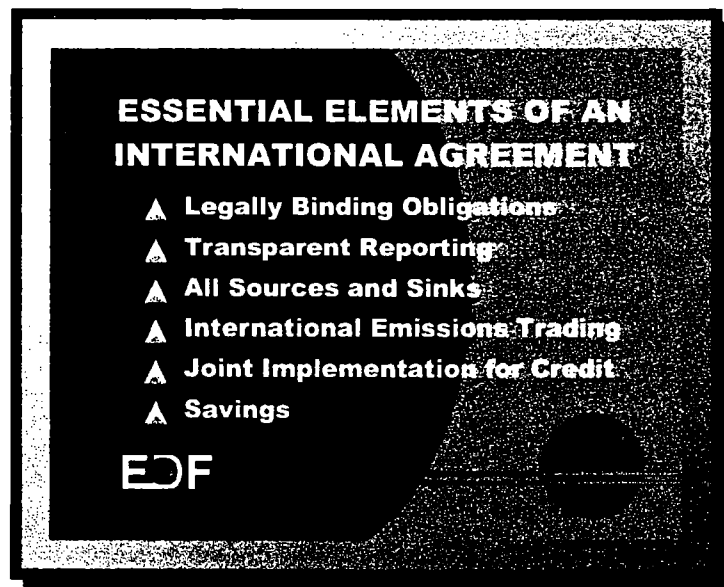
<sup>3</sup> See *Dudek, Daniel J.*, "Emission Budgets: Creating Rewards, Lowering Costs and Ensuring Results", Proceedings Climate Change Analysis Workshop, Springfield, Virginia, June 6-7, 1996, 18 pp.

the U.S. itself has indicated, a number of gaps that remain to be developed in order to fully develop the mechanics of a comprehensive global GHG budget and trading system.

For the COP to succeed in negotiating a viable GHG emissions protocol and for such protocol to succeed, in turn, in curbing GHG emissions such a vision is necessary. If designed in a way that included and integrated the necessary elements of accountability and flexibility, a GHG emissions budget and trading system would open the best – perhaps, the only – path to a global GHG regime that could meet the challenging array of tests confronting such a regime. However clear and well-aimed the U.S. documents have been in presenting a general outline, they also highlighted the crucial task of identifying the critical elements of such a system and of integrating those elements that must be accomplished by participants in the process leading up to and through the upcoming Kyoto Conference.

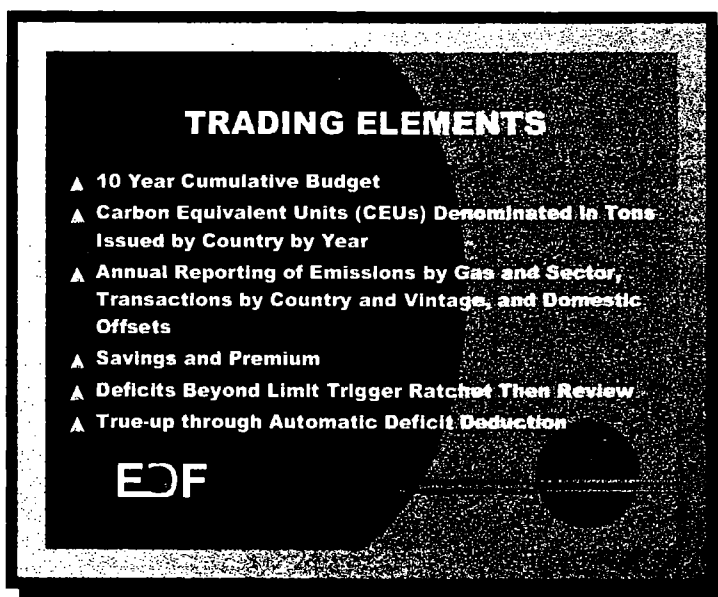
This report seeks to lay out EDF's current thinking on these critical elements and their integration. Specifically, it proposes an emissions budget and trading system for greenhouse gases that includes the following:

- ★ **national budgets**
- ★ **covering all sources and sinks**
- ★ **expressed as total GHG emissions over a decade-long period**
- ★ **and in terms of carbon equivalent units (CEUs).**



Nations could meet their decadal budget obligations by trading CEUs with each other and by “saving” CEUs whenever their decadal GHG emissions total was less than their total budget. Such CEUs could be used to offset GHG emissions in subsequent decadal periods and even earn “premiums” in the form of increases in their emissions

value.

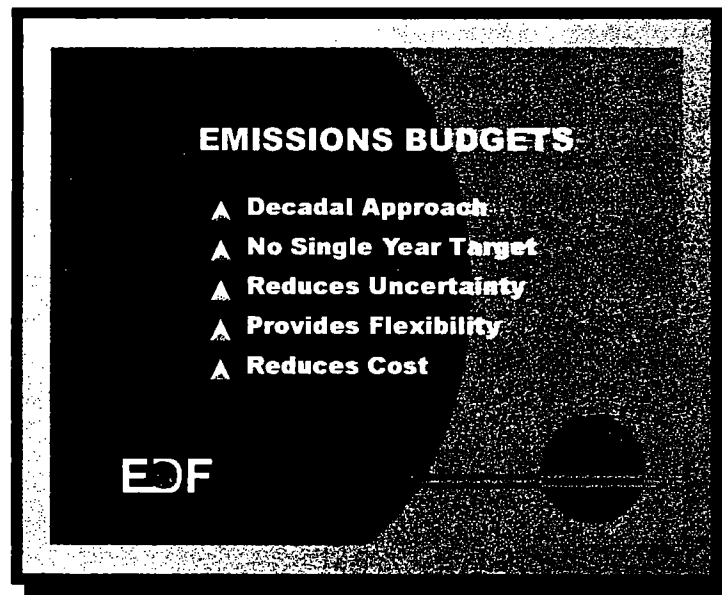


To ensure compliance, countries would be obligated to furnish detailed annual reports of their current and cumulative emissions and of the acquisition and/or sale of their CEUs. Countries exceeding their budgets would be subject to a two-pronged automatic sanction. The emissions value of any CEUs such countries had exported would be discounted upon their use by those holding such CEUs. In addition, cumulative GHG emissions in excess of a country's decadal budget -- adjusted to reflect CEUs acquired or exported by the country -- would be deducted --again, automatically -- from the country's budget for the decadal period immediately following.

Finally, each decade's emissions budget for affected nations would be established during the course of an ongoing review process undertaken by the Secretariat. Emissions budgets for upcoming decades would be announced at the 5-year point of the current decadal period after assessments of the atmospheric and climate science and of technology developments as well as of the performance to date of the overall regime.

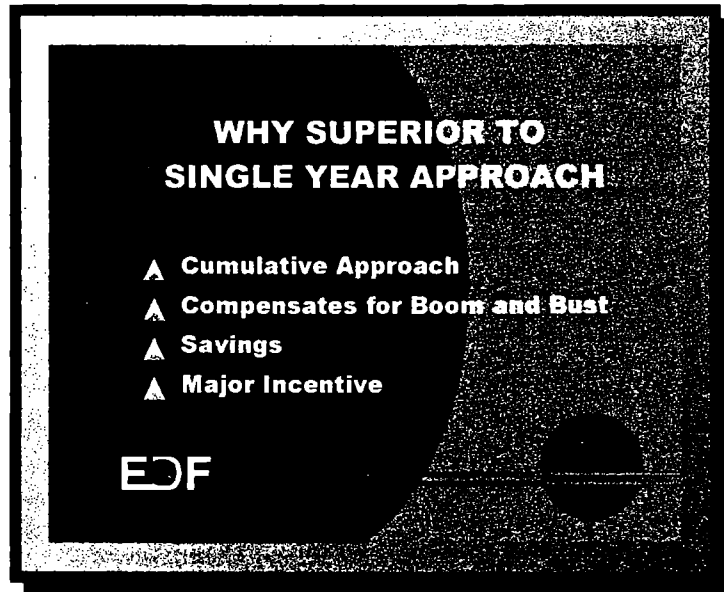
A simple exposition of these elements by itself does not reveal the underlying logic that dictates their necessary integration. Consequently, in addition to reviewing the importance of using an emissions budget and trading approach as the bulwark of an international GHG regime, one of the aims of this report is to distill the inextricable linkage between accountability and flexibility that these specific elements embody and that is indispensable to the success of a global GHG control strategy.

## REVIEW OF THE EMISSIONS BUDGET POLICY FRAMEWORK

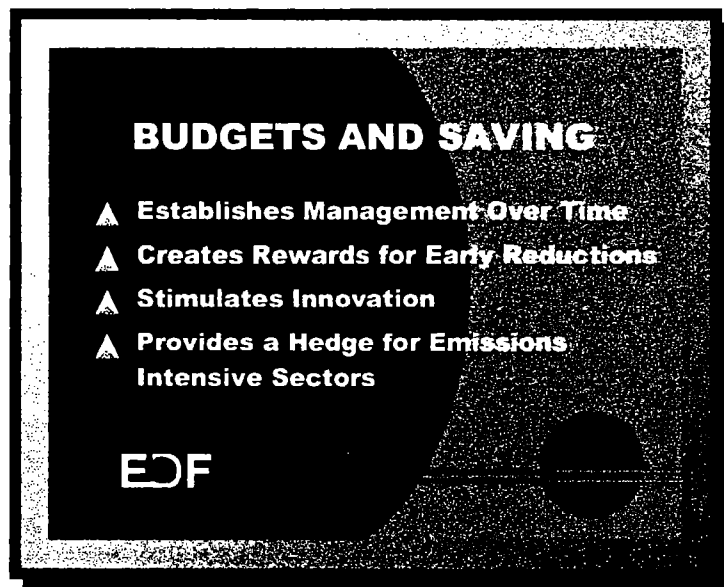


The fundamental definition of compliance -- i.e., in the form of an explicit quantity of emissions for which each nation is accountable -- parallels the experience of the U.S. under the Clean Air Act. Historically, Clean Air Act programs have imposed a variety of requirements on pollution sources, but only rarely have these made the sources directly or expressly accountable for their total emissions. As a result, these programs have tended to achieve fewer emissions reductions than intended or desired. In contrast, to combat acid rain, Congress amended the Clean Air Act to reduce emissions of sulfur dioxide from power plants. Here, each plant was held legally accountable for meeting a specific total emissions limit. This feature, together with the inclusion of emissions trading, has made this program one of the most successful of U.S. environmental policy initiatives.

Equally critical to the ultimate success of an international GHG regime is the integration of flexibility elements with express accountability on the part of each nation for meeting an explicit emissions limit. First, structuring each nation's budget as a 10-year cumulative obligation not only reflects the cumulative aspect of the effect of greenhouse gases on climate warming, but it also offers economic actors and nations' economies the temporal framework in which they can rationalize their response to the simultaneous demands of meeting their GHG emissions obligation and of inevitably dynamic economic conditions. As a result, sources and nations will be able to minimize the costs associated with budget compliance. At the same time, the 10-year budget period still creates a time horizon short enough to signal meaningful accountability so that nations and firms will feel compelled to manage their GHG emissions to meet the budget.



Second, the inherent opportunity for year-to-year “saving” of unused increments of each nation’s GHG emissions budget within each decadal budget period creates an explicit incentive for early reductions. Since it is the cumulative effect of GHGs in dangerously accelerating the *rate* of warming and of resulting climatic and ecological change that represents a critical aspect of the threat posed by global climate change, honing incentives for early reductions is essential. For this reason, an effective regime should permit “savings” of unused increments of a nation’s emissions budget to be carried forward for use in later periods.



To augment the value of such “savings” and thus intensify the incentives for early reductions, nations or firms that create and save unused budget increments or

CEUs should be able to earn a small premium that would increase the GHG emissions value of CEUs carried forward over time. Again, ecosystems – and human society – are critically sensitive not only to the extent of climate warming but also to the rate at which climatic change occurs. Offering an emissions-value-increasing premium for emissions savings parallels the environmental protection value that early reductions create by slowing the rate of climatic warming and avoiding ecological damage.

In addition to direct environmental considerations, among the effects created by both the opportunity for nations and sources to manage emissions over time and the resulting incentives for early reductions is the stimulation of innovation in reducing or avoiding GHG emissions. Successful innovation not only lowers cost but it is further rewarded through the economic value garnered by traded or “saved” CEUs. Increasing investment in environmental innovation opens an ongoing flow or supply of the technologies and innovations necessary to sustain, and ensure the economic affordability and environmental efficacy, of a long-term global commitment to curb GHG emissions.

Finally, the importance of temporal flexibility embodied in both cumulative budgets and the availability of “saving” is vividly illustrated by examining their significance for the emissions-intensive sectors and activities that dominate, at least in part, most industrialized and developing country economies. Since nations will accept to make the transition to low-emissions economies only if they can do so while maintaining robust economies, the predominance of these sectors dictates that nations have the flexibility needed to manage this transition over time. Similarly, the ineradicable economic self-interest of the firms that operate in these sectors demand that they, too, be afforded the tools needed to meet their emissions obligations while remaining viable. The ability to trade and save CEUs for future use provides precisely the mechanism for accommodating continued activity by these firms and sectors while allowing nations to meet the obligations of GHG emissions budgets.

## **INTERNATIONAL GREENHOUSE GAS TRADING: COST-SAVING AND SOVEREIGN COMPLIANCE**

Intra- and inter-budget-period savings is but one of two iterations of emissions trading. In addition to the “trading” of emissions between years and budget periods that savings allows, the budget system also permits trading between and among sovereign nations and firms in different countries. The set of benefits provided by inter-temporal trading through saving also emerges from international emissions trading. Since such trading confers an affirmative economic value upon actions that produce surplus reductions, the emissions trading market rewards environmental innovators and any firm or sovereign that overcomplies with its emissions reduction responsibility. In addition, emissions trades, almost by definition, allow the trading firms or nations to achieve the same net emissions reduction at a cost lower than that which they would

have incurred in making their reductions in the absence of the trade. That firms – and sovereigns – can resort to trading in addition to whatever other emissions reduction strategies might be available guarantees that they will enjoy increased flexibility in integrating their economic needs and their GHG compliance requirements.

At the same time, it is the economic dynamics of the emissions trading market that can provide the key to unlock the riddle of sovereign compliance with an international GHG emissions reduction protocol. Regardless of whether a protocol imposed quantitative emissions limitations or required specified technologies or taxes, the challenge of ensuring *sovereign nations'* compliance with a GHG protocol is one of the central environmental challenges in designing such a protocol.

To illustrate why this challenge is so daunting, the enforcement tools afforded the U.S. Environmental Protection Agency under the federal Clean Air Act make a revealing contrast with the remedies practically available in an international context in which the accountable party is a sovereign. For example, Title IV of the Clean Air Act, which established the emissions trading program for sulfur dioxide (SO<sub>2</sub>) reductions requires firms to pay an *automatic* penalty of \$2,000 for each ton of excess SO<sub>2</sub> emitted and to suffer an *automatic* deduction in their future allowable emissions. In addition, they are subject to a full panoply of civil and criminal sanctions. The availability of these remedies and the ability of enforcement officials to bring them to bear against firms reflects a widespread and highly durable consensus that permeates virtually every sector of U.S. society, a consensus, in turn, that, together with the threat of these sanctions, elicits compliance from the vast majority of regulated firms.

Similar tools are not nearly so readily available in an international context, nor is there likely to be a comparable consensus amongst sovereigns in the foreseeable future. Consequently, even with the third COP in Kyoto less than a year away, many governments and interested parties appear to be stumped by this question: if, at the end of each budget or compliance period, there are nations whose GHG emissions exceed their budgets, what happens? Environmentally, the atmosphere will continue to be subject to unacceptable levels of GHG emissions. By the same token, from the point of view of the integrity of a protocol purporting to embody “legally binding commitments”, the credibility of such an agreement would be destroyed if, instead of having an ongoing obligation, those nations simply are permitted to start with a “clean account” in the next budget cycle.

At the other extreme, remedies and sanctions that excluded such nations from the GHG emissions budget and trading system or imposed general trade sanctions would, if imposed without any intermediate compliance/enforcement measures, also render any agreement non-credible on environmental grounds. Simply banishing non-compliers from the trading system would be self-defeating as a first-order sanction, since those countries would continue to emit GHGs at excessive levels. In fact, one of the key functions that the protocol's compliance strategy must serve is ensuring that countries facing difficulties in complying are provided a mechanism or path that eases

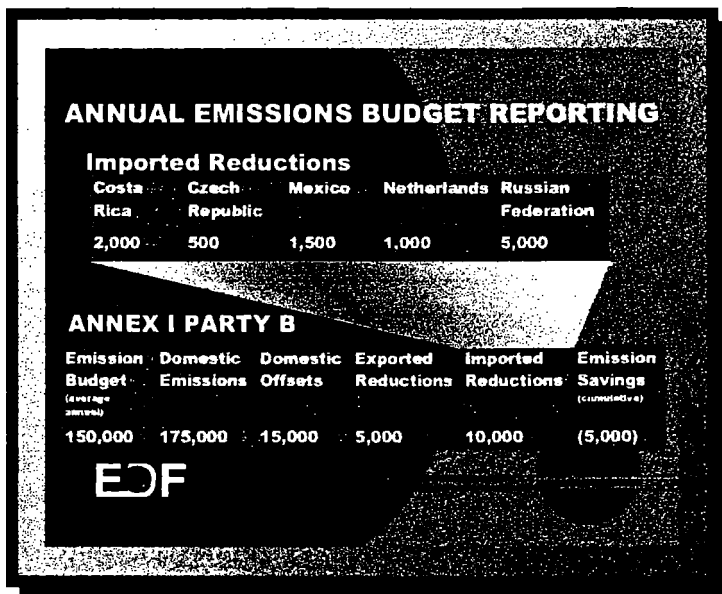
their achievement of compliance. A first-resort exclusion of these countries from the trading system would be environmentally counterproductive.

As for an approach that relied on general trade sanctions, the recent history of trade sanctions demonstrates that nations are extremely reluctant to administer such sanctions. Their imposition as a first-order measure requires a degree of political will that is unlikely to exist in the GHG context in the near term. Moreover, the environmental objectives of a protocol –not to mention the economic competitiveness concerns of nations with GHG emissions budget obligations -- strongly suggest that the protocol should seek to engender a dynamic that will encourage those nations in the developing world, which initially may not be subject to legally binding GHG reductions obligations, to assume such obligations eventually. General trade sanctions, however, may discourage, rather than encourage, other parties from taking on budget obligations. It is hard to imagine that nations considering accepting legally binding GHG obligations would choose to do so if the result were to expose them, as a first-order sanction, to the economic losses created by trade sanctions.

Ultimately, such sanctions will have to be included as sanctions in a protocol, but it is hard to see them serving any role other than that of last resort. On the contrary, the effectiveness of any GHG emissions limitation regime will depend on structured, automatic and readily usable first- and second-order measures. To accomplish this, the Kyoto protocol must build a “compliance tripod” of measures, fashioned as an extension of the emissions trading and banking system itself, which would both ensure inter-temporal environmental compensation for excess emissions and create an inherent disciplinary feedback against nations’ noncompliance. The three legs of the tripod are: 1) annual reporting, 2) automatic GHG emissions debiting with interest for those countries exceeding their GHG emissions budgets and 3) automatic discounting of GHG emissions reductions exported by nations that are significant violators.

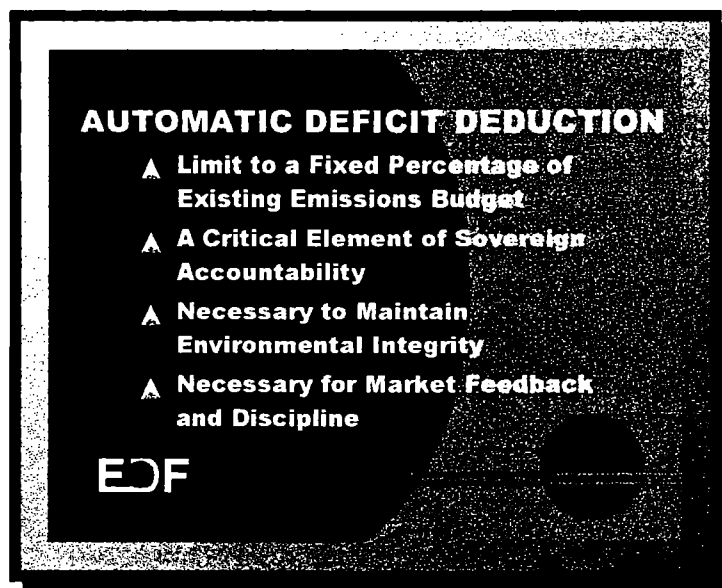
## **Reporting**

The annual reporting of each nation’s GHG emissions, internal offsets and international GHG emissions trading activity is an obvious, as well as indispensable, instrument of accounting for each nation’s compliance performance. By the same token, the reporting system should also serve as the formal instrument for tracking, and therefore formally effecting, the exchange of emissions between sovereigns and each sovereign’s “savings” and carrying forward of increments of its emissions budget through the achievement of early reductions. These mechanics will be discussed in more detail, in the section on “Mechanics”, below.



## Debt-Carryover and Discount

The concept of inter-temporal flexibility underlying banking -- which produces the benefit of early reductions -- must be applied to the likely event that some nations, including those not generally regarded as "bad actors", may simply miss their budgets. By imposing an automatic but limited debt-carryover with interest, the protocol would be able to harness that behavior by ensuring that it is environmentally compensated for -- rather than being either "forgiven" or subject to sanctions so draconian as to be unimplementable in the international context.



The debt-carryover would be implemented by automatically deducting from the ensuing period's budget the full amount of the nation's excess emissions at the conclusion of the current budget period. This automatic deduction would be augmented in size by an additional percentage of sufficient size to ensure that the mechanism itself -- which, in effect, is a form of "borrowing" an increment of a future budget and "repaying" the increment with "interest" -- would not be used as a routine compliance option. Rather, as a remedy for what would be treated as an initial instance of noncompliance, this debt-carryover would be a first-tier response, which could be followed by more stringent sanctions in the event the nation exceeded its net budget in the following period.

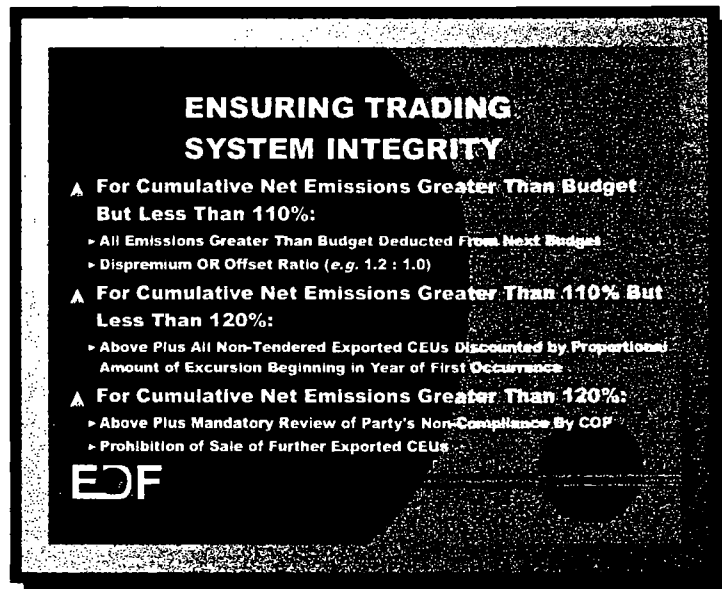
In addition to ensuring that each nation's accountability was truly continuous from budget period to budget period, the automatic debiting of nations' consecutive budgets for excess emissions would serve two other functions intrinsic to the integrity of the global GHG emissions budget and trading system. First, these debits would ensure that the environment was compensated both for the GHG emissions reductions initially lost and, through the additional "interest", for the delay in achieving those initially lost reductions. Second, in the absence of an automatic deduction for excess emissions, CEUs transferred by non-complying nations could be used to offset emissions generated by the firms or nations acquiring the CEUs notwithstanding the fact that such CEUs did not represent surplus emissions reductions. By offsetting the non-complying nation's excess emissions, however, the automatic debit would ensure that GHG emissions reductions transferred by the non-complying nation were surplus or ultimately became surplus. The automatic debt-carryover is an essential element of both the protocol's system of accountability and to its environmental integrity.

## **The Discount**

Though indispensable, mandatory debt-carryover alone is not sufficient to reward compliers and sanction non-compliers in a credible, effective and reliable way. In fact, the debt-carryover offers a partial answer at best to the question of what it is that the protocol can use or create to compel or induce a sovereign to achieve compliance with its GHG emissions budget. Certainly the prospect of an automatic deduction, augmented by "interest", in the immediately following budget period signals nations that an "emit now, pay later" strategy for managing their GHG emissions over time would be inevitably expensive and potentially risky.

For nations whose commitment to, or capacity for, compliance is only marginal, however, the budget deduction can prove to be little more than a mere restatement of the nation's future obligation, an obligation that in itself has little credibility unless backed by something more than attenuated threats of eventual sanctions. Since, as discussed above, a compliance strategy that relies primarily on the imposition of sanctions is simply not credible in this context -- and could even be self-defeating, the protocol needs to incorporate a mechanism that will lead sovereigns to *prefer*

compliance over noncompliance even if they are not persuaded by the possibility of sanctions.



It is from the inherent economic dynamics of the GHG emissions trading market that such a preference must come. In fact, the protocol should seek to rely directly and explicitly on the emissions trading market as the mechanism for delivering that preference. To do so, the protocol should include an automatic and immediate imposition of discounts on GHG reductions exported by nations whose annual reports show that the combination of their emissions and their exported reductions is putting them over their GHG budgets. In those cases, the protocol should require that, beginning in the year – within any budget period -- in which this first occurs, governments applying those reductions to their own budgets automatically discount, by the proportion of the exporting country's excess GHG emissions, the exported reductions' tonnage value for emissions offset purposes.

This automatic discount is necessary because without it, exported GHG reductions from non-complying nations would be available to offset in full other nations' actual emissions notwithstanding the fact that the exported reductions or CEUs did not represent actual surplus reductions. Although the automatic debt-carryover addresses this issue as well, the remediation it provides does not occur until the subsequent budget period.

Equally important, this automatic discounting would force the market to value various countries' exported reductions differently based on their compliance. Reductions from compliers would earn more than those from non-compliers at least in proportion to the tonnage-value discount imposed on the latter. At the same time, firms and nations buying exported reductions would exercise preference for reductions from

complying nations, and invest effort in ensuring that reductions they acquired were from countries in compliance or on a course for compliance. Thus, by sending a market signal back to nations that fail to manage their emissions reduction obligations, this discount provision fulfills the capacity of the "compliance triangle" to impose a discipline both on these sovereigns and their firms and on their emissions trading partners.

Because one critical attribute of the automatic discount is its shifting of some risk -- and, therefore, incentive -- to buyers, the discount enhances the integrity of the emissions trading system in another way. Buyers' preference will be for reliable trading partners who can deliver CEUs that will retain their full value in offsetting emissions in the context of buyers' own compliance obligations. As a result, a preponderance of the CEUs transacted in the global emissions trading market may be those that *in the first instance* are highly likely to represent truly surplus reductions.

At the same time, in contrast to a regime in which non-compliers were excluded from the emissions trading market de jure, the fact that it would be the market, in exercising its preferences, that produced the effective exclusion of non-compliers from emissions trading comports with an overall strategy of using the market to elicit compliance. In this instance, the loss of economic opportunity resulting from this exclusion could act as a spur to drive non-compliers to take the actions necessary to achieve compliance. In fact, firms and other entities seeking to generate surplus GHG emissions reductions and sell them in the global market would become constituents for compliance within their own countries. In the face of the limitations that characterize an international enforcement regime, the protocol must rely on using the incentives inherent in a global GHG emissions trading market to mobilize constituents in favor of compliance.

From a superficial perspective, an approach, such as an automatic discount, which exposes buyers to uncertainty as to the use-value -- in this case, the emissions-tonnage value -- of their acquisition would seem to be incompatible with an active exchange market. However, a simple comparison to currency markets, or, for that matter, to any transaction involving currencies that are "foreign" to one of the parties, and which regularly fluctuate in value in comparison to the party's "domestic" currency, demonstrates that this uncertainty is a routine part of international commerce. Moreover, it is easy to imagine that transaction partners and intermediaries would find a variety of hedging or insurance instruments readily available to manage such uncertainty. Only if it resulted in the full confiscation of a CEU's offset value would a discount system fatally inhibit the development of an international emissions trading market.

In this case, no such confiscation would be necessary. The concurrent presence of the debt-carryover mechanism would render surplus, at least eventually, exported reductions, even from initially non-complying countries. Consequently, the emissions-offset value of such reductions would not have to be discounted to zero. By the same token, the discounting would be applied only for those CEUs presented for

use in meeting the buyer's compliance obligations after the selling nation's budget exceedance emerged in annual reporting. CEUs that had been used prior to that time would not be discounted, thus avoiding the imposition of retroactive liability for purchasers of a sort that could inhibit emissions trading activity.

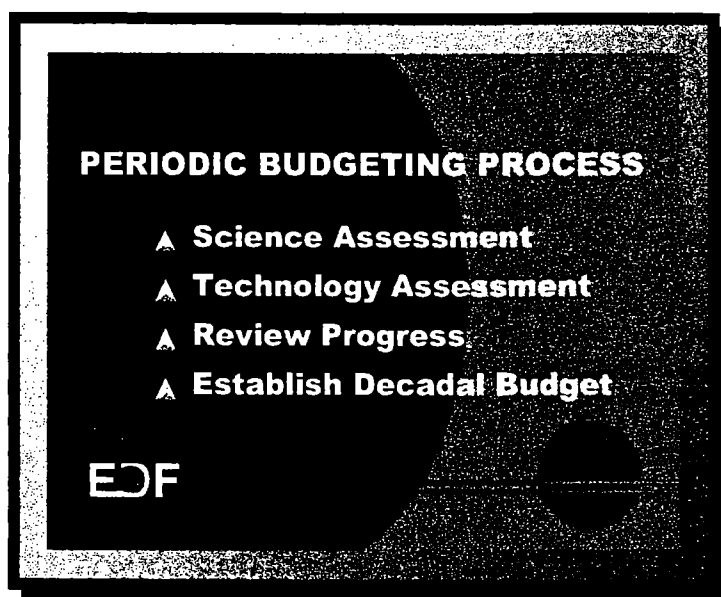
Without *both* an automatic debt-carryover to subsequent budget periods *and* an automatic discount applied within each budget period for CEUs exported by nations demonstrably exceeding their budgets, an international GHG protocol would lack adequate mechanisms for ensuring both nations' accountability for compliance and its own credibility. Without the ability to rely, in any but the most extreme circumstances, on the kinds of remedies, sanctions or other coercive measures typical of domestic pollution control laws such as the U.S. Clean Air Act or, in some instances, the general system of international commercial trade, a GHG protocol must develop a fully integrated set of incentives to motivate compliance.

That is why implementing nations' GHG emissions obligations through a system of emissions trading is so indispensable to the success of a GHG protocol. An emissions trading market is virtually the only mechanism that can provide such incentives. At the same time, the emissions trading and compliance regime must be carefully designed to hone these incentives. Just as the opportunity to create early reductions and "save" them for future use intensifies incentives for early action and for the development of environmental innovations, features like a discount applied to the GHG emissions reduction exports of non-compliers are essential to perfecting those incentives that can effect nations' -- and their firms' -- preference for compliance. Moreover, such a discount does more than provide a tangible instrument for delivering such incentives. Without a discount, the emissions budget and trading regime will lack important mechanisms that can be readily usable in the first instance to perform the function -- traditionally served by penalties and similar remedies in domestic legal programs -- of disciplining sovereigns that stray from the path of compliance.

## **THE IMMUTABLE IDENTITY BETWEEN TRADING AND COMPLIANCE**

In a GHG emissions budget and trading system, the mechanics of accountability must be carefully designed. Fortunately, it is possible to create a unified system through which sovereigns can effectuate emissions trading and, at the same time, to design it so as to establish their accountability for meeting their GHG emissions budgets.

## Setting the Budgets

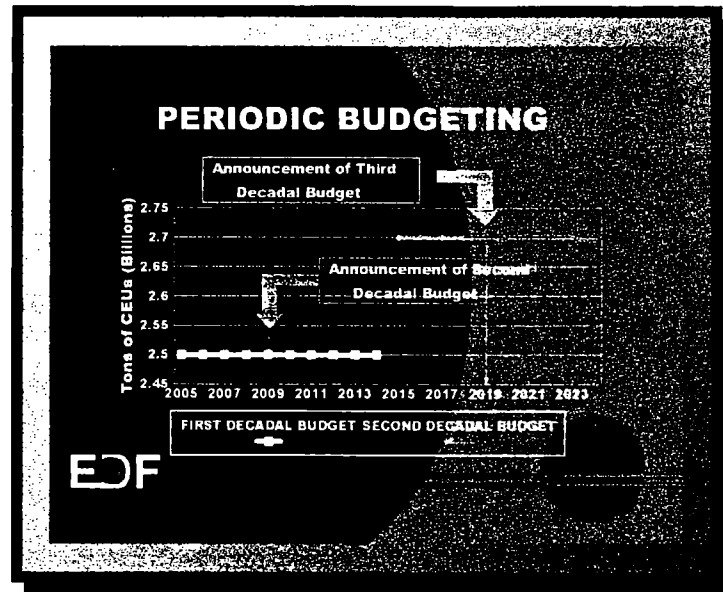


The key specification for each budget period is setting the numerical value of each nation's decadal budget. Presumably, since the initial commitments of the industrialized nations under the FCCC were expressed in terms of 1990 emissions levels, the protocol will establish each nation's initial budget as a function of its 1990 emissions. For purposes of setting the initial budget as well as each subsequent budget, the Parties should rely on the resources of international institutions such as the Intergovernmental Panel on Climate Change, under the direction of the Secretariat, to focus on three major components.

First, as the IPCC has done continuously since before the signing of the FCCC in 1992, the IPCC should provide an ongoing assessment of all scientific developments relevant to climate change. Inevitably, this will include a dual focus on tolerable concentrations of GHGs in the atmosphere and tolerable rates of climatic change. Second, technological advances and innovations are likely to progress at an accelerated pace in the wake of the establishment of a GHG protocol and in response to the incentives it engenders. These, as well as technological costs and limitations, should also be carefully assessed. Finally, nations' performance under the protocol as that performance develops needs to be assessed as well.

These assessments should inform the setting of the budget for the immediate subsequent period as well as projected reduction trajectories over a multi-budget-period horizon. An equally critical element of the budget-setting process is timing. Specifically, each budget should be established and announced no later than the end of the fifth year of the current budget period. By following this schedule, the protocol's budget-setting process will afford nations and firms the time necessary to

anticipate their upcoming compliance obligations and to integrate them with their overall economic responses.



This budget-setting schedule also contributes to the protocol's ability to establish a credible system of accountability. A five-year separation between the establishment of the ensuing period's budget and the application of remedies such as an automatic debt-carryover can help ensure that the budget-setting process will not be compromised by efforts to ease non-complying nations' obligations under the debt-carryover provision. As a result, the carryover will represent a true net deduction from a budget that is not inflated to defeat the effect of the carryover.

## **Mechanics of Reporting, Accounting and Trading**

One of the innovations introduced by the SO<sub>2</sub> emissions trading program under the U.S. Clean Air Act was that the SO<sub>2</sub> emissions "allowance" served – all at the same time – as i) the currency of trading, ii) the instrument of compliance for affected sources and iii) the regulatory mechanism applied by the U.S. EPA for ensuring sources' accountability and for "tracking" emissions trades. Similarly, the protocol can establish a single, simple sovereign accounting system that performs the same multiplicity of functions for an international GHG emissions budget and trading regime. At the same time, this system would be able to succeed without relying on the allocation of emissions "allowances" or marketable permits.

This is critical, since in the context of a GHG protocol a compliance accountability infrastructure must be designed to meet several constraints as well as

the demand that it work. First, the protocol, and its compliance and trading accounting method, must be able to accommodate every possible policy approach -- e.g., pollution taxes, technology standards, research and development subsidies, marketable permits -- available to sovereigns in adopting their respective domestic strategies to meet their GHG emissions budget obligations. A system that presupposed the adoption of certain measures and the exclusion of others would be untenable to the extent that it would necessitate the forfeiting by sovereigns of at least a portion of their own policy-making prerogatives.

By the same token, reliance on the creation of elaborate or powerful new international institutions for the purpose of implementing a protocol could doom such a protocol, for, here, too, demanding that sovereigns surrender significant elements of their authority may be a prospect even more daunting than inducing them to agree to curb their GHG emissions. Finally, an international system for accounting for, and tracking trades in, each nation's GHG emissions must be simple, reliable and durable.

Fortunately, the FCCC itself already has laid the foundation for such a system in its existing requirements that countries file annual reports of their GHG emissions. To implement each nation's GHG emissions budget requirements and effectuate the application of GHG emissions trading they may have engaged in in meeting their respective emissions budgets, the protocol should require each nation to file an *annual* report with the following information:

**EMISSIONS, REDUCTIONS, AND TRADING REPORTING**  
**Annex I Party B**

<b>Emission Budget</b> <small>(Average annual (tonnes))</small>	<b>Domestic Emissions</b> <small>(By sector)</small>	<b>Domestic Offsets</b> <small>(By sector)</small>	<b>Exported Reductions</b> <small>(By nation and storage)</small>	<b>Imported Reductions</b> <small>(By nation and storage)</small>	<b>Emission Savings</b> <small>(International tonnes)</small>
150,000	175,000	15,000	5,000	10,000	(5,000)
150,000	185,000	17,500	2,500	15,000	(10,000)
150,000	190,000	20,000	1,000	15,000	(16,000)
150,000	200,000	25,000	10,000	10,000	(41,000)
150,000	185,000	25,000	15,000	5,000	(61,000)
150,000	190,000	20,000	15,000	5,000	(81,000)
150,000	175,000	20,000	15,000	2,500	(98,500)
150,000	145,000	20,000	30,000	0	(105,000)
180,000	130,000	20,000	40,000	0	(105,500)
190,000	140,000	20,000	35,000	0	(108,500)

**EDF**

- 1. Emissions Budget**, expressed in annualized terms by multiplying its decadal GHG emissions budget by 0.1.
- 2. Actual Domestic Emissions Reported in Total and By Sector.**

**3. Domestic Offsets.** In this category, a nation could report *surplus* GHG emissions reductions generated as a result of actions in GHG emissions sectors not regulated under its domestic programs and not used by its sources in meeting compliance under those programs.

**4. Exported Reductions.** These would be reported expressly in terms of the year of their vintage, as well as being identified by their country of origin. In the case of the vintage year, this information is necessary for the purpose of calculating the emissions-value “premium” that could be earned for reductions that were “saved” and held unused over time. Since reductions, or CEUs, exported by nations whose annual reports revealed that they were exceeding their budgets would be discounted, in terms of their emissions value, before they could be applied to the importer’s domestic compliance program, the identity of the country exporting the CEUs would have to be maintained.

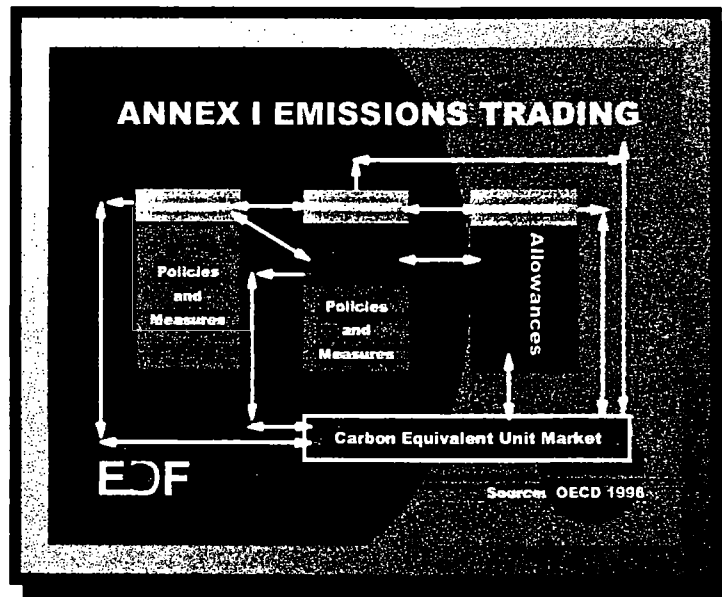
**5. Imported Reductions,** also reported expressly in terms of vintage year and country of origin for the same reasons.

**6. Emissions Savings and End-of-Period Net.** These would be the annual net of the other five entries. Of course, if in any year a nation’s emissions exceeded its annualized budget as adjusted to reflect domestic offsets, exports and imports, then such savings would be expressed as a negative value. In addition, to reveal each nation’s performance relative to its GHG emissions budget obligation, and thus expressed as either a net savings to be carried forward for future use or a net debit to be deducted immediately from the ensuing period’s budget, reports at the end of each budget period would state a net sum of the nation’s savings, either positive or negative.

This reporting approach would provide a unified mechanism for compliance and trading. It would be through each year’s report that the mechanics of compliance would be automatically triggered while at the same time international emissions trading would be effectuated.

## **Trading**

Through this approach, which is, in effect, one of double-entry record-keeping, the international emission trading system can accommodate GHG emissions trading between and among private firms in different nations while ensuring both the integration of private and sovereign trading and the full GHG emissions budget accountability of all nations. In addition, it does not presuppose any particular set of policy approaches that participating nations may use on a domestic level, nor does it rely on developing extensive new institutional authorities internationally.



In fact, under this system, virtually any firm operating under virtually any domestic policy regime can transact the international sale of purportedly surplus GHG emissions reductions. Meanwhile, the integrity of the system of accountability remains assured. This approach achieves this by requiring nations to report annually *all* emissions exports, whether initiated by the sovereign itself or any private firms operating within sovereign borders. Even private firm sales transactions, therefore, of necessity will have to be effectuated through both their being reported to the government of the selling firm and a corresponding *deduction being taken from that sovereign's budget*.

To ensure that this occurs with every such transaction, the sovereigns whose firms are purchasing such reductions – presumably for the purpose of using the reductions to offset their own emissions and thus comply with domestic obligations – would agree not to recognize or accept such reductions for such compliance purposes in the absence of a demonstration that the exporting sovereign had acknowledged the transfer and made the deduction from its own budget. Of course, in accepting such purchases, the importing sovereigns would be able to report either a net increase in their own budgets or a net decrease in their emissions. This approach thus makes all international GHG emissions trading take the form of inter-sovereign trading of increments of the sovereigns' GHG emissions budgets. As a result, this approach guarantees that, *by definition or as a creation of the accounting mechanism itself, all trades are for surplus reductions*. In effect, certifying that a traded reduction is surplus, often a prohibitively cumbersome process in other trading approaches, is a seamlessly built-in feature of the accounting mechanism.

## **Compliance**

The reporting mechanism is also a crucial trigger for the protocol's two key compliance mechanisms. Since the tenth annual report in each budget period will include a summing of each nation's "savings", both positive and negative, those reports that indicate a net deficit -- that is, emissions in excess of a nation's net budget as adjusted to reflect trades -- will trigger an automatic deduction from the affected nations' budget for the ensuing period.

Similarly, at any time during the course of a budget period a nation's annual report may reveal that its cumulative emissions exceed 110% of its total decadal budget. In that case, the discount requirement would be automatically triggered for application by every other sovereign whose firms held reductions, or CEUs, exported by that nation. Again, the discount, would be applied to those CEUs that were presented by the firms that had acquired them for use in offsetting their own emissions and thus meeting their domestic emissions obligations or were otherwise used by the sovereigns themselves to augment their budgets or offset their emissions. However, the discount would take effect only beginning in the first year after a nation's "budget deficit" was revealed and would affect only those CEUs or reductions that were submitted subsequently. Nevertheless, the ability of the annual reports to reveal, essentially immediately, the creation of nations' "deficits" before the end of the budget period would allow the protocol to require that the discount be applied automatically by all participating sovereigns.

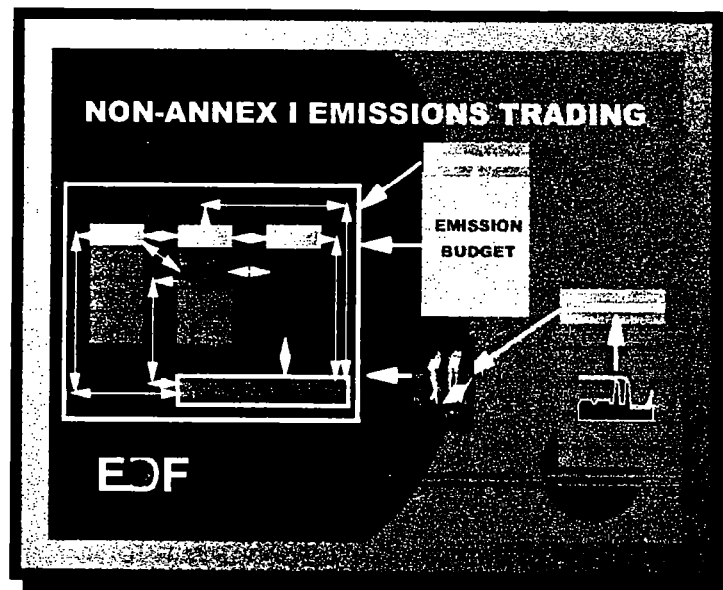
## **JOINT IMPLEMENTATION AND PARTICIPATION**

In its January submission to the international negotiating process, among the items emphasized by the U.S. were the details of a strategy for ensuring the ultimate participation by developing countries in an GHG emissions protocol. The key elements in the U.S. proposal included a proposed requirement that these nations adopt "no regrets" policies to curb GHG emissions and that they prepare annual reports on their emissions and on measures adopted to control such emissions. In addition, the U.S. called for the establishment of a date certain for negotiations which would result in developing countries' accepting GHG emissions obligations and that included mechanisms for the eventual strengthening of those obligations.

The U.S. proposal's focus on these countries and their emissions is especially compelling from both an environmental and economic competitiveness perspective. GHG emissions from the developing world are rapidly reaching or exceeding par with those generated by the industrialized and Eastern bloc nations. Their emissions trajectory corresponds to their economies' increasing importance and activity in the

global marketplace. In fact, unless a GHG protocol creates a robust structure for encompassing these nations and their GHG emissions it will lack environmental – and economic – credibility, a conclusion recognized, much to its credit, by the U.S. proposal.

These ideas will need to be developed further in order to provide a more comprehensive answer to the question of how the developing nations will come to agree to their inclusion in a GHG emissions budget regime. Certainly, as climate science advances the threats posed by climate change will be of concern to those societies whose relative economic disadvantage may render them more vulnerable. At the same time, the traditional tools of diplomacy, which may include outright pressure from the industrial powers will play a role as well. Nevertheless, the same factors that limit the ability of the international community to *compel* routine compliance with a GHG emissions budget regime pose analogous challenges to securing the full-fledged participation of developing countries in such a regime.



Here, too, then, the economic dynamics a global GHG emissions trading market must be enlisted in meeting these challenges. Ostensibly, the most effective way of using the emissions trading market to create incentives for developing countries to participate in an international GHG regime is to condition their ability to engage in transactions in the emissions trading market on their agreement to subject themselves to a GHG emissions budget. Under this approach, "joint implementation", understood as a method by which developing countries without GHG emissions budgets can sell GHG emissions reductions, would not be available as a compliance option for firms and sovereigns subject to a GHG emissions budget.

Erecting such a barrier to developing nations' participation in trading may prove to be too crude and risky a strategy, however, while also denying opportunities for achieving environmental and economic gains. In contrast, permitting international GHG emissions trading for and with nations prior to their accepting GHG emissions budget – that is, joint implementation -- may offer a smoother path by which developing countries can “graduate” to full participation in the emissions budget regime. Such an approach, in actuality, may enable the incentives represented by the opportunity to participate in emissions trading to function more effectively. In addition, it may create a stream of economic revenue tied to environmental investments during the current period when many developing economies are stepping up investment in long-term energy and transportation infrastructure. Furthermore, we believe that the incentives for participation can be increased by offering non-annex I Parties that take a budget a growth allowance. With a budget explicitly accommodating growth, Parties opting in would enjoy the full benefits of international greenhouse gas trading without the transactions costs that may dominate joint implementation.<sup>4</sup>

Typically, the kinds of international transactions that would result in the transfer of GHG emissions reduction credits would have the mutual economic benefits to buyer and seller characteristic of trading: sellers would gain a new, additional sources of revenue and buyers would be able to achieve compliance at lower cost. Moreover, these transactions would bring a host of benefits crucial to the credibility, durability and environmental performance of a GHG protocol. First, the very opportunity afforded firms and sovereigns in the industrialized world to meet their GHG emissions budgets at reduced cost and with greater flexibility would enhance the acceptance and credibility of an international GHG regime.

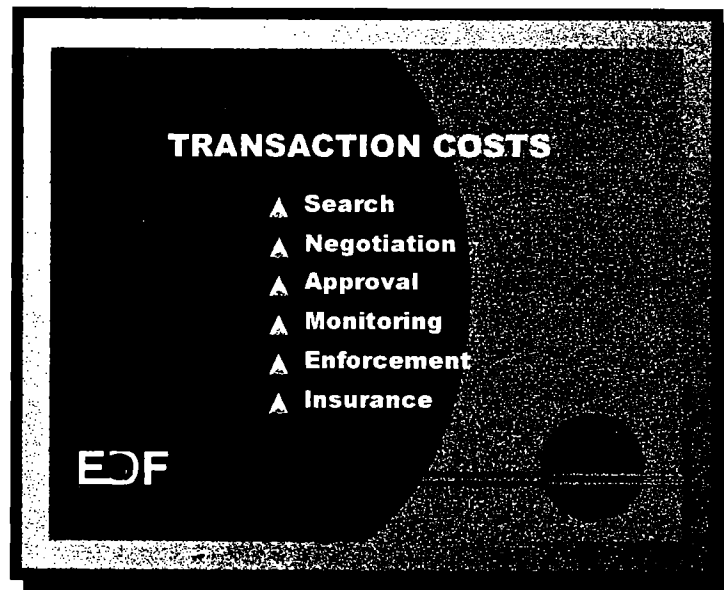
At the same time, those developing economies experiencing the greatest growth in the current economic time horizon are making substantial infrastructure investments whose environmental consequences, including GHG emissions, could have long-lasting effects for good or ill. Investments of the sort that yielded transactable GHG reductions for the host economy or the foreign investor simultaneously would help direct the host countries' economic growth along paths that were less, rather than more, GHG emissions-intensive. In addition to the environmental benefits that would result directly from this outcome, achieving growth in this way would make it that much easier for these countries to accept, eventually, a GHG emissions budget. As a result, the implicit gradualism in this strategy could speed and facilitate these countries' graduation to more rigorous international GHG obligations. In contrast, an approach which barred these countries from participating in international GHG emissions trading or joint

---

<sup>4</sup> For a more detailed discussion of this point see Dudek, Daniel J. and Jonathan Wiener, “Joint Implementation and Transaction Costs”, paper prepared for the Environment Directorate, Organization for Economic Cooperation and Development, Paris, 1996, 69 pp.

implementation *until after* they had accepted a GHG emissions budget could actually result in developing countries' finding it more difficult to accept such budgets.

By the same token, allowing developing countries to reap the benefits of engaging in GHG emissions trading even before they agreed to GHG emissions budgets could enhance the effectiveness of the incentive created by the promise of participation in trading following the imposition of a GHG emissions budget. Direct experience in the international GHG emissions trading market and direct enjoyment of the benefits of participation in the market could help persuade developing countries to move into the budget regime and to do so more quickly.

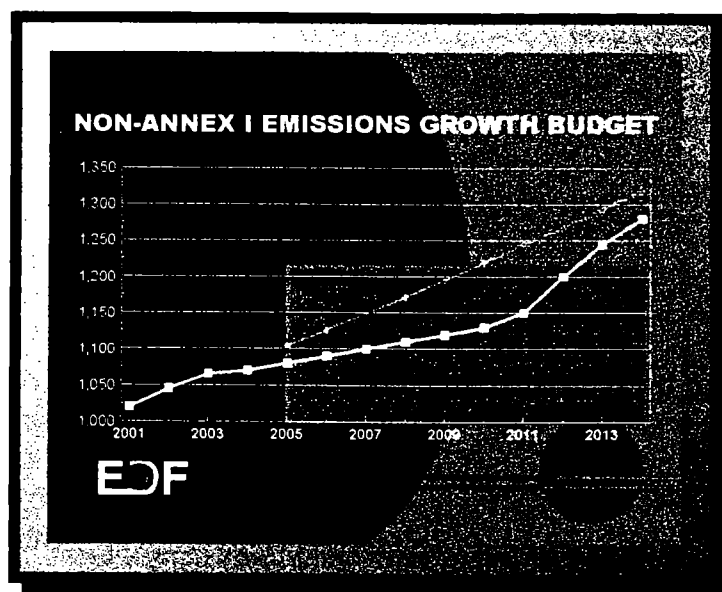


At first blush, this would seem to be a paradoxical result. Presumably, developing countries would be only too happy to reap the rewards of emissions trading without bearing the burden of a GHG emissions budget. In fact, participation in the emissions trading market under these circumstances inevitably will be significantly less advantageous and less lucrative for the exporting country than it would be for those countries that engage in trading while subject to a GHG emissions budget. It is this differential, which inevitably will be substantial, that will create the incentive for developing countries to adopt GHG emissions budget; yet, it is initially allowing countries to participate in emissions trading in the first place that will make the incentive more vivid and compelling.

This differential will arise from the contrast in transactions costs associated with trading where both affected sovereigns are subject to budgets and those associated with trades where the exporting nation is not subject to a budget. In the former case, as discussed at length above, the universal accounting and reporting system, backed by the discount and debt-carryover mechanisms, for countries subject to GHG

emissions budgets will render *all* transacted reductions surplus. As a result, firms and sovereigns engaging in such trades will have to incur few if any costs related to demonstrating that the reduction in question is surplus.

In the case of reductions exported by countries without GHG emissions budgets, however, the trading participants will be forced to incur significant costs in establishing that the reductions in question are truly surplus and can be used to offset emissions subject to GHG emissions budget requirements. This will be the case no matter how liberal the protocol may be or how dominant the constituencies seeking to encourage or facilitate joint implementation may be. In addition to meeting tests that may seek to establish not only “additionality” but “but for” causality as well, joint implementation projects may be required to demonstrate also that their emissions reductions are not merely the result of shifting emissions generation to other firms or activities. Proponents of joint implementation transactions will also incur the costs associated with seeking the approval of as many as three authorities -- that of the host country, that of the country against whose compliance requirements the reductions are being offered and possibly that of an international body that may be created for the purpose by the protocol itself.

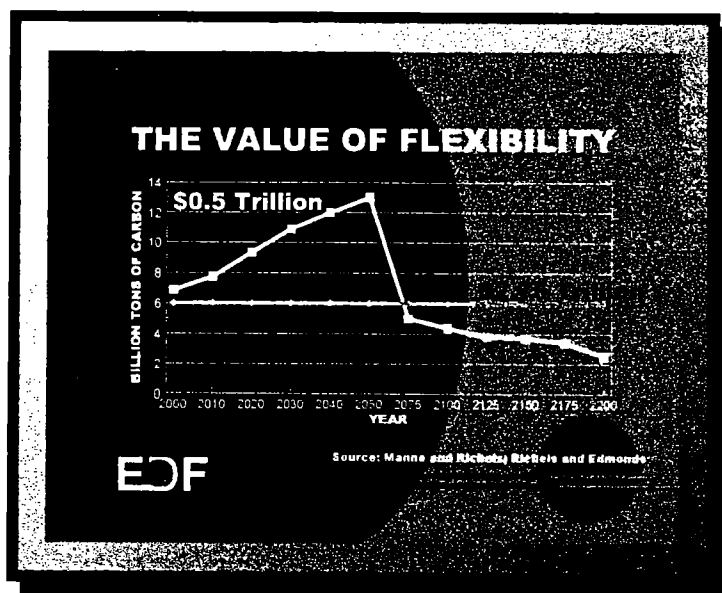


Meanwhile, thanks to the certification that reductions are surplus that is built into the very mechanics of reporting, parties to GHG trading in the emissions budget context will face none of these burdens and costs. As a result, they are likely to seek reductions from countries subject to GHG emissions budgets as a first preference and offer prices commensurate with the reliability and minimization of transactions costs characteristic of that context. In competing against that preference, sovereigns and firms without budgets will suffer smaller demand and lower prices for their reductions.

With experience, these nations will come to identify an economic advantage that the emissions trading market can confer on those that accept budgets.

To facilitate developing countries' response to this incentive, the protocol should specify a fixed formula to be universally applied to developing countries when they elect to adopt a GHG emissions budget. While the formula can include an advantage for those nations that act more quickly, applying a pre-established set of specifications, and thus eliminating case-by-case negotiations, will ensure the integrity of the system of budgets imposed on developing countries. As a result, this approach can be tailored to address the pressing demand of developing countries: that the perceived need for rapid economic growth, comparable to that enjoyed by industrialized nations earlier in their economic history be accommodated. Specifically, for the initial budget period or periods developing countries can be subject to "growth budgets" calculated, for example, as a function of current emissions with a small-percentage margin for increase over a certain time horizon. At the end of the horizon, which can be set at a length that would be greater for those nations that begin their budget commitments earlier, they would be subject to the same reduction path applicable to all nations.

## CONCLUSION



This paper has attempted to articulate the framework for an international greenhouse gas trading regime and to elucidate the importance of the elements of that framework for its effective functioning. As the international community rapidly moves toward the adoption of a protocol to limit greenhouse gas emissions, building an international understanding of the practicality and desirability of emissions trading is

essential if agreement is to be reached in Kyoto. Only a system of international emissions trading can effectively span the diversity of national interests, legal systems, norms, implementation strategies, and preferences represented among the community of nations. The very essence of emissions trading is choice -- the ability to choose when, where, and how much.

At the same time, only emissions trading has the capacity to modulate both total cost as well as the distribution of costs among nations. Economic analyses of greenhouse gas control are remarkably uniform in ascribing huge cost savings to emissions trading. The key to delivering these cost savings is the creation of a framework for trading which reduces transactions costs, provides environmental and financial credibility, and rewards innovation. This paper has identified the minimum elements necessary.



# GLOBAL CLIMATE COALITION

---

cc: AW  
JAF  
JS  
TR

19 February 1997

Dear Member of the Interagency Taskforce on Climate Change Policy:

Attached for your information is a letter from the Global Climate Coalition to Assistant Secretary Eileen Claussen outlining several concerns expressed by Coalition members with the January 17 "U.S. Draft Protocol Proposal."

Also attached are questions that the GCC believes need further clarification so that sound climate policies can be developed.

I hope you find this information useful.

Sincerely,

William F. O'Keefe  
Chairman



# GLOBAL CLIMATE COALITION

---

February 14, 1997

The Honorable Eileen Claussen  
Assistant Secretary of State for Oceans  
and International Environmental  
and Scientific Affairs  
Room 7831  
U.S. Department of State  
2201 C Street, NW  
Washington, D.C. 20520

Dear Ms. *Eileen* Claussen:

On behalf of the Global Climate Coalition, I want to thank you and other State Department officials for the time you set aside January 17 to brief interested parties about provisions in the "U.S. Draft Protocol Proposal" to the Framework Convention on Climate Change. In the interest of continuing that dialogue, I want to express several general impressions and to pose a number of questions prompted by this latest U.S. proposal and its predecessor last December.

First, we note the impressive effort evident in the proposal's elaborate policy architecture, given the short time allowed by the Secretariat to submit such documents. However, it is difficult to analyze the draft protocol and its implications until we are fully informed about the Administration's proposed target, timetables and policy tools--such as emissions trading--that have been proposed to implement a Kyoto agreement. The lack of detail denies the American public, labor and industry groups such as ours the ability to fully assess the merits of the U.S. draft protocol proposal, especially its implications for our nation's economic well-being. In our view, any protocol of this nature, were it ratified, may well result in policies, regulations and other measures many times more costly than they need be. Certainly, the growing body of economic analyses argues strongly against early actions that would be many times more costly but would produce no greater benefits than policies that were based on optimal timing.

As you know, our members strongly share the view that developing nations need to be part of any new Kyoto agreement. We have attached questions on

The Honorable Eileen Claussen  
February 14, 1997  
Page Two

this matter, as well as others. It is vitally important to establish in advance of the Kyoto meeting appropriate criteria for including developing countries and the resolve not to support any agreement that does not involve a specific schedule for active developing country participation. There is a political and equity argument why developing countries must be included in any new commitments. Would Americans accept a U.N. agreement that requires substantial personal, economic and lifestyle sacrifices, yet allows environmental gains, however distant or few, to first be marginalized and then completely overrun by the absence of active participation by developing nations, which will be the major emission sources in the next century? We think not, and urge the Administration to stand firm on developing country participation in any new agreement. At home, we urge you to make public as soon as possible the economic analyses on which your draft protocol proposal is based.

The GCC is encouraged by the stipulation that all greenhouse gases be included in any new agreement and by the attention given to the "free rider" problem. However, the GCC believes a number of points in this document require additional comment so that policymakers and the public may more precisely understand what U.S. representatives are preparing to negotiate in Kyoto. For example, how are the results of the Administration's economic analyses linked to the policy choices outlined in this draft protocol proposal? What, if any, institutional organizations need to be created or strengthened to implement the proposed tradable permits initiative? If international oversight is not contemplated, how would the integrity of such a system be protected, and by whom? Given the myriad of proposals now before the Parties, is the Administration concerned that important issues will not be resolved at the December meeting in Kyoto? If key issues are left unresolved, would the "Kyoto Agreement" be contingent on the satisfactory resolution of those issues by a time certain?

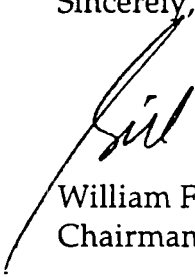
In short, we are encouraged by the Administration's January 17 effort to clarify its position regarding post-2000 greenhouse gas emissions, but we also are concerned by the important questions the draft protocol raises and does not answer. Rather than dwell on those concerns here, we enclose a list of some of the questions that we hope you can respond to before or after the Bonn meeting late this month.

The Global Climate Coalition appreciates this opportunity to comment on the U.S. draft protocol proposal. Be assured we will continue to participate

The Honorable Eileen Claussen  
February 14, 1997  
Page Three

constructively in this national and international debate seeking to identify realistic, flexible climate policies whose benefits are commensurate with costs.

Sincerely,

A handwritten signature in black ink, appearing to read "Bill", written over a diagonal line that extends from the top left towards the bottom left.

William F. O'Keefe  
Chairman

Attachment

cc: Federal Interagency Group on Climate Change Policy

**GLOBAL CLIMATE COALITION ENCLOSURE**  
**RE: SOME ISSUES CONCERNING U.S. NON-PAPER OF DECEMBER 1996**  
**AND U.S. DRAFT PROTOCOL FRAMEWORK OF JANUARY 17, 1997**

---

In asking these questions, we, of course, recognize that, in some cases, (such as Articles 2.7 and 4.6) you have not had an opportunity to spell out all of the details in the draft protocol and, of course, the specific target and timetable are absent. However, in other Articles, the lack of details raises issues and serious concerns. Our primary interest is in understanding what you intend or what you were thinking in crafting any particular Article, Annex, or provision in order for industry, labor and others to better understand the impact of the draft U.S. proposal and how it would be implemented from a practical sense should it or elements of it combined with proposals by other Parties be adopted in Kyoto.

Article 1 - Definitions

- A. The draft defines "Party" to mean a "Party to the Protocol". Annex A includes the Annex I Parties to the Convention that sign and ratify or accept the Protocol and Annex B includes such non-Annex I Parties to the Convention that want to be included in Annex B. Article 5.5 and 5.6 seem to suggest that other Convention Parties may become Parties to the Protocol. Is that intended? If the U.S. draft protocol or significant elements thereof are agreed to in Kyoto, could non-Annex I Parties to the Convention sign and ratify or accept the Protocol, have equal voting rights, and also not agree to be included in either Annex A or B?

Article 5 - Advancement of the Implementation of Article 4.1 of the Convention

- B. As drafted, Article 5 of the draft Protocol only applies to those Convention Parties who become Parties to the Protocol. Since Article 5 seems to impose new requirements or obligations, which you presumably believe are consistent with section 2.(b) of the Berlin Mandate Decision, on Protocol Parties in regards to Article 4.1 of the Convention, what is the incentive for non-Annex I Parties to the Convention (i.e. developing countries) to become Parties to the U.S. draft protocol and be subject to such requirements?
- C. Article 5.5 applies to non-Annex A and B Parties, while Article 5.7 applies to all Parties to the draft Protocol. Both include the words "no regrets measures" which are not defined. What are such measures? Is it true that "no regrets measures" are not necessarily "no risk measures"? Does Article 4.1 of the Convention provide for or require "no regrets measures" for any Party? If not, what is the application of Article 5.7(b) to Parties not subject to Article 5.5 of the draft Protocol?

Article 16 - Evolution

- D. There is concern that greenhouse gas emissions are growing rapidly in developing countries and that the Berlin Mandate precludes any new commitments applicable to such countries in any AGBM protocol or other legal instrument with the result that any such

instrument will not be fully global, will create economic and competitive disadvantages and will not be environmentally sound. We think a provision like Article 16 is needed for the developing countries, although we realize that it is only an agreement to agree. It does not, for example, include even a hint as to whether the agreement might, as minimum, be patterned after Article 5 of the Montreal Protocol. However, we are concerned that Article 16 (which, as drafted, now applies only to Protocol Parties) will not apply to developing country Parties to the Convention unless they become Protocol Parties and become Annex B Parties. Is it your intention that Article 16 should apply to developing country Parties to the Convention? What if they are not included in Annex B of the Protocol? Would that intention be better achieved by converting Article 16 to an amendment to the Convention?

- E. Do you contemplate that the process of implementation of Article 16 would be spelled out in a decision at COP3 by the Convention Parties or by the Parties to the Protocol at their first meeting after entry into force? Are you concerned that some Parties to the Convention might delay signing and ratifying the draft Protocol until they see the results of the process under Article 16, particularly if the delaying Parties are developing countries with significant growth in greenhouse gases?
- F. Annex B states that it includes Convention Parties "not listed in Annex A" that "indicate" they want to be "included" in Annex B. One country that immediately comes to mind because of its recent accession to the OECD would, based on Administration testimony in the House Commerce Committee last September, seem to be Korea which is a U.S. trading partner. However, we understand that an OECD document entitled "Korea's Accession Revised Draft Report to the Council" and dated last August states in paragraph 24 of an Annex entitled "Korean Undertakings" that: "For purposes of future negotiations and agreements, Korea would not choose to be classified as a developing country, except in the areas of agriculture and the UN Framework Convention on Climate Change." If the U.S. draft protocol was agreed to in Kyoto, is Korea committed as an OECD member to becoming a Party subject to Articles 5 and 16, but not Annex A or B, or does it mean that, as a developing country Korea could choose not to become a Protocol Party?
- G. As you know, non-Annex I Parties are participating in negotiations for new commitments for Annex I Parties, while they enjoy an exemption from new commitments. However, Article 16 provides no similar exemption for Annex I Parties. Why should Article 16 which calls for new and progressive "quantitative greenhouse gas emissions obligations" based on some future "agreed criteria" be applicable to Annex A Parties to the Protocol, including the U.S., since the U.S. draft of the Kyoto protocol otherwise applies to them and imposes new obligations on them beyond those in Article 4.1 and 2 of the Convention? What new obligations for Annex A Parties do you contemplate in the Article 16 process? Does, for example, this mean that under Article 4.1(b) Annex I Parties, like the U.S., by signing the Protocol are agreeing to reductions beyond the requirements of Article 2 of the draft protocol?

Article 2 - Emissions Budgets

- H. We observe that Section III of the December Non-Paper called for "focusing" negotiations on a "binding, medium-term emissions target" and expressed interest in working toward a "longer-term concentration goal". However, Article 2.3 appears to call for a second target or "budget period" before there is an agreement by non-Annex A and B Parties to the Protocol that are developing countries to negotiate "quantitative greenhouse gas emissions obligations" under Article 16 and to adopt such obligations by [2005]. Does this second target send the wrong signals to the developing countries who agree to become Parties to the draft protocol and are subject to Article 16? Why is it in the best economic and competitive interests of the United States to offer a second target and timetable before negotiations with all Parties to the Convention in the AGBM begin and before the U.S. analysis and assessment and its assumptions are provided to Congress, industry, labor, environmentalists, and others? What is the need?
- I. The Non-Paper states that the U.S. "strongly urges consideration of banking" and that multi-year averaging would give Parties "important flexibility". However, Article 2.5 seems to weaken that support for banking by providing that emissions of tonnes "may" (not "shall") be carried over and added to the "next budget period". That leaves uncertainty for industry and suggests that a Party like the U.S., might retire such tonnes rather than bank them which could have future economic and competitive consequences. Why did you take this discretionary approach? Why not follow the mandatory approach of Article 2.6? The Article does not specifically mention multi-year averaging. Why? Is it implied?

Article 6 - International Emissions Trading

- J. As the chief proponent of an emissions trading program, the U.S. in its December Non-Paper said it was "critical" that provisions for "international" emissions trading "be included in the Kyoto agreement." When Title IV of the Clean Air Act (CAA) was signed into law, it spelled out in great detail the allowance program for existing and new electric utility units, including the timetable, the target, the cap, the trading system, the nature of the allowances, the rights of allowance holders, the tracking system, and the limitations. Upon enactment, the utility industry knew the program details and could plan their future. That program, which applied equally to all covered units of the electric utility industry, is for one industry with an identified and limited number of sources and it is a national trading program. Presumably, an international trading program will cover many industries, sectors, and gases on an international scale. However, our review of Article 6 of the draft protocol provides none of the details of an international trading program. It merely authorizes trading between Annex A and B Parties that establish a "mechanism" for certifying and verifying trades. It does not require that a trading program be established by all such Parties or that such a "mechanism" be put "in place" or that it be operated uniformly. All the important details are missing.

Do you intend to include these "critical" provisions in the protocol to be adopted in Kyoto or do you plan to defer development of such provisions to a post Kyoto legal instrument, to a decision of the Parties to the Protocol after it enters into force, to bilateral negotiations between Parties, or some other means?

- K. Article 6 provides that a Party "may authorize" any domestic entity to participate in actions "leading to transfer" of tonnes. What "actions" do you have in mind for this entity? In the case of the CAA, the trades are between utilities with reporting to the Environmental Protection Agency. Is that same approach likely to be accepted on an international scale if the domestic entity is a non-governmental organization in one country and a government agency in another?
- L. As noted, Article 6 authorizes trading between Parties. However, unlike the CAA no mention is made of trading by private sector entities that will likely need such trading to operate. Also, unlike the CAA it does not allocate, or provide for an allocation of, the initial tonnes for various industries and sources to operate or indicate whether such industries and sources will be faced with penalties for continuing to operate without such allocation if such a program is initiated.

It only allows private sector entities, after receiving authorization from a Party, to "participate in actions leading to transfer and receipt..." of carbon equivalent emissions. Therefore, it appears that private sector entities can only suggest to Parties that certain emissions trading transactions take place. This imposes significant constraints on private sector international emissions trading, establishes a bureaucracy involving two separate governments or their designees between the private sector and the completion of trades, lowers any possible expectation that private sector entities would receive any benefit from trades, and makes the private sector subservient to the political and policy whims of governments in order to carry out what industry does best, i.e., produce goods and services and employ workers.

The wording of Article 7 on Joint Implementation carries the same structure and constraints. Under Article 7.1, any Party can generate tonnes of carbon equivalent emissions. Under Article 7.5, only Annex A or B Parties may acquire those tonnes of carbon equivalent emissions. And under Article 7.6, private sector entities, even after receiving authorization from a Party, are limited to "participat[ing] in actions leading to generation, transfer and receipt under this Article of tonnes of carbon equivalent emissions." Again, the private sector entities cannot, themselves, engage in emissions trading.

The proposed construction of Articles 6 and 7 and lack of details would appear to virtually eliminate the functioning of an international market in tradable permits. Instead, trading, as noted, can occur only between governments. The type of trading activity that would occur between governments, as a practical matter, would likely bear little resemblance to the trading activity that would be expected to occur in a private sector international tradable permits market if the program works as its proponents contend. Is the Administration intending an international governmental trading system? Who will

make the trades, pay for the tonnes, and receive the tonnes and money? If not, when will we learn the details for evaluation by industry, labor, and others?

Article 3 - Measurement and Reporting

- M. Article 3.5 suggests that the transfers of tonnes of carbon equivalent emissions under Articles 6 and 7 would be reported to the Convention Secretariat annually. Do you intend that the Secretariat would perform the role in trading that EPA does under Title IV of the CAA and if so is annual reporting adequate? If not, what entity should perform that role and what is the purpose and need for a Party to also report to the Secretariat? What are the advantages and disadvantages to the U.S. of an international entity performing the EPA-type role in trading?

Article 7 - Joint Implementation (JI)

- N. Article 7.2(b) uses the term "additional" which is not defined or explained. The definition of "additional" and the methodology for calculating greenhouse gas reductions from JI projects must be determined in order to estimate the magnitude of the cost savings due to JI. How will the Administration obtain this information in order to factor the cost savings of JI into its economic analysis?

**GLOBAL CLIMATE COALITION ENCLOSURE**  
**RE: SOME ISSUES CONCERNING U.S. NON-PAPER OF DECEMBER 1996**  
**AND U.S. DRAFT PROTOCOL FRAMEWORK OF JANUARY 17, 1997**

---

In asking these questions, we, of course, recognize that, in some cases, (such as Articles 2.7 and 4.6) you have not had an opportunity to spell out all of the details in the draft protocol and, of course, the specific target and timetable are absent. However, in other Articles, the lack of details raises issues and serious concerns. Our primary interest is in understanding what you intend or what you were thinking in crafting any particular Article, Annex, or provision in order for industry, labor and others to better understand the impact of the draft U.S. proposal and how it would be implemented from a practical sense should it or elements of it combined with proposals by other Parties be adopted in Kyoto.

Article 1 - Definitions

- A. The draft defines "Party" to mean a "Party to the Protocol". Annex A includes the Annex I Parties to the Convention that sign and ratify or accept the Protocol and Annex B includes such non-Annex I Parties to the Convention that want to be included in Annex B. Article 5.5 and 5.6 seem to suggest that other Convention Parties may become Parties to the Protocol. Is that intended? If the U.S. draft protocol or significant elements thereof are agreed to in Kyoto, could non-Annex I Parties to the Convention sign and ratify or accept the Protocol, have equal voting rights, and also not agree to be included in either Annex A or B?

Article 5 - Advancement of the Implementation of Article 4.1 of the Convention

- B. As drafted, Article 5 of the draft Protocol only applies to those Convention Parties who become Parties to the Protocol. Since Article 5 seems to impose new requirements or obligations, which you presumably believe are consistent with section 2.(b) of the Berlin Mandate Decision, on Protocol Parties in regards to Article 4.1 of the Convention, what is the incentive for non-Annex I Parties to the Convention (i.e. developing countries) to become Parties to the U.S. draft protocol and be subject to such requirements?
- C. Article 5.5 applies to non-Annex A and B Parties, while Article 5.7 applies to all Parties to the draft Protocol. Both include the words "no regrets measures" which are not defined. What are such measures? Is it true that "no regrets measures" are not necessarily "no risk measures"? Does Article 4.1 of the Convention provide for or require "no regrets measures" for any Party? If not, what is the application of Article 5.7(b) to Parties not subject to Article 5.5 of the draft Protocol?

Article 16 - Evolution

- D. There is concern that greenhouse gas emissions are growing rapidly in developing countries and that the Berlin Mandate precludes any new commitments applicable to such countries in any AGBM protocol or other legal instrument with the result that any such

instrument will not be fully global, will create economic and competitive disadvantages and will not be environmentally sound. We think a provision like Article 16 is needed for the developing countries, although we realize that it is only an agreement to agree. It does not, for example, include even a hint as to whether the agreement might, as minimum, be patterned after Article 5 of the Montreal Protocol. However, we are concerned that Article 16 (which, as drafted, now applies only to Protocol Parties) will not apply to developing country Parties to the Convention unless they become Protocol Parties and become Annex B Parties. Is it your intention that Article 16 should apply to developing country Parties to the Convention? What if they are not included in Annex B of the Protocol? Would that intention be better achieved by converting Article 16 to an amendment to the Convention?

- E. Do you contemplate that the process of implementation of Article 16 would be spelled out in a decision at COP3 by the Convention Parties or by the Parties to the Protocol at their first meeting after entry into force? Are you concerned that some Parties to the Convention might delay signing and ratifying the draft Protocol until they see the results of the process under Article 16, particularly if the delaying Parties are developing countries with significant growth in greenhouse gases?
- F. Annex B states that it includes Convention Parties "not listed in Annex A" that "indicate" they want to be "included" in Annex B. One country that immediately comes to mind because of its recent accession to the OECD would, based on Administration testimony in the House Commerce Committee last September, seem to be Korea which is a U.S. trading partner. However, we understand that an OECD document entitled "Korea's Accession Revised Draft Report to the Council" and dated last August states in paragraph 24 of an Annex entitled "Korean Undertakings" that: "For purposes of future negotiations and agreements, Korea would not choose to be classified as a developing country, except in the areas of agriculture and the UN Framework Convention on Climate Change." If the U.S. draft protocol was agreed to in Kyoto, is Korea committed as an OECD member to becoming a Party subject to Articles 5 and 16, but not Annex A or B, or does it mean that, as a developing country Korea could choose not to become a Protocol Party?
- G. As you know, non-Annex I Parties are participating in negotiations for new commitments for Annex I Parties, while they enjoy an exemption from new commitments. However, Article 16 provides no similar exemption for Annex I Parties. Why should Article 16 which calls for new and progressive "quantitative greenhouse gas emissions obligations" based on some future "agreed criteria" be applicable to Annex A Parties to the Protocol, including the U.S., since the U.S. draft of the Kyoto protocol otherwise applies to them and imposes new obligations on them beyond those in Article 4.1 and 2 of the Convention? What new obligations for Annex A Parties do you contemplate in the Article 16 process? Does, for example, this mean that under Article 4.1(b) Annex I Parties, like the U.S., by signing the Protocol are agreeing to reductions beyond the requirements of Article 2 of the draft protocol?

Article 2 - Emissions Budgets

- H. We observe that Section III of the December Non-Paper called for "focusing" negotiations on a "binding, medium-term emissions target" and expressed interest in working toward a "longer-term concentration goal". However, Article 2.3 appears to call for a second target or "budget period" before there is an agreement by non-Annex A and B Parties to the Protocol that are developing countries to negotiate "quantitative greenhouse gas emissions obligations" under Article 16 and to adopt such obligations by [2005]. Does this second target send the wrong signals to the developing countries who agree to become Parties to the draft protocol and are subject to Article 16? Why is it in the best economic and competitive interests of the United States to offer a second target and timetable before negotiations with all Parties to the Convention in the AGBM begin and before the U.S. analysis and assessment and its assumptions are provided to Congress, industry, labor, environmentalists, and others? What is the need?
- I. The Non-Paper states that the U.S. "strongly urges consideration of banking" and that multi-year averaging would give Parties "important flexibility". However, Article 2.5 seems to weaken that support for banking by providing that emissions of tonnes "may" (not "shall") be carried over and added to the "next budget period". That leaves uncertainty for industry and suggests that a Party like the U.S., might retire such tonnes rather than bank them which could have future economic and competitive consequences. Why did you take this discretionary approach? Why not follow the mandatory approach of Article 2.6? The Article does not specifically mention multi-year averaging. Why? Is it implied?

Article 6 - International Emissions Trading

- J. As the chief proponent of an emissions trading program, the U.S. in its December Non-Paper said it was "critical" that provisions for "international" emissions trading "be included in the Kyoto agreement." When Title IV of the Clean Air Act (CAA) was signed into law, it spelled out in great detail the allowance program for existing and new electric utility units, including the timetable, the target, the cap, the trading system, the nature of the allowances, the rights of allowance holders, the tracking system, and the limitations. Upon enactment, the utility industry knew the program details and could plan their future. That program, which applied equally to all covered units of the electric utility industry, is for one industry with an identified and limited number of sources and it is a national trading program. Presumably, an international trading program will cover many industries, sectors, and gases on an international scale. However, our review of Article 6 of the draft protocol provides none of the details of an international trading program. It merely authorizes trading between Annex A and B Parties that establish a "mechanism" for certifying and verifying trades. It does not require that a trading program be established by all such Parties or that such a "mechanism" be put "in place" or that it be operated uniformly. All the important details are missing.

Do you intend to include these "critical" provisions in the protocol to be adopted in Kyoto or do you plan to defer development of such provisions to a post Kyoto legal instrument, to a decision of the Parties to the Protocol after it enters into force, to bilateral negotiations between Parties, or some other means?

- K. Article 6 provides that a Party "may authorize" any domestic entity to participate in actions "leading to transfer" of tonnes. What "actions" do you have in mind for this entity? In the case of the CAA, the trades are between utilities with reporting to the Environmental Protection Agency. Is that same approach likely to be accepted on an international scale if the domestic entity is a non-governmental organization in one country and a government agency in another?
- L. As noted, Article 6 authorizes trading between Parties. However, unlike the CAA no mention is made of trading by private sector entities that will likely need such trading to operate. Also, unlike the CAA it does not allocate, or provide for an allocation of, the initial tonnes for various industries and sources to operate or indicate whether such industries and sources will be faced with penalties for continuing to operate without such allocation if such a program is initiated.

It only allows private sector entities, after receiving authorization from a Party, to "participate in actions leading to transfer and receipt..." of carbon equivalent emissions. Therefore, it appears that private sector entities can only suggest to Parties that certain emissions trading transactions take place. This imposes significant constraints on private sector international emissions trading, establishes a bureaucracy involving two separate governments or their designees between the private sector and the completion of trades, lowers any possible expectation that private sector entities would receive any benefit from trades, and makes the private sector subservient to the political and policy whims of governments in order to carry out what industry does best, i.e., produce goods and services and employ workers.

The wording of Article 7 on Joint Implementation carries the same structure and constraints. Under Article 7.1, any Party can generate tonnes of carbon equivalent emissions. Under Article 7.5, only Annex A or B Parties may acquire those tonnes of carbon equivalent emissions. And under Article 7.6, private sector entities, even after receiving authorization from a Party, are limited to "participat[ing] in actions leading to generation, transfer and receipt under this Article of tonnes of carbon equivalent emissions." Again, the private sector entities cannot, themselves, engage in emissions trading.

The proposed construction of Articles 6 and 7 and lack of details would appear to virtually eliminate the functioning of an international market in tradable permits. Instead, trading, as noted, can occur only between governments. The type of trading activity that would occur between governments, as a practical matter, would likely bear little resemblance to the trading activity that would be expected to occur in a private sector international tradable permits market if the program works as its proponents contend. Is the Administration intending an international governmental trading system? Who will

make the trades, pay for the tonnes, and receive the tonnes and money? If not, when will we learn the details for evaluation by industry, labor, and others?

Article 3 - Measurement and Reporting

- M. Article 3.5 suggests that the transfers of tonnes of carbon equivalent emissions under Articles 6 and 7 would be reported to the Convention Secretariat annually. Do you intend that the Secretariat would perform the role in trading that EPA does under Title IV of the CAA and if so is annual reporting adequate? If not, what entity should perform that role and what is the purpose and need for a Party to also report to the Secretariat? What are the advantages and disadvantages to the U.S. of an international entity performing the EPA-type role in trading?

Article 7 - Joint Implementation (JI)

- N. Article 7.2(b) uses the term "additional" which is not defined or explained. The definition of "additional" and the methodology for calculating greenhouse gas reductions from JI projects must be determined in order to estimate the magnitude of the cost savings due to JI. How will the Administration obtain this information in order to factor the cost savings of JI into its economic analysis?