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OA/ID Number: 62057
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Folder Title:

White House Conference on Science and Economics Related to Global Change - 4/90 [3 of 3]

Stack:

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Dr. Frank Press
President of the
National Academy of Sciences

and

Dr. Robert M. White
President of the
National Academy of Engineering

request the pleasure of your company
at a reception

honoring the International Delegates

to The White House Conference

on

Science and Economics Research
Related to Global Change

Tuesday, April seventeenth
six to seven-thirty o'clock

National Academies of Sciences and Engineering

Reply card enclosed

Between 21st and 22nd Streets
C Street Entrance

Manuel Lujan Jr.
Secretary of the Interior

and

Clayton Yeutter
Secretary of Agriculture

request the pleasure of your company
at a breakfast

honoring the
Heads of the International Delegations

to

The White House Conference

on

Science and Economics Research
Related to Global Change

Tuesday, April seventeenth
seven-thirty to eight-thirty o'clock

J.W. Marriott Hotel
Washington, DC

R.s.v.p.
452-8352

14th Street Entrance
Commerce Room

Dr. Ronald W. Roskens
Administrator
Agency for International Development
requests the pleasure of your company
at a luncheon

in honor of the delegations from

Brazil
India
Indonesia
Mexico
Nigeria
Poland
Zaire

to

The White House Conference

on

Science and Economics Research
Related to Global Change

Monday, April sixteenth
one o'clock

The J.W. Marriott Hotel
Washington, DC

R.s.v.p.
452-8352

14th Street Entrance
Capitol Ballroom, Salon D

Lawrence S. Eagleburger
Deputy Secretary of State

requests the pleasure of your company
at a dinner

in honor of the International Delegation

to

The White House Conference

on

Science and Economics Research
Related to Global Change

Tuesday, April seventeenth
seven-thirty to ten o'clock

Diplomatic Reception Rooms
Department of State
Washington, DC

R.s.v.p.

202-452-8352

Business Attire

*The Secretary of the Smithsonian Institution
The Secretary of Commerce
and
The Director of the National Air
and Space Museum*

*request the pleasure of your company
at a reception*

*in honor of the
the International Delegation
to
The White House Conference
on
Science and Economics Research
Related to Global Change*

*Monday, April sixteenth
seven to eight-thirty o'clock*

*National Air and Space Museum
Independence Avenue at Sixth Street, Southwest
Washington, DC*

Reply card enclosed

Business Attire

*The White House Conference
on
Science and Economics Research Related to Global Change*

National Air and Space Museum

April 16, 1990

I/We are able to attend the reception

Name(s) Dr. D. Allan Bromley

I/We are unable to attend the reception

Name(s) _____

For further information, please call (202) 452-8352

DR Bromley ⁴¹⁵ Gladwin Clinic Corp

These are the 3 documents
which are "cleared" so far in the
new, improved system for the
Conference.

There is nothing new in these -
just wordsmithing and editing.
I will update as new ones
come out

Document Originally
Attached to
Following Page

NM

**White House Conference on Science and Economics Research
Related to Global Change**

Documents cleared through the Conference Clearance System (set up in late March by Harris and Davis - includes Cicconi's process as well as clearance by Sununu's office)

1. April 4, 1990

Three documents were "cleared" on behalf of the Co-Chairmen by the Co-Chairmen's representatives (Maynard, Gruenspecht, and Struhs).

The words (or some earlier version thereof) in all three documents have been previously cleared by the Chairmen, or they have been pulled from the President's (or other Administration official) speeches

The documents are:

- a. Overview of the Conference**
- b. Fact Sheet (updated from the original distributed in brown booklet)**
- c. Global Stewardship Statement (will be published as a brochure)**

White House
Conference on Science and Economics Research
Related to Global Change

Memorandum

To: CEA, CEO, OSTP

From: The Secretariat

Subject: Overview of the Conference

Date: April 4, 1990

Time: 8 : 15 am/pm

The final draft of the document described above appropriately reflects the comments received through the staff review process. The content is therefore approved for production.

Thank you *H. G. [unclear] for Michael [unclear]*
9/4/90 D. Strick for Mike [unclear]
4/4/90 [unclear] for D. Alan Bromley

THE WHITE HOUSE CONFERENCE
on
SCIENCE AND ECONOMICS RESEARCH
Related to
GLOBAL CHANGE

April 17-18, 1990
Washington, D.C.

OVERVIEW OF THE CONFERENCE

GOALS AND OBJECTIVES OF THE CONFERENCE:

President George Bush invited the Heads of State from seventeen nations and the leadership of the E.C. and the OECD to send ministerial-level delegations to the White House Conference on Science and Economics Related to Global Change. The Conference is designed to bring together government leaders in science, economics, energy, and the environment concerned with the central research issues of Global Change. The Conference is designed to advance understanding of Global Change phenomena, to enhance international cooperation, and to build the basis for future efforts among nations to integrate more fully science and economics research into the policy process. The Conference adds a new dimension to the international dialogue on Global Change -- the proposition that economics, both analysis and research on economic policy and economic consequences, is an essential link between the science of Global Change and policy alternatives. Science and economics research can also serve to identify and develop technologies and policy instruments that relax the tension between growth and Global Change, allowing for greater progress on both fronts. To address these broad goals, the Conference will:

- **Focus on science and economics research** issues relevant to policy on Global Change,
- Address important next steps to substantially **enhance and broaden international understanding** of science and economic research issues that relate to Global Change,
- **Highlight the special role that economics plays** in integrating the science of Global Change with the policy process,
- **Demonstrate linkages between science and economics** research and domestic and international policy processes, and

- Seek to take the initial steps toward **implementing joint international science and economics research efforts.**

The Conference is conceived as an integral part of the ongoing international process to understand the science of and policy options relating to global environment issues. The need to substantially improve understanding of both the science and economics of Global Change has been noted by many world leaders. The Conference, therefore, focuses on science and economics research issues as a complement to the on-going Intergovernmental Panel on Climate Change (IPCC) and other international forums that seek to address the issue of Global Change. It is hoped that the results of the Conference will contribute to the IPCC process and other ongoing international debates and actions.

The Conference focuses on "Global Change," an area of research concerned with understanding the fundamental processes that govern the the Earth system functions. Global Change encompasses such diverse and interrelated issues as ozone depletion, greenhouse gases, climate change, food security, water supply, sea level changes, wetlands, deforestation, biodiversity, population change, and energy demand.

The Conference will provide a forum for international leaders to address the complex science and economics research issues central to the policy process, including:

- How well can we predict temperature trends in the decades ahead?
- How "good" are our global scale models, such as models to predict temperature changes?
- How well can we predict the interconnections between global environmental change and the resulting social and economic impacts?
- What are the economic consequences of adapting to or mitigating global change?
- How "good" are the models used to assess these economic consequences and their impact on the well-being of humanity?

By addressing such questions, it is hoped that the nations might pledge to enhance joint international research efforts that focus on rapid improvement of both scientific and economic knowledge and development of the necessary infrastructure to implement such efforts.

To address these complex and interrelated issues, President Bush invited nations to send delegations, led by ministerial-level officials, from a small group of nations. The Conference was conceived with the idea that a representative group of countries would be invited to participate. Their selection was based on the simple criteria that the meeting should include countries or organizations of countries that have substantial populations, large land masses, industrialized economies, heavy future energy needs, major research infrastructures, or have provided international leadership on issues related to climate and Global Change. These countries and organizations were selected:

1. Australia
2. Brazil
3. Canada
4. Federal Republic of Germany
5. France
6. India
7. Indonesia
8. Italy
9. Japan
10. Mexico
11. Netherlands
12. Nigeria
13. Norway
14. Poland
15. Soviet Union
16. United Kingdom
17. Zaire
18. European Community
19. OECD

THE EXPECTED RESULTS OF THE CONFERENCE:

The Conference will provide an opportunity to address the science and economics research issues related to Global Change in the context of the policy process. To accomplish these goals, the Conference will focus on and seek to promote:

- A substantially enhanced understanding of the scientific, economic, and environmental research agenda central to the needs of future Global Change policy development.
- A substantive understanding of the uncertainties in both science and economics knowledge of changes in the global environment of the planet.

- Increased mutual understanding of and sensitivity to the substance of science and economics research between both of those research communities.
- Increased sensitivity by the two research communities to the policy needs evolving in such areas as environmental and energy policy, and vice versa. ✓
- A solid and well implemented science and economics research effort as a pre-requisite for a complement to evolving efforts by nations to address the international policy questions of global environmental changes.
- A communication network among national leaders concerned with, and responsible for, the research and policy agenda related to Global Change. More particularly, this Conference provides a "first-ever" opportunity to forge a partnership between the science and economics research communities and the policy-makers.

To provide a vehicle to focus on these vital issues, the Conference will include two Plenary Sessions and several concurrent Working Groups, which will address the three major themes of the Conference:

- The Science and Economics Research Challenge
- Integrating Science and Economics Research in the Policy Process
- Building a Partnership for Science and Economics Research

The Conference is expected to produce ^a Co-chairmen's Report, which will outline the deliberations of the Conference and set forth common actions designed to expand research and cooperation among nations. ✓

As President Bush stated in his invitation letter, "It is my hope that the expertise, experience, and data available in our respective countries can be brought together in a more integrated and coherent fashion. By working together, our nations can enhance international cooperation in these vital areas and contribute to the success of the ongoing IPCC process."

White House
Conference on Science and Economics Research
Related to Global Change

Memorandum

To: CEA, CEQ, OSTP

From: The Secretariat

Subject: Fact sheet

Date: April 4, 1990

Time: 8:25 am/pm

The final draft of the document described above appropriately reflects the comments received through the staff review process. The content is therefore approved for production.

Thank you

Howard Hampton for MTB
Clay May for P.A. Baily
David B. Sturges 4/4/90

OK by Gumpelt
for Bush

OK for Deland
by Strub

FACT SHEET
for
THE WHITE HOUSE CONFERENCE
on
SCIENCE AND ECONOMICS RESEARCH
RELATED TO GLOBAL CHANGE

w/ changes
in red ink.

April 17-18, 1990
Washington, D.C.

PBS

4/4/90

On February 5, 1990, the President invited the Heads of State from seventeen countries, the European Community (EC) and the Organization for Economic Cooperation and Development (OECD) to send ministerial-level delegates to a White House Conference on Science and Economics Research Related to Global Change.

The Conference will be held in Washington, D.C. on April 17-18, 1990.

The President first indicated his intention to host such a Conference on this subject during his Summit meetings with President Gorbachev, on December 4, 1989, and later on ~~Monday~~ February 5, 1990, during his speech to the United Nations Intergovernmental Panel on Climate Change.

~~The Conference will be devoted to science and economics research issues relevant to policy on global change, including climate. The Conference is designed to address important next steps that for substantially enhance and broaden international understanding of science and economics research issues that related to global change. Further, The Conference seeks to frame the initial steps towards a strategy for implementing joint international science and economics research efforts. It also seeks to integrate and link scientific and economic research results to both the domestic and international policy process, and because it seeks for the first time to join research issues central to both the science and the economics related to global change.~~

→ for the first time

The Conference focuses on "Global Change," a scope of research interest that has evolved out of the science that concerns itself with understanding the ~~fundamental~~ processes that govern the way the global Earth functions. Thus, the research agenda not only as well as includes scientific and economics research issues related to global

natural

~~climate change, but also includes other important global processes.~~

The conference is conceived as an integral part of the ongoing international process of trying to understand changes in the global environment. The need for substantially improved understanding of both the science and economics of global change has been noted by virtually all world leaders. This Conference will focus on ~~scientific and economic research issues~~ ^{Scientific} as a complementary effort to the ongoing Intergovernmental Panel on Climate Change (IPCC) ~~and other upcoming international meetings that seek to address the serious policy issues that evolve out of the concerns for the changes in the global environment, particularly climate change.~~ The President strongly supports the IPCC efforts and expects that the results of the Conference will contribute to the on-going international debate on ~~these~~ issues. ~~For example, the leadership of the~~ Dr. Bert R. Rein, the

~~Intergovernmental Panel on Climate Change has been invited to take an active role in the Conference.~~

The Conference will convene a delegation of three ministerial-level officials from a representative group of nations, each representing ~~one of three disciplines~~ ^(i.e.) science, economics, and the environment ^{energy}.

~~The Conference was conceived with the idea that a small representative group of countries would be invited to participate. Their selection is based on the simple criteria that the meeting should include countries or representatives of country interests that have substantial populations, large land masses, industrialized economies or heavy future energy needs, substantial research infrastructures, or have provided international leadership on issues related to climate and global change. A representative group of countries has been selected.~~ ^{nts were invited} The President has asked the Heads of State of the following countries and organizations to send a delegation: [So to list]

and other upcoming international meetings that seek to address the serious policy issues that evolve out of the concerns for the changes in the global environment, particularly climate change. The President strongly supports the IPCC efforts and expects that the results of the Conference will contribute to the on-going international debate on these issues. For example, the leadership of the Intergovernmental Panel on Climate Change has been invited to take an active role in the Conference.

The Conference will convene a delegation of three ministerial-level officials from a representative group of nations, each representing one of three disciplines: science, economics, and the environment. The Conference was conceived with the idea that a small representative group of countries would be invited to participate; their selection is based on the simple criteria that the meeting should include countries or representatives of country interests that have substantial populations, large land masses, industrialized economies or heavy future energy needs, substantial research infrastructures, or have provided international leadership on issues related to climate and global change. A representative group of countries has been selected. The President has asked the Heads of State of the following countries and organizations to send a delegation:

1. Australia
2. Brazil
3. Canada
4. Federal Republic of Germany
5. France
6. India
7. Indonesia
8. Italy
9. Japan
10. Mexico
11. Netherlands
12. Nigeria
13. Norway
14. Poland
15. Soviet Union
16. United Kingdom
17. Zaire
18. European Community (EC)
19. Organization for Economic Cooperation and Development (OECD)

It is expected that each country or organization will send a ministerial-level official to represent ~~each of their agencies of~~ science, economics, ^{energy} and the environment, ~~together with no more than two staff associates per official.~~ It is suggested that one delegate

repeated

relevant including agencies

in each of the three ^{ce} areas will be an individual who is currently active in science ~~major~~ or economics research. It is recognized that the delegations are likely to have one "at-large" member. Thus, the total delegation size should not exceed ten per country. Once the delegations are determined, it is planned to consult with these countries on agenda details.

The U.S. delegation will be:

Secretary of the Treasury - Nicholas F. Brady

Secretary of Interior - Manuel Lujan, Jr.

Secretary of Agriculture - Clayton Yeutter

Secretary of Commerce - Robert A. Mosbacher

Secretary of Energy - Admiral James D. Watkins (Ret)

Administrator, Environmental Protection Agency - William K. Reilly

Administrator, National Aeronautics and Space Administration
- Richard H. Truly

Under Secretary of Commerce for Oceans and Atmosphere; and
Director, National Oceanic and Atmospheric Administration -
John A. Knauss

Director, National Science Foundation - Erich Bloch

Member, Council of Economic Advisors - Richard Schmalensee

Conference Co-Chairmen:

Chairman, Council Economic Advisors - Michael J. Boskin

Assistant to the President for Science and Technology - D. Allan Bromley

→ [Deland



Chairman, Council on Environmental Quality - Michael R. Deland

The Conference is designed to be a forum to bring a number of ministerial-level leaders together to enhance international cooperation and to build the basis for joint efforts in these vital areas. It is hoped that the delegates, working together, will agree upon those areas of opportunity for cooperative action in the areas of scientific and economics research. The goal would be to address three major themes:

- Uncertain Change: The Scientific and Economics Research Challenge
- Integrating Scientific and Economics Research in the Policy Process; and
- Building Partnerships for Scientific and Economics Research.

The Conference provides a forum for international leaders to consider and discuss research questions that are critical to the policy process, such as:

- * How well can we predict temperature trends in the decades ahead?
- * How "good" are our global-scale models, such as models to predict temperature changes?
- * How well can we predict the interconnections between global environment change and the resulting social and economic impacts?
- * What are the economic costs of adapting to or mitigating global change?
- * How "good" are the economic models used to compute these costs?

By addressing such questions, it is hoped that the nations might agree to support joint international research efforts related to global change that focus on rapid improvement of both scientific and economic knowledge and developing the necessary infrastructure, including:

- Establishing a more formal international mechanism to improve the coordination of global change science and economics research programs, and

substitute
overview
p.2.

revised
in
outline

- Participating in cooperative research efforts, such as the World Ocean Circulation Experiment and cooperative economic projects of the OECD.

The Conference is a White House Conference, initiated by the President. Hence, the President has appointed three members of the Executive Office of the President in the relevant areas, to be the co-chairmen of the Conference. The three co-chairmen are: The Chairman of the President's Council of Economic Advisors, Dr. Michael J. Boskin, the President's Science Advisor and Director of the Office of Science and Technology Policy, Dr. D. Allan Bromley; and the Chairman of the President's Council on Environmental Quality, Mr. Michael R. Deland. ✓

The President stated, "this conference is a vital next step in a joint international approach to address changes in the global environment."

White House
Conference on Science and Economics Research
Related to Global Change

Memorandum

To: CEA, CEQ, OSTP

From: The Secretariat

Subject: Global Stewardship Brochure

Date: April 4, 1990

Time: 8:25 am/pm

The final draft of the document described above appropriately reflects the comments received through the staff review process. The content is therefore approved for production.

Thank you

NGM for D. Allan Briley 4/4/90
DSS for Mike Deland 4/4/90
Harold Gumpelt for Michael Bodin 4/4/90

A Statement of The
Context and Challenges Facing the
White House Conference
Science & Economics Research
Related To
Global Change

DBS approves w/ changes
for Deland 4/4/94
N6M for Bromley 4/4

SCIENCE AND ECONOMICS RESEARCH
FOR GLOBAL STEWARDSHIP

Global stewardship is our shared responsibility and our shared opportunity. We must manage the Earth's natural resources in ways that assure the sustainability of humanity on this planet and in ways that maximize our potential for growth and opportunity for all. Global stewardship is a continuing process of political, economic and social decision-making that meets the needs of the present generation while expanding the opportunities of future generations.

Global stewardship will become a dominant scientific, economic and environmental issue of the 21st century. The experience of the past 45 years has shown that growth can be achieved only through the synergy of democratic political institutions and market economic systems. But just as democratic institutions are expanding, our ability to grow could be limited by changes in our already stressed environment. Solutions must be found which will protect the quality of our natural environment while allowing for the economic growth necessary to sustain a growing world population ^{AND IMPROVE THE LIVING STANDARDS OF A} ~~and improving its living standards.~~

For perhaps the first time in human history, we now understand that our progress depends on accounting for our environmental resources and using them wisely. A new understanding of complex environmental systems is emerging. This understanding means that we are now called upon to create new directions for our creative energies and technologies. Global stewardship is the key.

To exercise effective ~~global~~ ^{stewardship} stewardship, we must advance our knowledge of natural and human systems. We must create solutions that join economic growth with sound management of our environment. Meeting this challenge will require an integration of scientific, economic, and environmental concerns—an integration which moves global stewardship and human sustainability to center stage.

As "global stewards" we need new tools to effectively evaluate how to respond to global environmental changes. Science and economics research can provide some of the tools needed to understand and properly manage our changing planet. Global change is concerned with such diverse but interrelated issues as ozone depletion, greenhouse gases, climate change, food security, water supply, sea level changes, wetlands, deforestation, biodiversity, population changes, and energy demands. A common ingredient in each of these issues is the level of uncertainty about the scale at which these changes are occurring and humanity's relative contribution to the change. There is also uncertainty regarding the social and economic consequences of change itself and of policy measures which might be taken to address it. As global stewards we must address these uncertainties by increasing our scientific and economic knowledge and take justifiable actions to manage global change... ^{WITH DUE CONSIDERATION} ^{GIVEN TO THE UNCERTAINTY} ^{WHICH EXIST.} ~~face of remaining uncertainty.~~

Therefore, the challenges of global stewardship require agreement in these three areas:

- Scientific and economic uncertainties—research challenges;
- Strategies and challenges to integrating economic and scientific research; and
- Building better international partnerships for economic and scientific research.

Our existence depends on our ability to draw sustenance from the natural world while supporting the systems that regenerate that world. Building an integrated program of economic and scientific research is the step we must take today, on the path of global stewardship. Global stewardship is not a fixed state but a process of change in which environmental and economic values are brought into balance to meet human needs and to expand human prospects. Let us join together and accept the challenge of Global Stewardship.

George Bush

AS OF 4/5/90

**AGENDA FOR REVIEW WITH CO-CHAIRMEN
for
WHITE HOUSE CONFERENCE
on
SCIENCE AND ECONOMICS RELATED TO GLOBAL CHANGE
April 17-18, 1990
Washington, D.C.**

MONDAY - APRIL 16, 1990

12:00 pm Early Registration - J.W. Merriott
1:00 pm Luncheon for LDC's - Hosted by Ronald Roskens, Administrator
for the Agency for International Develop.

Invited Delegations:

- * Brazil
- * India
- * Indonesia
- * Mexico
- * Nigeria
- * Zaire

7:00 pm Reception - National Air and Space Museum
 Hosts: Robert A. Mosbacher, Sec. of Commerce,
 Adm. Richard H. Truly, Admin. of NASA
 Still to Confirm -> Robert M. Adams, Secretary, Smithsonian Inst.
 Martin Harwit, Dir. Nat'l Air & Space Museum

TUESDAY, APRIL 17, 1990

7:30 am Continental Breakfast for all Delegates, with a room set aside for the Heads of Delegations where a Breakfast will be Co-Hosted by Sec. Manuel Lujan, Dept of the Interior and Sec. Clayton Yeutter, Dept. of Agriculture.

9:00 am PLENARY SESSION I (Moderator: Michael J. Boskin)

Welcoming Remarks: Nicholas F. Brady, Sec. of the Treasury

Welcome: President George Bush

10:10 am **Goals and Expectations for the Conference - D. Allan Bromley**
Opening Remarks by a Visiting Delegate - POLAND

Break

10:30 am PLENARY SESSION II (Moderator: Michael R. Deland)

Theme I Presentation: "The Science and Economics Research Challenge" - D. Allan Bromley

Visiting Delegate Views on Theme I: UK Delegate

Theme II Presentation: "Integrating Science and Economics Research in the Policy Process" Michael J. Boskin

Visiting Delegate Views on Theme II: JAPANESE Delegate

Theme III Presentation: "Building Partnerships for Science and Economics Research" - Michael R. Deland

Visiting Delegate Views on Theme III: USSR Delegate

12:00 pm Luncheon

Speakers:

- * INDONESIAN Delegate**
- * William Reilly, Admin. EPA**

1:45 pm WORKING GROUPS SESSIONS

Working Group Session I: Three Foreign Delegates serve as Chairmen of the A,B, and C Working Groups

3:15 pm Break

3:45 pm Working Group Session II: Three Foreign Delegates serve as Chairmen of the A,B, and C, Working Groups

5:15 pm Working Group Sessions End

6:00 pm Reception at the National Academy of Sciences Building, Hosted by Frank Press, Pres. of the NAS and Robert White, Pres. of the NAE.

8:00 pm Dinner in the Diplomatic Suite of the State Department Host: Sec. James Baker (Still to be Confirmed)

WEDNESDAY, APRIL 18, 1990

8:00 am Continental Breakfast

9:00 am WORKING GROUP SESSIONS

**Working Group Session III: Three Foreign Delegates serve as
Chairmen of the A,B, and C, Working
Groups**

10:30 am Break

**11:00 am Working Group Session IV: Three U.S. Delegates serve as
Chairmen of the A,B, and C, Working
Groups (i.e., Sec. Watkins, Admin.
Reilly, and Dir, Bloch)**

12:00 pm Luncheon

Speakers:

- * MEXICAN Delegate**
- * Sec. James Watkins, DOE**

1:45 pm PLENARY SESSIONS III (Moderator: Michael J. Boskin)

IPCC Address - Bert Bolin, Chairman, IPCC

2:15 pm PLENARY SESSION IV (Moderator: D. Allan Bromley)

Visiting Delegates Report on Conference - NORWAY

Summary Reports from the Three Working Groups

- * Sec. James Watkins - W.G (A)**
- * Admin. William Reilly - W.G. (B)**
- * Dir. Erich Bloch - W.G. (C)**

**Review of Co-Chairmen's Report - Michael R. Deland, for the
Conference Co-Chairmen**

Closing Remarks - President George Bush

3:30 pm Conference Ends

ANALYSIS OF FOREIGN COUNTRY PARTICIPATION

1. Australia W.G. Chairman (1) - 10 Minute Talk
2. Brazil W.G. Chairman (2) - 10 Minute Talk
3. Canada W.G. Session III - 10 Minute Talk on Partnerships in W.G. (A)
4. Fed. Rep. of Germany W.G. Chairman (3) - 10 Minute Talk
5. France W.G. Chairman (4) - 10 Minute Talk
6. India W.G. Chairman (5) - 10 Minute Talk
7. Indonesia Second Lunch, ~~Before~~ Watkins (Lunch Speech)
8. Italy W.G. Chairman (6) - 10 Minute Talk
9. Japan Comments on Boskin's Theme II - 10 Minute Talk
10. Mexico First Lunch, ~~Before~~ Reilly (Lunch Speech)
11. Netherlands W.G. Chairman (7) - 10 Minute Talk
12. Nigeria W.G. Session III - 10 Minute Talk on Partnerships in W.G. (C)
13. Norway Closing Comments before Reports by U.S. Participants (Speech)
14. Poland Opening Remarks from a Foreign Delegation (Speech)
15. Soviet Union Comments on Deland's Theme III - 10 Minute Talk
16. United Kingdom Comments on Bromley's Theme I - 10 Minute Talk
17. Zaire W.G. Chairman (8) - 10 Minute Talk
18. E.C. W.G. Chairman (9) - 10 Minute Talk
19. OECD W.G. Session III - 10 Minute Talk on Partnerships in W.G. (C)



c.c. →
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**INTERGOVERNMENTAL PANEL ON
CLIMATE CHANGE**

**POLICYMAKERS
SUMMARY**

**OF THE
SCIENTIFIC ASSESSMENT OF
CLIMATE CHANGE**

Report to IPCC from Working Group 1

Second Draft, 12 March 1990

Redraft following discussion at the WGI Lead Authors Meeting
Edinburgh, 26 February - 2 March, 1990

Prepared by the IPCC Group at the Meteorological Office, Bracknell, UK

Executive Summary

We are certain of the following:

The greenhouse effect is real; natural greenhouse gases already keep the earth over 30°C warmer than it would otherwise be.

Man made emissions are substantially increasing the atmospheric concentrations of the main greenhouse gases: carbon dioxide, methane, the chlorofluorocarbons, and nitrous oxide. These increases will lead to a warming of the Earth's surface.

Our best tools predict that, in the absence of other effects, man made emissions will lead to the following changes:

By the year 2020, global mean temperatures will have risen 1.8 C above pre-industrial, with a probable range between 1.3 and 2.5 C; global mean precipitation and evaporation will have increased by 3%. By the year 2070, the range of temperature increase will be 2.4 to 5.1 C with a best estimate of 3.5 C, and precipitation will be 7% greater. Areas of snow cover and sea-ice will be smaller.

Regional changes will in most cases be different to the global mean; in general, land surfaces warm more rapidly than the oceans. Examples of regional change are that temperature increases in Southern Europe and North America will be higher than the global mean, accompanied by reduced summer precipitation and soil moisture.

Sea Level is ~~expected to~~ rise mainly due to the thermal expansion of the oceans and the melting of some land ice. Sea level ~~will~~ rise by about 20cm (with a probable range of 10cm to 32cm) by 2030, and by 2070 it ~~will~~ have risen 45cm (with a range of 33cm to 75cm). Within the next century, it is unlikely that there will be a major outflow of ice from the West Antarctic Ice Sheet due directly to greenhouse warming.

Our best judgement is that:

Global - mean surface air temperature has increased by 0.3 to 0.6 C over the last 100 years, with the six global-average warmest years being in the 1980s.

The size of this warming is broadly consistent with predictions of climate models but, because of natural variability and other factors, we cannot say how much of the observed temperature rise to date is due to man-made greenhouse gases.

There is no real evidence that climate has become more variable over the last few decades. However, episodes of high temperatures will become more frequent in the future simply due to an increase in the mean temperature.

Ecosystems will be affected by a changing climate and by increasing carbon dioxide concentrations. Many ecosystems disadvantaged by climate change will be unable to migrate fast enough, and will become prone to extensive damage by exceptional events such as drought and fire.

1
2 **We calculate with confidence that:**
3

4 Some gases are potentially more effective than others at changing climate; the Global
5 Warming Potential index of each gas relates the warming effect of its emissions to
6 those of equal emissions of carbon dioxide. Because carbon dioxide emissions are
7 much larger than those of the other greenhouse gases, it is likely to be responsible for
8 over half the total man-made greenhouse effect.
9

10 To stabilise the atmospheric abundances of most greenhouse gases at present levels
11 would require reductions in man-made emissions of 50-80%; methane would require
12 only a 15-20% reduction.
13

14 There is a long lag between changes in the emission of greenhouse gases and the
15 resultant change in climate. Therefore, reductions in man-made greenhouse gas
16 emissions will take decades to centuries to become fully effective. Emission
17 decreases made sooner will have a greater effect than the same decreases made
18 later.
19

20
21 **To improve our predictive capability, we need:**
22

- 23 • To accelerate the development of numerical models.
- 24
- 25 • To undertake experimental and theoretical studies aimed at understanding
26 critical processes within the climate system.
27
- 28 • To maintain and improve global observing systems, particularly those which
29 are space-based.
30
- 31 • To increase support for national research activities, and for international
32 programmes under which they can be carried out.
33
34

Introduction: what is the issue ?

There is concern that man may be inadvertently changing the climate of the globe through the enhanced greenhouse effect, by continuing to emit pollutants which will eventually cause the temperature of the earth to increase - the so called "global warming". If this occurs, consequent changes to sea level and to ecosystems may have a significant impact on society and economies.

The purpose of the Working Group I report, as determined by the first meeting of IPCC, is to provide a scientific assessment of:

- 1) the factors which may affect climate change during the next century especially those which are due to human activity.
- 2) the responses of the atmosphere - ocean - land - ice system.
- 3) current capabilities of modelling global and regional climate changes and their predictability.
- 4) the past climate record and presently observed climate anomalies.

On the basis of this assessment, the report presents current knowledge regarding predictions of climate change (including sea level rise and the effects on ecosystems) over the next century, the timing of changes together with an assessment of the uncertainties associated with these predictions.

This Policymakers Summary aims to bring out those elements of the main report which have the greatest relevance to policy formulation, in answering the following questions:

- What factors determine climate, and how might man change them?
- What are the greenhouse gases, and how and why are they increasing?
- Which gases are the most important?
- How much do we expect the climate to have changed by the year 2020 and beyond?
- How much confidence do we have in our estimation?
- What will be the effects on sea level and ecosystems?
- Are the predicted climate changes unusual?
- Has man already begun to change global climate?
- What should be done to reduce uncertainties, and how long will this take?

1 Throughout the report, we keep in mind the practical needs of the policymaker.
2 The report is not an academic review, neither is it a plan for a new research
3 programme. Uncertainties attach to almost every aspect of the report, yet
4 policymakers are looking for clear guidance from scientists; hence authors have
5 been asked to provide best-estimates wherever possible, together with an
6 assessment of the uncertainties.

7
8 This report is a summary of our understanding as at mid-1990. Although continuing
9 research will deepen this understanding and require the report to be updated at
10 frequent intervals, basic conclusions concerning the reality of the greenhouse
11 effect and its potential to alter global climate are unlikely to change.
12
13
14

15 What factors determine global climate and how 16 might man change them ? 17

18 The driving force for weather and climate comes from the sun. The earth intercepts
19 solar radiation (mainly in the short-wave, visible, part of the spectrum); about a third
20 of it is reflected, the rest is absorbed by the different components (atmosphere,
21 ocean, ice, land and biosphere) of the climate system. The energy absorbed from
22 solar radiation must be balanced (in the long term) by outgoing radiation from the
23 earth and atmosphere; this terrestrial radiation takes the form of long-wave invisible
24 infra-red energy. As the amount of outgoing terrestrial radiation is determined by
25 the temperature of the earth, this temperature will adjust to emit just the right
26 amount of radiation to balance that coming from the sun.
27

28 There are several important factors which can change the balance between the
29 energy (in the form of solar radiation) absorbed by the earth and that emitted by it in
30 the form of longwave infra-red radiation - the radiative forcing on climate. The
31 most obvious of these is a change in the amount or seasonal distribution of solar
32 radiation which reaches the earth; these changes were probably responsible for
33 initiating the ice ages.
34

35 One of the most important of these factors is the greenhouse effect. Shortwave
36 solar radiation can pass through the clear atmosphere relatively unimpeded. But
37 long-wave terrestrial radiation emitted by the warm surface of the earth is partially
38 absorbed and then re-emitted by a number of trace gases in the atmosphere
39 above. Since the atmosphere is cooler than the earth's surface, the emission to
40 space is reduced. Both the atmosphere and the surface warm until the outgoing
41 long wave radiation balances the incoming solar radiation. This is the basic
42 greenhouse effect. The main greenhouse gases are not the major constituents,
43 nitrogen and oxygen, but water vapour (the biggest contributor), carbon dioxide,
44 methane, nitrous oxide, ozone in the low atmosphere and (in recent years)
45 chlorofluorocarbons. Naturally occurring greenhouse gases keep the earth warm
46 enough to be habitable, but their increase will raise temperatures- and change
47 other aspects of climate, particularly precipitation and evaporation.
48

49 Other factors which affect climate are mentioned later in the Summary, when we
50 discuss uncertainties in climate predictions.
51
52

Simple diagram illustrating the greenhouse effect

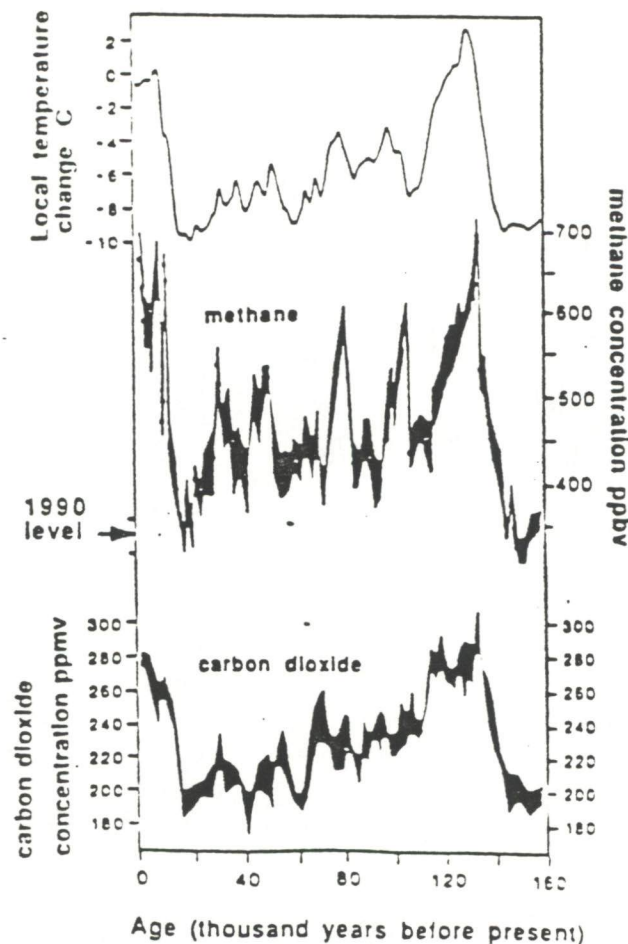
How do we know that the greenhouse effect is real ?

The greenhouse effect is real: infrared absorbing gases in the atmosphere make the surface of the earth warmer than it would otherwise be. It is a well understood effect, based on established scientific principles.

We know that the greenhouse effect works in practice, for several reasons. Firstly, the mean temperature of the earth's surface is already about 33 C warmer than it would be if the natural greenhouse gases (mainly carbon dioxide and water vapour) were not present. Satellite observations of the radiation emitted from the earth's surface and atmosphere demonstrate the absorption due to the greenhouse gases.

Secondly, we know the compositions of the atmospheres of Venus, Earth and Mars are very different, and their surface temperatures are in good agreement with greenhouse theory.

Thirdly, measurements from ice cores going back 160,000 years show that the earth's temperature closely paralleled the amount of greenhouse gases in the atmosphere. It is likely that changes in greenhouse gases were part (but not all) of the reason for the large (4 - 5 C) temperature swings between ice ages and interglacial periods.



The enhanced greenhouse effect

We are confident that an increase in concentrations of the greenhouse gases will raise the global, annual-mean surface-air temperature (which, for simplicity, is referred to as the "global temperature"). Strictly, this is an enhanced greenhouse effect - above that occurring due to natural greenhouse gas concentrations; the word "enhanced" is usually omitted, but it should not be forgotten. A global warming will cause sea levels to rise, partly due to the thermal expansion of the ocean surface waters, and partly due to the melting of land ice (but not due to the melting of sea ice - such as the north polar sea ice - which is already floating and thus displacing water).

What are the greenhouse gases and how are they changing ?

We know, with certainty, that the concentrations of greenhouse gases in the atmosphere have changed naturally on ice-age timescales, and have been increasing since pre-industrial times due to human activities. The table below summarizes the present and pre-industrial abundances, present rates of change and atmospheric lifetimes of the main greenhouse gases.

SUMMARY OF KEY MAN-MADE GREENHOUSE GASES					
	Carbon Dioxide	Methane	CFC-11	CFC-12	Nitrous Oxide
Atmospheric concentration	ppmv	ppmv	pptv	pptv	ppbv
Pre-industrial	280	0.79	0	0	288
Present day††	354	1.717	280	484	310
Current rate of change	1.6 (0.5%)	0.015 (0.9%)	10 (4%)	17 (4%)	0.8 (0.25%)
Atmospheric lifetime (years)	(50-200)†	10	65	130	150

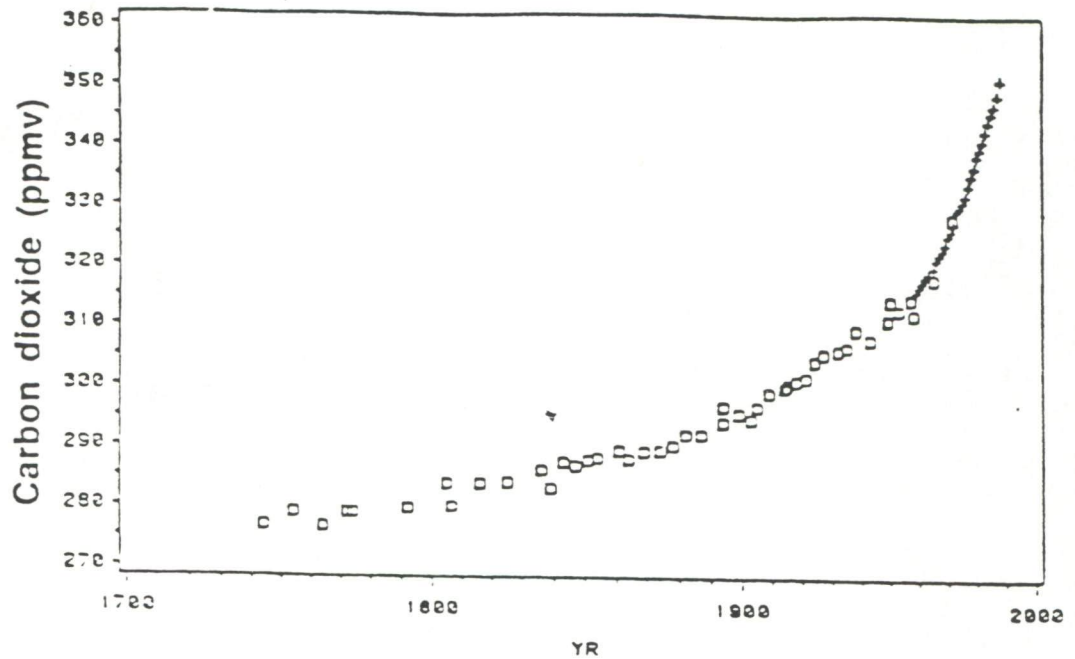
ppmv = parts per million by volume; ppbv = parts per billion by volume;
pptv = parts per trillion by volume.

† - The way in which CO₂ is absorbed by the oceans is not simple and a single value cannot be given
†† - estimated

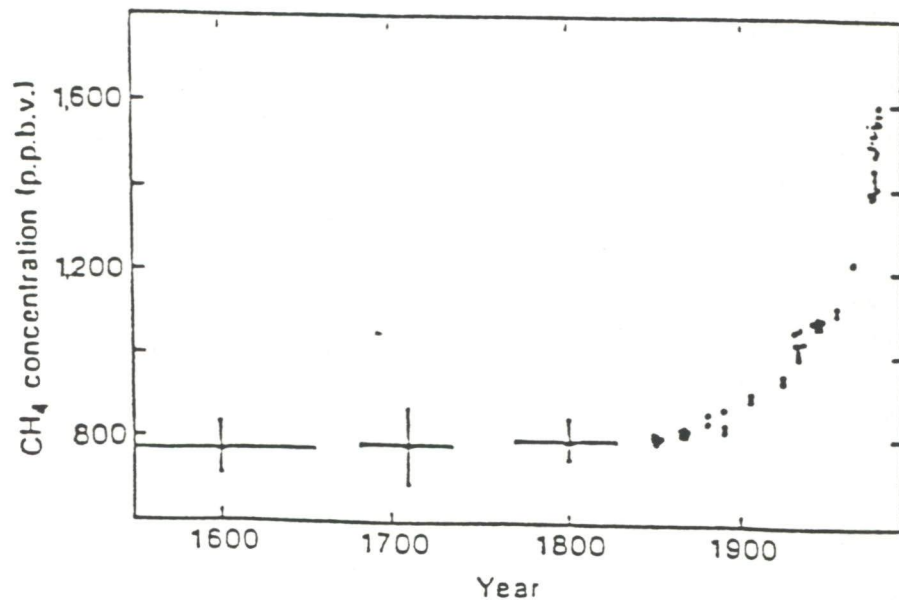
Carbon dioxide, methane, and nitrous oxide all have significant natural and man-made sources, while the chlorofluorocarbons (CFCs) are purely man-made. Water vapour is also a major greenhouse gas and, although its concentration may also change in future, this will be as a consequence of any global warming and not as a direct result of man-made emissions; we incorporate the effects of this in the estimates of future climate change discussed later.

Alkan, how close know that? (not, it is reasonable to believe...)

For a thousand years prior to the industrial revolution, the abundances of these greenhouse gases were relatively constant. However, as the world's population increased, and the world became more industrialized, the abundances of the greenhouse gases increased markedly. The figures below illustrate this for carbon dioxide and methane.



Carbon dioxide concentration from ice cores (squares) and surface observations (Mauna Loa - crosses)

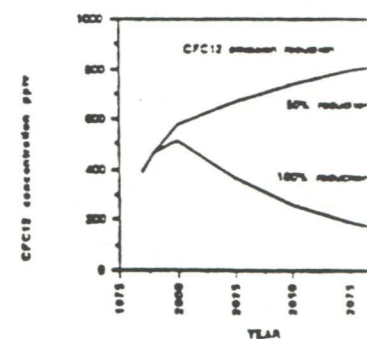
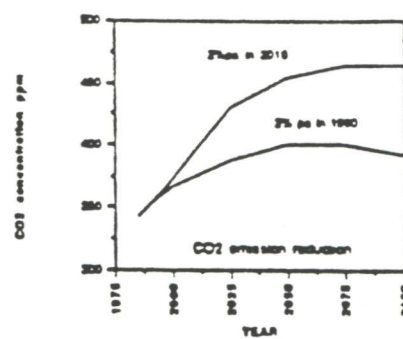
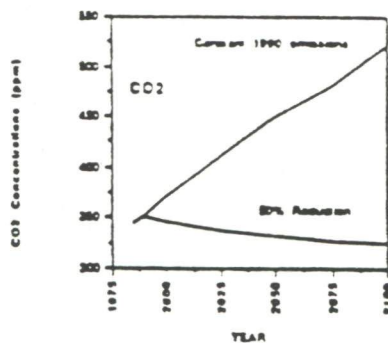


Methane concentration deduced from ice cores and from recent surface observations

We know quite well the reasons for the increased abundances of carbon dioxide, methane, chlorofluorocarbons, and tropospheric ozone, but those for nitrous oxide are less certain. Since the industrial revolution carbon dioxide has increased by 25% because of the combustion of fossil fuels and deforestation practices, in mid-latitudes and in the tropics. Methane has more than doubled because of rice production, breeding domestic ruminants, biomass burning, coal mining and ventilation of natural gas; transport and industry may have also contributed in an indirect way. Low-level ozone has doubled because of increased abundances of carbon monoxide, nitrogen oxides, and hydrocarbons from industry and transport; and nitrous oxide has increased by 8% probably because of fossil-fuel combustion or agricultural practices. Chlorofluorocarbons, which are used as aerosol propellants, solvents, refrigerants, and foam blowing agents were not present in the pre-industrial atmosphere.

Lifetimes and stabilisation of the gases

The lifetimes of the greenhouse gases are determined by their sources and sinks in the oceans, atmosphere and biosphere. Carbon dioxide, chlorofluorocarbons and nitrous oxide have long lifetimes; hence, following a change in emissions, their atmospheric concentrations respond slowly and would not reach a new equilibrium state for many centuries. In contrast, some of the CFC substitutes and methane have relatively short atmospheric lifetimes so that their atmospheric concentrations respond quite quickly and would reach a new equilibrium within a few decades following a change in emissions. This emission-concentration relationship is illustrated below for some of the gases.



It can be seen, for example, even with a complete cessation in the emission of CFC 12 in the year 1990, its atmospheric abundance would still be about a third of today's level in the year 2100. Also shown is the effect on concentrations of continuing man-made emissions of carbon dioxide at 1990 levels, or 50% of 1990 levels, and of a reduction in global emissions of 2% per year from 1990 and from 2010; if there are critical concentration levels that should not be exceeded then it can be seen that earlier emission reductions are more effective than later ones.

The term "atmospheric stabilisation" is often used to describe the limiting at present day values of the concentration of the greenhouse gases. The amount by which man-made emissions of a greenhouse gas must be reduced in order to achieve this is shown in the box below.

STABILISATION OF ATMOSPHERIC CONCENTRATIONS

Reductions in the man-made emissions of greenhouse gases required to stabilise concentrations at present day levels:

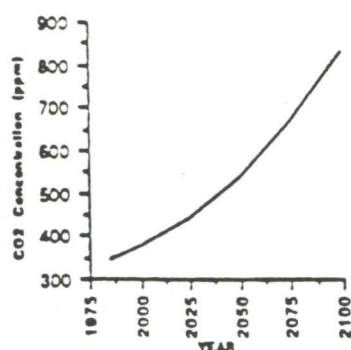
Carbon Dioxide	60 - 80%
Methane	15 - 20%
Nitrous Oxide	70 - 80%
CFC11	70 - 75%
CFC12	75 - 85%
HCFC22	40 - 50%

Natural sources and sinks are assumed to remain unchanged

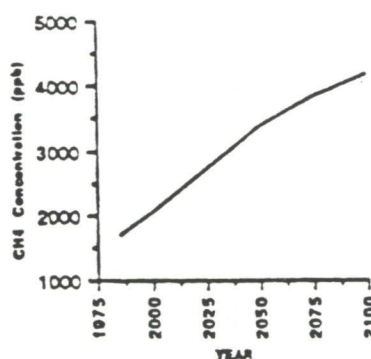
Note that the stabilisation of each of these gases would have different effects on climate, as explained in the next section.

The same models used for these calculations are also used to determine future concentrations of the greenhouse gases which would arise from scenarios of future emissions generated by IPCC Working Group 3. Shown below are the concentration trends of some of the greenhouse gases expected to result from the High Emissions scenario.

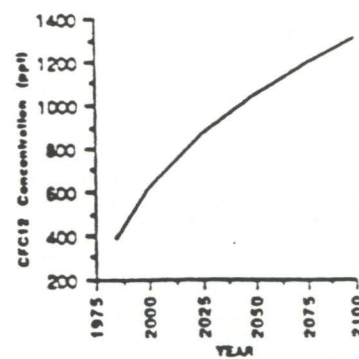
CO₂ Average Concentrations



CH₄ Average Concentrations



CFC12 Average Concentrations

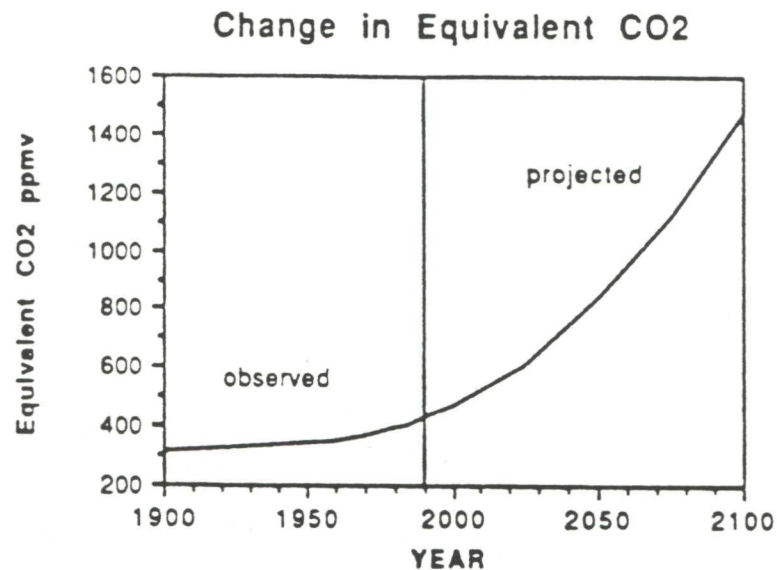


Which gases are the most important?

We know, with certainty, that more greenhouse gases means more radiative forcing and hence a global warming. We can calculate the the radiative forcing due to the increase in concentration of each gas with much more confidence than the calculation of the resulting climate change because the former only involves laboratory measurements of the gases: how strongly, and where in the spectrum,

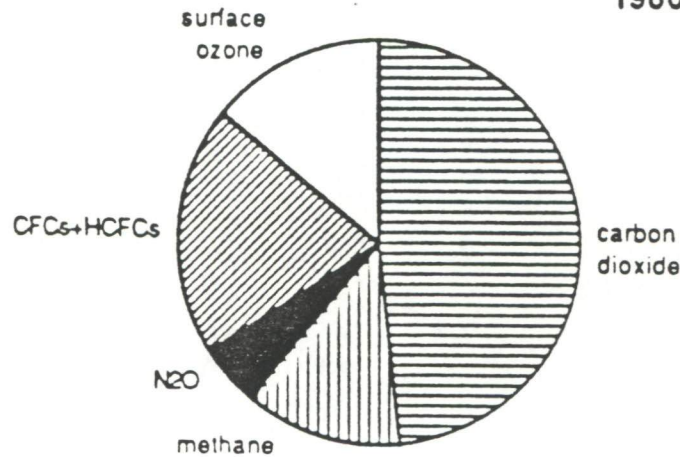
they absorb infra-red radiation. We then have a base from which to calculate the relative effect on climate of an increase in **concentration** of each gas in the atmosphere: both in absolute terms and relative to carbon dioxide. These relative effects span a wide range; methane is about 21 times more effective, molecule-for-molecule, than carbon dioxide, and CFC11 about 12 000 times more effective.

The total radiative forcing at any time is the sum of those from the individual greenhouse gases. For simplicity, we can express total forcing in terms of the amount of carbon dioxide which would give that forcing; this is termed the **equivalent carbon dioxide concentration**. We show how this quantity has changed to date (based on observations of all the greenhouse gases) and how it might change in the future (based on the IPCC Working Group 3 High Emissions scenario) in the figure below. At present, greenhouse gases have increased since pre-industrial times (the mid 18th century) by an amount that is radiatively equivalent to about a 53% increase in carbon dioxide, although carbon dioxide itself has only risen by 26% - other gases have made up the rest.



The contributions of the various gases to the total increase in climate forcing during the 1980s is shown below as a pie diagram; carbon dioxide is responsible for about half the decadal increase.

Contribution to climate forcing change: 1980-90



How can we evaluate the effect of different greenhouse gases?

To evaluate possible policy options, it is useful to know the relative radiative (and, hence, climate) effect of equal emissions of each of the greenhouse gases. The concept of relative **Global Warming Potentials (GWP)** has been developed which takes into account the differing times that gases remain in the atmosphere.

This index allows for the determination of the time-integrated, relative warming effect based on the instantaneous release of a unit mass (1 kg) of a given greenhouse gas. These GWPs are defined for convenience relative to carbon dioxide, the greenhouse gas of most concern. The GWPs in the following table are shown for three time horizons, reflecting the need to consider these cumulative effects on climate over various time scales.

The table indicates, for example, that the effectiveness of methane in influencing climate will be greater in the first few decades after initial release, whereas emission of the longer lived nitrous oxide will affect climate for a much longer period of time. The lifetimes of the proposed CFC replacements range from 1 to 40 years. The longer lived replacements are still potentially effective as agents of climate change. The extreme example of this, HCFC 143a (with a 40 year lifetime), has a very similar effect (when released in the same amount) to CFC11 on a 20 year timescale.

GLOBAL WARMING POTENTIALS

The warming effect of an emission of 1kg of each gas relative to that of CO₂

	time horizon		
	20 yr	100 yr	500 yr
Carbon dioxide	1	1	1
Methane	63	21	9
Nitrous oxide	270	290	190
CFC11	4500	3500	1500
CFC12	7100	7300	4500
HCFC22	4100	1500	510

Global Warming Potentials for a range of CFCs and potential replacements are given in the full text

Although the table shows carbon dioxide to be the least effective greenhouse gas on an equal emissions basis, the warming effect will depend on the size of emissions. In the example shown below, 1990 emissions of carbon dioxide will contribute well over half the man-made warming effect over the next 100 years.

THE RELATIVE CUMULATIVE CLIMATE EFFECT OF 1990 EMISSIONS

	GWP (100yr horizon)	1990 emissions (Tg)	relative contribution over 100yr
carbon dioxide	1	26000†	61%
methane	21	300	15%
nitrous oxide	290	6	4%
CFC11	3500	0.3	2%
CFC12	7300	0.4	7%
HCFC22	1500	0.1	0.4%
Others (including indirect effects, eg that of NO ₂ on surface ozone)			10.6%

†26000Tg of carbon dioxide = 7Gt of carbon

There are other criteria which may help policymakers to decide, in the event of emissions reductions being necessary, which gases should be considered. Does the gas contribute in a major way to current, and projected future, climate forcing? Does it have a long lifetime, so that controlling its concentration would require emissions to be reduced sooner rather than later? And are its sources and sinks well enough known to decide which of them could be controlled in practice? The table below illustrates these factors.

GAS	MAJOR CONTRIBUTOR?	LONG LIFETIME?	SOURCES KNOWN?
carbon dioxide	yes	yes	yes
methane	yes	no	qualitatively
nitrous oxide	no	yes	qualitatively
CFCs	yes	yes	yes
HCFCs etc	not at present	mainly no	yes
surface ozone	yes	no	yes

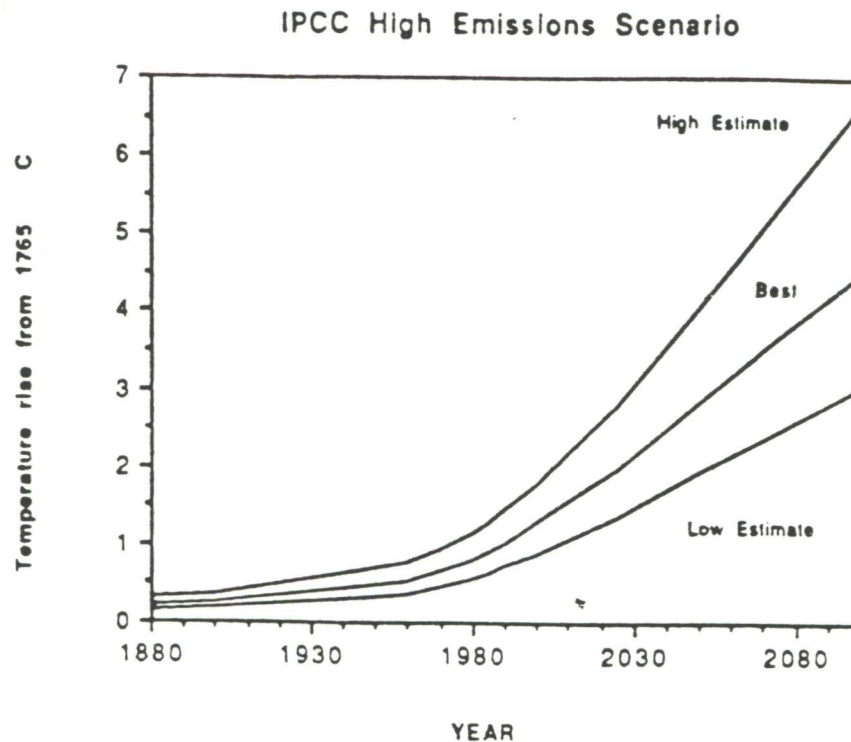
How much do we expect climate to change?

Computer-based numerical models are the best tools we have for making climate predictions; a description of their main features, and how much confidence we can place in their results, are given in the boxes. We outline below the predictions they make for changes at a global and sub-global level.

To estimate the change in climate, we need to know what emissions of greenhouse gases will be over the next decades; in the predictions below we assume the **High Emissions scenario** developed by IPCC Working Group 3. The concentrations and radiative forcing derived from this emissions scenario were shown earlier.

How quickly will global climate change ?

Using this emissions scenario we estimate that, by the year 2020, the increase in global mean temperatures due to man-made greenhouse gas emissions will be 1.8 C above pre-industrial, with a probable range between 1.3 and 2.5 C. By the year 2070, the range is 2.4 to 5.1 C with a best estimate of 3.5 C. The best-estimate projection out to the year 2100 is shown in the diagram below.



The global warming will also lead, on average, to increased precipitation and evaporation; perhaps by 3% and 7% by the years 2020 and 2070. Not surprisingly, we expect areas of sea-ice and snow to diminish.

There will be large variations in the magnitude of the warming, and those in precipitation will be even greater, with substantial areas of decreased precipitation within an overall global increase.

What will be the patterns of climate change by about 2020?

Knowledge of the global mean warming and change in precipitation is of limited use in determining the impacts of climate change, for instance, on agriculture. To do this we need to know what these changes will be at a smaller scale. Our best models predict that surface air over land warm faster than that over oceans; the northern hemisphere will warm faster than the southern, and a minimum of warming will occur around Antarctica and in the North Atlantic region.

There are some continental scale changes in which we have relatively high confidence because they are consistently predicted by the most comprehensive models and because we understand the physical reasons for them. The warming is predicted to be 50-100% greater than the global mean in high northern latitudes in winter, and substantially smaller than the global mean in regions of sea ice in summer. Precipitation is predicted to increase in middle and high latitude continents in winter (by some 5 - 10% over 35-55 N).

In the box below are given the changes in temperature, precipitation and soil moisture, which are predicted to occur by 2020, averaged over the 5 regions (each of which are a few million square kilometres in area) selected by IPCC. There may be considerable variations within the regions. In general, confidence in these

regional estimates is low, especially for the changes in precipitation and soil moisture, but they are examples of our best estimates. We cannot yet give reliable regional predictions at the smaller scales demanded for impacts assessments.

CURRENT BEST ESTIMATES FOR CHANGES BY 2020 (IPCC High Emissions scenario; changes from pre-Industrial)

Central North America (35 -55N, 85 -105W)

The warming ranges between 3 and 4 °C in winter and 2 to 3 °C in summer. Precipitation increases range from 0 to 20% in winter whereas there are decreases of 5 to 10% in summer. Soil moisture decreases in summer by 10 to 15%.

South East Asia (5 -30N, 70 -102 E)

The warming ranges from 1 to 2 °C throughout the year. Precipitation changes little in winter and generally increases throughout the region by 5 to 15% in summer. Summer soil moisture increases by 5 to 10%.

Sahel (10 - 20 N, 20 -38 E)

The warming ranges from 1 to 2 °C. Area mean precipitation increases and area mean soil moisture decrease marginally in summer. However there are areas of both increase in and decrease in both parameters throughout the region which differ from model to model.

Southern Europe. (35 - 50 N, 10 W - 45 E)

The warming is about 2 °C in winter and varies from 2 to 3 °C in summer. There is some indication of increased precipitation in winter, but summer precipitation decreases by 5 to 15%, and summer soil moisture by 10 to 25%.

Australia (12 - 43 S, 115 - 154 E)

The warming ranges from 1 to 2 °C in summer and is about 2 °C in winter. Summer precipitation increases by around 10% , but there the models do not produce consistent estimates of the changes in soil moisture. There are large variations at the sub-continental level within this area.

How will climate extremes and extreme events change?

Changes in the variability of weather and the frequency of extremes will generally have more impact than changes in the mean climate at a place. With the possible exception of an increase in the number of intense showers, there is no evidence from our work so far that weather variability will change in the future. However, with no change in variability, even for a modest change in the mean, the number of days with temperatures above a given value at the high end of the distribution will increase substantially. Similarly, there will be a decrease in days with temperatures

at the low end of the distribution. So the number of very hot days or frosty nights will be substantially changed without any change in the variability of the weather. Changes in the number of days with a minimum threshold amount of soil moisture (for viability of a certain crop, for example) would be even more acute.

Will storms increase in a warmer world?

Storms can have a major impact on society. Will their frequency, intensity or location increase in a warmer world?

Tropical storms, such as typhoons and hurricanes, only develop at present over seas that are warmer than about 26°C. As the area of sea having temperatures over this critical value will increase as the globe warms, the potential certainly exists for there to be a wider area available for storm development. However, the vertical structure of the atmosphere may also change, and offset this increase. Climate models give no clear indication whether tropical storms will increase or decrease in frequency or intensity as greenhouse gases increase; neither is there any evidence that this has occurred over the past few decades.

Mid-latitude storms, such as those which track across the North Atlantic, are driven by the equator-to-pole temperature contrast. As this contrast will probably be weakened in a warmer world (at least in the northern hemisphere), it could be argued that mid-latitude storms will also weaken. But higher in the atmosphere the thermal contrast strengthens, and in addition the increased amount of water vapour in the atmosphere can supply extra energy to storm development. We do not know which of these factors will be the more influential, and how storms will change in frequency or intensity. Even if changes of this sort do not occur, the tracks they take might move and affect new regions; again, we have no evidence of where, or if, this would happen.

What tools do we use to predict future climate ?

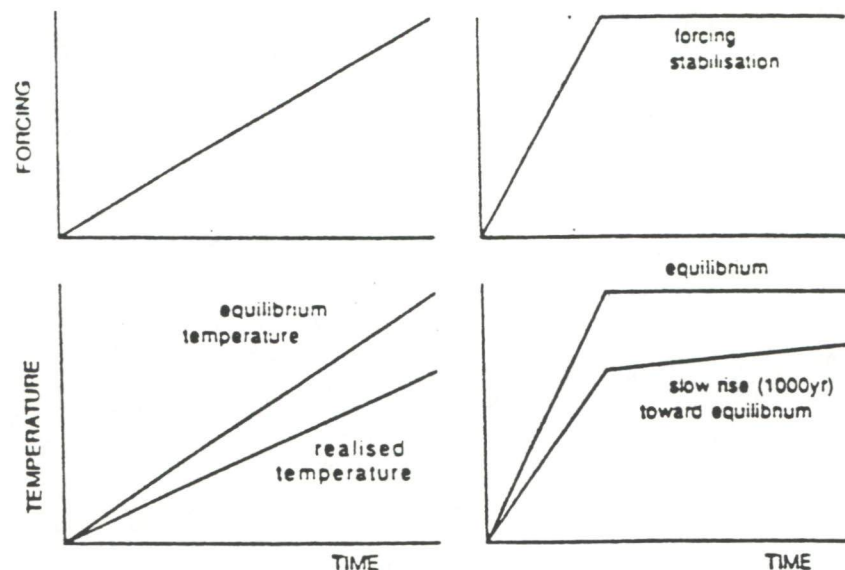
It is relatively easy to predict the direct effect of the radiative forcing due to increases in greenhouse gases. However, as climate begins to warm, various processes act to amplify (through positive feedbacks) or reduce (negative feedbacks) the warming. The feedbacks are due to changes in water vapour, sea-ice, clouds and the oceans. In making a climate forecast, all these processes have to be taken into account. These are described in three-dimensional mathematical model of the atmosphere and ocean (often known as a general circulation model or GCM). These are based on the equations of motion and use descriptions in simple physical terms (called parameterisations) of the smaller scale processes such as those due to clouds and to deep mixing in the ocean. (The atmospheric component of a climate model is essentially the same as a weather prediction model).

Equilibrium and realised climate change

We have explained that increases in greenhouse gases will (instantaneously) increase radiative forcing. However, the full warming will not occur instantaneously, because of the effect of the oceans. Firstly, the mixed layer of the ocean (about 100m deep) will have to warm at about the same rate as the atmosphere, because transfer of heat from one to the other takes place very efficiently; this will take typically 10 years. Secondly, there are two areas of the oceans (the northern North Atlantic and the Antarctic ocean) where circulation patterns act to draw down water from the warm upper layers into the very deep ocean. Some of the heat from the upper layers is therefore also drawn into the deep ocean, where it remains for a very long time - upwards of a thousand years; on the century timescale we are considering here, the heat is effectively lost.

Consider the case where continuing increases in greenhouse gases is giving a steady increase in radiative forcing at a rate of about 1% per year - this is roughly what is happening at the moment. The first diagram below shows the equilibrium temperature rise which would ultimately occur due to this forcing - this is also the temperature we would experience straight away if there were no oceans. The lower line shows our best estimate of the realised temperature rise: the temperature trend that (in the absence of other forcing and variability) we would observe. The realised temperature trend approximates to the eventual temperature trend reduced (mainly because of the heat sequestered into the deep ocean) by about a third.

The concept of the equilibrium temperature can best be illustrated (as in the second diagram below) by the artificial case of halting and stabilising the radiative forcing at a future date (remembering that this would require a very large reduction in emissions). The realised temperature would then rise slightly over a ten year period as the ocean mixing layer "catches up" with the atmosphere, but then rise further only very slowly, to meet the equilibrium temperature in over a thousand years.



The long term change in surface air temperature following from a doubling of carbon dioxide (generally used as a benchmark and referred to as the climate sensitivity) is most likely to be somewhere between 1.5 and 4.5°C, with a most likely estimate of 2.5°C. The lowest result from all models so far is about 1.5°C and, although some models give figures higher than 4.5°C (up to 5.2°C), there are good reasons to believe that the less detailed representation of cloud processes in these models leads to an over-estimation of the warming. This range of climate sensitivity deduced from mathematical models is consistent with empirical evidence from paleo epochs.

How do we forecast climate ?

Climate forecasts are derived in a different way from weather forecasts. A weather prediction model gives a description of the atmosphere's state up to 10 days or so ahead, starting from a detailed description of an initial state of the atmosphere at a given time. Such forecasts describe the movement and development of large weather systems, though they cannot represent very small scale phenomena; for example, individual shower clouds.

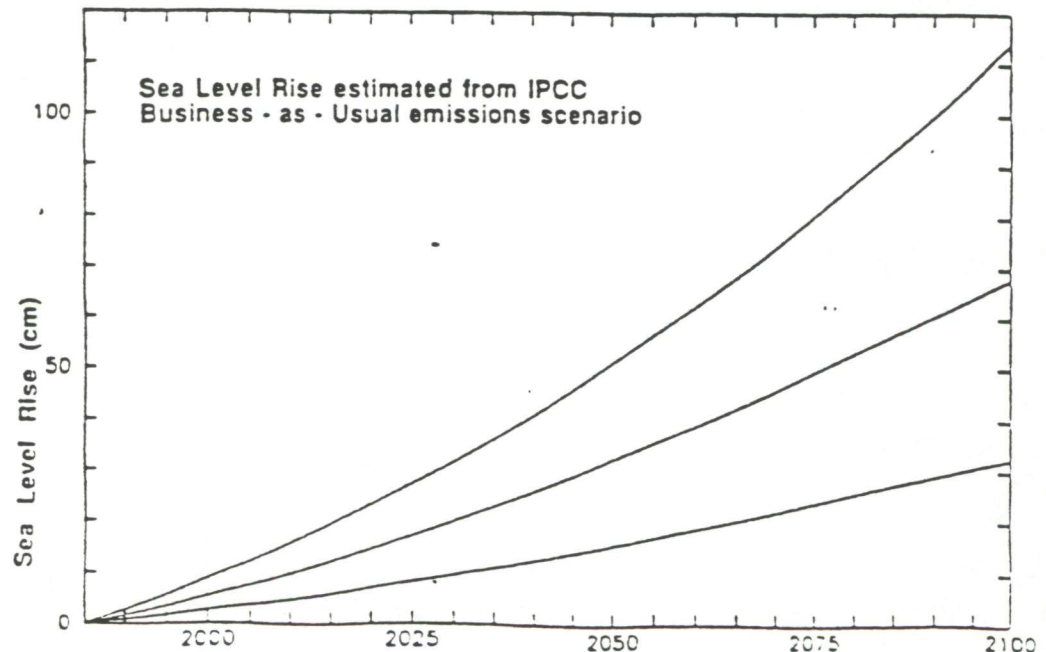
To make a climate forecast, the climate model is first run for a few (simulated) decades. The statistics of the model's output will be a description of the model's simulated climate which, if the model is a good one, will bear a close resemblance to the climate of the real atmosphere and ocean. The above exercise is then repeated with increasing concentrations of the greenhouse gases in the model. The differences between the statistics of the two simulations (for example in mean temperature and interannual variability) provide an estimate of the accompanying climate change.

A completely different, and potentially powerful, way of predicting patterns of future climate is to search for periods in the past when the global mean temperatures were similar to those we expect in future, and then use the past spatial patterns as analogs of those which will arise in the future. For a good analog, it is also necessary for the forcing factors (eg. greenhouse gases, orbital variations) and other conditions (e.g. ice cover, topography, etc.) to be similar; direct comparisons with climate situations for which these conditions do not apply cannot be easily interpreted. So far, analogs of future greenhouse-gas-changed climates have not been found. We cannot therefore advocate the use of paleo climates as predictions of regional climate change due to future increases in greenhouse gases.

How much will sea level rise ?

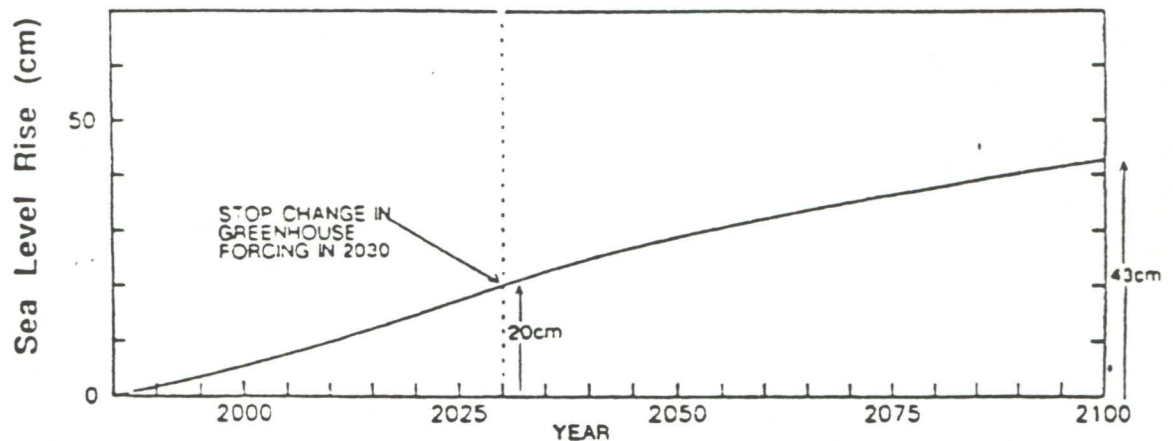
Simple models were used to calculate sea level rise to the year 2100 AD; the results are illustrated below. The calculations necessarily ignore any long-term changes, unrelated to greenhouse forcing, that may be occurring but cannot be detected from the present data on land ice and the ocean. For the IPCC High Emissions scenario, sea level is expected to be between 10 cm and 32 cm higher than today by the year 2030, with a best-estimate of 20 cm.

SEA LEVEL RISE A BETA=1.0 K=0.6338 DT=1.5,2.5,4.5 W=4 DO=4.367



The best estimate is made up of positive contributions from thermal expansion of the oceans (12cm); melting of glaciers (8cm) and the Greenland ice sheet (1cm), with a 1cm negative contribution from Antarctica due to higher ice/snow accumulation in a slightly warmer climate. By the year 2070, sea level is expected to be 45cm higher, with a range of 33cm to 75cm.

By 2030, even if greenhouse forcing increased no further, the world would still be committed to a continuing sea level rise for many decades and even centuries, due to delays in climate, ocean and ice mass responses (see figure below). Sea level would go on rising from 2030 to 2100, by a further 23cm, due to the effects of pre-2030 greenhouse gas increases alone. Moreover, in the longer term, irreversible changes could be triggered with long-lasting effects. For instance, for a persistent 4°C warming, the major part of the Greenland ice sheet would eventually disappear (but over thousands of years), and would not reform even with a return to the present climatic conditions.



SEA LEVEL RISE COMMITMENT. Even if greenhouse gas concentrations were stabilised in 2030, sea level would continue to rise steadily

The West Antarctic Ice Sheet (WAIS) is of special concern, as a large portion of it is grounded far below sea level and it contains an amount of ice equivalent to 5m of global sea level. Recent studies have demonstrated that individual ice streams are changing rapidly on a decadal to century time scale. This variability is not necessarily related to climate, but is important for future sea level change. Within the next century, it is not likely that there will be a major outflow of WAIS ice due directly to greenhouse warming.

Regional rise in sea level is expected to differ substantially from the global mean value. Thermal expansion, changes in ocean circulation, and surface air pressure will vary from region to region as the world warms, but in a yet unknown way. Such regional details await further development of realistic physical models of the ocean circulation. In addition, vertical land movements can be as large or even larger than changes in global mean sea level. For estimates of regional sea level rise, these should be added to climate-related changes in ocean volume.

How much confidence do we have in our predictions?

Uncertainties in the predictions above arise from a number of sources. Firstly, it is obvious that future climate change will depend on the rate at which greenhouse gases (and other gases which influence them) are emitted; this in turn will be determined by various complex economic and sociological factors.

Scenarios of future emissions were generated within IPCC by Working Group 3; four such scenarios are explored in the main report, and one of these (corresponding to a **Business - as- Usual case**) is used to illustrate this Summary.

Secondly, because we do not fully understand the sources and sinks of the greenhouse gases, there are uncertainties in our calculations of future concentrations arising from a given emissions scenario. For carbon dioxide, for example, the concentration calculated for 2070 from the Business-as-Usual emissions scenario ranged from 560ppmv to 720ppmv; we have chosen a best estimate for each gas. Furthermore, because natural sources and sinks of greenhouse gases are sensitive to a change in climate, they may substantially modify future concentrations; ice core records show that methane and carbon dioxide concentrations changed in the same way as temperature between ice ages and interglacials. For example, if wetlands become warmer, methane emissions (and hence concentrations) will increase; if they become drier, methane emissions will decrease. Although these factors are complex, it appears that they are more likely to increase greenhouse gas abundances overall and hence increase the climate change estimates given above.

Thirdly, although we understand quite well the forcing due to changing gas concentrations, other factors apart from these can influence climate. Those which could be important on a decadal timescale are: short term variability of solar radiation output; aerosols from a large volcanic eruption and low level aerosols arising from man-made sulphur emissions. On the timescale of the next century, however, the change in climate due to increasing greenhouse gases is likely to be far more important than that from these other effects.

Because of long period couplings between ocean and atmosphere the earth's climate would still vary without being perturbed by any external influences. This natural variability could act to speed up, or slow down, any man-made warming but on a century timescale would be less than greenhouse gas-induced changes.

Fourthly, models are only as good as our understanding of the processes which affect climate, and this is far from perfect. The range in the climate predictions given above reflects an estimate of uncertainties due to model imperfections; the largest of these is cloud feedback, leading to a factor of two uncertainty in the size of the warming. Nevertheless, for reasons given in the box below, we have substantial confidence that models can predict at least the broad scale features of climate change.

Confidence In predictions from climate models

What confidence can we have that climate change will look anything like what the models tell us? Weather forecasts can be compared with the actual weather the next day and their skill assessed; we cannot do that with climate predictions. There are several indicators that give us some confidence in the predictions from climate models.

When they are run with the present amount of carbon dioxide in the atmosphere their simulation of present climate is generally realistic, capturing the major features such as the wet tropical convergence zones and mid-latitude depression belts, as well as the contrasts between summer and winter circulations. The models also simulate the observed variability; for example, the large day-to-day pressure variations in the middle latitude depression belts and the maxima in interannual variability responsible for the very different character of one winter from another both being represented.

Overall confidence is increased by their generally satisfactory portrayal of aspects of variability of the atmosphere such as that associated with El Niño (the irregular warming of the Eastern tropical Pacific).

In addition, when forced with correct conditions (solar radiation, greenhouse gas forcing, ice caps, etc) they can capture important features of climates 6,000 to 9,000 years ago and the most recent ice age about 20,000 years ago.

It is also worth noting that the weather forecasting models (from which climate models have been developed) predict weather for several days ahead, with generally great success.

Will the predicted changes be unusual?

When considering future climate change, it is clearly essential to look at the record of climate variation in the past. From this record we can learn about the range of natural climate variability, to see how it compares with what we expect in the future, and also look for evidence of recent climate change due to man's activities.

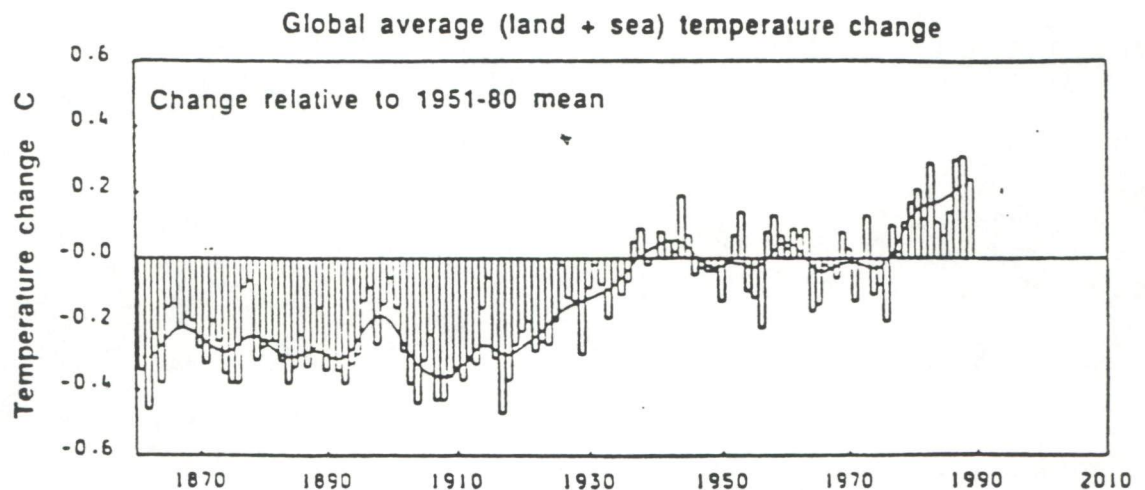
Climate varies naturally on all time scales from hundreds of millions of years down to the year to year. Prominent in the earth's history have been the 100,000 year glacial-interglacial cycles when climate was mostly cooler than at present. Global surface temperatures have typically varied by 5 to 7°C through these cycles, with large changes in ice volume and sea level, and temperature changes as great as 10-15°C in some middle and high latitude regions of the northern hemisphere. Since the end of the last ice age, about 10,000 years ago, global surface temperatures have probably fluctuated by little more than 1°C. Some fluctuations have lasted several centuries, including the Little Ice Age which ended in the nineteenth century and which appears to have been global in extent.

The changes predicted to occur by about 2040 due to man made increases in greenhouse gas concentrations will make global mean temperatures higher than they have been in the last 100,000 years.

Has man already begun to change the global climate?

The instrumental record of **surface temperature** is fragmentary until the mid nineteenth century, after which it slowly improves. Because of different methods of measurement, historical records have to be harmonised with modern ones, introducing some uncertainty. **Despite these problems we believe that a real warming of the globe of 0.3 C - 0.6 C has taken place over the last century.**

Moreover since 1900 similar temperature increases are seen in three independent data sets: one collected over land and two over the oceans. The figure below shows current estimates of smoothed global mean surface temperature over land and ocean since 1860.



Although overall temperature rise has been broadly similar in both hemispheres, it has not been steady, and differences in their rates of warming have sometimes persisted for decades. Much of the warming since 1900 has been concentrated in two periods, the first between about 1920 and 1940 and the other since 1975. The northern hemisphere cooled between the 1940s and the early 1970s when southern hemisphere temperatures stayed nearly constant. The pattern of global warming since 1975 has been uneven with some regions, mainly in the northern hemisphere, continuing to cool until recently. This regional diversity indicates that future regional temperature changes are likely to differ considerably from a global average.

That there has been a real temperature rise is strongly supported by the retreat of most mountain glaciers of the world since the end of the nineteenth century and the fact that sea level has risen over the same period by an average of 1 to 2 mm per year.

Estimates of thermal expansion of the oceans, and of increased melting of mountain glaciers and the ice margin in West Greenland over the last century, **shows that the major part of the rise appears to be related to the observed global warming. This apparent connection between observed sea level rise and global warming provides grounds for believing that future warming will lead to an acceleration in sea level rise.**

1 The magnitude of the warming over the last century is broadly consistent with the
2 theoretical predictions of climate models. If the sole cause of the observed warming
3 were the man-made greenhouse effect, then the implied climate sensitivity would
4 be in the lower half of the range inferred from the models. However, the range of
5 natural variability is almost certainly as large as any change to date due to the
6 man-made greenhouse effect.

8 Global-mean temperature alone is an inadequate indicator of greenhouse-gas-
9 induced climatic change. Identifying the causes of any global-mean temperature
10 change requires examination of other aspects of the changing climate, particularly
11 its spatial and temporal characteristics - the man-made climate change "signal".
12 However, we do not yet know what the "signal" looks like because, as we have
13 seen, prediction of many of these detailed characteristics is not yet possible;.

15 Although we are convinced of the reality of an increasing anthropogenic
16 greenhouse effect, by the time unequivocal detection has been achieved, the
17 commitment to future climate change will be considerably larger than it is today.

20 What will be the effect of climate change on 21 ecosystems ?

23 Our life support system depends on the basic functioning of our ecosystems.
24 Photosynthesis captures atmospheric carbon dioxide and solar energy and stores
25 them in organic compounds which are then utilized for subsequent plant growth,
26 the growth of animals or the growth of microbes in the soil which release CO₂ via
27 respiration into the atmosphere.

29 The rates of ecosystem processes are dependent on climatic factors in the short
30 term and carbon dioxide concentration may also modify the rates of
31 photosynthesis and respiration. In the longer term, climate and atmospheric
32 carbon dioxide control the structure of ecosystems by selecting species which
33 together function within them. Changes in climate and atmospheric carbon dioxide
34 concentrations will, therefore, modify both function and structure in our
35 ecosystems.

37 Photosynthesis fixes 120-160 Gt of carbon each year (90-120Gt on land and 30-40
38 Gt in the oceans). Most land plants have a system of photosynthesis which will
39 respond positively to increased atmospheric carbon dioxide ("the carbon dioxide
40 fertilization effect"), but the response varies with species and may decrease with
41 time. The response to increased carbon dioxide results in greater efficiencies of
42 water and nitrogen use and may be particularly important in plants of stressed
43 ecosystems (in arid/semi arid and infertile areas). Photosynthesis will also
44 increase as temperature and moisture increase and as nutrient availability
45 increases through the stimulation of the decomposition process by increased
46 temperatures.

48 So far there is no incontrovertible proof that net terrestrial ecosystem production
49 has increased. If there were, it would be almost impossible to apportion this
50 between land use effects, fertilization by atmospheric pollutants and climate
51 change. The extent to which ecosystems can sequester increasing atmospheric
52 carbon remains to be quantified.

As various species respond differently to various components of the physical environment, some species in a particular location will be more advantaged than others by global change. They will then displace other species and communities and ecosystems will change in structure. Displaced species will be forced to higher latitudes and altitudes, and will be prone to extinction, having no potential habitat while existing where change is predicted to be greatest. Communities will not move en bloc and new assemblages of species will form at new locations. However, a major constraint on the movement of species will be their potential migration rates which will almost always be less than the rates projected for climate change. The result is likely to be unstable ecosystems prone to extensive damage by exceptional events such as drought and fire.

Deforestation and Reforestation

Man has been deforesting the Earth for millennia since the development of shifting cultivation. During the early part of the century this was mainly in temperate regions, more recently it has been concentrated in the tropics. Deforestation has three potential impacts on climate: through the carbon and nitrogen cycles (where it can lead to changes in carbon dioxide concentrations); through the change in reflectivity of terrain when forests are cleared, and through their effect on the hydrological cycle (precipitation and evaporation).

The destruction of 100,000 square km of tropical forest has been estimated to release up to 2 Gt of carbon (GtC) to the atmosphere, though allowing for replacement by grassland suggests that nearer 1 GtC is a likely figure. If all the tropical forests were removed, the input is variously estimated at from 150 to 350 GtC; this would increase atmospheric carbon dioxide by 35 to 80 ppmv. The rate of loss of forest is difficult to estimate; probably till the mid-20th century, deforestation was a more important contributor to atmospheric carbon dioxide than was the burning of fossil fuels. Since then, fossil fuels have become dominant; one estimate is that around 1980 1.7 GtC was being released annually from the clearing of tropical forests, compared with 5 GtC from burning of fossil fuels. Carbon dioxide will be absorbed from the atmosphere during the growth phase of new forests; it is estimated that the planting of 4 million square kilometres of temperate forest would withdraw about 1 Gt of carbon from the atmosphere per year for over 100 years.

Deforestation can also alter climate directly by decreasing the absorption of solar radiation, so weakening the local heat source and decreasing rainfall. Experiments with climate models predict that replacing all the forests of the Amazon basin by grassland reduces the rainfall over the basin by about 20%.

How can we limit climate change?

From studies of how quickly ecosystems can adapt to climate change, it may be relevant to assess what maximum emissions of greenhouse gases would result in global temperatures changing by, say, 0.1°C or 0.2°C per decade.

Even if we were able to stabilise atmospheric concentrations of the greenhouse gases at present day levels (requiring, as we saw above, cutbacks in emissions of 50 - 80% in most gases), this would still not keep climate as it is today; we may already be committed to a global rate of change of about 0.1 C per decade. To limit global temperature increase to about 0.2 C per decade, emissions of carbon dioxide would have to be reduced by about XX% (calculation to be finalised), making reasonable assumptions about the effect on CFCs of the Montreal Protocol, and assuming emissions of other gases remain unchanged.

What should be done to reduce uncertainties, and how long will this take ?

Policymakers will be aware from this assessment that, although we can say that significant climate change is unavoidable, much uncertainty exists in prediction of global climate properties such as the temperature and rainfall near the surface and the mean sea level. Even greater uncertainty exists in predictions of regional climate change.

To reduce these uncertainties large improvements are required in our capability to model and to observe the global climate system, and to understand it through studies of the processes that need to be represented in the global models. As far as the global modelling is concerned, it is particularly urgent to develop coupled atmosphere -ocean-ice models with increased spatial resolution, incorporating more realistic formulations of relevant physical, chemical and biological processes.

As far as the processes are concerned, the main areas of uncertainty are (1) the role of the clouds which lead to feedback that may amplify or limit the response of the atmosphere to greenhouse forcing, (2) the changes that can occur in the world ocean circulation and in the heat intake of the ocean which acts to reduce and delay surface warming, and (3) the changes that will modify biological activity on land and in the seas. Detailed field studies of these processes are either planned or underway.

As far as the global observational capability is concerned there needs to be increased accuracy and coverage in the observations of the properties of the atmosphere and oceans, especially those directed to the earlier possible detection of climate changes and towards the verification of climate models. The main observational requirements are (1) the maintenance and improvement of observations provided by the World Weather Watch programme of WMO, (2) the development of major new satellite observing systems to obtain global description of properties such as three dimensional cloud distribution and rainfall from polar orbiting platforms, and three dimensional wind fields from a low altitude satellite covering tropical regions, and (3) a new initiative to establish measurements from ships and automatic instrumented vehicles, deep sea moorings and shore stations.

International cooperation to carry out all aspects of this work is concentrated in the World Climate Research Programme and the International Geosphere-Biosphere Programme. These are large and complex endeavours - the largest coordinated international scientific programmes yet attempted. To reinforce existing projects and tackle new scientific problems not only will increased resources be necessary to support existing research teams in each nation, but an increased supply of trained scientists will also be essential; this has implications now at all levels of education. The international community of scientists also needs to be widened to include more participants from developing countries.

As research advances, increased understanding and improved observations will lead to progressively more reliable climate predictions. However considering the complex nature of the problem and the scale of the scientific programmes to be undertaken we know that rapid results cannot be expected. Indeed further scientific

1 advances may expose unforeseen problems and areas of ignorance. Surprises are
2 possible; for instance it is worth noting that the "ozone hole" resulting from the
3 effects of CFCs was entirely unpredicted. The box below gives some important
4 milestones towards narrowing the uncertainties.
5
6
7
8
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11
12
13

TIMESCALES FOR
NARROWING UNCERTAINTIES

PREDICTIONS OF RATE OF CHANGE OF CLIMATE
(as a result of coupled atmos-ocean models
and better understanding of the ocean)

PREDICTIONS OF REGIONAL DIFFERENCES IN
CLIMATE INCLUDING WATER RESOURCES (as
a result of higher resolution models and a
better understanding of the water cycle)

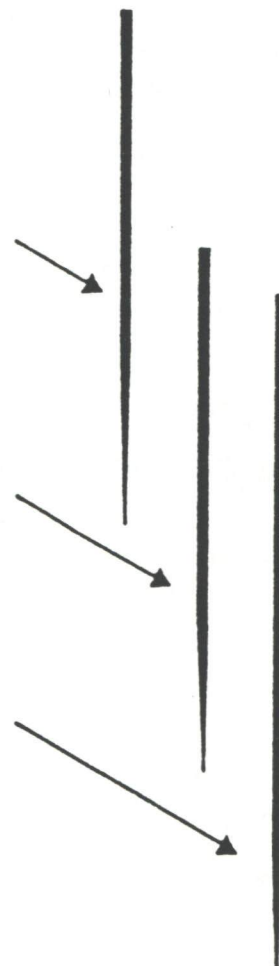
IMPROVED RELIABILITY OF PREDICTIONS &
DEFINITION OF RANGE OF POSSIBLE CLIMATE
VARIATION (as a result of models
containing better representations of
clouds, oceans, ice-sheets, chemistry &
biosphere)

1990

1995

2000

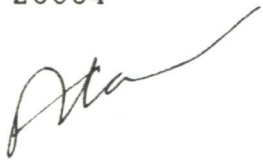
2005



THE WHITE HOUSE

WASHINGTON

ADDRESS TO WHITE HOUSE CONFERENCE ON SCIENCE AND
ECONOMICS RESEARCH RELATED TO GLOBAL CHANGE

Date: Wednesday, April 18, 1990
Location: J.W. Marriott Hotel
1331 Pennsylvania Avenue
Washington, D.C. 20004
Time: 2:30 pm
From: D. Allan Bromley 

I. PURPOSE

To address the closing plenary session of the White House Conference on Science and Economic Research Related to Global Change.

II. BACKGROUND

During the campaign the President raised the issue of an international conference on global change. He formalized his intention to host such an event during his Summit meeting with President Gorbachev on December 4, 1989, and later on February 5, 1990, during his speech to the United Nations Intergovernmental Panel on Climate Change.

III. PARTICIPANTS

Approximately 190 delegates representing 17 countries, the European Community (EC) and the Organization for Economic Cooperation and Development (OECD).

IV. PRESS PLAN

Open.

V. SEQUENCE OF EVENTS

See Advance Office scenario.

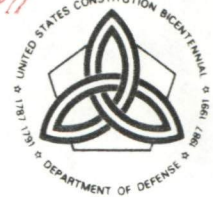
VI. REMARKS

To be provided by speechwriters.

FAX to Frankmarie Keel 4/16
@Jwharrist



THE SECRETARY OF DEFENSE
WASHINGTON, THE DISTRICT OF COLUMBIA



DT

13 APR 1990

Dr. D. Allan Bromley
Assistant to the President
for Science and Technology
The White House
Washington, D.C. 20500

Dear Dr. Bromley:

This responds to your letter of March 26, 1990 requesting that the Department of Defense contribute funds for the White House Conference on Science and Economics Research Related to Global Change. I am pleased to advise you that I have authorized the transfer of the \$150,000 you requested as our share of the total cost of the Conference. We are pleased to participate and wish you success in achieving Conference objectives.

Should there be any need to obtain additional details on funding arrangements, please contact Mr. Geoff Cratch at 697-6760.

Sincerely,

D. Cheney

THE WHITE HOUSE
WASHINGTON

April 23, 1940

Dr. Frank B. Rowell

Dear Frank:

Just a brief note of appreciation for your help - beyond any conceivable call of duty - with respect to the President's Conference. Your wisdom, experience, insight and sense of humor were all crucial to pulling this off.

And on our own I am confident that we could have avoided the glitches!

It was a great pleasure during this opportunity to work with you and when you return I have a small memento that I would like to give you.

With warmest thanks. Sincerely,
Roosevelt

THE WHITE HOUSE
WASHINGTON

April 23, 1990

Dr. Nancy Maynard:

Dear Nancy:

This is just a brief note of thanks for your truly heroic efforts toward making the President's Conference a success. On our own we could even have avoided the glitches!

I know what incredible time and effort you and the Conference core group (Bob and Jeanmarie) put into it and wanted to say how very much I appreciated it—as does the President.

We can be reasonably pleased with what we accomplished.

Sincerely
Susan

THE WHITE HOUSE
WASHINGTON

April 23, 40.

Dr. Michael Boskin:

Dear Mike:

Just a brief note of appreciation.

In retrospect, I think that we can be relatively pleased with the Conference despite some glitches that really were outside of our control.

I particularly wanted to say how much I enjoyed working with you on this and how much I learned from you.

I look forward to a continuing close and rewarding relationship in the days ahead.

Sincerely
Aker

THE WHITE HOUSE
WASHINGTON

April 23, 1990

Dr. Robert Condit

Dear Bob:

Just a brief note of warmest appreciation of your truly heroic efforts on behalf of the President's Conference. I cannot think of anyone who would have been more effective - and I know what difficult situations you encountered throughout.

Despite glitches I think we can be well pleased with the outcome.

Again my warmest personal thanks and that of the President.

Sincerely
Dylan

THE WHITE HOUSE
WASHINGTON

April 23, 90

Mr. Michael Debevoise

Dear Michael:

It was a great pleasure working with you on the President's Conference. Despite a few glitches I think that we can be well pleased with the outcome.

You have been a singularly effective spokesman for the President in all areas of the environment—a true voice of reason—and a much appreciated colleague!

Look forward to working with you in the days ahead—but no conferences—at least for a while.
Sincerely Allan

04:13 PM EDT

Conference file

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AM-Greenhouse Conference, Bjt, 738K

Administration Criticized for Environmental InactionK

By H. JOSEF HEBERT*

Associated Press Writer=

WASHINGTON (AP) — Delegates from 17 nations gathered for a White House conference on global warming amid criticism Monday from some participants and environmentalists that the Bush administration isn't dealing with the problem.

Senior administration officials said the United States will call for increased international research on both the science of global warming and the economic implications of the "greenhouse" effect when the two-day conference begins Tuesday.

But as delegates arrived, environmentalists chastised President Bush for not calling for specific actions to ease the global warming problem, including commitments to make specific reductions in greenhouse pollutants.

The Sierra Club, which announced a TV advertising campaign to highlight concerns about global warming, called the White House conference an attempt by the administration to shift the focus of the issue away from the need for pollution controls to a debate over economic considerations.

"It's really a smoke screen for the administration's inaction on global warming," said Daniel Becker of the Sierra Club. "We know enough now to begin acting on to curb global warming today."

Some conference participants also expressed concern about the heavy U.S. focus on more research.

"In spite of remaining uncertainties on some aspects of the issue, an effective response policy must be established now, without any further delay," said a statement issued on behalf of the 12 nations attending from the European Community.

Lauries Jan Brinkhorst, director-general for the environment of the European Community's Council of Ministers, and Padraig Flynn, environmental minister of Ireland, said there was an "urgent need for an effective response policy" while additional research is under way.

Senior administration officials have reiterated in recent days that Bush will offer no new policy proposals to curb the manmade pollution that scientists agree is causing the earth to warm.

Bush, in remarks that will open the conference, was expected instead to focus on the need for additional research to resolve both scientific uncertainties about global warming and establish clearer estimates on economic costs.

The conference, which is being held just days before Sunday's celebration of Earth Day, fulfills a campaign promise Bush made to hold an international conference on global warming early in his presidency.

Representatives to the meeting are senior cabinet-level advisers on economics, science and the environment from 17 nations, including the

European Community, Japan and Brazil.

Bush advisers said they hoped the conference would, for the first time, give equal weight to economic and environmental issues related to global warming and "ensure the economics will be injected ... into all future international forums" on the subject.

"We hope it will raise the level of debate ... on the science and economics of global change," said Michael Boskin, chairman of the president's Council of Economic Advisers and one of the conference co-chairmen.

A number of European countries, including the Netherlands and West Germany, have advocated that industrial nations commit to a stabilization of carbon dioxide emissions by 2000 through a variety of programs reducing energy needs.

Carbon dioxide, which is produced in the burning of fossil fuels, is responsible for about half the greenhouse pollutants.

Environmentalists have argued that a wide range of actions could be taken to conserve energy and reduce greenhouse pollutants by requiring the manufacture of more fuel-efficient cars and promoting energy savings in other ways in homes and businesses.

The Sierra Club, which has more than 500,000 members, will take that message to the public with a series of public service ads featuring actors such as William Shatner, John Ritter and Jane Alexander.

The Bush administration has maintained that while there is widespread agreement that manmade pollutants are causing the earth to warm, it's not clear how severe the problem will be to warrant pollution controls that could have widespread economic impact.

The president's chief science adviser, Allen Bromley, last week criticized those who advocate "slam-dunk solutions" to global warming.

"We cannot sail blindly into the future," said Bromley, another conference co-chairman.

Some computer models have suggested that manmade pollutants will cause a 4-degree to 9-degree Fahrenheit increase in global temperatures in 60 years as the increasing pollution traps heat close to the Earth.

However, some scientists said those projections are uncertain and may not adequately take into account clouds or other factors that might have a counteracting effect.



AGENDA

MONDAY - APRIL 16, 1990

- 12:00 p.m.** **Early Registration** - J.W. Marriott Hotel
1331 Pennsylvania Avenue
Washington, D.C.
- 7:00 p.m.** **Reception - National Air and Space Museum (Closed to Media)**
- Hosts:** Robert A. Mosbacher, Secretary of Commerce
Richard H. Truly, Administrator of NASA
Martin Harwit, Director, National Air and Space Museum

TUESDAY, APRIL 17, 1990

- 9:30 a.m.** **PLENARY SESSION I (Open to Media)**
- Moderator:** Michael J. Boskin, Chairman, Council of Economic Advisors
- Welcoming Remarks:** Nicholas F. Brady, Secretary of the Treasury
- President George Bush**
- Goals and Expectations for the Conference:** D. Allan Bromley, Assistant to the President for Science and Technology
- Opening Remarks by Visiting Delegate:** Jan Janowski, Deputy Prime Minister of Poland, Director of the State Office for Science and Technology Development
- 11:00 a.m.** **PLENARY SESSION II (Open to Media)**
- Moderator:** Michael R. Deland, Chairman, Council on Environmental Quality
- Theme I - The Science and Economics Research Challenge**
- Theme II - Integrating Science and Economics Research in the Policy Process**
- Theme III - Building Partnerships for Science and Economics Research**
- Presentations:**
D. Allan Bromley
Michael J. Boskin
Michael R. Deland

- 12:00 Luncheon (Open to Media)**
Speaker: William K. Reilly, Administrator, Environmental Protection Agency
- 1:45 p.m. WORKING GROUP SESSIONS (Closed to Media)**
Working Group Session I
Working Group Session II
- 6:00 P.M. Reception at the National Academy of Sciences Building (Closed to Media)**
Host: Frank Press, President of the National Academy of Sciences and
Robert White, President of the National Academy of Engineering
- 8:00 p.m. Official Delegate Dinner (Closed to Media)**
Host: Lawrence Eagleburger, Deputy Secretary of State
Address: Bert Bolin, Professor of Meteorology, Stockholm University, Sweden
Chairman, Inter-Government Panel on Climate Change

WEDNESDAY, APRIL 18, 1990

- 9:00 a.m. WORKING GROUP SESSIONS (Closed to Media)**
Working Group Session III
Working Group Session IV
- 12:00 p.m. Luncheon (Open to Media)**
Speaker: James D. Watkins, Secretary, Department of Energy
- 1:45 p.m. CONCLUDING SESSION (Open to Media)**
Moderator: D. Allan Bromley
Review of Co-Chairmen's Report: Michael R. Deland, for the Conference Co-Chairmen
President George Bush
- 3:00 p.m. Conference Ends**



EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON, D.C. 20500

Michael R. Deland
Chairman

(202) 395-5080

April 23, 1990

Dear Allan,

Recent days have heightened my recollection of a breakfast with you last fall at which you stated how it might be helpful to assemble some of your colleagues in the international scientific community to quietly, in a low key forum, discuss global change...

Well, Allan you did it - in remarkable fashion - and in so doing have forever ~~redefined~~ redefined "low key"!

You have yet again served the President extraordinarily well - and under less than easy circumstances...
(over)



It was a privilege and pleasure
for me and the CEE team to lend
a helping hand.

I greatly look forward to our
continuing cooperation and constructive
working relationship.

However, as happy as our
collaboration was, I'd appreciate
a brief pause before the next
event - unless of course it
is just another "quiet, low key"
affair!

Congratulations and very best
regards.

Sincerely, M.L.