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ABSTRACT
TESTIMONY OF DONNA R. FITZPATRICK
UNDER SECRETARY OF ENERGY
BEFORE THE HOUSE SUBCOMMITTEE ON ENERGY AND POWER

The evidence available to date on global climate change is sufficient cause for serious concern, even at the most optimistic end of the range of predicted impacts. Therefore, the government should continue efforts to reduce gaps in the data, refine modeling capabilities, and develop options to reduce the accumulation of greenhouse gases and to mitigate or adjust to the result of climate changes.

Reducing scientific uncertainty is crucial in building an international consensus. Climate change is an international concern which must be addressed cooperatively among nations. Thus, the United States Government has launched an important initiative to establish, at the United Nations, an Intergovernmental Panel on Climate Change. DOE's policy is to aggressively pursue resolution of scientific uncertainties and to further develop an international consensus. Also required now are rigorous scientific research and technology development programs and continued analysis of policy options.

At DOE, we are pursuing precisely this course. Our CO2 research program is improving understanding of CO2 interactions with the atmosphere, biosphere, oceans and cryosphere. Our technology development programs include aggressive efforts to reduce CO2 emissions in the fossil energy sector through advanced clean coal burning efficiency; non-fossil fuel energy supply technologies are being improved by programs in nuclear fission, fusion and renewable sources; and, improve efficiency in energy uses will be possible because of DOE research in industrial end-use, transportation, and building end-use. We are also improving the data bases and models necessary to evaluate additional policy alternatives.

TESTIMONY OF
DONNA R. FITZPATRICK
UNDER SECRETARY OF ENERGY
BEFORE THE
HOUSE COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON ENERGY AND POWER

Thursday, September 22, 1988

TESTIMONY OF DONNA R. FITZPATRICK
UNDER SECRETARY OF ENERGY
HOUSE COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON ENERGY AND POWER

Thank you, Mr. Chairman, for this opportunity to address your subcommittee on this important topic of potential climate change caused by the absorption of infrared radiation by certain gases in the atmosphere. These gases include carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄), tropospheric ozone and chloroflourocarbons (CFCs).

The greenhouse effect caused by the infrared absorption has been the subject of research attention at the Department of Energy (DOE) for more than ten years. As recently as December 1985, DOE published a four volume report which summarizes much of what is known and not known about the relationship between CO₂ and climate change. That assessment has identified important areas for future research so that policymakers will have the information necessary for formulating effective policies for addressing climate change.

Significant gaps exist in our knowledge of the greenhouse effect -- gaps that must be reduced if we are to address the concerns raised by potential climate change in a scientifically supportable manner. The five major general circulation models predict that a doubling of CO₂, (or the equivalent of a CO₂ doubling when the other greenhouse gases are included) will lead

to an increase in global mean temperature of between 1.5 and 4.5 degrees centigrade. At present emissions growth rates, this could occur by the middle of the next century. Since we currently may be near the peak of an interglacial period, such temperature increases as represented by this range are legitimate causes of concern. Although this temperature range is very broad, it does not yet capture all the uncertainties. Important feedback mechanisms which would reduce any projected warming are not well understood or incorporated in these models. Cloud cover, the role of oceans as a sink for CO₂, and enhanced vegetative growth due to increased CO₂ are three of these important scientific uncertainties.

For policy formulation purposes, another important factor is the inability of the models to agree on the regional climate implications of greenhouse gas concentration increases. Would the Midwest, for example, receive more or less rain if its temperature increases? This is a crucial consideration in developing mitigative strategies or in evaluating the effectiveness and efficiency of potential emissions stabilization policies.

In addition, increases in the amount of CO₂ production have been greater than the corresponding increases in CO₂ concentrations. Where has the extra CO₂ gone over the last 140 years? Until we

have a better understanding of the carbon cycle, it is difficult to know the effectiveness of potential emissions stabilization policies. These scientific uncertainties must be reduced before we commit the Nation's economic future to drastic and potentially misplaced policy responses.

Reducing scientific uncertainty is also crucial in building an international consensus on the need for action and on its appropriate form. Climate change is an international problem which must be addressed cooperatively among nations. No individual nation can substantially influence the rate of climate change using any set of feasible policies.

International cooperation on science and policy should develop together. Further, discussions on methods for policy evaluation, cooperative policy analysis where scientific understanding is sufficiently robust, and preliminary discussions of the national interests of countries could contribute to developing an international consensus when both scientific understanding and policy analysis mature. For this reason, the United States Government, with DOE involvement, launched an important initiative last year to encourage the formation of an Intergovernmental Panel on Climate Change to advise the World Meteorological Organization and the United Nations Environment Programme on climate change research and policy analysis

activities. This panel will be an influential forum for the discussion among governments on questions of science and policy. As in the Vienna Convention and the Montreal Protocol for the Protection of the Ozone Layer, the U.S. Government provided international leadership by setting in place the appropriate mechanism for addressing climate change issues.

The evidence available to date is sufficient cause for serious concern, even at the most optimistic end of the range of predicted impacts. Therefore, the government should continue efforts to reduce gaps in data and to refine modeling capabilities. DOE and other interested agencies should also continue work to develop options to reduce the accumulation of greenhouse gases and to mitigate or adjust to the results of possible climate changes. These options must be analyzed for their technical feasibility, effectiveness, and efficiency as well as their economic impacts. Without carefully developed information of this sort, it will be impossible to arrive at the kind of national and international consensus that will be required for effective and efficient action. Particular caution should be exercised to avoid taking actions which would burden the U.S. economy or any sector of it or any geographic area in a manner which may be unwarranted based on the available scientific evidence. Unilateral actions of this type could result in a loss of jobs and harm the Nation's international competitiveness.

What is required is a vigorous scientific research, technology development, and policy analysis effort. The U.S. Government is pursuing precisely this path.

At the present time, carbon dioxide emissions contribute about one half of the greenhouse effect. Deforestation results in approximately 25 percent of the added CO₂ while fossil fuel combustion provides nearly all the remaining man-made CO₂ releases. The United States contribution to the global figure due to energy sources is about 23 percent. The U.S. contribution, in turn, can be split into 44 percent from oil, 36 percent from coal and 20 percent from natural gas. Considering the U.S. total from the end-use perspective, fossil fuel burning to supply electric power is 35 percent of the national total, for transportation 32 percent, heating and cooling 13 percent, and for industrial uses is 20 percent.

The present energy policy -- to assure a diversity of energy options at affordable costs -- is the appropriate policy for contingency planning for global climate change also. However, we must recognize that the policy options -- and the need for diversity -- includes options for all nations, not just the U.S. or just the developed countries.

The energy technology options can be grouped under four general topics:

- End use conservation initiatives
- improved efficiencies and modified fuel choices in combustion technologies
- available or soon-to-be-available non-combustion technologies
- long-term technology research

Conservation initiatives have been happening over the past 15 years due to energy concerns and will continue. The question is to what level can they be accelerated in developed countries and be introduced in developing economies.

Combustion technologies can reduce CO2 emissions by modernization and achievement of higher efficiencies and through fuel switching toward greater use of natural gas. Repowering technologies in our Clean Coal Program have high promise but general introduction in this country is not likely prior to the year 2000.

Non-combustion technologies -- nuclear or renewable power -- are available now. But rapid introduction to offset substantial fossil fuel use until well into the 21st century is not likely. There are specific concerns with nuclear power that must be better addressed and rates of renewable technology penetration will not make substantial fuel switching changes prior to year 2000.

Long-term technologies -- fusion, hydrogen power, superconductivity applications -- have high promise but will require decades before their impact is felt.

My characterizations are for U.S. applications; timing for global introduction of technologies is likely to require additional years or decades before the impact is seen.

At DOE, a number of our programs have important roles in contributing to a reduction in greenhouse gas emissions and contributing to our understanding of climate change. Several of these developmental programs presently being carried out will be discussed next.

DOE's Carbon Dioxide Research - Since the beginning of this program in 1978, DOE has published more than 80 technical and

research reports on CO₂ that bear directly on global climate change problems.

The goal of DOE's CO₂ research is to develop the scientific knowledge base for governmental action and policy formation in response to changes of atmospheric CO₂ and related effects on the earth's climate and biological systems. Achievement of this goal requires increased understanding of CO₂ interactions involving the global atmosphere, biosphere, oceans, and cryosphere.

The Office of Energy Research has developed estimates of future atmospheric CO₂ levels from energy models of the carbon cycle, including fundamental information about natural carbon exchanges among the atmosphere, the oceans and the terrestrial biosphere. This information is used to quantify changes of atmospheric CO₂ concentration from human activities such as CO₂ emissions from fossil fuel use and land clearing.

Knowledge of CO₂ retained in the atmosphere is a key determinant in estimating the atmospheric CO₂ concentration. Research has reduced the uncertainty of estimates of atmospheric CO₂ retention from a scientifically-plausible range of 30-80 percent of human-related carbon release to the atmosphere to a "most likely" retention range of 50-60 percent. This relationship may change

as global warming continues. An understanding of the global carbon system and its sensitivity to human and climate perturbations is crucial for reliably estimating future increases in the atmospheric CO₂ concentration.

Research is also directed toward reducing scientific uncertainties and predicting of CO₂-induced regional and seasonal patterns of climate change. The observational temperature data base has been expanded from only the Northern Hemisphere land area to a global data set, with a time span of about 130 years.

Climate models have improved. Model improvements include atmosphere-ocean coupling that provides for transport and storage of heat, and the source of moisture for global change model prediction of precipitation. Coupled ocean-atmosphere models are essential for estimating time rate of climate change.

Models agree well with each other and with data in estimating global average temperature and all models predict a global warming trend for increased atmospheric CO₂ concentrations, which is consistent with theoretical expectations. However, models do not agree with each other or with observed data for temperature changes for regions (e.g., for areas the size of a western state, differences as large as plus or minus 5°C are possible). The related changes in regional precipitation

patterns show even greater uncertainties; that is, various models project conflicting results in seasonal totals for some regions -- showing both increases and decreases for the same region among these models.

In addition, research will determine responses of crops and natural vegetation to increased concentration of atmospheric CO₂ and to possible climate change. Specific research objectives are: to determine fundamental effects of long-term exposure to elevated CO₂ on plant physiology and growth; and to evaluate ecosystem responses to CO₂ in terms of productivity and altered plant and animal composition of ecosystems. Subjects of study include crops and ecological systems with special attention to effects of CO₂ on vegetation and the possible effect of CO₂ on carbon balance of the terrestrial biosphere. Previous laboratory and field studies have demonstrated that increased concentration of CO₂ fertilizes plants, enhances plant growth, and improves water-use efficiency.

Within the Office of Energy Research, major technology research programs are being conducted on advanced energy sources and processes such as fusion, hydrogen fuel cells, and superconductivity which could significantly improve energy efficiency.

Conservation and Renewable Energy Programs

Ongoing energy conservation research and development programs seek to support the availability of more energy efficient end-use technologies in the future. These programs relate to energy use in commercial and residential buildings, industry, and transportation. Improvements in end-use efficiency could reduce the growth in future energy demand by as much as 16 quads annually in 2010. Energy efficiency improvements and energy conservation are approaches to limiting emissions that will receive increased attention. Increased energy efficiency can help slow the rate of growth in use of fossil fuels and provide additional time to develop and commercialize alternative energy supply options.

Conservation programs, which aim at the development of new technologies to use energy more efficiently, affect all end user sectors -- residential, industrial, and transportation. New high temperature recuperators use waste heat to preheat combustion air for industrial furnaces and boilers and save over 50 percent of the energy used by non-recuperative equipment. Composite ceramic materials under development will allow operation of recuperators in very high temperatures to recover waste heat at much higher temperatures than at present. New technologies for making steel and aluminum offer the opportunity of large reductions in energy

consumption in the manufacture of those key materials. The development of high temperature ceramic material for use in new automotive engines will provide much more efficient use of liquid fuels with a dramatic improvement in the emissions profile. Special coatings for glazing, advanced refrigeration systems, and thermally activated heat pumps will reduce energy consumption in residences. These kinds of technology developments presently underway should result in lower energy consumption and improved emissions characteristics without sacrificing operating efficiency or flexibility.

Specific research on recovery and use of CO₂ may also help contribute to reducing CO₂ emissions. For example, the Industrial Energy Conservation Program is working on methods to reuse CO₂ from fossil fuel combustion in enhanced oil recovery and other applications. All industrial applications currently use 1.25 to 3 billion tons of CO₂ per year. Reuse technologies can have a small but significant impact on reducing future CO₂ loading. In addition, higher oil prices will eventually encourage increased CO₂ use in secondary and tertiary oil recovery.

Renewable energy technologies convert naturally occurring or reoccurring physical resources into useful energy forms, such as electricity, heat, or liquid fuels. Wind, solar, hydro,

geothermal, biomass, and ocean resources which are the basis of these technologies represent a vast source of potential energy supply. Photovoltaics, wind, solar thermal, and hydropower technologies employ no combustion at the point of use and therefore entail no emissions, including CO₂. The cumulative effects of growing and burning biomass on CO₂ loading are considered to be substantially less than the effects attributable to the use of fossil fuels. While the use of biomass contributes to the CO₂ loading, the increased production of biomass per acre through well managed growth consumes CO₂ from the atmosphere at an increased rate. Further, the root mass which remains after harvesting retains up to 30 percent of the consumed carbon. Methanol and other liquid fuels produced from biomass have the potential for reducing transportation emissions and displacing fossil based liquid fuels. In our continuing review of this area, we are paying special attention to the full fuel cycle CO₂ attributes of biomass technology options. On a fuel cycle basis, an integrated biofuels energy system is probably the closest to being net zero for CO₂ effects of all combustion based energy systems, due to the CO₂ absorption of the growing feedstocks.

Collectively, renewable energy plays a significant role in the current global energy mix, and represents some 9 percent of domestic U.S. energy production. Many developing countries use substantially larger percentages, mostly because of

woodburning. This contributes, in part, to the deforestation problem.

The prospects for future growth in the use of renewable technology appear especially promising as research continues to improve their efficiency, economics, and reliability. Renewable energy use can reduce carbon emissions and give developing countries attractive alternatives to the use of fossil fuels and further depletion of forests.

As a longer term option to carbon-based transportation fuels, hydrogen is a clean burning and versatile fuel. However, because hydrogen does not exist in a free state, current methods of hydrogen processing consume large amounts of primary energy which must be factored into the full fuel cycle assessment of CO₂ releases. Several promising hydrogen-processing technologies such as photochemical electrolysis might lead to cost-effective methods of producing hydrogen without adding to CO₂ production so that the hydrogen could be used in transportation and all other energy uses.

Several of the electric energy system and storage technologies under development within the DOE program are primarily aimed at facilitating reliable and efficient operation of the Nation's electric power grid and the effective integration of renewable

energy technologies into these grids. This will also improve the efficient use of base resources and thus reduce fuel use and emissions.

Nuclear Energy Programs

Nuclear energy in its existing form is a proven technology that currently provides nearly 20 percent of the Nation's electricity. There are currently 109 operable nuclear reactors, which generate electricity without producing CO₂. Had the electricity generated by plants begun since 1973 been produced by oil-fired generators, it would have required approximately 3.5 billion barrels of oil, thus weakening the Nation's energy security position.

There are substantial improvements that can be made in nuclear reactor designs and the Department is sponsoring work to ensure that safe, environmentally compatible, and economic powerplants are available to utilities. We also recognize the need to shorten the delays involved in licensing reactors. To do this requires a new generation of reactors with designs that resolve many of the concerns expressed today.

There are three advanced reactor technologies actively being developed by the Department: the advanced light water reactor

(ALWR), the modular, high temperature gas reactor (MHTGR), and the liquid metal reactor (LMR).

The Department is focussing research in a joint program with industry on the development of the light water reactors that will be greatly simplified, incorporate passive safety features, certified by the Nuclear Regulatory Commission, and ready for commercialization in the 1990s without need for prototype demonstration.

The MHTGR Program, with industry and international support, is in the preliminary design stage. This technology is very promising, but will require a demonstration of reliability and economics, hence, commercial deployment will not occur until after the year 2000.

The LMR has the greatest potential to achieve significant breakthroughs in economics, safety, licensability, and waste management. The Department has just selected General Electric's 465MW power reactors inherently safe module (PRISM) for a three-year effort to develop a conceptual design, with an option for two additional years of preliminary design. However, this technology is not considered as a practical option for marketplace acceptance until after the year 2000.

Fossil Energy Programs

Traditionally, DOE's advanced coal technology program has attempted to boost overall power generating efficiencies as a way of improving economics and reducing the cost of electricity to consumers. Efficiency improvements have taken on added importance because they are directly related to reducing CO2 and other greenhouse gases.

A conventional 500 megawatt, pulverized coal-fired power plant without a flue gas scrubber (burning 2.8 percent sulfur bituminous coal) emits approximately 2.75 million tons of CO2 per year. Adding a limestone scrubber to the plant -- to meet sulfur dioxide reduction standards imposed by the amended Clean Air Act -- actually increases the release of CO2 by about 3 percent while reducing the facility's power output.

Virtually all of the advanced power generation technologies in DOE's Fossil Energy R & D and Clean Coal Technology Programs offer significant improvements over the 30-35 percent efficiencies of conventional coal-fired power plants equipped with scrubbers.

Therefore, while these coal-combustion options to modernize and replace present coal-fired power generators do not eliminate CO₂ and other emissions, the increased efficiencies can reduce the levels of emissions for a given level of power output. For example, replacement of a current conventional boiler by the integrated gasification, combined cycle system can reduce CO₂ emissions from that system by 14 percent and the use of coal-based fuel cells can reduce CO₂ emissions from that system by 28 percent.

Significant reductions in CO₂ emissions from the power generation sector of our economy are possible by developing and deploying more efficient, advanced fossil energy technologies in place of current technologies. Fuel use efficiencies and, consequently, CO₂ emissions reductions can be further improved by applying many of these technologies to cogeneration applications where useful heat can be extracted along with electricity, boosting useful energy output per fuel input.

In addition, the Department is developing, through its Clean Coal Technology and Coal R&D programs, advanced retrofit environmental control technologies that retain higher overall plant efficiencies than a conventional flue gas scrubber. Technologies such as advanced coal cleaning, in-duct sorbent injection and gas reburning can reduce sulfur and nitrogen emissions without significantly lowering plant efficiency. The result would be a

reduction in acid-rain-related emissions without introducing additional CO₂ into the atmosphere at levels that would occur if conventional scrubbers were added to older powerplants.

Many advanced clean coal technologies also reduce nitrogen oxides (NO_x) in the range of 50-90 percent compared to pulverized coal plants. NO_x is receiving increasing scrutiny relative to its role in the formation of tropospheric ozone (which also acts as a greenhouse gas).

The greatest percentage reductions in CO₂ emissions from hydrocarbon combustion result from advanced power generation technologies that include improvements in efficiency and are fueled totally or in part with natural gas. Natural gas is the fossil fuel having the lowest CO₂ emissions rate, yielding about half the CO₂ of coal combustion for the same heat of energy produced.

In addition to its coal-based R&D program, the Department is also conducting R&D on the extraction of unconventional natural gas resources. Unconventional gas has the potential to make a significant contribution to the Nation's future energy supply by augmenting current conventional supplies. Currently, about one trillion cubic feet annually (about 5 percent of total annual gas production) is produced from unconventional gas resources. But

if present technological barriers can be removed, natural gas could be produced in greater quantities in the future from tight sands, shales and coal seams, and in the longer term, possibly from methane hydrates, deep source deposits, and biomass.

Environment, Safety and Health

The Office of Environment, Safety and Health has been expanding the capability of existing emissions projection models to incorporate some of the other greenhouse gases in addition to CO₂. In this fiscal year, methane, which has energy and biogenic sources, is being added to the model. Incorporating energy sources of methane release will improve our capacity to develop realistic scenarios of greenhouse gases. This work will continue in the coming year with the addition of other gases and sources of methane release.

Additionally, an energy data base for developing countries, which will be important sources of emissions in the future, is being developed. This work initially focuses on electricity generation in these countries, but future work will develop data on other fuel uses.

Congress has recently directed four studies from the Office of Environment, Safety and Health on the relationship of energy

policy and climate change, including an evaluation of Federal R&D activities on alternative fuels, analysis of potential policies to achieve reductions in CO₂, a greenhouse gas emissions inventory, and study of policies to encourage private sector planning for climate change (H.R. 4567, Energy and Water Development Appropriation). These studies are required on a very short time scale; planning is underway to begin those studies at the start of the new fiscal year. Policy analysis on climate change will be an important part of this Office's program in the coming years.

SUMMARY

Mr. Chairman, this completes my review of DOE actions to address the issues raised by the greenhouse effect. Information needed to reduce science uncertainties and to evaluate the effectiveness of potential policy responses to global climate change issues will not be acquired quickly and will require a sustained effort on the part of governments and the private sector. I will be happy to answer any questions the subcommittee may have.

Draft
FIRST REGULAR SESSION OF THE
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

10/12/88

November 9-11, 1988
Geneva, Switzerland

U.S. OBJECTIVES

At the first session of the IPCC, the US should be prepared to offer constructive suggestions with regard to: Defining the responsibilities of the IPCC, setting up attainable and reasonable goals for the Panel, and establishing a timetable for activities of the panel. Specific goals of the U.S. strategy are:

- o To seek agreement that Panel members represent their respective governments and that the Panel is an autonomous intergovernmental body (similar to the UNEP Governing Council and WMO Congress), rather than an expert group advising the Executive Director of UNEP or Secretary General of WMO.
- o To play a leadership role by offering to chair the response strategies working group (and thereby participate in the Bureau), and by providing expertise in other areas. Chairing the response strategies working group would enable the U.S. to shape the most politically sensitive aspect of the Panel's work.
- o To defer consideration of a global convention. Calls for a global convention are likely to be made by several other countries. The U.S. believes that the panel should focus first on scientific and other assessment activities to analyze and communicate to policy makers what is known, what is not known, and what the uncertainties are about (a) climate change, (b) the social and economic effects of climate change, and (c) potential responses. The results of these assessments, along with other pertinent information, will provide a basis for considering a wide range of options to deal with the global climate issue, including the possibility of a climate convention.
- o To encourage the IPCC, in executing its work, to draw on the technical capabilities of the World Climate Program (WCP), International Geosphere-Biosphere Program (IGBP), UN and other international agencies, governments, and non-governmental scientific groups, rather than establishing duplicative activities.

- o To make the IPCC a forum for intergovernmental coordination in order to strengthen the related programs of WMO, UNEP, and other international programs. The IPCC should encourage the WCP and IGBP to address specific issues raised by the IPCC.

- o To develop a logical sequence of activities to contribute to responsible consideration of climate change issues by the international community. The Panel should be a forum for governments to coordinate the many upcoming conferences hosted by various governments and international organizations on climate change issues.

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1. ORGANIZATION OF THE SESSION AND OF THE PANEL

Election of the Chairman

WMO's suggestion of Bolin of Sweden for session chair and Saudi Arabia, Indonesia or India as vice chair is acceptable. Election of the Bureau should be deferred until late in the meeting, following discussions on the Panel's responsibilities and activities.

Participation in the Panel

The delegation should seek agreement that participation in the full Panel is open to governments of all member nations of the United Nations. Provision should be made for participation by representatives of international organizations and nongovernmental organizations as observers.

The Delegation should also seek agreement that Panel members represent their respective governments and that the Panel is an autonomous intergovernmental body (similar to the UNEP Governing Council and WMO Congress), rather than an expert group advising the Executive Director of UNEP or Secretary General of WMO.

Election of the Bureau

The Panel should establish a Bureau comprised of the chair and cochair of the Panel as a whole and of working groups in each of the main subject areas. The Bureau should be elected toward the end of the session for a term that includes the next meeting of the full Panel.

The delegation should support a balanced Bureau, including countries making major contributions to various aspects of the climate change issues and countries representing major geographic regions. For example, the delegation could support election of a Bureau along the following lines:

Chair: Sweden (Bolin)
Vice Chair: India, Indonesia or Saudi Arabia
Science Working Group Chair: UK (Houghton)
Vice Chair: LDC or USSR
Impacts Working Group Chair: India or Brazil
Vice Chair: Netherlands or Japan
Response Strategies Working Group: US
Vice Chair: LDC

The delegation should actively seek to have the U.S. chair the response strategies working group.

Talking Points

- As one of the primary supporters of establishment of this Panel when our governments met as the governing bodies of WMO and UNEP eighteen months ago, my government would like to ensure that we all have the same understanding of the nature of the Panel.
- It is the understanding of the U.S. Government that, given the global nature of the climate change issue, participation in this Panel is open to governments of all member nations of the United Nations.
- Further, it is the understanding of the U.S. Government that the Panel is an autonomous intergovernmental body and that we are here representing our governments rather than as individual experts.
- In light of the large number of countries which may participate in the Panel, I would suggest that, in order to carry out effectively the complex work before us, we establish a Bureau consisting of a Chair and Vice Chair of the full Panel and Chairs and Vice Chairs of major working groups.
- We will, of course, want to make the Bureau balanced and representative. I would propose that we now elect officers only for this session and that we defer selection of countries to chair and co-chair the full panel and working groups until late in the session. At that time, we will be able to consider the Bureau as a whole in the context of the organization and activities we plan for the Panel.

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2. NATIONAL STATEMENTS .

(ten minute oral statement, 4-8 page hand-out statement, plus
ten-line summary to be drafted)

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3. THE PANEL'S PROGRAM OF WORK

The letter of invitation from WMO and UNEP defines the major aims of the Panel as (a) to undertake assessments of available scientific and other information on climate warming, together with its environmental and socio-economic impacts and (b) to formulate realistic response strategies for the management of the problem.

To carry this out, the IPCC should establish working groups in the following subject areas: scientific assessment (including physical effects), assessment of socioeconomic and environmental impacts, response strategies, and perhaps information transfer.

The terms of reference should establish the main working groups, of 10-15 countries each, including countries making major contributions to various aspects of the climate change issue and representing major geographic regions; provide for a chair and co-chair for each working group; and state that the composition of the groups should be established by meetings of the full Panel.

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3.1 SCIENTIFIC ASSESSMENT

The U.S. should urge that work on a scientific assessment begin immediately and that a working group on science be established to oversee the development of this task.

The U.S. need not chair the working group since the U.S. will automatically play a major role in the scientific assessment; the U.S. should seek to be a member of the working group and ensure election of a competent and moderate chair (e.g., U.K.).

The working group on science should determine how to organize and implement the scientific assessment. The delegation should seek to have the current meeting of the IPCC request that consultations among scientists begin immediately to prepare a recommendation on the design of the assessment for consideration by a meeting of the working group in early 1989. A US proposal is attached.

The U.S. should propose that the IPCC be briefed on the results of the scientific assessment by the end of 1990 and that the assessment be presented to a major forum such as the Second World Climate Conference (SWCC) by mid-1991.

The scientific assessment should consider as input to their analysis likely scenarios for greenhouse gas emissions to be developed by the response strategy working group (see 6.3.1).

Some delegations will undoubtedly argue that a major scientific assessment is not necessary and that enough is known to proceed with policy consideration. The U.S. position should be that in order to consider policy options productively and responsibly, it is necessary to develop a common understanding among policymakers of the state of science. A major product which should be included in the scientific assessment is a scientifically sound and credible exposition of the major gaps in our knowledge and a description and characterization of significant uncertainties, written in terms accessible to policymakers and the public.

Talking Points

- Extensive mechanisms exist for cooperative research, including programs under the World Climate Program, the International Oceanographic Commission, and the new International Geosphere-Biosphere Program. We need to be careful to draw on them and coordinate with them, but not to duplicate them.
- In order to consider policy options productively and responsibly, it is necessary not just to carry out good science but also to develop a common understanding among policymakers of the state of the science.
- To achieve this common understanding, we propose establishment of a science assessment working group to oversee an assessment of the state of scientific knowledge, including an assessment of predictability and uncertainties.
- I would suggest that the Panel request that consultations among scientists begin immediately to prepare a recommendation on the design of the assessment for consideration by a meeting of the working group in early 1989.
- Our scientists tell us that a careful review of currently-available information could be completed by the end of 1990 if we set them to the task immediately. (If the two-year timescale is questioned) I suggest we ask the scientists to discuss the content and timetable for the assessment and make a recommendation for decision by the working group in January.
- My government is prepared to contribute substantial time and expertise of our scientists to this effort and I hope other governments will do likewise.

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3.2 IMPACT ASSESSMENT

The U.S. should agree to the creation of a working group on assessment of environmental and socio-economic impacts of climate change.

Talking Points

- The working group on environmental and socio-economic impacts should review what assessments are currently underway by member governments, UNEP, OECD and other organizations. It should examine the regional coverage, methodologies and schedule of existing assessments, and recommend what additional work needs to be undertaken.
- The working group should examine the methodological problem of how best to make impact assessments useful and meaningful when the scientific inputs to the assessments, particularly regional distribution of predicted climate change, are still subject to gaps of knowledge or to major uncertainties. It should recommend ways to deal with such gaps and uncertainties in impact assessments and ways to present the resulting impact assessment uncertainties to policymakers and the public.
- The working group should review UNEP's long term plan in light of the IPCC activities with a view to making the two compatible. The IPCC should encourage the World Climate Impacts Program and IGBP to address specific issues raised by the impact assessment working group.

The working group should prepare recommendations to the IPCC on data acquisition, methodology development, and additional studies necessary to prepare credible impacts assessments. The working group should prepare summary reports to IPCC on likely impacts which could affect the common interests of several countries. Included in these should be an indication of the degree of confidence that may be attached to the direction, magnitude, extent and timing of the impacts.

Draft
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INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

November 9-11, 1988
Geneva, Switzerland

3.3 RESPONSE STRATEGIES

The U.S. should propose the creation of a working group on response strategies to coordinate and assess studies for evaluating alternative policies to adapt to climate change or limit emissions of greenhouse gases.

The U.S. should chair the response strategies working group. Governments should be encouraged to appoint representatives from energy, natural resources, and environmental protection agencies. Appropriate national and international agencies (e.g. FAO, IBRD, IEA, OECD) should be invited to participate in the activities of the working group.

The Work Plan for Developing U.S. Global Climate Change Policy, an EPA/DOE proposed work plan for the IPCC response strategies working group, and elements for terms of reference for the IPCC group are attached.

The initial activity of this group would include the development of:

- 1) internationally acceptable scenarios for greenhouse gas emissions under currently projected conditions, including analysis of ranges of uncertainties and probabilities of occurrence of specific scenarios.
2. methodologies for evaluating mitigation and emissions control strategies (including engineering/technological approaches).

The U.S. should propose to host a meeting of the working group ? (should we host or just chair it but have it in Geneva?) and to organize seminars on emission forecasting and methodologies, assessments of the status of technological development, and assessments of adaptation strategies.

The Canadian delegation and possibly others are likely to raise the issue of a climate convention. We understand the Canadian government will offer to host a conference in February 1989 to look at existing law and precedents. Still, the Canadians have said that they do not expect negotiations to begin immediately and that consideration of any such convention would take place over a period of several years. We should therefore avoid

confrontation on this issue while not making commitments, by putting consideration of a convention in the context of consideration of a full range of possible options after the appropriate assessment and analytical work has been done. If a legal group is established, it should be a subgroup of the response strategies group. Similarly, if the Canadians call for action in response to the statement of the Toronto Conference, those proposals should be considered, along with other such proposals, by the response strategies working group.

Talking Points

- Climate change can no longer be considered a subject only for scientific inquiry. We must also begin the complex work of analysis of possible response strategies that could be undertaken if governments determine they are appropriate.
- The Response Strategies Working Group should identify and analyze the effectiveness and efficiency of a wide range of potential strategies to adapt to climate change or to limit emissions of greenhouse gases.
- To consider responsibly possible adaptive or emissions-limiting strategies, we must first assess current and projected emissions as well as available and projected technological/engineering approaches.
- An emissions assessment will contribute to development of realistic scenarios by the science assessment group. Both an emissions assessment and technology studies will contribute to analysis of costs and benefits of various possible response strategies.
- (If a convention or the Toronto conference recommendations are raised) As I said earlier, the Response Strategies Working Group should identify and analyze the effectiveness and efficiency of a wide range of potential emission-limiting and adaptive response strategies. The Working Group or a subgroup should look at possible legal arrangements and precedents which might be considered.
- My government is prepared to chair the Response Strategies Working Group. My government is prepared to devote substantial staff time and expertise to this important work and I hope other governments will as well.

- I would suggest the Working Group meet early next year to define its activities in more detail. My government would be prepared to organize seminars on topics such as emission forecasting and methodologies, assessments of the status of technological development, and assessments of adaptation strategies.

- It is important that the Working Group engage agencies of member governments and other international agencies which are responsible for policy development on energy, resource protection and development, industrial and agricultural strategies.

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3.4 INFORMATION TRANSFER .

The U.S. should propose that existing WMO/UNEP/ICSU programs be used to inform the public worldwide on climate change issues. If establishment of an IPCC working group on this subject is proposed, the delegation should urge that each of the other working groups address information transfer with regard to its own activities. If the proposal is pressed, we should urge that consideration be postponed to a future meeting. If a group is established, the delegation should seek to ensure that participating countries in the group reflect a balanced view of climate change issues.

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4. SCHEDULE OF WORK OF IPCC

The delegation should propose that the full Panel meet in the spring of 1989 several weeks before the meetings of the WMO Executive Council and UNEP Governing Council and annually thereafter. The Bureau and working groups should meet as needed, probably biannually. We would envision meetings of the working groups early in 1989 (the science group in January, the impacts and response strategies groups in March or April), followed by a Bureau meeting to plan the full Panel meeting.

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5. THE SECOND WORLD CLIMATE CONFERENCE, TORONTO CONFERENCE,
AND OTHER CONFERENCES

Many conferences related to global climate change are planned or proposed. For example, the Canadian government plans to host a meeting on international law related to the atmosphere in early 1989 and has offered to host a major conference in 1989 (which Soviet Foreign Minister Shevardnadze has proposed by at the summit level) on sustainable development. The Japanese Prime Minister has proposed hosting a conference on global change or global climate change in 1990. The FRG is hosting a large conference on Climate and Development the same week as the IPCC meeting. Vice President Bush has said the U.S. will host a conference on climate change if he is elected. New offers to host conferences will probably be made in national statements at the IPCC.

A major, long-planned conference is the Second World Climate Conference scheduled for June 25-July 3, 1990 in Geneva. (Gene Bierly/Ted Williams please fill in more on SWCC)

The Canadian government may introduce the organizers' report on the June 1988 conference in Toronto on "The Changing Atmosphere: Implications for Global Security." Some U.S.G. participants in the conference feel the report does not reflect the range of views expressed at the conference. If it is introduced in a manner which requires a response from the Panel, the report of the IPCC meeting could "note" it but the delegation should seek to avoid report language which "welcomes" or "accepts" the report.

Talking Points

- The Panel should develop a logical sequence of activities to contribute to responsible consideration of climate change issues by the international community.
- Many countries and organizations have proposed various conferences on related themes. I would ask that the Secretary to the Panel compile a list of planned conferences, workshops, etc. so that the organizers of each conference can see how they might focus their conference on aspects not covered by others at the same time or in the same region. I suggest that the Bureau consider at its first meeting the sequence of upcoming meetings so that it might advise governments, IPCC working groups and other organizations on gaps and potential duplication.
- The Second World Climate Conference (SWCC) will be a major forum, reflecting the important work of the World Climate Program since its inception at the First World Climate Conference in 1979. The timing and content of the SWCC should be reviewed by the SWCC organizers to determine the most effective coordination with other activities.
- We welcome the request from the SWCC Organizing Committee for the IPCC's thoughts on how impacts and policy responses could be considered at the SWCC. Each IPCC working group should consider this at its first meeting. At the present time, I would only suggest that each working group chair describe to the SWCC the ongoing activities of the working group. The focus of the First World Climate Conference and the World Climate Program has been scientific and technical, and our current thinking is that the Second World Climate Conference should remain so rather than expanding into the socioeconomic and policy analysis aspects.
- We could consider making the SWCC the major forum for presentation of the results of the IPCC scientific assessment. If so, we would have to consider whether the SWCC should be delayed from the proposed date of June 1990.

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Position Paper

ISSUE: USG financial support for the Intergovernmental Panel on Climate Change.

BACKGROUND: Permanent financial and structural arrangements for the Intergovernmental Panel will be established at the first meeting of the body. Both WMO and UNEP will provide secretariat support for the IPCC. Specific figures regarding the cost of the Panel are not available as yet. The secretariat has promised to provide its estimations before the November meeting. Broad estimates, however, based on the number of meetings and services proposed by the secretariat for the Panel and its working groups, range between 750,000 and 1,000,000 dollars.

It has been proposed that the Panel's secretariat be supported by a trust fund consisting of contributions from the participating member countries. This trust fund would be held by UNEP/WMO, but administered separately and would require independent accounting. This trust fund would be used to fund expenses related to the operation of the secretariat, meetings of the full Panel and working groups, and activities such as documentation. Assessments and analyses carried out by lead and contributing countries and organizations would not be financed by trust fund funding. Assistance to developing countries for participation in IPCC activities should be by voluntary contribution, not from the trust fund.

Both WMO and UNEP are expected to make a contribution to the IPCC trust fund, although the amounts have not been determined.

In general, it is the policy of the U.S. Government (USG) not to use trust funds as the financing venue for its contributions to international organizations and activities. However, in order to enhance the independence of the Panel, a trust fund arrangement provides the most appropriate financial support structure. In the case of the Intergovernmental Panel, the Department of State, Bureau of International Organizations authorizes an exception to the rule discouraging USG contributions through trust funds.

The USG initial contribution (FY-1989) to the trust fund will consist of a combination of funds provided by EPA, DOE, NSF, NOAA, NCPO and other participating USG agencies. The Department of State also has been included in its IO & P budget for FY-1989 a sum of 300,000 dollars for the Vienna and Cartagena Conventions and associated Protocols. A portion of this money can be drawn upon for the USG FY-1989 contribution. In the future, however, the USG contribution to the IPCC will be provided by the Department of State from its annual IO & P budget. Agencies will continue to make significant contributions to the work of the IPCC by carrying out studies, hosting workshops, etc.

U.S. POSITION:

The U.S. delegation should support financial and structural arrangements for the IPCC as outlined above. The delegation is permitted to commit the USG to an annual financial contribution not to exceed 50,000 dollars or 20% of total contributions.

The U.S. delegation should seek from the secretariat specific information regarding financial arrangements for the Panel. This information should include which organization (WMO or UNEP) will be the holding company for the trust fund, which organization and who will operate it and other details regarding management of the trust and the payment of the USG contribution for FY-1989 and in the future.

FINANCIAL IMPLICATIONS:

See above.

STATEMENT:

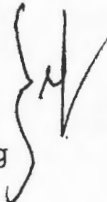
None

ATTACHMENTS:

Talking Points

Drafted: IO/T/SCT:MRStrachan:ms
9/29/88 X72752 #2876D

Cleared: IO/T:JBuche
IO/S/SB:DELeach
L/UNA:RMeyer
OES/ENV:ASens
IO:SLVogelgesang



TALKING POINTS

- The Government of the United States supports the recommendation that the activities of the secretariat for the Panel be supported by independent trust fund.
- This trust fund would be held by secretariat of WMO, but should be administered separately and would require independent accounting.
- We would strongly recommend that this trust fund be used to fund only expenses related to the operation of the secretariat, meetings of the full Panel and working groups, and activities such as documentation.
- We also recommend that assessments and analyses carried out by lead and contributing countries and organizations be funded by those countries.
- The U.S. Government also believes that assistance to developing countries for participation in IPCC activities should be by voluntary contribution, not taken from the trust fund.

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DELEGATION

The U.S. delegation to the first IPCC meeting should include:

Dr. Frederick M. Bernthal, Head of Delegation (State)
Linda Fisher (EPA), Alternate Head of Delegation
Dr. E. Friday (NOAA/NWS, U.S. Permrep to WMO)
William A. Nitze (State)
Edward Williams (DOE)

Advisors:

Dr. Beverly Berger (OSTP)
Dr. Eugene Bierly (NSF)
Indur Goklany (Interior)
Alan Hecht (NCPO)
Richard Morgenstern (EPA)
J.R. Spradley (Commerce/NOAA)
Dr. Norten Strommen (USDA)
Dr. Robert Watson (NASA)

THE WHITE HOUSE
WASHINGTON

October 7, 1988

MEMORANDUM FOR THE WORKING GROUP ON ENERGY, NATURAL RESOURCES
AND ENVIRONMENT

FROM:

RALPH C. BLEDSOE
Chairman

Ralph Bledsoe

SUBJECT:

October 12 Meeting

The Working Group on Energy, Natural Resources and Environment is scheduled to meet on Wednesday, October 12, 1988 from 3:00 to 5:00 p.m. in Room 248 of the Old Executive Office Building. We will receive a briefing on the science of global climate change.

Please inform Mary Beth Riordan (456-6640) of your attendance.

Nitze

Bilateral w/ USSR -

- Andy Sans to Geneva on Hazardous Waste Nov. 9-11 - needs authority*
- Climate change - coord. mtg on 10/11 results*
- Next mtg Mon 10/17 - 3^{pm} - Chair response strategic group*
- Invitations to full membership*
- Membership or delegation*

Fisher

Effects Report



United States Department of State

*Bureau of Oceans and International
Environmental and Scientific Affairs*

Washington, D.C. 20520

October 12, 1988

MEMORANDUM

TO: Members of the Domestic Policy Council
Working Group on Energy, Natural Resources
and Environment

FROM: William A. Nitze *WAN/AR*
Deputy Assistant Secretary of State
for Environment, Health and Natural Resources

SUBJECT: Preparations for U.S.G. Participation in the
Intergovernmental Panel on Climate Change

The U.S. representative to the Intergovernmental Panel on Climate Change (IPCC), Assistant Secretary of State Dr. Frederick M. Bernthal, will chair a meeting at 3:30 p.m., Monday, October 17 for interagency review of preparations for the first meeting of the Panel, November 9-11 in Geneva. Please provide your agency's comments on the attached draft position papers to Andrew Sens (telephone 647-9266, fax 647-5947) by noon Friday, October 14. Because of the involvement of many agencies in this issue, written comments will help enable us to prepare a redraft reflecting various agencies' views.

The draft position papers are based on the draft workplan for development of U.S.G. policy on climate change, the strategy prepared by the National Climate Program Policy Board which was circulated and discussed at the September 12 ENRE meeting, agency comments on those drafts, and the draft agenda for the IPCC meeting which we have just received. Since these position papers are based on extensive earlier interagency discussions and in light of the short time remaining before the IPCC meeting, the October 17 meeting should reach closure on most if not all issues. This is particularly important in order to enable U.S.G. representatives to initiate discussions to lay the groundwork internationally for a successful IPCC meeting and to carry out consultations with the Congress and the public. I would therefore urge that these papers be reviewed carefully by each interested agency, that written comments be provided to my office by noon Friday, and that participants in the Monday meeting be prepared to make decisions. I expect that in most cases participants in the October 17 meeting will be the same persons who participate in the DPC ENRE, along with those who have been proposed to participate in the delegation.