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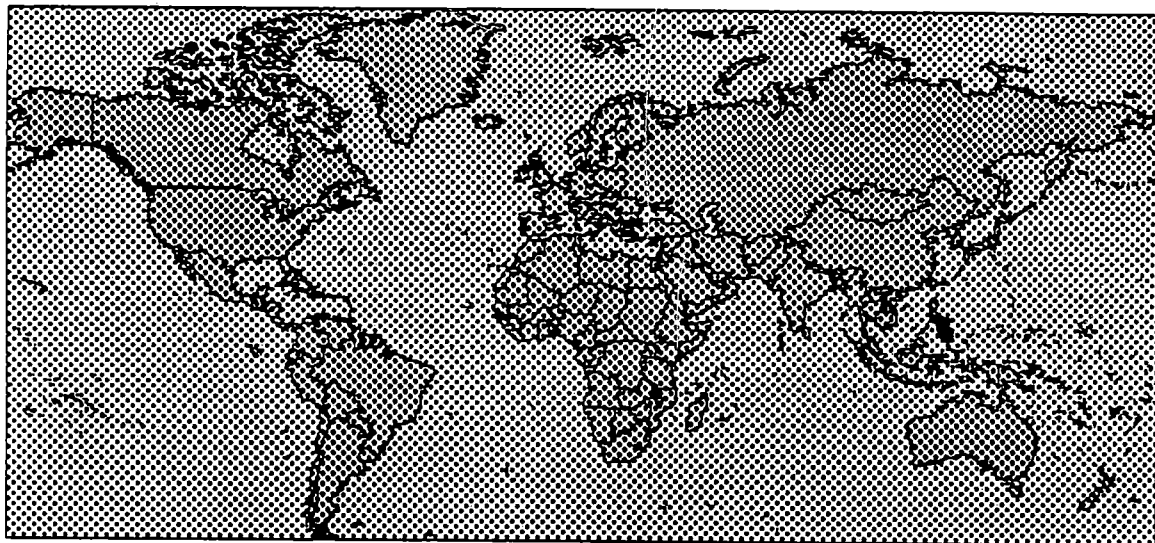
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**INTERNATIONAL TECHNOLOGY
COOPERATION
FOR THE ENVIRONMENT:**

**A Framework for Addressing
Global Climate Change**



Draft Report and Inventories
August 23, 1991

INTERNATIONAL TECHNOLOGY COOPERATION FOR THE ENVIRONMENT:

A Framework for Addressing Global Climate Change

INTRODUCTION

The development and transfer of environmentally sound technologies and know-how to developing countries¹ will be a crucial element in international efforts to deal with the potential for global climate change. Such technology cooperation, within a framework of appropriate institutional strengthening and effective environmental policies, will also promote international economic and social development on a sustainable basis and facilitate U.S. exports and investment.

Innovative approaches to technology development and dissemination are called for on all fronts -- institutional, policy, financing, and technological -- to assist developing countries in economic and industrial development without the level of environmental degradation experienced by the industrialized countries. Lessons learned by industrialized countries in understanding environmental impacts of industrial and economic development will provide important information regarding the harmonization of economic growth with environmental protection.

Recognizing the critical role that technology can play in environmental mitigation and economic development, the Department of State, the Environmental Protection Agency (EPA), and the Agency for International Development (AID) established an ad hoc working group, under the Policy Coordinating Committee, to help formulate U.S. policy on this area. Benefitting from the considerable work that has already been carried out on this issue,² the working group has drafted this Plan to outline its recommendations for a comprehensive U.S. government strategy to disseminate commercial technologies to developing countries.

¹For the sake of brevity, the term "developing country" is broadly defined here to include non-industrialized, semi-industrialized, and newly industrialized countries as well as the nations of Eastern Europe.

²See, for example, the Report of the Response Strategies Working Group under the Intergovernmental Panel on Climate Change, the Final Report to the EPA Administrator of the International Environmental Technology Transfer Advisory Board (IETTAB), and the U.K. Report on "Global Climate Change: The Role of Technology Transfer". In addition, as described in greater detail in Appendix (), Japan will contribute funding to UNEP to support the establishment of the "Center for Global Environment Technology" in Osaka, and Switzerland announced at the end of the Second World Climate Conference its intention to establish a Technology Transfer Center in Geneva.

This Action Plan emphasizes the primary role of the private sector in developing and commercializing climate-related technologies. It suggests a conceptual framework for promoting international technology cooperation and concludes with recommendations regarding the U.S. Government's role as a "facilitator" in this process. Specifically, it calls for: (1) greater participation by the private sector; (2) identification of developing country needs; (3) international dissemination of information; (4) identification and mobilization of existing sources of technical assistance and training; (5) more efficient and coordinated use of existing sources of financial assistance; and (6) strengthened developing country absorptive capacities.

Information contained in the appendices constitutes a preliminary inventory of U.S. technology cooperation programs now underway within five agencies of the U.S. government: AID, EPA, and the Departments of Commerce, Energy and Agriculture. It demonstrates that a wide range of programs are already underway and that these programs, through improved coordination and integration, can serve as the cornerstone for successful international technology cooperation.

A CONCEPTUAL FRAMEWORK FOR TECHNOLOGY COOPERATION

While there are many different definitions of the term "technology", this Plan defines the term broadly to include information, knowledge, practical know-how, and skills regarding the use of equipment, systems or processes. Recognizing that greenhouse gas emissions result from human activity in virtually every economic sector (including the transportation, residential and commercial, industrial, agricultural, energy, and natural resource sectors), the Plan defines "climate-related technologies" equally broadly to include limitation and adaptation strategies regardless of the particular sector.

There are likewise a number of different definitions, used both nationally and internationally, for the terms "technology transfer" and "technology cooperation". This Plan adopts the following definition suggested recently by the International Environment Bureau of the International Chamber of Commerce³:

"Technology Cooperation can be defined as a process by which two or more parties identify individual and common interests to share information, knowledge, know-how, and managerial skills regarding the utilization of technologies that are: more environment friendly, more energy efficient, less resource intensive, less polluting, oriented towards recycling and sustainable in the long term".

³International Environment Bureau, "Technology Cooperation for Sustainable Development", Paper Presented to WICEM II, April 11, 1991, Rotterdam

"...[u]nlike the approach of technology transfer, in which knowledge of technology flows only in one direction (from those who have the technology to those that do not), technology cooperation is based on the assumption that the sharing of knowledge and information of technology is of mutual interest to the specific parties involved".

Technology cooperation involves U.S. and host country collaboration in technology development and commercialization. Technology cooperation focuses on a private sector approach and consists of: (1) commercial transactions involving existing technology; (2) new technology development and commercialization; and (3) research collaboration, market assessments, and policy studies.

The goal of international technology cooperation is to accelerate the dissemination and adaptation of economically and environmentally sound technology through:

- policy, legal, and institutional reform (including the protection of intellectual property rights and the development of appropriate trade policies);
- innovative financing (involving a public role in cost and risk sharing with the private sector);
- institutional capacity development and human resources development (including technical, managerial, and operational education and training);
- joint venture promotion and business opportunity identification.

Technology cooperation will build on successful U.S. government program in developing countries. These programs include bankable project development and implementation, export promotion, technology research and development, human resources development, country studies, and institutional policy and organizational reform.

Figure 1 (on the next page) suggests a conceptual framework for promoting technology cooperation. The figure emphasizes the need for a catalyst or facilitator to foster technology cooperation between developed and developing countries. Specifically, it stresses the facilitator's role in the following areas:

- (1) Assessment/Information Dissemination, including problem analysis, identification of source and recipient needs and terms, evaluation of technology (in terms of availability, cost, applicability, and effectiveness)

TECHNOLOGY COOPERATION

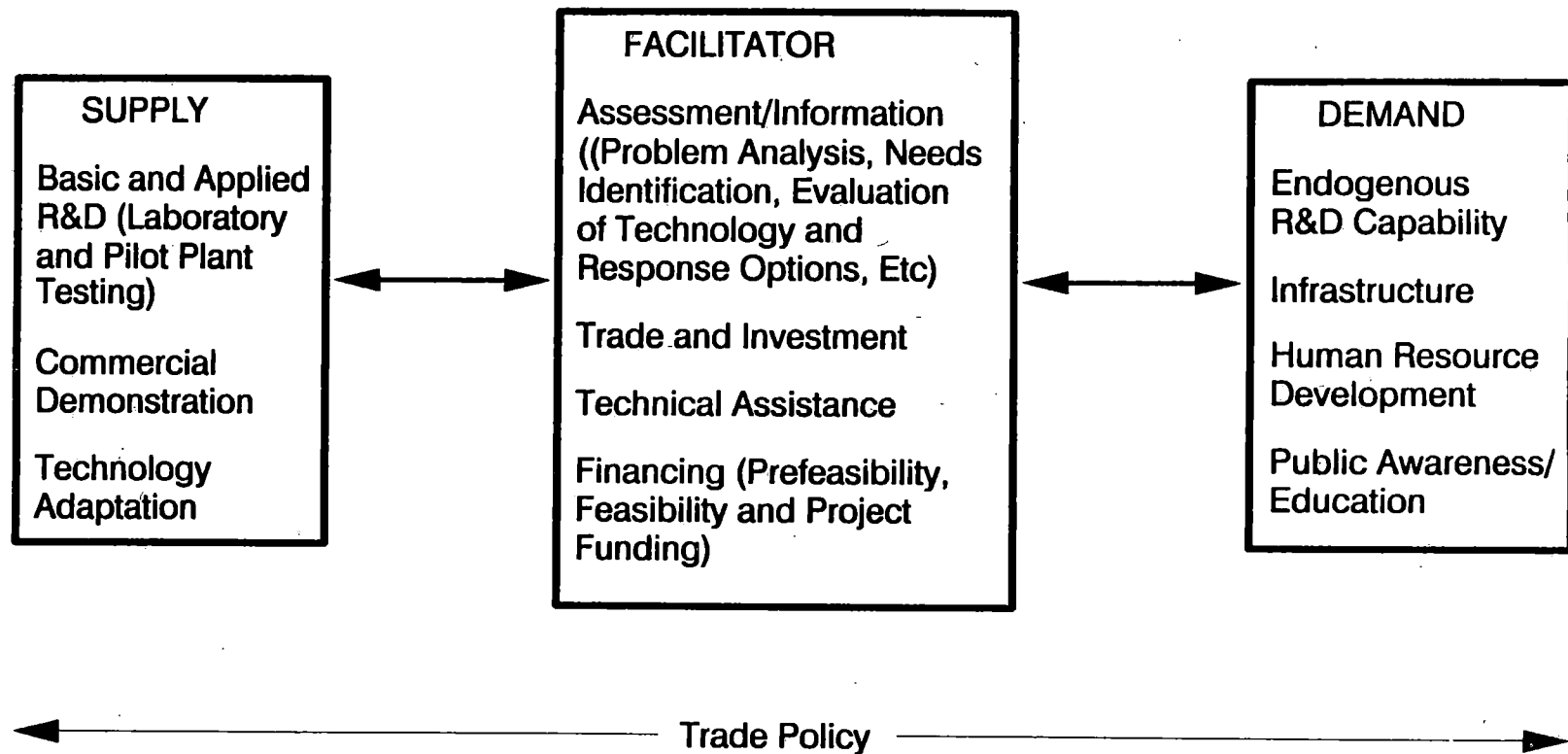


Figure 1

and response options, and evaluation of the existing legal, institutional and policy frameworks;

- (2) Trade and Investment, which recognizes that the vast majority of technological exchanges will occur through commercial transactions;
- (3) Technical Assistance, including training and on-site assistance in installation, operation and maintenance, and adaptation; and
- (4) Financing, including prefeasibility, feasibility and project funding.

As indicated at the bottom, the framework recognizes that the entire process will largely depend on the development of appropriate national and international trade policies in support of such technological exchanges.

RECOMMENDATIONS ON U.S. GOVERNMENT ROLE

The United States has formidable technological, professional, and institutional resources and capabilities that can be used to assist developing countries in confronting the environmental challenges resulting from industrial development. Many developing countries recognize the special capabilities of the United States in science and technology, environmental management, and private sector leadership in environmental control.

The Office of Technology Assessment and the National Academy of Sciences have recently concluded that a number of cost-effective technologies are already available for dealing with global climate change. The Energy and Industry Sub-Group (EIS) of the Intergovernmental Panel on Climate Change (IPCC) has also initiated the development of an inventory of technological response options, which will greatly facilitate analytical work towards the identification of technologies and information and technology transfer to respond to climate change.⁴

As described in greater detail in the appendices, there is also a wide range of other national and international programs which support the transfer of climate-related technologies to developing countries. While a number of national and international

⁴The EIS report also contains several illustrative lists of such technologies. See the EIS Sub-group Report for the Fourth Session for IPCC Working Group III, Geneva, August 5-8, 1991 (WG III/4th/Doc.3)

programs have made limited recommendations on this issue⁵, there has not been a concerted national or international effort to identify these activities, much less to suggest ways in which these mechanisms can be better integrated and mobilized to meet the needs of the international community.

Drawing from the framework described above, the following recommendations pertain to the U.S. Government's role in promoting climate-related technology cooperation. They relate specifically to the U.S. role in: (1) promoting the development and commercialization of climate-related technologies; (2) acting as a facilitator in encouraging greater technology cooperation, through both commercial transactions and government-to-government cooperation; and (3) working directly with recipient nations in developing the necessary absorptive capacities and in obtaining the necessary technical and financial assistance.

1. **Promote Private Sector Participation in Technology Research, Development, and Commercialization Ventures**

Any successful technology cooperation regime must recognize the primary role of the private sector not only in developing and commercializing climate-related technologies, but also in providing the necessary technical assistance, training, and know-how. Much of the associated technical and financial assistance will occur through "internal" technology transfer within multinational corporations outside the direct influence of governments or international organizations. In such instances, for example, the source, facilitator, and recipient functions can all be embodied within a single multinational corporation, as the corporation acts to transfer technology and know-how between or among its headquarters and subsidiary operations. The proper role for the U.S. Government in this instance is primarily to promote the national and international economic and regulatory framework in which this transfer is encouraged.

Many corporations have initiated aggressive programs to promote environmentally sound technologies both within their own operations and to outside parties.⁶ Nevertheless, there are a number of ways in which the U.S. Government can play a more direct role in promoting the participation of the private sector, thereby improving U.S. competitiveness while supporting international efforts to protect the environment. AID, for example, has sponsored the U.S.-ASEAN Council on Business

⁵See, for example, the [Touche Ross Report] and the December 1990 Final Report to the EPA Administrator of the International Environmental Technology Transfer Advisory Board

⁶See the Final Declaration of the Second World Industry Conference on Environment Management, Rotterdam, April 10-12, 1991. Note also the recent establishment in the United States of the President's Commission on Environmental Quality (PCEQ).

and Technology, a private sector initiative designed to expand U.S. trade and investment and technology transfer between U.S. companies and the ASEAN region. AID, EPA, the Department of Energy (DOE), and the Department of Commerce (DOC) have all supported trade fairs, reverse trade missions, feasibility studies, and joint venture arrangements in Asia, Central America, the Caribbean, and, most recently, in Eastern Europe. In addition, the Trade and Development Program (TDP), the Overseas Private Investment Corporation (OPIC), and other U.S. agencies are valuable sources of pre-export assistance, export loans and guarantees, project financing and investment and export insurance for private sector initiatives worldwide.⁷

The U.S. Government should use existing resources to create financing facilities for joint venture technology development and commercialization in key countries. The AID program for Acceleration of Commercial Energy Research (PACER) (see box on next page) and the Program for Advancement of Commercial Technology (PACT) have provided successful models for a U.S. Government financing role in reducing risk associated with private sector joint ventures between U.S. and host country industry. These models could promote technology development and commercialization in developing and Eastern European countries.

Many environmentally sound and efficient commercial technologies are already available in the United States. A feasibility study fund should be established to promote the dissemination of such technology. Such feasibility studies should lead to technology licensing and investment, including "bankable" projects for multilateral development bank (MDB) lending, in developing countries.

EPA, AID, and other interested agencies should work through the OECD to review comparable government-supported private sector initiatives in Japan, Germany and other industrialized nations and develop recommendations on improving U.S. programs. In addition, the United States should continue to work internationally (e.g., through the General Agreement on Tariffs and Trade) in promoting the elimination of regulatory and trade barriers and the establishment of an international legal and economic climate more conducive to active private sector technology transfers. The protection of intellectual property rights and a more detailed understanding of potential liability issues will be important elements of this effort.

Figure 2 diagrams the expected relative levels of public and private sector involvement to achieve success in the following areas: policy reform; innovative financing; institutional strengthening, training, human resources development, improved

⁷For more detailed information on U.S. Government resources in support of environmental projects in the private sector, see William A. Delphos, Environment Money: The International Business Executive's Guide to Government Resources, Venture Publishing, N.A., Washington DC, 1990

The Program for the Acceleration of Commercial Energy Research (PACER)

The Program for the Acceleration of Commercial Energy Research (PACER) is a \$20 million, six-year project initiated in 1987 by AID in bilateral collaboration with the Government of India. PACER aims at promoting market-driven and environmentally sound technological innovations in the Indian energy sector. This is achieved through cost and risk-sharing with consortia of manufacturers, research institutions, and/or end-users. PACER provides up to \$3 million in conditional grants to co-finance costs of technology development and commercialization. If the project succeeds, the promoters repay the grant. If it fails, the grant is written off. Criteria for eligibility are:

- (a) The consortium involves Indian and/or U.S. manufacturers, research institutions, and end-users;
- (b) The project involves the commercialization of innovative and environmentally benign products and processes relevant to the Indian energy sector;
- (c) The technology shows significant potential for commercialization within a period of five years.

The PACER program also supports two related activities: a competitive research awards program and an analysis and outreach program. The latter includes energy and environmental strategy formulation, policy analysis, information dissemination, training and promotional activities.

PACER is being implemented by the Industrial Credit and Investment Corporation of India Ltd. (ICICI) Bombay, under a \$20 million grant agreement signed in August 1987. An Energy Research Advisory Committee consisting of representatives from government, academia, private sector, and electric power utilities provides policy and strategy guidance for the program. The advisory committee is chaired by the Department of Non-Conventional Energy Sources of the Government of India.

As of July 1991, 12 consortia R&D projects and 8 research studies involving PACER funding of \$3.6 million have been approved. The approved sub-projects include energy efficient product developments, renewable power generation, advanced power systems, and analytical studies of management and policy changes in the Indian power sector.

PACER has gained widespread recognition in the Indian and international energy community as a model for technology cooperation with advanced developing countries.

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Figure 1
Public and Private Sector Roles
in International Technology Cooperation

Strategic Elements	Research		Technology Development and Commercialization		Commercial Technology	
	Public Sector Role	Private Sector Role	Public Sector Role	Private Sector Role	Public Sector Role	Private Sector Role
Policy Reform	H	L	H	M	H	H
Innovative Financing	H	L	H	L-M	M	H
Institutional Strengthening, Training, Human Resources Development, Improved Maintenance/Operational Capabilities	H	L	M-H	L-M	L	H
Joint-Venture Promotion, Business Opportunity Identification	L	L	L-M	H	L-M	H

Note:

H-High
M-Medium
L-Low

maintenance and operation capabilities; and joint venture promotion and business opportunity identification.

2. Support International Efforts to Identify Developing Country Needs (Needs Assessment)

Country studies carried out under the Montreal Protocol played an extremely important role in achieving international consensus on the need for further measures to protect the ozone layer. Such studies helped developing countries identify their current and project demand for ozone-depleting substances and the technological options for reducing their production and use. From a U.S. standpoint, these studies also resulted in: (1) significantly lower international estimates of the costs that would be entailed in eliminating these substances,⁸ and (2) expanded environmental cooperation between the United States and the three nations (Brazil, Egypt, and Mexico) assisted by the U.S.

Comprehensive country, sector, and market studies related to climate, led by developing country governments and institutions, could help provide information for climate research activities, assess country-specific policy and technological needs, and contribute to the formulation of U.S. government studies on global climate change issues. These studies could be conducted in parallel with and stimulate the development of implementation strategies for technology development and commercialization. International coordination and the use of common methodologies would ensure common results that could be used in the international negotiating process.

The Intergovernmental Panel on Climate Change (IPCC) has established a process to assist developing countries develop emission inventories. The United States has taken the initiative internationally to begin a series of country-specific studies, and EPA is planning to assist Mexico, Brazil, and Poland in carrying out comprehensive studies in these three countries, which incorporate both emission inventories as well as develop mitigation strategies. These studies follow on initial country studies that have been conducted in approximately 16 developing countries. In addition, the Asian Energy Institute (AEI), with the support of AID and other bilateral donors, the Asian Development Bank, and the Rockefeller Foundation, is conducting a study of the greenhouse gas contributions of Brazil and twelve Asian countries. The study will assess technical and financial transfers as well as institutional mechanisms for distribution of identified appropriate technologies to reduce greenhouse gas emissions.

⁸The Group of 77 had originally called for \$400 million per year for ten years to assist developing countries implement the Protocol. Based on the results of approximately 10 country studies, the Protocol Parties eventually agreed on an Interim Multilateral Fund providing for \$160-240 million over three years.

3. Promote International Dissemination of Information

Figure 1 emphasizes the importance of information flow throughout the entire technology cooperation process, including information on global, regional, national and local environmental problems; information on the availability, costs, applicability, and effectiveness of particular technologies; and information on the individual technical and financial needs of both sources and recipients. The Intergovernmental Panel on Climate Change (IPCC) has already made an important contribution to the international debate on climate change by, inter alia, identifying appropriate response options with respect to climate and their costs. As with the Technology and Economic Assessments carried out under the Montreal Protocol, this information should be continually updated, translated as appropriate, and disseminated.

The United States is a leading source of environmental information systems in both the public and private sectors. EPA, for example, operates a number of information clearinghouses and databases related to climate, including the Center for Environmental Research Information, the Pollution Prevention Information Clearinghouse, the Innovative/Alternative Projects Clearinghouse, and the Pathfinder to International Databases. EPA is now developing a Global Climate Technology Transfer Center and, in cooperation with AID and DOE, the Environmental and Energy Efficient Technology Transfer Clearinghouse. Acting in effect as a "clearinghouse of clearinghouses", this clearinghouse will provide domestic and international users with information on major technologies, including energy efficiency and renewable energy technologies. In addition, AID, DOE and the Committee on Renewable Energy, Commerce, and Trade (CORECT) have published and widely disseminated to developing countries information on renewable technology options, costs, and technologies and services available from U.S. suppliers.

AID, EPA, and other interested federal agencies will work with appropriate international organizations to evaluate the effectiveness of existing national and international information systems, focusing particularly on their accessibility and applicability to developing countries, and suggest ways to centralize and/or fill in potential gaps of information. Such systems help disseminate information on both source and recipient needs and the wide range of climate-related technologies and services offered by U.S. companies.

4. Identify and Mobilize Existing Sources of Technical Assistance and Training

After developing countries have identified climate-related environmental problems and the technological options and costs for resolving them, they will require technical assistance and training to enable them to successfully absorb, adapt, operate and maintain climate-related technologies. Major components of this assistance will

include the training of skilled technicians and managers, institution-building, and the development of endogenous research and development capabilities (as described in greater detail in later recommendations).

A number of U.S. agencies, including AID, DOE, and EPA, are actively involved in promoting climate-related technical assistance. The appendices provide a preliminary overview of some of these activities and programs. These agencies will seek to identify these activities more fully and make recommendations for improved coordination and mobilization. Specifically, they will determine the comparative advantage of each Agency in conducting these activities, suggest ways for improved cooperation and coordination, and identify potential gaps.

5. Promote More Efficient and Coordinated Use of Existing Sources of Financial Assistance

Faced with shortages of convertible currency and competing social and economic priorities, developing countries are sometimes hesitant to devote scarce resources to environmental protection efforts, especially where the benefits of these efforts appear global rather than local. Accordingly, citing the need for "new and additional" financial assistance beyond current levels of official developmental assistance, many developing countries argue that one of the primary obstacles to successful technology transfer is the lack of available financing to support the purchase and operation of climate-related technologies and know-how. Developing countries will also require additional financial support to carry out the country, energy, forest and other studies described in Recommendation #2.

Where climate-related technologies are proprietary, developing countries will need assistance in paying royalties or in obtaining patents or licenses. Where (as in most cases) the technologies are already in the public domain, developing countries will require additional financial support in acquiring "soft" technologies, including training, information, and institutional development, as well as equipment.

In the case of patented technologies and know-how which are already fully commercialized, much of the necessary financing (e.g., pre-feasibility, feasibility, and project funding) will be available through normal commercial channels (i.e., through "internal" technology transfer or through licenses or joint ventures). Supporting these commercial transactions will be the development of sound regulatory, economic or fiscal policies in both donor and recipient countries.

In the case of climate-related technologies which are not being transferred through normal commercial channels, financial support is available from a wide range of national and international organizations. Actual and potential sources of U.S. Government financing for environmental programs are described in the appendices. Additional financing is available through the United Nations Development Program and other U.N. agencies, the World Bank and regional multilateral development banks, the Global Environment Facility (GEF), and the Montreal Protocol Interim Multilateral Fund.

The U.S. role in facilitating the provision of financial assistance should focus on a number of different areas, including:

- (1) continued active public sector cooperation and support for the development and commercialization of climate-related technologies in the private sector;
- (2) identification of existing sources of U.S. financial assistance for prefeasibility, feasibility, and project funding in support of climate-related technology cooperation and recommendations on their improved integration and mobilization;
- (3) improved communication and coordination among donor nations and between donor and recipient nations and a reevaluation of both the existing "Paris Club" agreement with respect to the use of tied aid and the OECD arrangement on the terms of export financing for environmental technologies;
- (4) accelerate the funding of projects under the GEF and Montreal Protocol Interim Multilateral Fund, while ensuring accountability and rigor in their operations; and
- (5) evaluation of the GEF's usefulness in demonstrating environmental approaches and in acting as a potential financing facility for future international agreements; and

Many specific actions can be undertaken to implement the activities described above. For example, with respect to improved coordination among donor and lending agency financial assistance programs, the United States -- through AID -- participates

in the Multi-Agency Group for Power Sector Innovation (MAGPI)⁹ The MAGPI framework provides a mechanism for donors and lenders to contribute financial and intellectual resources efficiently. The MAGPI framework could be used for similar collaborative arrangements in areas related to global climate change.

In addition, the United States should evaluate the establishment of a financing facility in key developing countries for joint venture technology development and commercialization. The primary concern expressed by industry in technology development and commercialization ventures is the level of risk associated with product development and commercialization, particularly when investing in other countries. The PACER project has provided a successful model for a public sector financing role in reducing this risk while promoting private sector joint ventures between U.S. and host country industry. This project could be expanded or imitated to promote technology and commercialization in developing countries.

6. Improve Developing Country Absorptive Capacities

A primary condition of successful technology cooperation with respect to climate will be the ability of developing countries to absorb the technologies being transferred. To this end, the United States should work with developing countries in a number of areas, including:

- (1) Development of R&D capabilities to enable developing countries to assess, operate, maintain, and adapt existing technologies and to develop new technologies designed specifically for their individual needs;
- (2) Development of the appropriate legal, institutional, and policy framework to support technology cooperation including the protection of intellectual property rights, sound economic and fiscal policies, and a full regulatory and enforcement infrastructure;
- (3) Human resource development including the education and training of scientists, technicians and managers; and

⁹MAGPI consists of the World Bank, the Inter-American Development Bank, the Asian Development Bank, the African Development Bank, the International Finance Corporation, and the United Nations, AID, the Overseas Development Administration of Great Britain, DANIDA of Denmark, FINNIDA of Finland, and KfW and GTZ of Germany. This group includes approximately 20 senior decision-makers with operational responsibilities.

- (4) Public education and awareness about both the nature of the problem itself and the potential economic and social benefits of limitation and adaptation strategies in order to build public support for action.

The United States should propose the establishment of regional environmental centers to provide training, analytical and technical support, information dissemination, and documentation capabilities. The proposed centers should include strong private sector and end-user involvement, including cost-sharing with the developing country private sector, institutions, and governments. The centers would also help improve information exchange and promote joint venture research by facilitating the creation of institutional networks. These networks would provide a mechanism for collaborative programs and improved communication among institutions research climate change research and environmentally sound technologies.

APPENDIX:

Selected Inventory of Public-Private Sector and Private Sector Initiatives

Committee on Renewable Energy, Commerce, and Trade (CORECT)

The Committee on Renewable Energy, Commerce, and Trade (CORECT) was launched by the Department of Energy in 1984 to serve as a catalyst in promoting the commerce of renewable energy products and services. CORECT's mandate is to bring together potential users, decision-makers, funding sources, and U.S. industry to ensure that U.S. renewable energy applications are considered for viable applications throughout the world. CORECT consists of specialists from a number of U.S. government organizations, including the Departments of Energy, Commerce, Defense, the Interior, State and the Treasury, the Overseas Private Investment Corporation, the Small Business Administration, the Export-Import Bank, AID, the Office of the U.S. Trade Representative, and the U.S. Trade and Development Program.

Clean Coal Technology (CCT) Demonstration Program

Sponsored by the Department of Energy, the Clean Coal Technology (CCT) Demonstration Program is a multi-year, multi-billion dollar program through which the Federal Government pays up to 50 percent of the costs of selected projects that test emerging technologies on a commercial scale. Participating private sector firms pay the remainder of the project costs. In this program, the most promising advanced coal-based technologies are being moved to the marketplace through demonstration. The demonstration program is scaled large enough to generate the data needed for the private sector and regulators to judge the commercial potential of the processes being developed.

Environmental Enterprises Assistance Fund

Environmental Enterprises is a non-profit, international development non-governmental organization. Established in 1990 by Winrock International and the U.S. Agency for International Development, Environmental Enterprises has set a funding target of \$20 million to be achieved within 3 years, of which \$5 million will be in endowment support. Emphasizing renewable energy projects, Environmental Enterprises supports international environmental projects by identifying project sites and participants, supporting prefeasibility and feasibility studies and by making loans and equity investments. The Fund also maintains a strong team of experience private-sector specialists who can assist less experienced managers in developing countries.

Global Environmental Management Initiative (GEMI)

The Global Environmental Management Initiative (GEMI) is a "world business initiative", launched in 1990 by 15 leading U.S. corporations, designed to achieve environmental, health, and safety goals by continuously improving environmental management practices and performance. GEMI will support and be coordinated with efforts already underway by the United Nations Environment Program (UNEP), the International Chamber of Commerce (ICC), and the International Environment Bureau (IEB).

Green Lights

The "Green Lights" program is an aggressive, non-regulatory effort to reach corporate decision-makers with information on new lighting technologies and the economic and environmental benefits of efficient lighting. Over 30 major corporations have already signed agreements with EPA committing themselves to upgrade their facilities over the next five years with energy-efficient lighting products. The program's target is a 10 percent or greater reduction in national electricity demand with an associated 4 to 7 percent reduction in emissions of carbon dioxide, sulfur dioxide, and nitrogen oxides.

Industry Cooperative for Ozone Layer Protection (ICOLP)

The Industry Cooperative for Ozone Layer Protection (ICOLP) is a consortium of over 10 major electronic companies in the United States and Canada designed to encourage the worldwide dissemination and use of non-ozone depleting solvents in the electronics sector. While primarily a private sector initiative, ICOLP was developed in close coordination with EPA, and EPA and the Department of Defense are all members of the cooperative. ICOLP includes an international on-line, computerized database designed to provide users of ozone-depleting solvents through "broadcast technology transfer" information on substitute processes, materials and technologies.

International Environment Bureau (IEB)

The International Environment Bureau (IEB) of the International Chamber of Commerce is a private sector organization based in Geneva designed to make available industrial know-how and expertise on environmental problems to developing countries and to medium- or small-sized companies everywhere. IEB manages an information clearinghouse on "positive and pragmatic action already taken by IEB member companies" and organizes seminars and meetings.

US-ASEAN Council for Business and Technology, Inc.

The US-ASEAN Council for Business and Technology is implementing the trade and investment promotion component of the Private Investment and Trade Opportunities (PITO) program. The project is an AID sponsored initiative designed to expand trade, investment and technology transfer between ASEAN nations and the United State. PITO focuses on three "best opportunity" sectors: environment, agribusiness, and energy. The environmental initiative under PITO serves U.S. and ASEAN companies through a four step plan consisting of: (1) development of market information, (2) promotional seminars, (3) missions to the ASEAN region, and (4) active follow-up.

World Environment Center

The World Environment Center (WEC) is designed to strengthen the management of industry-related environmental, health, and safety practices worldwide. The WEC promotes information exchange and the development of partnerships among industry, governmental and non-governmental organizations; provides volunteer experts and technical assistance to institutions of developing countries; and provides international public recognition for outstanding accomplishments in industry.

APPENDIX :

Selected Inventory of Multilateral Programs With Technology Transfer Programs Related to Climate Change

Energy Sector Management Assistance Project (ESMAP)

The Energy Sector Management Assistance Project (ESMAP) was launched jointly by the World Bank and the United Nations Development Program to identify and propose actions to address serious energy problems in developing countries. ESMAP acts as a pre-investment facility to assist in the implementation of recommended actions. Its goal is to advance and strengthen the impact of bilateral and multilateral resources and private sector investment available to the energy sector. ESMAP provides potential investors with information necessary to help identify environmentally sound energy-sector projects and to accelerate their preparation and implementation. To date, approximately \$800 million of ESMAP recommendations have been funded and over \$2.7 billion is currently being arranged.

Inter-American Development Bank (IDB)

The primary goals of the Inter-American Development Bank are to encourage private investment in projects (or to supplement existing funds) and to provide technical assistance for the preparation, financing, and implementation of development plans and projects. In the past year, the IDB has devoted increased emphasis on the environmental impact of IDB projects as well as on projects specifically designed to sustain the regional/global environment. For example, a new Environmental Impact Assessment (EIA) system has been incorporated into the IDB project screening process. The system is overseen by environmental specialists and analyzes both the direct and indirect environmental impact of proposed IDB operations.

Intergovernmental Negotiating Committee (INC)

The Intergovernmental Negotiating Committee (INC) was established by the United Nations General Assembly Resolution 45/212 to negotiate a Framework Convention on Climate Change and related instruments. The INC held its first meeting February 1991 in Chantilly, Virginia, and is due to complete the convention by the 1992 UNCED in Brazil. The convention is expected to include major provisions related to the transfer of climate-related technologies.

Intergovernmental Panel on Climate Change (IPCC)

The Intergovernmental Panel on Climate Change (IPCC) provides the main international forum for research into the sources, possible impacts, and possible responses to climate change. It also provides on request objective scientific and technical advice to the Intergovernmental Negotiating Committee (INC).

International Bank for Reconstruction and Development (World Bank)

The World Bank plans to extend between \$21 billion and \$24 billion in loans and credits to developing countries in fiscal year 1991. A large portion of these funds will be devoted to the energy, agricultural, forestry and other relevant sectors in developing countries -- almost \$1 billion for free-standing "environmental" projects, plus substantial additional amounts for environmental components of a large proportion of other World Bank projects.

International Energy Agency (IEA)

The International Energy Agency has recently undertaken a major study on the energy dimensions of climate change, and a quantitative assessment of the potential impact of a climate tax; IEA is undertaking further work on the efficiency and effectiveness of emission reduction policies.

International Finance Corporation

The International Finance Corporation (IFC) acts as a catalyst or adviser to donor and recipient firms involved with technology transfer. The Technology and Development Unit will identify suitable technologies, innovative concepts, products and processes, and adapt them as necessary for transfer to entrepreneurs in developing countries. A major study was recently completed at the IFC that focused on environmental opportunities in developing countries. The IFC Technology and Development Unit also provides contracting opportunities for consultants concerning feasibility studies.

The IFC is also launching a new, nine-country case study of the scope and parameters of the potential market for environmental goods and services in the private sector. Covering commercial aspects, risks, economics, appropriateness of available technologies and possible project roles for the IFC, the study will involve Chile, Czechoslovakia, Indonesia, Malaysia, Mexico, Pakistan, Poland, Thailand and Turkey.

Montreal Protocol Interim Multilateral Fund

In June 1990, the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer established an Interim Multilateral Fund to assist "Article 5 Parties" (i.e., developing countries with low per capita consumption levels of ozone-depleting

substances) meet the "incremental costs" of reducing their use of chlorofluorocarbons, halons and other ozone-depleting (and greenhouse) gases. The World Bank will administer financing; UNDP will assist with feasibility and pre-investment studies and other forms of technical assistance; and UNEP will carry out clearinghouse functions and assist with "political promotion". The Fund will be supported by up to \$160 million over three years, with an additional \$80 million to be made available if other developing countries (such as China and India) join the Protocol.

Multilateral Investment Guarantee Agency (MIGA)

The Multilateral Investment Guarantee Agency (MIGA) was recently formed by the World Bank to complement the activities of national investment insurance programs, private insurance companies, the World Bank and the International Finance Corporation. MIGA's objective is to facilitate foreign investment in developing member countries through long-term political risk insurance and advisory and consultative services.

Organization for Economic Cooperation and Development (OECD)

The Organization for Economic Cooperation and Development (OECD) has undertaken a number of macro studies on climate change, its causes, effects and technologies which could assist in its reduction. The OECD has recently begun a three-year program on Technology and the Environment which will examine incentives and barriers to the development and dissemination of environmentally sound technologies. OECD is also undertaking work to establish a methodology for measuring greenhouse gas emission inventories.

The OECD is also undertaking a study of possible clearinghouse mechanism for technologies to help address GHG emissions, which will cover both abatement technologies and technologies which could assist in the reduction of emissions through energy conservation, clean coal technology and demand management.

Regional Environmental Center for Central and Eastern Europe

Opened in September 1990, the Regional Environmental Center for Central and Eastern Europe in Budapest provides a forum for environmental officials and representatives of worldwide non-governmental organizations to exchange ideas and discuss issues of global interest. The Center's programs will focus on information collection and dissemination, institution-building, environmental education, and clearinghouse functions.

United Nations Center for Science and Technology for Development (UNCSTD)

The United Nations Center for Science and Technology for Development (UNCSTD) is undertaking a study on ways and means of ensuring the participation of developing countries in international cooperation for research and development of environmentally sound technologies, and the rapid and effective transfer of such technologies to those countries.

United Nations Center on Transnational Corporations (UNCTC)

The United Nations Center on Transnational Corporations (UNCTC) has initiated a research project entitled "Options for Facilitating Access by and Transfer to Developing Countries of Environmentally Sound Technologies on Favorable Terms". The study will examine the role of the UNCTC and other mechanisms which can be made available to industry, governments and international organizations to increase the transfer of environmentally sound technologies.

United Nations Development Program (UNDP)

As an intergovernmental agency of the United Nations with resident offices in over 110 nations, the United Nations Development Program (UNDP) is instrumental in funding environmental projects in developing countries. UNDP currently supports more than 5,400 projects valued at over \$7 billion in 150 developing countries. UNDP has earmarked more than \$500 million to support environmental investment activities.

UNDP administers the program for Technical Cooperation Among Developing Countries (TCDC). Begun in 1982, the TCDC has been active in over 100 developing countries. Funding has come from several sources, depending on the project. TCDC has been involved with specific energy and agricultural programs related to global warming. For example, the "Mega-Cities" project was one which dealt with the problems of large cities in developing countries. TCDC programs have been highly successful.

UNDP also supports the United Nations Fund for Science and Technology for Development (UNFSTD) which provides funding, project development, and advisory services to developing countries dealing specifically with development technology. Through UNFSTD, countries have access to a wide range of expertise, training and equipment for applying advanced technologies. UNFSTD will help assess a nation's needs, devise strategies for them, and then help to implement a program to meet their goals.

Since 1980, over \$80 million has been provided by the Fund for national, regional, and inter-regional projects involving 65 developing countries. A separate energy account has been given \$35 million to assist 60 projects, and \$100 million has been contributed by the developing countries.

UNFSTD cooperates with the United Nations Center for Science and Technology to draw upon panels of international experts. There are also 400 specialists who go to developing countries to advise in planning, technical, and operational missions through two UNFSTD managed facilities.

United Nations Educational, Scientific and Cultural Organization (UNESCO)

The United Nations Educational, Scientific and Cultural Organization (UNESCO) contributes to the improved transfer of environmentally sound technologies through its Engineering and Technology Division. Specifically, UNESCO's activities include: (1) improved and appropriately adapted environmentally sound engineering curricula for technical university staff, engineers and technicians, (2) the development, production and testing of learning packages in engineering sciences, (3) the establishment of production units and the provision of assistance to a number of engineering faculties and technology parks of developing countries, and (4) the promotion of international and regional cooperation in the area of environmentally sound engineering education and sciences, through the establishment of three regional networks and the creation of an exchange program for linking East and Western European universities.

United Nations Environment Program (UNEP)

The United Nations Environment Program (UNEP) was established in 1973 to play a catalytic and coordinating role on international environmental issues. While UNEP conducts a number of specific activities, particularly in the developing world, its focus is on the collection and dissemination of information. In 1989, 65 countries donated approximately \$40 million to UNEP; the 1992 target is over \$100 million per year. To date, UNEP has raised \$4 million to every \$1 million it has spent. Selected programs include the Global Environmental Monitoring System (GEMS), which provides worldwide information on renewable resources, climate systems, and other environmental issues and INFOterra (as described below).

Through the Industry and Environment Office (IEO) in Paris, UNEP also conducts the Cleaner Production Program in cooperation with other international organizations and industry. The Programme is based on the concept that it is better to prevent environmental problems than to clean them up. An important part of this program is the transfer of information on environmentally sound technologies. These activities involve, among others, the International Cleaner Production Information Clearinghouse (ICPIC), the technical query/response services within the Industry and Environment Office, training activities on hazardous waste management, and the Awareness and Preparedness for Emergencies at Local Level (APELL).

World Bank Global Environment Facility (GEF)

The World Bank Global Environment Facility (GEF) was established in November 1990 to assist developing countries address global environmental problems in four major areas: ozone depletion, greenhouse gas emission reductions, international water resources, and the preservation of biological diversity. Funded at approximately \$1.0-1.5 billion over three years, this pilot facility will be administered by the World Bank in cooperation with the United Nations Environment Program (UNEP) and the United Nations Development Program (UNDP).

APPENDIX

Selected Inventory of National and International Clearinghouses and Databases Related to Climate Change

Center for the Analysis and Dissemination of Demonstrated Energy Technologies (CADET)

Created in 1988 by the International Energy Agency (IEA), the Center for the Analysis and Dissemination of Demonstrated Energy Technologies center (CADET) promotes the international exchange of information on demonstrated energy-efficient technologies, thus leading to better informed decisionmaking and increased adoption of successful efficient projects. CADET attempts to achieve this goal through two major activities: (1) the dissemination of information on demonstration projects, and (2) the analysis of demonstration projects and market opportunities in areas that are particularly promising for the adoption of new energy efficient technologies.

ENVIRONET

Working closely with AID and DOE, EPA is establishing an international clearinghouse for technology transfer information. The Clearinghouse, called ENVIRONET for working purposes, will be a computerized information system providing current information free or at minimum cost on major environmental technologies. ENVIRONET will serve domestic and international users in a phased-in system. Stage I will be a pilot domestic demonstration by the summer of 1991. Stage II will be a test of an international pilot program in a selected U.S. Embassy, such as Mexico. State III will be a full-scale demonstration at the 1992 United Nations Conference on Environment and development (UNCED) in Brazil. State IV will set full operation of ENVIRONET by June 1993.

EPA is establishing ENVIRONET in response to the December 1990 recommendations of the International Environmental technology Transfer Advisory Board (IETTAB). IETTAB was in turn established by the EPA Administrator in response to President Bush's instructions in July 1989 to "convene a group at the technological level of scientists and high-tech people to see whether, through sharing information, we can make things better for countries that can't afford the science and technology."

EPA Information Clearinghouses and Databases

EPA runs a number of information clearinghouses and databases related to climate, including the Center for Environmental Research Information, the Pollution Prevention Information Clearinghouse, the proposed Global Climate Technology

Transfer Center, the Innovative/Alternative Projects Clearinghouse, and the Pathfinder to International Databases.

Industry Cooperative for Ozone Layer Protection (ICOLP)

The Industry Cooperative for Ozone Layer Protection (ICOLP) is a consortium of over 10 major electronic companies in the United States and Canada designed to encourage the worldwide dissemination and use of non-ozone-depleting solvents in the electronics sector. ICOLP includes an on-line, international, computerized database called OZONET designed to provide users of ozone-depleting compounds with information on substitute processes, materials, and technologies. OZONET resides in the General Electric Information Services network and is accessible from more than 750 cities in 35 countries worldwide. It can be accessed from more than 90 percent of the world's business telephones.

INFOTERRA

INFOTERRA is a global information system sponsored by the United Nations which enables both government and non-governmental bodies to have access to the knowledge and experience of others. INFOTERRA uses a network of national focal points which feed information into an international directory.

International Cleaner Production Information Clearinghouses (ICPIC)

Sponsored by UNEP in cooperation with EPA, the International Cleaner Production Information Clearinghouse (ICPIC) promotes cleaner production through technology transfer, education, and public awareness. The electronic information exchange component of ICPIC contains a message center, bulletins, a calendar of events, case studies, program summaries, an on-line bibliography, and a directory of contacts. ICPIC also organizes topical conferences on various issues of cleaner production. "Cleaner production" is defined as "reducing or eliminating discharges to the environment through source reduction, recycling, implementation of low and non-waste technologies, and product life cycle management."

International Environment Bureau (IEB)

The International Environment Bureau (IEB) of the International Chamber of Commerce is a private sector organization based in Geneva designed to make available industrial know-how and expertise on environmental problems to developing countries through a clearinghouse on "positive and pragmatic action already taken by IEB member companies" and organizes seminars and meetings.

Network for Environmental Technology Transfer (NETT)

The Network for Environmental Technology Transfer is a non-profit international association set up in 1989 with the support of the European Commission to provide a network of members, commercial companies and private-led public institutes specializing in environmental matters related to exchange technological expertise, answer one another's requests, set up joint proposals to answer calls for tender, and set up joint ventures.

UNEP Center of Global Environment Technology

The Government of Japan has proposed the establishment of a UNEP Center of Global Environment Technology in Osaka City and the Shiga Prefecture to promote technology transfer to developing countries on environmental issues, including global climate change and ozone depletion. The Center will disseminate information, support training and consulting services, and promote research and development.

UNEP Clearinghouse under the Montreal Protocol Interim Multilateral Fund

The Montreal Protocol Interim Multilateral Fund includes a clearinghouse, administered by UNEP out of Nairobi, to disseminate information on non-ozone-depleting chemicals, products and technologies. The clearinghouse will assist "Article 5" Parties to the Montreal Protocol (i.e., developing countries with low per capita consumption levels of controlled substances) technological options for dealing with them. Specifically, the clearinghouse will support country-specific studies, distribute information and hold workshops.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

September 10, 1991

MEMORANDUM FOR D. ALLAN BROMLEY

FROM: NANCY G. MAYNARD *NM*
SUBJECT: Proposal for Industry & Environment Initiative

A small group of industry representatives are proposing an initiative to undertake a major international effort to create a working partnership between industry and government to both exploit the economic potential nested in productive economic growth and development world-wide as well as confront major environmental problems at the same time.

Overall Objective

The proposal, at the moment, is called "A Global Partnership for Enterprise and the Environment" and has, as its objective:

"To enable enterprise and governments to secure the environmental rights of society while realizing the totality of economic potential."

Organization

They are proposing to set up a not-for-profit multinational corporation located in Washington, D.C. with other sites to be established in appropriate locations such as Toronto, Brussels, Berlin, Tokyo, etc. Leadership would be formed from international corporate, government and scientific leadership.

Specific Objectives

- . Provide a forum for economic and environmental information exchange, the development of mutually beneficial policies, and public education,
- . Identify near-term needs and market opportunities in the areas of regional and global environmental damage assessment, clean-up, mitigation, and adaptation,
- . Identify market incentives to spur long term investment in environmentally responsible research and development,
- . Support the development of a base of scientific, economic and public policy information on environmental problems.

Specific environmental and economic problems proposed:

- . Environmental Crisis. Eastern Europe and the Soviet Union. Provides both near-term marketing potential and opportunity for significant environmental restoration.

- . Environmental Opportunity. Pacific Basin or Latin America. Provides unique opportunities a priori to guide economic development and environmental enhancement in mutually beneficial ways. Governments and industry can design and implement a variety of new approaches to technological development, industrial growth, and environmental protection.

- . Exploiting understanding. Identify and exploit a single well understood environmental issue of global consequences in order to demonstrate that economic advantage can be gained by anticipating environmental change. Examples: forecasting the global climate consequences of El Nino; trends in stratospheric ozone concentrations.

Next Steps

The group is seeking White House approval to proceed and have promised that, if the US Government were to put up some seed money toward such an initiative, the industry groups involved have indicated that they would be prepared to match it by twenty times the amount.

Opportunities

- . This initiative could form the basis of a very significant and constructive environmental and development initiative by the US to be presented at UNCED. It could address in a concrete way many of the most important elements of the UNCED agenda. If fully developed, this could help restore the US to the international leadership position on environmental matters.

- . If the initiative is solid and the timing is right, it could be concrete material for both the President's speech in November and material for the State of the Union Address.

3. Robert G. Lawrie 3-22-45

Lawyer, Senior Vice President, Law and External Affairs, Abitibi-Price, Inc., Toronto, Canada. Abitibi-Price is Canada's largest natural resource company and a transnational corporation. Lawrie is the senior officer responsible for environmental matters, and is well connected to the Prime Minister and other key Canadian officials and corporate leadership. His company would help raise support if there is White House interest in the Partnership proposal.

J. Lawrence F. Mihlen 3-8-35

CEO and founding director of the California Council on Europe. From 1982-1984, Managing Director of the Air & Space Bicentennial, a joint industry-government program to advance European-American cooperation in aerospace. 10 years with Exxon, including Director of Corporate Communications, worldwide, and Director of External Affairs for Exxon's US chemical operations. Also Senior Public Affairs Advisor to Esso Europe and other Exxon corporate departments, including transportation and refining, exploration and production and environmental affairs. Vice President, Corporate Relations and member of the Management Committees of United Brands and Singer, with special responsibility for operations in Europe. As a consultant in New York, Washington, and Europe, clients included IBM, GE, Lufthansa, and MATRA. At McGraw Hill, Managing Editor of World News and of International Management Magazine.

4. John J. Rosati //25-3/

President and CEO, Bainbridge Technology Group, LTD. Previously Advanced Technology Manager, TRW Systems Integration Group. Over 30 years experience in managing high technology projects and organizations in R&D, and application of advanced technologies to space, defense, industrial and environmental systems. Member, Board of Trustees, UCLA Foundation; Chair, UCLA Physics Advisory Council; Member, UCLA Advisory Councils for Earth and Space Science, Atmospheric Science, Computer Science and Cognitive Science. Board of Directors, NSF National Center for Geographic Information & Analysis; Member Board of Trustees, Advanced Science and Technology Institute, State of Oregon; Board of Directors, TELEMAT Cellular Corporation, and Advanced Sciences, Inc.

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Global Partnership for Enterprise and the Environment

I. Mission, Purpose and Goals

Except for the pursuit of world peace, there are no issues of concern to the nations and peoples of the world that are as compelling as those dealing with the environment. The increasing awareness that human activities are altering the environment, both regionally and globally, has generated an increasing tension between the goals of economic development and environmental quality. Responding to these circumstances requires creative and constructive policies worldwide that convert this tension to opportunity and simultaneously further the cause of improving the quality of life, sustaining economic vitality, and protecting and enhancing the global and local environment. To address these opportunities a Global Partnership for Enterprise and the Environment (GPE²) should be established:

To enable enterprise and governments to secure the environmental rights of society while realizing the totality of economic potential.

II. Background

The GPE² initiative recognizes that the world's corporate community is at the vortex of the ability not only to exploit economic potential but to confront environmental issues. The corporate community must be seen and accepted as more the principal part of the solution rather than solely the cause of the world's environmental problems.

The world's corporate community must be more involved in shaping the debate so critical to the maintenance of economic health and future survival of business opportunity. It must also take advantage of a wide range of opportunities imbedded in the global community's need to understand, mitigate, and adapt to regional and global environmental problems and challenges.

Furthermore, the international scientific community is and must remain at the forefront of an aggressive research and development program aimed at anticipating the nature and effects of global and regional environmental challenges, such as global warming.

The situation provides an unusual opportunity for products, services, and ideas; for advanced technologies, engineering and management techniques found not only in Western industry, but throughout global industry; and constitutes a rare level of motivation to bring to bear knowledge and leadership absolutely vital to resolving these matters of environmental concern.

Therefore GPE² direction and resources will emanate as much from the corporate community as from government and non-government institutions and organizations. Its leadership will be drawn equally from government, non-government and the corporate community.

GPE² will seek to develop a system of incentives and rewards designed to make environmental responsibility a way of life within the world's enterprise system, rather than relying on regulation and punishment as principal instruments to shape corporate behavior.

<<GPE² will target for dramatic reduction the proliferation of competing, conflicting and contradictory policies and regulations. Its principal weapons in the attack will be vastly improved coordination of data collection, problem solving and policy formulation.>>

Implementing the above requires a new order of thinking and innovative levels of cooperation and leadership from industry, governments, the scientific community and public interest groups.

To be effective, GPE² must address the following objectives:

- Provide a forum for economic and environmental information exchange, the development of mutually beneficial policies, and public education.
- Identify near-term needs and market opportunities in the areas of regional and global environmental damage assessment, clean-up, mitigation and adaptation.
- Identify market incentives to spur long term investment in environmentally responsible research and development.
- Support the development of a base of scientific, economic and public policy information on environmental problems.

In order to overcome traditional obstacles/impediments to this new level of cooperation, we recommend undertaking a suite of projects which address a range of urgent environmental and economic problems of differing complexity and scales.

- Environmental Crisis: Eastern Europe and the Soviet Union. This region can be characterized as being in environmental crisis. It therefore provides both near-term marketing potential and the opportunity for significant environmental restoration.
- Environmental Opportunity: Pacific Basin or Latin America. Either of these regions provides unique

opportunities a priori to guide economic development and environmental enhancement in mutually beneficial ways. Governments and industry can design and implement a variety of new approaches to technological development, industrial growth and environmental protection.

- Exploiting Understanding: Identify and exploit a single, well understood environmental issue of global consequences in order to demonstrate that economic advantage can be gained by anticipating environmental change. One example is forecasting the global climate consequences of El Nino; a second might take advantage of our present understanding of trends in stratospheric ozone concentrations.

Questions still to be resolved include: what assets are required to achieve the objectives of each of these projects, how these assets are to be acquired and managed, and the relative roles and responsibilities of the multinational partners.

III. Organizational Structure

GPE² will be a not-for-profit multinational corporation located in Washington, DC. Other sites will be established, in appropriate locations, such as Toronto, Brussels, Berlin, Tokyo, etc.

GPE² leadership will be formed from international corporate, government and scientific leadership.

Funding is to be determined.

IV. Benefits

Benefits to Governments

- Enhanced economic vitality and political stability
- Increased quality of life for citizens
- Stewardship for sustainable value of environmental resources
- Reduced world tensions
- Opportunity for global leadership

Benefits to Corporations

- Producing business opportunities from environmental challenges
- New market and employment opportunities
- Increased recognition as responsible global citizens

- Give corporations an opportunity to be proactive on shaping economic and environmental policy

Benefits to Society/Citizenry

- Securing environmental rights
- Improved standard of living and quality of life
- Increased employment opportunities
- Increased personal freedom

V. Implementation Strategies

- Publish a draft concept document (Cover: Globe with Trade Routes)
- Review with selected CEOs and Government leaders and revise, as appropriate
- Develop strategy and implementation plan
- Establish ownership: government, industry, science, public interest groups
- Infuse concept into UNCED process

- Models (create a working group for each area):
 - Eastern Europe (all countries)
 - Latin America (US)
 - Central Africa (EEC)
 - S/E Asia (Japan)

V. Implementation Plans (To Be Done)

- A. Industry
- B. Government
- C. Education
- D. Outreach
- E. Organization and Management
- F. Infrastructure
- G. Financial
- H. Assessment and Evaluation

(In alphabetical order)

1. Dr. John A. Dutton
Dean, College of Earth and Mineral Sciences, The Pennsylvania State University. Presently Chair, Board of Atmospheric Science and climate, National Academy of Sciences. Frequent member of space science and earth science advisory committees to Federal agencies; frequent Congressional witness in science and environmental policy.

2. Robert G. Lawrie
Lawyer, Senior Vice President, Law and External Affairs, Abitibi-Price, Inc., Toronto, Canada. Abitibi-Price is Canada's largest natural resource company and a transnational corporation. Lawrie is the senior officer responsible for environmental matters, and is well connected to the Prime Minister and other key Canadian officials and corporate leadership. His company would help raise support if there is White House interest in the Partnership proposal.

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4. John J. Rosati
President and CEO, Bainbridge Technology Group, LTD. Previously Advanced Technology Manager, TRW Systems Integration Group. Over 30 years experience in managing high technology projects and organizations in R&D, and application of advanced technologies to space, defense, industrial and environmental systems. Member, Board of Trustees, UCLA Foundation; Chair, UCLA Physics Advisory Council; Member, UCLA Advisory Councils for Earth and Space Science, Atmospheric Science, Computer Science and Cognitive Science. Board of Directors, NSF National Center for Geographic Information & Analysis; Member Board of Trustees, Advanced Science and Technology Institute, State of Oregon; Board of Directors, TELEMAT Cellular Corporation, and Advanced Sciences, Inc.

CLEAN COAL TECHNOLOGY COALITION

MEMBERSHIP

September 12, 1991

*Willie Swink DEE
Wilson CORR January*

A.T. Massey Coal Company, Inc.
Alabama Coal Association
Amax Coal Industries
American Electric Power Service Corporation
American Mining Congress
Asea Brown Boveri, Inc.
Ashland Coal, Inc.
Babcock & Wilcox
Baltimore Gas & Electric Company
Bechtel Power Corporation
Bethlehem Steel Corporation
Brigham Young University
Carbon Fuels Corporation
Centerior Energy
Central Illinois Public Service Company
Cincinnati Gas & Electric Company
Combustion Power Company
Cyprus Coal Company
Deutsche Babcock Werke, AG
Duke Power Company
Ebara Environmental Corporation
Edison Electric Institute
Fluor Corporation
General Electric Company
General Public Utilities, Inc.
Geneva Steel
Illinois Power Company
Indiana University
Indianapolis Power & Light
Jersey Central Power & Light Company
Marietta Coal Company
Metropolitan Edison Company
MHD Development Corporation
Montana State University
Morrison-Knudsen Corporation
National Coal Association
National Lime Association
Northern Indiana Public Service Co. (NIPSCO)
Ohio Edison
Ohio Mining and Reclamation Association
Ohio Clean Fuels, Inc.
Oklahoma Gas & Electric Company
Orange and Rockland Utilities, Inc.
Passamaquoddy Technology
Peabody Holding Company, Inc.

Pennsylvania Electric Company
 Pennsylvania Power & Light Company
 Pittsburgh & Midway Coal Mining Co.
 Public Service Company of Colorado
 Public Service Company of Indiana
 Public Service Electric and Gas Company
 Sargent & Lundy Engineers
 Shell Mining Company
 South East Coal Company
 Southern Company Services
 Southern Illinois University at Carbondale
 Southern Indiana Gas & Electric Company
 Stone & Webster Engineering Corporation
 Texaco, Inc.
 The Commonwealth of Kentucky
 The State of Alabama
 The State of Colorado
 The State of Illinois
 The State of Indiana
 The State of Ohio
 The State of Texas
 The State of West Virginia
 TransAlta Utilities Corporation
 Union Electric Company
 United Coal Company
 School of Mines and Energy Development, University of Alabama
 University of Missouri-Columbia
 University of Montana
 University of Southern Indiana
 University of Tennessee
 University of Wyoming
 Western Research Institute
 West Virginia University
 Wisconsin Power & Light Company
 Wisconsin Public Service Corporation
 Zeigler Coal Company

July 30, 1991

TALKING POINTS IN SUPPORT OF THE CLEAN COAL AND RENEWABLE ENERGY
TECHNOLOGY TRANSFER PROGRAM

PURPOSE OF THE PROGRAM:

- Sec. of Energy to establish a program that identifies electric power projects in lesser developed and third world countries then solicits clean coal or renewable energy project proposals from U.S. firms.
- U.S. firms are to propose U.S.-developed clean coal or renewable energy technologies; at least 50% of the project cost is to be provided directly or indirectly by the host foreign government.
- The U.S. to provide 50% of project cost in the form of a repayable loan; this program will be governed in the same manner as the on-going DOE clean coal program.

REASONS FOR THE PROGRAM:

- Many clean coal technologies, if introduced and widely utilized in other countries intending to use coal, could dramatically reduce the amount of SO₂, NO_x and CO₂ emissions. Pressurized fluidized bed boilers and integrated gasification combined cycle powerplants, for example, are able to control very high percentages of SO₂ and NO_x compared to existing technology. Because these new technologies are more efficient in the conversion or combustion of coal, they also produce significantly less CO₂ (see: attached chart I).
- The clean coal program is a success story. 35 clean coal projects are underway; the DOE is currently conducting a fourth solicitation with selections to be made in Sept., 1991; a fifth solicitation is scheduled for 1992.
- \$2.7 billion in U.S. funding through the clean coal program and \$3.0 to \$3.5 billion in private sector funds will be contributed to the demonstration of these new, cost-effective and environmentally superior clean coal technologies.
- By 2010, total world energy requirements will be 71% greater than today. Almost 60% of the energy consumed in the world by 2010 will be in the developing nations, the USSR and Eastern Europe.

- The Electric Power Research Institute estimates that coal capacity world wide will nearly double over the next 30 years. 60% of that expected growth in coal capacity and use will be in the developing countries, the USSR and Eastern Europe (see: attached chart II).
- In the 1940's the U.S. had a 70% share of the world's assets and markets. Due to limited resources, a large Federal deficit and a substantial trade deficit, the U.S. currently has only an 18% share of the world's assets and market.
- In 1988, 14% of U.S. economic aid was used for capital projects. In contrast, 61% of Japan's, 46% of Germany's, and 62% of Italy's economic aid went to capital projects. A recent report by the Center for Strategic and International Studies estimates that \$2.4 to \$4.8 billion of U.S. exports are lost annually because of the discrepancy between the U.S. and foreign countries' tied aid credits. (Tied aid credits are loans made to developing countries which must be used to import goods and services from the donor country.)
- Tied aid and tied aid receipts are a primary mechanism that West Germany, France and Japan use as a wedge for economic influence around the world. For example, from 1984 to 1987, West Germany, France and Japan spent 70% of aid on capital-intensive projects to create large markets for capital goods exported from the home country. During these same years, the U.S. dedicated 7% of its assistance to such projects.

CONCLUSIONS:

- Many countries of the world, particularly lesser developed nations, will use coal; growth in energy demand in these countries is expected to be exceptionally high.
- These countries should be introduced to environmentally superior clean coal technologies to best insure that expected coal use will be accompanied by protection of the environment.
- From the standpoint of U.S. competitiveness, balance of trade, full potential for the taxpayer's investment made, and coal use tied to use of environmentally superior clean coal technologies, it is in our country's best interest to insure that U.S. firms gain "footholds" in these countries so that use of coal is tied to use of technologies developed through U.S.-supported clean coal or renewable energy projects.

June 12, 1991

SO2 AND CO2 EMISSION COMPARISON OF CONVENTIONAL AND CLEAN COAL TECHNOLOGIES

This chart provides a comparison of the sulfur dioxide (SO2) emissions that a utility steam generating facility would emit if it used a conventional pulverized coal boiler (with a thermal efficiency of about 33 percent) and a wet scrubber system (achieving a 90 percent reduction) against several of the clean coal technologies which are expected to operate at higher efficiencies and remove well above 90 percent of the uncontrolled SO2 emissions from the unit. Except as otherwise noted below, the SO2 emission levels are calculated for a 500 MW facility (i) burning coal with a 2 percent sulfur content (3.33 lbs/mmBtu) and a heating value of 12,000 Btu's per pound of coal, and (ii) operating at a 65 percent capacity for a 30-year period. A similar comparison is provided for carbon dioxide generated at each facility.

Technology	Plant Capacity (Megawatts)	%SO2 Removal (Percent)	Plant Efficiency (Percent)	Plant Heat Rate (Btu/kwh)	Ann. SO2 Emissions (Tons)	30-Year SO2 Emissions (Thousand Tons)	Ann. CO2 Emissions (Millions Tons)	30-Year CO2 Emissions (Millions Tons)
PCB (uncontrolled)	500	N/A	36.0	9,500.0	45,200	1,356	3.13	93.9
PCB (uncontrolled)*	500	N/A	36.0	9,500.0	11,100	330	3.13	93.9
PCB (uncontrolled)+	500	N/A	34.5	9,900.0	8,200	246	3.27	98.1
PCB with Scrubber	500	90	33.0	10,331.9	4,902.5	147	3.0	90
AFBC	500	90	36.0	9,470.9	4,493.9	135	2.8	84
	500	90	37.0	9,214.9	4,372.5	131	2.7	81
PFBC	500	95	40.0	8,523.8	2,022.3	61	2.5	75
	500	95	45.0	7,576.7	1,797.6	54	2.2	66
IGCC	500	99	40.0	8,523.8	404.5	12	2.5	75
	500	99	42.0	8,117.9	385.2	12	2.4	72
	500	99	48.0	7,103.2	337.0	10	2.1	63
IGCCwith Fuel Cells	500	99	50.0	6,819.1	323.6	10	2.0	60
	500	99	55.0	6,199.1	294.1	9	1.8	54
MHD	500	99	50.0	6,819.1	323.6	10	2.0	60
	500	99	55.0	6,199.1	294.1	9	1.8	54
	500	99	60.0	5,682.6	269.6	8	1.7	51

PCB - Pulverized Coal Boiler
AFBC - Atmospheric Fluidized Bed Combustion
PFBC - Pressurized Fluidized Bed Combustion
IGCC - Integrated Gasification Combined Cycle
MHD - Magnetohydrodynamics

+ Emissions are based on the unit burning coal with a 0.35 percent sulfur content (0.58 lbs/mmBtu) and a heating value of 12,000 Btu's per pound of coal.

* Emissions are based on the unit burning coal with a 0.35 percent sulfur content (0.82 lbs/mmBtu) and a heating value of 8,500 Btu's per pound of coal.

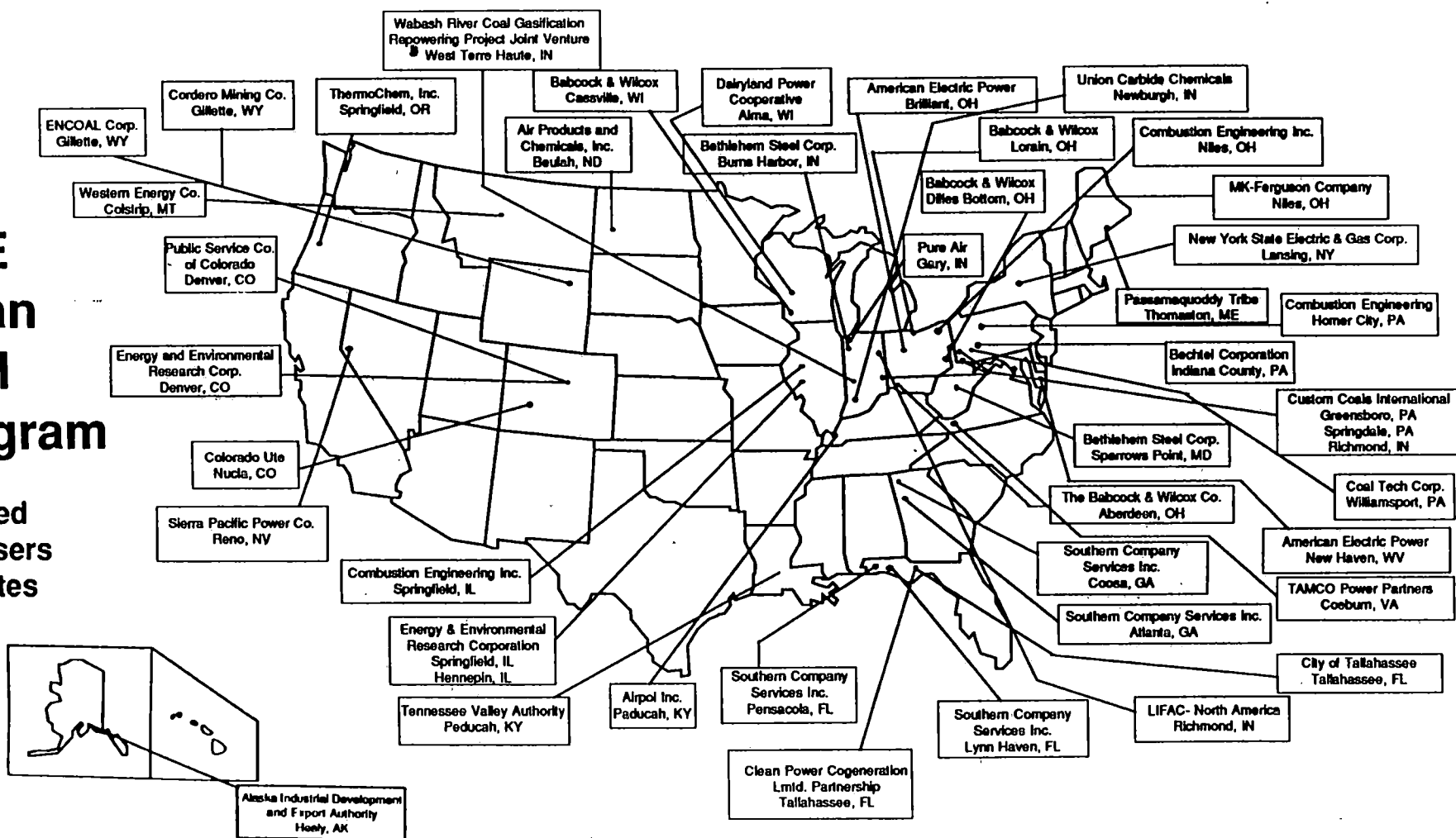
COAL-FIRED GENERATING CAPACITY GROWTH

	1990 Installed Coal Capacity (GW)	Expected Coal Growth 1990-2000			Expected Coal Growth 2000-2020		
		Tons of Coal Consumed in 1990 (in millions)	%/Year	New GW	Tons of Coal Consumed per Year (in millions)	%/Year	New GW
N. America	340	884	1.0	30	78	2.0	180
W. Europe, Japan, Australia	220	572	2.0	40	104	1.5	100
E. Europe, USSR	250	650	1.1	30	78	1.5	100
China, India, Africa	200	520	1.3	30	78	2.0	110
Pacific Rim, S. America	60	156	7.5	60	156	4.7	190
TOTAL	1040			190			680

* In order to equate coal consumption, assume average plant efficiency equals 35%; average coal heating value=10,000 btu/lb; and average capacity factor of US coal plant equals 60%.

DOE Clean Coal Program

Selected Proposers and Sites



Date 9/17/91
Produced by:
Clean Coal Technology Coalition

Environmental Performance of Innovative Clean Coal Technologies in Comparison to Conventional Coal-Fired Power Plant

<u>Technology</u>	<u>% SO₂ Reduction</u>	<u>NOx Emitted</u>	<u>Waste Characteristics</u>
<u>CONVENTIONAL</u>			
Coal Cleaning	10-30	No change	Solids disposal
Flue Gas Scrubber	90+	No change	Sludge
<u>RETROFIT</u>			
Advanced Flue Gas Cleanup	90+	High reduction	None, Byproduct produced
Limestone Injection Multistage Burner	50-60	Moderate reduction	Dry nontoxic powder suitable for landfill
Slagging Combustor	50-90	Moderate reduction	Dry non-toxic powder suitable for landfill
Gas Reburning	10-20	Moderate reduction	None produced
In-duct Sorbent Injection	50-70	No change	Dry powder suitable for landfill
Advanced Coal Cleaning	30-90	No change	Solids disposal
Coal Slurry	10-90	No change	Solids disposal
<u>REPOWERING</u>			
Integrated Gasification Combined Cycle	95-99	Moderate reduction	Usable slag, saleable sulfur and small quantities of other solid wastes
Pressurized Fluidized Bed Combustion	90-95	Moderate reduction	Dry granular nontoxic solid waste
Atmospheric Fluidized Bed Combustion	85-90	Moderate reduction	Dry granular nontoxic solid waste

Source: Department of Energy's report,
"America's Clean Coal Commitment,"
January 1987

Options for Further Emission Reductions of SO₂ and NO_x

Install SO₂ Scrubbers

Advantage:

- Proven method to significantly control SO₂
- Allows existing coal to be used

Disadvantages:

- Very expensive
- Reduces Plant efficiency
- Produces large quantities of difficult-to-handle sludge

Switch to Low Sulfur Coal

Advantage:

- Proven method to significantly control SO₂

Disadvantages:

- Would displace many miners of high-sulfur coals
- High cost
- would result in boiler deratings
- premium on low-sulfur coals
- would require upgrading of particulate controls

Conventional Coal Cleaning

Advantages:

- Allows existing coals be used
- Improves boiler performance

Disadvantage:

- Can remove only 10-30 percent of the sulfur from most coals

Innovative Clean Coal Technologies

Advantages:

- Much more cost effective in control of SO₂
- Many also control NO_x
- Some could be used to reduce emissions, increase plant output, extend plant life -- all in one!
- Produce usable or easily disposable waste

Disadvantage:

- Full slate of technologies not yet commercially available

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9/3/91-91Annual

TECHNOLOGICAL CHALLENGE AT THE SUMMIT

By Robert M. White

President

27th Annual Meeting

National Academy of Engineering

October 2, 1991

Washington, D.C.

Welcome to the 27th Annual Meeting of the National Academy of Engineering, and a special welcome to our new members and foreign associates, their families, friends, and guests who are with us for the first time.

Each year, I have shared my thoughts with you on some aspect of the state of the engineering enterprise. I have also shared with you the pride of engineering achievement by the induction of new members, each of whom is elected to this Academy in recognition of his or her engineering achievements. This year is especially noteworthy in that we also recognize outstanding engineering achievement not only through our Founders and Bueche Awards but also the Charles Stark Draper Prize. This year the Draper Prize will carry a stipend of \$375,000, the largest prize in the world awarded specifically for engineering achievement. The recipients will be announced immediately at the close of this morning session.

It has been an exciting and gratifying year for the Academy. Together with the Academy of Sciences and the Institute of Medicine, we have addressed many pressing public policy issues. Among the highlights have been reports on policy options for climate warming, the adequacy of the space station and the earth

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observing satellite systems to meet scientific goals. We have appraised the administration of our export control laws, assessed the health of research universities and continued our work on the effects of technological change on the U.S. defense establishment of the future. We have formed a new education council to coordinate and spearhead a major effort of the Academies to advance science, engineering and mathematics education at all grade levels, but especially focusing on grade K-12. We are midstream in developing recommendations on the future of nuclear power and automotive fuel efficiency standards.

In NAE we continued our work on the effective harnessing of engineering and technology for increasing industrial productivity and economic growth. We have sought to define our national interests in this age of technological interdependence; and address the impact of short time horizons on investment in science, engineering and technology. We have appraised the innovation process to define general principles as guides to profiting from innovation, and have probed new manufacturing concepts asking whether there are underlying principles that can advance productivity of manufacturing systems.

These efforts have involved hundreds of our members and thousands of scientists, engineers and others. By working on such important issues with significant engineering content, engaging the best minds and experience and carefully maintaining the quality and credibility of our reports the reputation of your National Academy of Engineering for solid and important work continues to grow and with it

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recognition as a key adviser to our government.

As important as it is to respond to the problems of the day, we also need to set our sights and programs on the emerging problems that will engage us in the future. As I ponder the challenges confronting the engineering community, there is one of special and fateful significance for our country and the world. In June 1992, an earth summit will be convened in Brazil --- the United Nations' Conference on Environment and Development (UNCED). It will be a truly global happening where it is estimated that 70 heads of state will join to consider how the nations of the world will navigate the environmental crossroads.

While global climate warming is the issue that crystallized the great international political drive to confront problems of global change, environmental problems are legion, embracing the destruction of natural habitats; the irreversible extinction of species and the loss of biodiversity; encroaching desertification in marginal arid areas of the world; contaminated and depleted underground aquifers; and pollution of the coastal oceans.

An Earth Charter setting out the rights and obligations of nations with respect to the use and protection of the global environment while providing for national and global economic development will be signed. An action program to achieve the goals set forth in the charter will comprise "Agenda 21" to guide nations of the world in the twenty-first century. Finally, several international conventions will be adopted by the assembled nations to address global environmental issues such as climate

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warming, biodiversity and forest conservation. The achievement of these goals faces daunting hurdles.

The conference theme is "sustainable development" an imprecisely defined concept that seeks to capture what many regard as the central problem of humanity: how to sustain the life support environment of the planet and its habitability while providing for the economic development that will assure civilized standards of living for its inhabitants.

Everywhere, there has been a reaching for concepts that can capture the issues. The language of the conference will be peppered by phrases such as "sustainable development," "eco-debt," "eco-restructuring," "industrial ecology," "industrial metabolism," "social cost pricing," "dematerialization," and "decarbonization." This is the language of a "new world environmental order". This new language is obscure and covers both knowledge and ignorance and resists careful definition. But, we should make no mistake. Next year will witness a seminal global meeting. And while there are many issues whose resolution will determine the outcome, there is no question that access to and the development and global diffusion of environmentally advantageous technology will be at the root. Speeding the development and diffusion of such technologies is perhaps the greatest challenge facing the world engineering community. It is on par in its importance with harnessing engineering and technology for economic growth.

The conference will cast in relief the difficult choices nations face as the

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strains and pressures of global political and economic changes and persistent domestic problems vie for limited global financial and intellectual resources. The transformation of centrally planned to market economies in Europe, the Soviet Union and elsewhere in the world, begs for vast infusions of financing and investment. The disintegration of the Soviet Union and the associated economic chaos only serves to emphasize the point. Continued economic growth in industrial countries as they seek to be competitive in global markets presses on capital availability. And even the richest of nations, such as the United States, face great domestic financial needs to address their persistent problems of improved health care, re-invigoration of educational systems, rebuilding of deteriorating infrastructures, and eliminating domestic poverty in the face of massive budget deficits.

Set against these claims are needs to arrest the increasingly rapid deterioration of the habitability of the planet due to the degradation of planetary environmental and ecological support systems; to come to grips with the appalling growth of poverty among billions of desperate people throughout the world; and to address the urgent need for economic development in many of the poor nations.

Among the many issues that will need resolution, perhaps the most difficult is how the developing nations of the world can be encouraged and enabled to join other nations in addressing global environmental problems. These countries located largely, but not exclusively, in tropical regions are those caught in a vicious cycle of

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rapid population growth, low rates of economic development, desperate poverty, resulting in environmental degradation that in turn intensifies poverty and retards economic growth. It is in these nations that we see some of the most egregious examples of environmental degradation and where it is projected that principal sources of global environmental deterioration in the future will be encountered.

While the solution of global environmental problems requires the participation of the developing countries they require even more so concerted actions by industrialized nations. Global environmental problems are caused by and envelop us all. It is the industrialized countries that today consume most of the world's fossil energy that releases greenhouse gases, that produce the chemicals that destroy stratospheric ozone and that are the prime markets for virgin forest timber.

The industrialized nations have recognized the need to change present practices and are moving to limit such emissions and effluents through conservation and efficiency measures, by substitution of less offending materials and chemicals, and developing new approaches to the design of industrial processes and new practices that can increase industrial metabolism and minimize wastes.

The Montreal protocol to phase out the production of CFC's (chlorofluorocarbons) is a landmark international treaty to protect the stratospheric ozone layer. The recent passage of the amendments to the Clean Air Act in the United States and the statements of interest to limit greenhouse gas emissions by many industrialized countries is solid recognition by many industrialized countries of

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the pressing nature of environmental issues. The industrialized nations are also embarked on a massive research endeavor to understand and monitor global change processes.

International awareness that both industrialized and developing nations have a common destiny traces to the report of the United Nations Commission on Environment and Development under the leadership of G.H. Bruntland, Prime Minister of Norway. This common destiny is shaped by the interdependence of national environments and national economies on international environmental actions.

This environmental interdependence is best illustrated by the problems of global climate warming, destruction of stratospheric ozone, pollution of the world's coastal oceans and destruction of forests. The sources of the emissions, wastes and some of the economic causes are found in all nations and no nation is immune to the consequences. These are problems that can be addressed only by international action.

This interdependence generates economic and political forces that spill over and affect nations in critical ways. These forces can take many forms. Some believe for example that the accelerating illegal immigration inundating the U.S. and Europe are already the harbingers of the consequences of environmental poverty. Demand in industrialized and developing countries for endangered species, for lumber, or minerals or other resources give rise to environmentally destructive forces. They can

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take the form of environmental havens for companies and industries seeking to avoid the costs of adherence to environmental regulation.

There is unfortunately a conflict in views about how to proceed with a concerted world effort in the face of this global environmental and economic interdependence. The differences stem from what is rhetorically called the "eco-debt" that industrial nations are presumed to owe developing nations. In this view, the industrialized nations in the course of their development have already used up much of the environmental carrying capacity of the global atmosphere and oceans and brought about the prospect of environmental tragedy. As a consequence, they are asked to pay this debt by the transfer of resources to developing nations to enable them to address their development needs which in turn will enable them to become good global environmental citizens. The recent meeting in Beijing of the leaders of the developing nations to consider these global environmental issues leaves no doubt about their stand.

Every nation has a self interest in protecting the global environment although reasons may differ. Some nations have much to lose, and all nations differ in their resilience to adapt to environmental change. Industrialized nations are generally in a better position to adapt than most developing nations. The environmental threats are therefore likely to have greater direct impact on developing nations. On the other hand industrialized nations are perhaps more threatened by the consequences of the 2nd tier effects, such as migration and the resulting political consequences. It

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is in the self interest of all, however, to consider those priority actions that can put all nations on track to a world of sustainable development. Among the most important must be those of governments and private entities to speed the global diffusion and development of environmental technologies.

Free market forces can accomplish much. Companies will seek markets for environmental technologies where their investments can be profitable, and nations and international funding organizations can provide the economic incentives that will attract such private investment. Developing nations can do much to further the process by establishing economic policies that provide the necessary stability for long term investment. If developing nations take steps to provide an inviting economic and political environment so that free market forces can operate, the power of the private sector in achieving environmental goals can be formidable. It is encouraging that India for example has recently adopted economic policies that permit majority foreign ownership.

Market forces alone, however, will not provide a universal and equitable diffusion of technology. Such forces will need to be supplemented by national bilateral and international assistance programs to ensure that all countries can respond to the need for the introduction of environmental technologies. Already actions by international agencies such as the World Bank have made environmental efforts a consideration in their assistance efforts as have individual governments including the United States.

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We now have close to a half century experience in the massive investment of governmental resources for development activities. The amount of official development assistance dispensed by the World Bank, the United Nations Development Program international funding agencies and bilateral assistance is enormous. The problem is that national governments in applying for such assistance do not judge their priorities through an environmental prism. Nor do donor nations operate with environmental blinders. Trade-offs at both the national and international level are inevitable and we need to recognize that these trade-offs will not always favor the environment.

There is a need also to recognize that even under the most favorable circumstances, time horizons for achieving sustainable development will inevitably be long. We need to take advantage of the fact that environmental problems have different time scales before change is irreversible. For example, the extinction of species is now proceeding at an accelerated rate with irreversible consequences for the world genetic pool. It is clearly a near term problem as contrasted with the projected consequences of global climate warming. This suggests that a first principle of any global strategy must be to focus efforts on those environmental problems where time to irreversibility is shortest, taking those essential long lead time actions to position us to confront other environmental issues. Such a strategy should enable us to deploy scarce resources effectively, concentrate effort and achieve early salutary results.

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Our strategies also need to be clear about what we mean by the phrase "environmental technologies" --- that is technologies that are environmentally friendly or advantageous. Jesse Ausubel has written thoughtfully on this topic. He concludes that environmental technologies are where you find them. Any technology, hard or soft, that reduces the present level of environmental contamination traceable to any industrial, agricultural or cultural practice is an environmental technology. With some exceptions, almost all evolutionary and replacement technologies as well as those specifically designed for environmental goals are in this sense environmental technologies. Electric power plants that burn fossil fuels more efficiently represent an environmental technology; as does the segregation of solid waste at the source to facilitate recycling. A refrigerator whose compressor design and insulation reduces the power consumption for its operation is an environmental technology as are agricultural practices that use less environmentally contaminating pesticides.

The important point is that a large part of the solution is not in the development of new technologies, but in the diffusion of existing technologies and practices and the elimination of the economic, political and sometimes cultural obstacles. This is not to minimize the importance of and need for new technology development to address longer term environmental prospects. The world will ultimately need to be weaned from fossil fuels and it will need technologies for industrial and agricultural practices that are more efficient and less polluting than any we now have.

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The strategies appropriate for industrialized and developing nations will be different. There is a general agreement that the sine-qua-non for technology diffusion to developing nations is building indigenous national capacities. These nations must have the indigenous capacity to understand the nature of local and regional environmental problems so that locally appropriate plans for solutions can be forthcoming. Scientific and technological infrastructures are needed in each nation or region to understand, deploy and maintain technological devices and processes that are now well known throughout the industrialized world, and to absorb and use wisely new technologies that will be available in the future.

The industrialized nations face a different set of challenges. First they must achieve the diffusion of existing environmental technologies within their own countries. They must assume the burden of the development of new technologies. Finally, as possessors of environmental technologies they must foster their global diffusion. As we have learned in the U.S. it is no easy task even in an industrialized nation to accelerate the diffusion of environmental technologies. We should not be surprised that global diffusion will be orders of magnitude more difficult. Obstacles to environmental technology diffusion take resistant forms. In our economic system the most effective mechanisms are economic incentives. Such incentives call for "getting the prices right." This leads to questions of taxation of polluting materials or polluters. We need to face the fact that receptivity of legislatures to increased taxes is an oxymoron.

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We encounter also the capital stock obsolescence problem. Interestingly, rapid obsolescence especially of consumer products has generally been deplored as evidence of a wasteful society but it does have virtues. The twin desiderata of environmental protection and economic growth are both advanced by rapid obsolescence of capital stocks. It is the massive emissions from older automobiles not equipped with modern catalytic converters that are the large contributors to urban air pollution. It is the fifteen or twenty year old refrigerator in the home that uses considerably more energy as compared to modern, energy efficient refrigerators that is the energy hog. Rapid turnover of capital stock also permits and is abetted by rapid technological change which in turn is the engine of economic growth.

We need also to face up to the fact that on the global level, technological diffusion rates are a function of national priorities and ability of recipient countries to pay. Some environmental problems simply do not reach high on potential recipients priorities, whether for allocation of their own resources or multilateral or bilateral assistance. These latter are generally global environmental problems such as stratospheric ozone depletion or climate warming or ocean pollution. These are the environmental problems of the global commons which can only be addressed by international action.

No mystery surrounds the kinds of technologies that are available and could be transferred if financing were available and economic policies appropriate. For example, ways to increase efficiency and conservation in the production, distribution

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and use of fossil energy are well known. Clean coal combustion, co-generation, fluid bed technology, and systems for emission controls are widespread. Non-fossil energy resources --- nuclear, solar, geothermal, have their particular niches and problems but the technologies are well developed. On the demand side, we know how to alter patterns of energy usage whether in automobiles, home appliances, home construction or home lighting. The same is true for water supply, recycling, chemical processing and manufacturing technologies.

All will agree that over the long term there will be a need for new technology yet to be developed for a transition from economies heavily dependent upon fossil fuels or environmentally destructive industrial and agricultural practices to those that will be very much less so. This transition will depend upon the development of new generations of publicly acceptable nuclear power, more efficient sources of solar power and renewables, and novel developments of other energy sources, modes of distribution and use.

We know that new technologies and new materials will be needed to minimize wastes and effluents from manufacturing and chemical processing industries. We know that we will need new technologies to recycle and dispose of waste products in environmentally acceptable ways. Finally, there are new technologies that will be needed to enable us to mitigate or adapt to global environmental changes such as climate warming --- the genetic engineering of more environmentally resistant strains of crops or technologies that can enable us to

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recycle carbon dioxide or change atmospheric radiation processes.

If as now seems likely, environmental considerations will become more pressing it is likely that over the next several decades a major global market for environmental technologies looms. As governments and international organizations insist on the introduction of environmental technologies, governmental and market forces should stimulate major private investment in environmental technologies. Some nations such as Japan, join their altruistic environmental objectives with the anticipation of such a development. They have already begun massive investment in such technologies.

Expectations of all, need to be shaped by realism about financing and the promise of technology. There is a need to recognize that all global environmental needs will not be satisfied easily or in the short run in the face of many claims upon global capital resources. This implies a need for strategies tuned to increased but constrained financing and the key role of technology.

As strategies for formulating international approaches to global environmental problems take shape, I offer a few suggestions for guiding principles:

1. We need to disaggregate global environmental issues so that effort and resources can be focused. The separate conventions on climate warming, biodiversity, and forestry are steps in the right direction. But we may need to go further. There are certain global and regional environmental problems that can be attacked and great progress made by small groups of cooperating

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nations whose collective action might go a long way to solving some problems, thus alleviating the need for universal participation. For example, the number of nations producing CFCs and their alternatives is small and an international sub-grouping of nations in which it is easier to come to agreement might very well be able to solve most of that problem.

2. All evidence indicates that without indigenous national capacities for planning national strategies for the acquisition and deployment of appropriate technologies and the capacity for accepting, using and maintaining environmentally advantageous technologies, technological diffusion will be difficult. There seems to be general agreement that this is a matter of top priority and private foundations and multilateral assistance organizations recognize the problem. We now need to get on with this effort. It is a "doable" problem with multiple benefits not only for environmental remediation but also economic growth.
3. For some environmental issues, solutions lie in the realm of economic and social policy. Forest conservation and arresting desertification are examples. While the application of technology is important, it is not the pacing factor. For other global environmental problems such as climate warming, ozone depletion there remain significant scientific uncertainties about causes and consequences. These uncertainties need to be reduced. For these reasons the continued emphasis on research on the physical and biological dimensions

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as well as the economic and social dimensions of environmental issues is essential. The nations of the world have joined in an international research effort on global change to establish the scientific understanding of global processes. They need also to join in an analogous effort on the economic and social ramifications.

4. There is a need for an international effort for the development of new environmental technologies as we chart the pathways to sustainable development. The plans and commitments of the Japanese government to the development of such technologies is to be commended and represents an effort around which we can nucleate additional national and international programs. Hopefully market forces will bring this about. But government working with the private sector can foster this process. Unless the private sector takes the lead to develop environmentally friendly production systems, sustainable development will remain only a slogan.

Indeed, there are formidable obstacles to achieving sustainable development that lie ahead. If our strategies for achieving this goal are realistic, I am optimistic about a favorable outcome. It lies in my belief that the creativity, drive and leadership of the world engineering community will not fail to rise to this challenge. The National Academy of Engineering will not be found wanting. Thank you.

THE WHITE HOUSE

WASHINGTON

June 5, 1991

Attendees for 2:30 pm meeting

Richard Lindzen, MIT

Patrick Michaels, University of Virginia

Robert Balling, Arizona State University

Andrew Solow, Woods Hole Oceanographic
Institute

Hugh Ellsaesser, Lawrence Livermore Nat'l
Laboratory

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

May 21, 1991

MEMORANDUM FOR D. ALLAN BROMLEY

FROM: NANCY G. MAYNARD *NM*
SUBJECT: Meeting of Scientists with Alternative Perspectives on
Global Warming

As requested, listed below are the names of several key participants in the upcoming meeting, "Global Warming Crises: Science or Politics?" to be held June 5-6, 1991. Background information on each of these participants can be found at Tab A. The conference brochure is attached at Tab B.

There are a number of other attendees who could also provide good information for discussion but, as requested, this is a short list. These people have been chosen from the list of speakers. We could certainly add participants either from the speaker list or from the conference attendees once we determine who will be there during the conference itself.

I have tentatively reserved the Roosevelt Room for the following 2 periods of time:

- . June 5: 1-2 p.m.
- . June 6: 9-10 a.m.

The suggested list of participants:

Richard S. Lindzen, Massachusetts Institute of Technology
Patrick Michaels, University of Virginia
Robert Balling, Arizona State University
Andrew Solow, Woods Hole Oceanographic Institution
Hugh Ellsaesser, Lawrence Livermore National Laboratory

n/ursci

LINDZEN, RICHARD SIEGMUND, b Webster, Mass, Feb 8, 40; m 65; c 2.
DYNAMIC METEOROLOGY, APPLIED MATHEMATICS. *Educ:*
Harvard Univ, AB, 60, SM, 61, PhD(appl math), 64. *Prof Exp:* Res fel
meteorol, Univ Wash, 64 & Univ Oslo, 64-65; res scientist, Nat Ctr
Atmospheric Res, 65-68; prof, Univ Chicago, 68-72; prof meteorol, Harvard
Univ, 72-83, dir, Ctr Earth & Planetary Physics, 80-83; SLOANS PROF
METEOROL, MASS INST TECHNOL, 83- *Concurrent Pos:* Exec mem,
Nat Acad Comt Global Atmospheric Res Prog, 68-; consult, Naval Res Lab,
72-83, Control Data Corp, 77 & NASA, 77-; mem, Nat Acad Assembly Math
& Phys Sci, 78-81. *Honors & Awards:* Meisinger Award, Am Meteorol Asn,
68; Macelwane Award, Am Geophys Union, 69; Charney Award, Am
Meteorol Soc, 85. *Mem:* Nat Acad Sci; fel Am Acad Arts & Sci; fel Am
Meteorol Soc. *Res:* Hydrodynamic stability; climatology; upper atmosphere
dynamics; general atmospheric circulation; tides. *Mailing Add:* Ctr Meteorol
& Phys Oceanog Mass Inst Technol Cambridge MA 02139

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
01. Redaction	Redaction of a Social Security Number (1 pp.)	05/22/91	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Chief of Staff, White House Office of
Series: Sununu, John, Files
Subseries: Issues Files
WHORM Cat.:
File Location: Global Warming 1991 [1]

Date Closed: 1/1/1998	OA/ID Number: 29158-007
FOIA/SYS Case #: 1998-0004-F[2]	Appeal Case #:
Re-review Case #:	Appeal Disposition:
P-2/P-5 Review Case #:	Disposition Date:
AR Case #:	MR Case #:
AR Disposition:	MR Disposition:
AR Disposition Date:	MR Disposition Date:

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

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 P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

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 (b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
 (b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
 (b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
 (b)(9) Release would disclose geological or geophysical information

RESUME

Patrick J. Michaels

DOB: February 15, 1950

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Spouse: Erika N. Kancler

Two Children

EDUCATION

A.B. Biological Sciences, 1971, University of Chicago

S.M. Biology, 1975, University of Chicago

Ph.D. Special Graduate Committee on Ecological Climatology,

1979, University of Wisconsin-Madison

Dissertation: Atmospheric Anomalies and Crop Yields in North America

PROFESSIONAL EXPERIENCE (Abbreviated)

Center for Climatic Research, University of Wisconsin, 1976-1979

Developed and tested a new family of crop yield/climate models for small grains in the United States, India and Mexico.

Department of Environmental Sciences

University of Virginia

Assistant Professor, 1980-1986

Associate Professor, 1986-present

Appointed Virginia State Climatologist by Governor

John Dalton, July, 1980.

PROFESSIONAL SOCIETIES

Sigma Xi, The Scientific Honor Society

American Meteorological Society

(President, Central Virginia Chapter, 1986-87)

(Program Chair, Committee on Applied Climatology)

American Association for the Advancement of Science

American Association of State Climatologists

(President, 1987-88; Executive Board, 1986-89)

COURSES OF INSTRUCTION

EVSC 100A: The Greenhouse Effect and Public Policy

EVSC 447: Climatological Analysis

EVAT 796: Advanced Climatology

ACADEMIC COMMITTEE SERVICE (Major Professor Only)

David Stooksbury (PhD)
Paul J. Knappenberger (MS)
Harry Lins (PhD)

GOVERNMENT ADVISORY SERVICE

Governor's Inquiry--1980 drought
Governor's Inquiry--1981 drought
Virginia Farm Bureau--1983 drought
Virginia Department of Agriculture and Consumer
Services--Avian Influenza, 1983-4
Virginia Air Pollution Control Board--Acid Precipitation, 1984-1987
Governor's Task Force the Disposal of High-Level
Nuclear Waste, 1986.
Governor's Task Force on Drought, 1986
Virginia Office of Economic Development, 1986-7
Virginia Film Office, 1986
Virginia Division of Forestry, 1982-1987
Virginia Water Resources Research Center, 1986
U.S. Environmental Protection Agency Global Change
Initiative, 1987
U.S. Geological Survey, 1988

INVITED LECTURES AND TESTIMONY

Environmental Sciences Departmental Seminar, 1980, 1986
New Mexico State University, 1981
Virginia Farm Bureau, 1981, 1982, 1983
Virginia Small Grains Conference, 1981, 1988
Environmental Sciences Undergraduate Seminar, 1982, 1983, 1987
Sigma Xi, University of Virginia, 1982
Economics Honor Society, J. Madison University, 1983
Colorado State University, Atm. Sci. Dept. Seminar 1983
Virginia Tech Short Course on Viticulture, 1984
American Meteorological Society, Central Virginia Chapter, 1984
National Academy of Sciences, Commission on Life Life Sciences, 1985
Environmental Sciences Undergraduate Seminar, 1985
University of Virginia Institute of Government, 1985
University of Virginia Blandy Experimental Farm, 1986
Virginia Mosquito Control Commission, 1986
Virginia Water Resources Research Center, 1986 (2), 1988
Virginia Air Pollution Control Board, 1986
Virginia Tech Extension Service, 1987, 1988
Cooperative Institute for Research in the Atmosphere, Colorado State University, 1987
Virginia Agricultural Chemical and Soil Fert. Assn. 1988
U.S. Geological Survey, Advisory Committee on Water Data, 1988

University of Delaware, Geography Dept. Seminar 1988
Moderator, U.S. Drought Symposium, The Weather Channel, 1988
U.S. National Climate Program, Panel on Climate Trends, 1988
Lynchburg College Special Lecture, 1988
Sigma Xi, U.S. Department of Energy, 1988
American Society of Chemical Engineers, 1988
South Carolina Water Resources Commission, 1988
Virginia Mathematics and Science Center, 1988
Scripps Institute of Oceanography, 1988
Virginia State Air Pollution Control Board, 1989
Virginia State Feed Association, 1989
U.S. House of Representatives, Subcommittee on Energy and Power, 1989
Brookings Institution, 1989
American Society of Civil Engineers, 1989
Federal Executive Institute Alumni Association, 1989
Executive Board, National Coal Association, 1989
U.S. Senate, Committee on Foreign Relations, 1989
U.S. Department of State, Foreign Service Institute, 1989
Virginia Department of Agriculture and Consumer Services, 1989
National Association of Home Builders, 1989
American Meteorological Society, Committee on Broadcast Meteorology, 1989
Georgia and North Carolina Textile Manufacturing Association, 1989
The Eris Society, Aspen, Colorado, 1989
University of Texas, Conference on Energy Futures, 1989
Western Fuels Association Annual Meeting, 1989
7th International Pittsburg Coal Conference, 1989
U.S. Department of State, Seminar on Current Affairs, 1989
Edison Electric Institute, 1989
Virginia Soil and Water Conservatio Association, 1989
University of Illinois, Annual Energy Conference, 1989
The Keystone Center, Washington DC, 1989
National Governor's Conference, United Nations, 1989
Basin Electric Power Cooperative, Bismark ND, 1989
Bennington College, Bennington in New York Seminar, 1989
Virginia Tech Turkey Days (I), 1989
North Carolina State University MEAS Seminar, 1990
Illinois Power Corporation, 1990
Georgia Southern University, Conference on Global Issues, 1990
Virginia Division of Forestry, 1990
West Richmond Businessmen's Association, 1990
Southeastern Climate Symposium, Charleston SC, 1990
American Meteorological Society, Washington DC, 1990
Virginia Council on the Environment/Virginia Education Association, 1990
American Meteorological Society, Richmond VA, 1990
Department of Environmental Sciences Undergraduate Seminar, 1990
Virginia Mathematics and Science Center, 1990
Missouri Governor's Conference on Natural Resources, 1990

Consumer Alert, National Press Club, 1990
Virginia Emergency Services Conference on Severe Weather, 1990
North Carolina Coal Institute, 1990
The Brookings Institution, 1990
Pacific Research Institute, 1990
Virginia Soil and Water Conservation Association, 1990
American Association of State Climatologists, 1990
Grand Rounds, Western State Hospital, 1990
Penn Ag Industries Annual Meeting, 1990
Kentucky Coal Operators Association, Pikeville KY, 1990
Council of Industrial Boiler Owners, Orlando FL, 1990
Chemical Manufacturers Association, Washington DC, 1990
Maryland Chemical Industry Council, Baltimore MD, 1990
American Water Resources Association, Denver CO, 1990
Hillsdale College, 1990
National Coal Association, Washington DC, 1990

PUBLICATIONS

Senior Author unless otherwise noted

1977. A Predictive Model for Wheat Yield in Sonora, Mexico. University of Wisconsin, Institute for Environmental Studies, Report #73. University of Wisconsin--Madison, 53706. 17pp.

1977. An Aggregated National Model for Wheat Yield in India. University of Wisconsin, Institute for Environmental Studies, Report #74. University of Wisconsin--Madison, 53706. 17pp.

1978. A Predictive Model for Winter Wheat Yield in the U.S. Great Plains. University of Wisconsin, Institute for Environmental Studies, Report #94. University of Wisconsin--Madison, 53706. 44pp.

1979. A Simple Large Area Crop/Climate Model for United States Winter Wheat. American Meteorological Society, 14th Conf. on Agric. and For. Meteor., Amer. Met. Soc., Boston Mass. pp64-67.

1981. The Climatic Sensitivity of 'Green Revolution' Wheat Culture in Sonora, Mexico, Envi. Conserv. Vol.8, 307-312.

1981. Virginia's Climate. University of Virginia News Letter, Vol. 57, no.5, 17-20. (with B.P. Hayden, Senior Author)

1981. Comparison of the Climatic Sensitivity of "Green Revolution" Wheat Culture to that in the United States Great Plains. American Meteorological Society, 15th Conf. on Agric. and For. Meteor., Amer. Met. Soc., Boston, Mass. pp106-109.

1982. The Response of the 'Green Revolution' to Climatic Variability. Cli. Change, Vol. 4., 255-271.

1982. Five Tropical Systems on Similar Tracks. Mon. Wea. Rev., Vol.110., 883-885.

1982. Atmospheric Pressure Patterns, Climatic Change, and Winter Wheat Yields in North America. Geoforum, Vol.13, 263-273.

1982. Determination of the Climatic Component of Southern Pine Beetle Host Susceptibility with Multivariate Statistical Methods. Progress Report, USDA Cooperative Agreement 59/2513/1/3/006/0. 24pp.

1982. Statistical-Dynamic Models for Virginia Corn Yields. Final Report, USDA Cooperative Agreement 58/319T/1/0308. 50pp., and addendum of 13pp.

1983. Weather and the Southern Pine Beetle in Atlantic Coastal and Piedmont Regions. American Meteorological Society, 16th Conf. on Agric. and For. Meteor., Amer.Met. Soc., Boston Mass. pp241-244.

1983. Improved Specification of the Climatic Component of Southern Pine Beetle Host Susceptibility with Multivariate Statistical Methods. Progress Report, USDA/UVa Cooperative Agreement 5-29309. 15pp.

1983. Statistical-Dynamic Models for Virginia Corn Crops. American Meteorological Society, 16th Conf on Agric. and For. Meteor., Amer. Met. Soc., Boston, Mass. pp150-153. (with T.J. Smith, Senior Author)

1983. Temporal and Spatial Changes in Mesoscale Climatic Patterns. American Meteorological Society, 2nd Conf. on Climatic Variations, Amer. Met. Soc., Boston, Mass.p20.

1983. Price, Weather and "Acreage Abandonment" in Western Great Plains Wheat Culture. J. Clim. and Appl. Met., Vol. 22, 1296-1303.

1983. Climate and High Yielding Variety Wheat Yields. Geoforum, Vol. 14, 441-446.

1984. Modification of MOS-Derived Thunderstorm Probabilities over Complex Terrain with Continental Scale Upper Air Data. American Meteorological Society, 10th Conference on Weather Forecasting and Analysis. Amer. Met. Soc., Boston, Mass. pp 160-164.

1984. Estimating the Future Areal Coverage of Pine Beetle Infestations over large areas: An Integrated Approach. Progress Report, USDA IPM on Bark Beetles. 23pp.

1984. Climate and the Southern Pine Beetle in Atlantic Coastal and Piedmont Regions. Forest Science, Vol. 30, 143-156.

1984. Statistical Relations between Summer Thunderstorm Patterns and Continental Mid-Tropospheric Heights. Mon. Wea. Rev., Vol.112,778-789.

1985. Economic and Climatic Factors in "Acreage Abandonment" over Marginal Cropland. Climatic Change,6, 185-202.

1985. An Automated Objective Prediction Package for the Spread of Southern Pine Beetle. 17th Conf. on Agric. and For. Meteor., American Meteorological Society, Boston, Mass., 70-73.

1985. Sea-Breeze Induced Mesoscale Systems and Severe Weather. Progress Report to National Aeronautic and Space Administration. 26pp.

1985. Objective Prediction of Climate-Related Changes in the Distribution of Southern Pine Beetle. IN: Branham, S. J., and R. C. Thatcher, (eds.): Integrated Pest Management Research Symposium: The Proceedings. USDA Southern Forest Experiment Station General Technical Report SO-56, pp 41-52.

1985. SPBCMP: An Automated Prediction Package for Southern Pine Beetle. User's Guide. Southern Forest Experiment Station, Pineville, Louisiana. 34pp. (Philip J. Stenger, Senior Author)

1985. Anomalous Mid-Atmospheric Heights and Persistent Thunderstorm Patterns over Florida. J. Climatol. 5, 529-542.

1985. Weathering the Media Storm. Washington Post Outlook 10/13/85.

1986. Timeliness and Accuracy of a Series of Empirical Crop/Climate Models under Extreme Conditions. Int. Jour. Ecol. and Environ. Stud. 12, 19-34.

1986. Commentary on "The Cumulative Impacts of Human Activities on the Atmosphere." In Cumulative Environmental Effects: A Binational Perspective, National Research Council, Washington DC, 127-129.

1986. Climatological Considerations for Siting a Crystalline Repository for High-Level Nuclear Waste in the Commonwealth of Virginia. Report to the Governor's Task Force on the Crystalline Repository Project. 26pp.

1986. SPBCMP--A Program to Assess the Likelihood of Major Changes in the Distribution of Southern Pine Beetle. S. Jour. App. For. 10, 158-161.

1986. Greenhouse Effect? Then Why is it Colder? Washington Post Outlook, 5/15/86.

1986. Southwide Modelling of Southern Pine Beetle Coverage Changes with Temperature and Objective Moisture Status Indicators. Theor. Appl. Clim. 37, 39-50.

1987. Climate and the Eastern Repository for High Level Nuclear Waste. Proceedings, 5th Conf. on Appl. Clim., American Meteorological Society, Baltimore MD, 35-39.

1987. Surrogate 500mb heights: An Objective Determinant of Climatic Change?. Proceedings, 5th Conf. on Appl. Clim., American Meteorological Society, Baltimore MD, 17-20.

1987. The Predictability of Sea-Breeze Generated Thunderstorms. World Meteorological Society Int'l Workshop on Rain Producing Systems in the Tropics and Extra-Tropics. World Meteor. Org. symp. pp unknown. (R. A. Pielke, Senior Author)

1987. Hurricanes, Droughts, and Southeastern Crop Yields. Proceedings, Southeastern Drought Symposium, Columbia SC. SC St. Climatology Pub G-30, 14-18 (Paul C. Knappenberger, Senior Author).
- 1987 Modelling the Climate Dynamics of Tree Death. Bioscience 37, 603-610.
- 1987 Climate and the Eastern Repository: A Comparative Study. Environ. Man. 15, (5), 627-636.
- 1987 Composite Climatology of Florida Summer Thunderstorms. Mon. Wea. Rev. 115 (10), 2781-2791.
- 1987 Nonthermometric Measurement of Secular Climatic Variability. CO2-Clim. Dial. 2, (1), 7pp.
- 1988 Sno Biz 88: Waiting for the Big One. Washington Post Outlook, 1/17/88.
1988. Nonthermometric Measurement of Recent Temperature Variability over the Conterminous United States, Southern Canada, and Alaska. CIRA Symposium on Climatic Change, Fort Collins, Colorado, 119-133.
1988. Simulation Models of Forest Succession. In: Rosswall, T., Woodmansee, R.G., and P. G. Risser, Eds., Scales and Global Change, SCOPE #39, J. Wiley, New York, 125-151. (H. Shugart, Senior Author)
1988. Anthropogenic Warming in North Alaska? J. Climate 1, 942-945.
1988. Origin and Destination of Pollutant-Bearing Airstreams Impacting and Exiting the Commonwealth of Virginia. Final Report to Virginia Air Pollution Control Board. 131pp. Additional Technical Appendix, 1800pp.
1989. Atmospheric Pollutant Transport: Take it or Leave it. Proceedings, 6th Conference on Applied Climatology, American Meteorological Society, Charleston SC, pp 80-83 (P.J. Stenger, Senior Author).
1989. Regional 500mb Heights Prior to the Radiosonde Era. Proceedings, 6th Conference on Applied Climatology, American Meteorological Society, Charleston SC, pp 184-187.
1989. The Greenhouse Climate of Fear. Washington Post Outlook 1/8/89.
1989. Testimony to the U.S. House of Representatives, Subcommittee on Energy and Power. U.S. Government Printing Office, Serial No. 101-31, 78-86.
1989. The Greenhouse Effect: Chicken Little and our Response to "Global Warming". J. Forestry 87, 35-39.
1989. The Science and Politics of Global Change. 7th International Pittsburgh Coal Conference, University of Pittsburgh, Vol 1, 173-182.

1989. Crisis in Politics of Climate Change Looms on Horizon. Forum for Appl. Res. and Pub. Policy 4, 14-23.

1990. The Science and Politics of the Greenhouse Effect: Collision Course? In Environmental Consequences of Energy Production, University of Illinois, Chicago IL, 115-138.

1990. The Greenhouse Effect: Beyond the Popular Vision of Catastrophe. Liberty 3, 27-33.

1990. I Remember Camille. Mar. Wea. Log. 34, 8-11.

1990. The Greenhouse Effect and Global Change: Review and Reappraisal. Int. Jour. Envi. Stud. 36, 55-71.

1990. Climatic Change and Climatic Uncertainty: A Regional Perspective. Proceedings, 21st meeting, Advisory Committee on Water Data for Public Use, U.S. Geological Survey, New Orleans LA, 36-59.

In Press. Observed and Projected Climatic Change: Fact and Fiction. EPRI Symposium "Interaction of the Global Carbon and Climate Systems", Electric Power Research Institute, Palo Alto, CA.

In Press. Testimony to the Committee on Foreign Relations, United States Senate. To Congressional Record, 4/21/89.

In Press. Regional 500mb Heights Prior to The Radiosonde Era. Theor. Appl. Clim. Accepted 10/89.

In Press. Global Climate Change and the U.S. Southeast: Much More Research is Needed. Symposium on Global Change and the Southeast, Southeast Regional Climate Center, Charleston SC, 2/90.

In Press. The Predictability of Sea-Breeze Generated Thunderstorms. Atmosfera, accepted 4/90 (R.A. Pielke, Senior Author).

In Press. Global Warming: A New Synthesis. In Jastrow, R., Editor, The Greenhouse Problem, Jamison Books, Washington DC, Accepted 6/90

In Press. Cluster Analysis of Southeastern U. S. Climate Stations. Theor. Appl. Clim. Accepted 11/90. (D.E. Stooksbury, Senior Author)

In Press. Global Warming: An Increasingly Unlikely Apocalypse. In Simon, J., Editor, The Resourceful Species, Accepted 12/90.

In Review. Climatic Change in Mixed-Layer Trajectories over Large Regions. Submitted to Theor. Appl. Clim, 6/90. (P.J. Stenger, Senior Author)

In Review. Cyclone Tracks and Wintertime Climate in the Mid-Atlantic Region of the United States. Submitted to J. Climatol. 7/90. (P.C. Knappenberger, Senior Author)

THE VIRGINIA CLIMATE ADVISORY

The *Advisory* is a quarterly publication of the State Climatology Office, targeted for Education, Governmental Agencies, and the educated layman. Current circulation is approximately 4,000. Each issue contains a main feature, a roundup of recent conditions, as well as an in-house generated long range forecast whose inaccuracy is held up for public scrutiny in each edition.

- 1980. 4 (1) Degree-days and energy usage in Virginia. 27pp.
- 1980. 4 (2) Modelling soybean/climate relationships. 24pp.
- 1980. 4 (3) History of tropical cyclones in Virginia. 33pp.
- 1981. 4 (4) History of drought in Virginia. 27pp.

- 1981. 5 (1) Satellite climatology. 26pp.
- 1981. 5 (2) Acid rainfall in Virginia. 26pp.
- 1981. 5 (3) Winter severity over Virginia. 26pp.
- 1982. 5 (4) Coastal cyclogenesis. 26pp.

- 1982. 6 (1) History of tornadoes in Virginia. 26pp.
- 1982. 6 (2) Lightning and damaging thunderstorms in Virginia. 26pp.
- 1982. 6 (3) Thunderstorm patterns over Virginia. 26pp.
- 1983. 6 (4) Virginia wind patterns. 26pp.

- 1983. 7 (1) Virginia fog frequency and distribution. 26pp.
- 1983. 7 (2) Origin and distribution of summertime haze over Virginia. 26pp.
- 1983. 7 (3) Mountain temperature regimes. 26pp.
- 1984. 7 (4) The Carbon Dioxide controversy. 26pp.

- 1984. 8 (1) Precipitation and Elevation. 30pp.
- 1984. 8 (2) Improvements for Virginia Thunderstorm Forecasts. 30pp.
- 1984. 8 (3) Vineyard Microclimate. 30pp.
- 1985. 8 (4) Objective Improvement of Local Temperature Forecasts. 30pp.

- 1985. 9 (1) Radar Climatology of Piedmont Thunderstorms. 30pp.
- 1985. 9 (2) Cumulus Clusters. 30pp.
- 1985. 9 (3) Hurricane Gloria. 30pp.
- 1986. 9 (4) Winter History since 1890. 30pp.

- 1986. 10 (1) Climate and High-Level Nuclear Waste Disposal. 30pp.
- 1986. 10 (2) Carbon Dioxide/Climate Revisited. 30pp.
- 1986. 10 (3) Virginia Acid Rain Research. 30pp.
- 1987. 10 (4) Hurricanes, Drought, and Va Agriculture. 30pp.

- 1987. 11 (4) The Ozone Hole and Nuclear Winter. 30pp.
- 1987. 11 (2) Virginia Evaporation Regimes. 30pp.
- 1987. 11 (3) Virginia Snow Phobia. 30pp.

1988. 11 (4) Updated Climatic History. 30pp.

1988. 12 (1) Historical Floods. 30pp.

1988. 12 (2) Acid Precipitation Trajectories. 30pp.

1988. 12 (3) Eastern Shore Hurricane History. 30pp.

1989. 12 (4) Eastern Shore Northeaster History. 30pp.

1989. 13 (1) Testimony on Greenhouse Effect. 30pp.

1989. 13 (2) Hurricane Camille. 30pp.

1989. 13 (3) Hurricane Hugo. 30pp.

1990. 14 (2) Scales of Temperature Variation. 30pp.

1990. 14 (3) Climate of Saudi Arabia. 30pp.

THE SOUTHEASTERN CLIMATE REVIEW

The Southeastern Climate Review is a technical and public service publication of the Southeast Regional Climate Center. Circulation is approximately 4,500.

1989. 1 (1) Background on Climatic Change. 30pp.

1989. 1 (2) Hurricane Camille. 30pp.

1990. 1 (3) Hurricane Hugo. 30pp.

1990. 1 (4) Severe Cold Outbreaks. 30pp.

1990. 2 (1) Drought Preparedness. 30pp/

FINANCIAL SUPPORT (OVER \$15,000)

1981-1985. United States Department of Agriculture, Forest Service. Prediction models for Southern Pine Beetle Outbreaks. \$133,000.

1981-1982. United States Department of Agriculture, Economics Research Service. Statistical-

~~Dynamic Models for Virginia Corn and Soybean Yields. \$25,000.~~

~~1981-1986. United States Department of Commerce, National Oceanic and Atmospheric Administration Sea Grant Program. High Resolution Weather Forecasts for Chesapeake Bay and Estuarine Virginia. \$84,000.~~

1983-1985. National Aeronautic and Space Administration. Sea Breeze-Induced Mesoscale Systems and Severe Weather. \$26,000.

1985-1986. United States Department of Agriculture, Forest Service. Historical fluctuations of Gypsy Moth Populations and Climate. \$18,000.

1986-1987. National Oceanic and Atmospheric Administration. Objective Characterization of the Relationship between Seasonal Wind Regimes and the Recruitment of Croaker Flounder. \$41,000

1986-1988. Commonwealth of Virginia, State Air Pollution Control Board. Origin and Destination of Pollutant-bearing Airstreams Entering and Exiting the Commonwealth of Virginia. \$140,000.

1989-1990 Southeastern Regional Climate Center. Research Publication for the Southeastern Climate Center. \$76,000

1989-1990. Jet Stream Alterations Induced by Anthropogenerated Sulfur Emissions. Cyprus Minerals Company. \$40,000

LAST UPDATE OF RESUME: December 21, 1990

Robert Balling, Arizona State University

more avail until Friday

Andrew R. Solow
Marine Policy Center
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
(508) 548-1400

Experience:

1987-	Statistician Marine Policy Center Woods Hole Oceanographic Institution
1985-1987	Fellow Marine Policy Center Woods Hole Oceanographic Institution

Education:

1986	PhD, Geostatistics Stanford University
1981	MSc, Geomathematics Stanford University
1977	BA, Economics Harvard University

Honors:

Magna cum laude with highest distinction in Economics,
Harvard University

Phi Beta Kappa, Harvard University

Penzance Independent Study Award, Woods Hole Oceanographic
Institution

President's Award, International Association for
Mathematical Geology

Memberships:

American Statistical Association

Climate Trends Panel, National Climate Program Office

Scientific Working Group, Intergovernmental Panel on
Climate Change

Research interests:

spatial statistics, stochastic modelling, Bayesian
methods, environmental statistics, animal behavior

Publications:

Solow, A.R. 1985. Bootstrapping correlated data. Mathematical Geology, 17, 769-775.

Solow, A.R. 1986. Mapping by simple indicator kriging. Mathematical Geology, 18, 335-352.

Solow, A.R. and Gorelick, S.M. 1986. Estimating monthly streamflow values by cokriging. Mathematical Geology, 18, 785-810.

Solow, A.R. 1987. The application of eigenanalysis to tide-gauge records of relative sea level. Continental Shelf Research, 7, 629-641.

Solow, A.R. 1987. Testing for climate change: An application of the two-phase regression model. Journal of Climate and Applied Meteorology, 26, 1401-1405.

Solow, A.R. 1988. Detecting changes through time in the variance of a long-term hemispheric temperature record: An application of robust locally weighted regression. Journal of Climate, 1, 290-296.

Solow, A.R. 1988. A Bayesian approach to statistical inference about climate change. Journal of Climate, 1, 512-521. ✓

Solow, A.R. and Broadus, J.M. 1988. A simple model of overforecasting. Monthly Weather Review, 116, 1371-1373.

Solow, A.R., Bullister, J.L., and Nevison, C. 1988. An application of circular-linear correlation analysis to the relationship between Freon concentration and wind direction in Woods Hole, Massachusetts. Environmental Monitoring and Assessment, 10, 219-228.

Solow, A.R. 1989. Statistical modeling of storm counts. Journal of Climate, 2, 131-136.

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Gornitz, V. and Solow, A.R. 1989. Observations of long-term tide-gauge records for indications of accelerated sea level rise. Proceedings of the Department of Energy Workshop on Climatic Change, to appear.

Solow, A.R. 1989. Reconstructing a partially-observed record of tropical cyclone counts. Journal of Climate, 2, 1253-1257. ✓

Solow, A.R. and Broadus, J.M. 1989. On the detection of greenhouse warming. Climatic Change, 14, 449-453.

- Solow, A.R. 1989. Bootstrapping a sparsely sampled point pattern. Ecology, 70, 379-382.
- Solow, A.R. 1989. A randomization test for independence of animal locations. Ecology, 70, 1546-1549.
- Solow, A.R. 1989. On assessing dry probabilities in offshore oil and gas exploration: An application of Bayes Theorem. In Quantitative Analysis of Mineral and Energy Resources (C.F. Chung, ed.)
- Solow, A.R. and Broadus, J.M. 1989. Loss functions in estimating offshore oil resources. Resources and Energy, 11, 81-92.
- Solow, A.R. and Tyack, P. 1989. Inhomogeneity and apparent organization in animal behavior. Biometrics, 46, 837-840.
- Solow, A.R. 1989. A counter-intuitive result for mixture random fields. Mathematical Geology, 21, 379-382.
- Solow, A.R. 1989. Detecting climate change. Report of the World Meteorological Organization, to appear.
- Solow, A.R. 1990. Discriminating between models: An application to relative sea level at Brest. Journal of Climate, 3, 792-796.
- Solow, A.R. and Nicholls, N. 1990. On the relationship between the Southern Oscillation and the tropical cyclone frequency in the Australian region. Journal of Climate, 3, 1097-1101.
- Solow, A.R. 1990. Testing for density dependence: A cautionary note. Oecologia, 83, 47-49.
- Solow, A.R. 1990. A note on geostatistical cross-validation. Mathematical Geology, 22, 637-639.
- Solow, A.R. 1990. Nonparametric analysis of point process data: The freezing history of Lake Konstanz. Journal of Climate, 4, 116-119. ✓
- Solow, A.R. 1990. Exploratory modelling of explosive volcanism in the Northern Hemisphere: 1851-1985. Journal of the American Statistical Association, 86, 49-54. ✓
- Solow, A.R. and Smith, W. 1990. Detecting cluster in a heterogeneous community sampled by quadrats. Biometrics, 47, 311-318.
- Solow, A.R. 1990. Estimating multivariate normal orthant probabilities. Journal of Statistical Computation and Simulation, 37, 225-229.
- Solow, A.R. 1990. A randomization test for discriminant analysis. Ecology, 71, 2379-2381.

Solow, A.R. and Steele, J.H. 1990. On sample size, statistical power, and the detection of density dependence. Journal of Animal Ecology, 59, 1073-1076.

Solow, A.R., Tyack, P., and Sayigh, L. 1990. The statistical analysis of whistle exchanges in dolphins. Animal Behaviour, submitted. ✓

Solow, A.R. 1990. Assessing model fit in non-stationary Poisson processes. Applied Stochastic Models and Data Analysis, submitted.

Solow, A.R. 1990. A note on the statistical properties of animal movements. Journal of Mathematical Biology, 29, 189-193.

Solow, A.R. and Gallager, S.M. 1990. Capture efficiency in suspension feeding: An application of nonparametric binary regression. Marine Biology, 107, 341-344.

Solow, A.R. and Smith, W. 1990. A conditional test of independence of Markov chains. Biometrics, submitted.

Solow, A.R. 1990. Is there a global warming problem? Proceedings of the MIT Conference on Global Warming, to appear.

Haney, J.C. and Solow, A.R. 1990. Analyzing quantitative relationships between seabirds and marine resource patches. Current Ornithology, to appear.

Solow, A.R. and Broadus, J.M. 1990. Decision-making and the value of information under uncertainty. Proceedings of the WIDER Conference on the Environment and Economic Development, to appear.

Solow, A.R., Polasky, S., and Broadus, J.M. 1991. On the calculus of biological diversity. Journal of Environmental Economics and Management, submitted.

Solow, A.R. 1991. On the equivalence of two common tests for density dependence. Journal of Functional Ecology, submitted.

Solow, A.R. 1991. The use of multidimensional scaling in the analysis of genetic distance data. Systematic Zoology, submitted.

Hugh Ellsaesser, Lawrence Livermore

waiting for ✓

GLOBAL ENVIRONMENTAL CRISES:



Science or Politics?

A Cato Institute Conference
June 5-6, 1991

The Capital Hilton Hotel
16th and K Streets, N.W.
Washington, D.C.

"The notion that global warming is a fact and will be catastrophic is drilled into people to the point where it seems surprising that anyone would question it, and yet, underlying it is very little evidence at all. Nonetheless, there are statements made of such overt unrealism that I feel embarrassed. I feel it discredits science. I think problems will arise when one will need to depend on scientific judgment, and by ruining our credibility now you leave society with a resource of some importance diminished."

—Richard S. Lindzen



Robert H. Nelson
Author



Patrick J. Michaels
University of Virginia



Richard L. Stroup
Montana State University



Robert W. Brocksen
Brocksen and Brand, Inc.



Richard S. Lindzen
Massachusetts Institute
of Technology



Wilbur A. Steger
CONSAD Research
Corporation



Robert C. Balling, Jr.
Arizona State University



Edward C. Krug
Committee for a
Constructive Tomorrow



Fred L. Smith, Jr.
Competitive Enterprise
Institute



Donald H. Stedman
University of Denver



Dennis T. Avery
Center for Global Food
Issues, Hudson Institute



S. Fred Singer
Washington Institute for
Values in Public Policy

WEDNESDAY, JUNE 5

REGISTRATION

8:00 - 9:00 a.m.

PANEL I

9:00 - 10:30 a.m.

10:45 a.m. - 12:30 p.m.

LUNCHEON

12:45 - 2:15 p.m.

PANEL II

2:30 - 3:30 p.m.

PANEL III

3:45 - 5:15 p.m.

RECEPTION

5:30 - 6:30 p.m.

PANEL IV

9:00 - 10:30 a.m.

10:45 a.m. - 12:15 p.m.

LUNCHEON

12:30 - 2:00 p.m.

DEBATE

2:15 - 4:15 p.m.

Congressional Room

GLOBAL WARMING: CATASTROPHIC? MANAGEABLE CHANGE? BENEFICIAL?

"The Political Science of Global Warming"

Patrick J. Michaels, University of Virginia

"Interpreting the Global Temperature Effect"

Robert C. Balling, Jr., Arizona State University

"Will Rising Atmospheric CO₂ Increase Carbon Accumulation in Terrestrial Ecosystems?"

Bert G. Drake, Smithsonian Environmental Research Center

"Critical Issues in Climate Forecasting"

Richard S. Lindzen, Massachusetts Institute of Technology

"CO₂ Emissions Limits: An Economic Cost Analysis for the World"

W. David Montgomery, Charles River Associates

"Global Warming: Unacceptable Climate Change"

*Daniel A. Lashof, * Natural Resources Defense Council*

"The Detection of Greenhouse Warming"

Andrew Solow, Marine Policy Center, Woods Hole Oceanographic Institution

THE JUDEO-CHRISTIAN ROOTS OF ECOTHEOLOGY

Robert H. Nelson, author of Reaching for Heaven on Earth

STRATOSPHERIC OZONE THINNING

"The Flaws in the Stratospheric Ozone Thinning Hypothesis"

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"The Holes in the Ozone Hole"

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speaker to be announced

"A European View of Sustainable Development"

*Alain Madelin, * Institut Euro 92*

Federal Room

THURSDAY, JUNE 6

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J. Laurence Kulp, Consultant, Environmental and Energy Affairs

"Acid Rain, Forests, and Fish"

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Robert W. Brocksen, Brocksen and Brand, Inc.

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"Are the Clean Air Act and Economic Competitiveness Compatible?"

Wilbur A. Steger, CONSAD Research Corporation

HOW BAD SCIENCE BECOMES PUBLIC POLICY

Fred L. Smith, Jr., Competitive Enterprise Institute

RESOLVED: PRUDENT PUBLIC POLICY DECISIONS TO ENSURE SUSTAINED ECONOMIC GROWTH REQUIRE ACTION TO REDUCE THE RISKS OF RAPID CLIMATE CHANGE DURING THE NEXT DECADE

Patrick J. Michaels, University of Virginia vs. Irving M. Mintzer Center for Global Change*

**speaker not confirmed*

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The only problem with those scenarios of catastrophe is that they may not be true. Even if they are, the economic costs alone of the proposed "cures" may exceed the costs of the threats. Many may find it surprising that respected scientists challenge all of the media-hyped environmental ills. Certainly policymakers and the public are almost totally unaware of the scientific controversy. Concern about global warming, for example, has become a part of the American psyche—despite scientific uncertainty.

Congressional committees rarely seek the views of the dissenting scientists. National legislation and even international treaties proceed as if scientific truth were irrelevant. A "politically correct" scientific view, which supports a "need" to force social change and to transform Western society, now dominates the policy debate.

Environmentalism's traditional values have been abandoned. The principle that the polluter should pay has been replaced by the cynical principle that those with the deepest pockets should pay. No longer should we "think globally, act locally"; that invites public derision. Perhaps most disturbing, even leading scientists quoted in *Science* magazine recently suggested that we have become dangerously addicted to the pursuit of science rather than the development of public policy. Those quoted in the *Science* story criticized the National Acid Precipitation Assessment Program's scientists for too diligently attempting to discover and understand the causes and effects of acid precipitation and warned against overemphasizing the role of science in reaching solutions to the even more complex issue of global climate change.

As the major United Nations World Conference on Environment and Development scheduled for Rio de Janeiro in June 1992 approaches, we are seemingly marching toward a new world order of population control, economic planning, and "sustainable development." The economic, societal, and personal consequences of such changes have been ignored.

Instead of accepting more regulation and possibly jeopardizing our common future, Cato is bringing together those scientists and policy analysts who offer alternative perspectives on environmental crises in the interests of rational and humane decisionmaking. In the tradition of public policy debate we have also invited respected spokespersons for the conventional paradigm to ensure a balanced debate on the crucial issues that are shaping our future.

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GUEST ROOM RESERVATION REQUEST

Name _____ Address _____ City _____ State _____ Zip _____

Reservations received after June 1, 1991, subject to availability. Rooms will be held until 6:00 p.m. on the date of arrival unless we are otherwise advised. Please mail directly to the Capital Hilton.

Arrival Date _____ Hour _____ A.M. P.M.
Departure Date _____ Hour _____ A.M. P.M.

Room Rate: \$140 single, \$160 double.
Credit Card (MasterCard or VISA only) _____ Exp. Date _____

Account # _____
Signature _____

The Capital Hilton
16th and K Streets N.W., Washington D.C. 20036
Attn: Reservations
(202) 393-1000 Fax (202) 393-7992

GLOBAL ENVIRONMENTAL CRISES
Cato Institute, June 5-6, 1991

GLOBAL ENVIRONMENTAL CRISES

CONFERENCE REGISTRATION

Registration Fee (includes all sessions and luncheons)

By June 1	After June 1
\$250	\$300
\$100	\$150

☐ Individual and corporate
☐ Academic, nonprofit, and government
☐ Enclosed is a check payable to the Cato Institute for \$ _____
for _____ registration(s). ☐ Bill my ☐ VISA ☐ MasterCard

Account # _____
Exp. Date _____ Signature _____

Name _____
Affiliation _____ Phone () _____

Address _____
City _____ State _____ Zip _____

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A Cato Institute Conference
June 5-6, 1991

Science or Politics?



GLOBAL
ENVIRONMENTAL
CRISES:

Cato Institute
224 Second Street, S.E.
Washington, D.C. 20003

"A system providing each successive generation better health, a cleaner environment and more real income is practicing sustainable development. Market economies, employing technological advances and pushed by the rising demand for environmental quality generated by rising incomes, have delivered these things. Economies where the government controls the means of production have seldom delivered sustainable development. It would be ironic if market economies were steered into collectivism in search of what collective systems of control cannot, by their very nature, deliver."

—Richard L. Stroup

"The conventional wisdom among scientists, environmentalists, and politicians has blamed acid rain for the acidification of lakes and the depletion of game fisheries in the Adirondacks. Yet recent research suggests that acid rain has little or nothing to do with these problems. Fossil records in lake sediments reveal that many lakes that are acidic today have been highly acidic for centuries, except for several decades in the late 19th century and early 20th century when they were unnaturally alkaline."

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THE WHITE HOUSE
WASHINGTON

DATE: May 15, 1991

TO: Governor Sununu

FROM: ANDY CARD

Have you seen this?

AC HAS SEEN

**EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506**

Date: May 13, 1991

TO: Andy Card

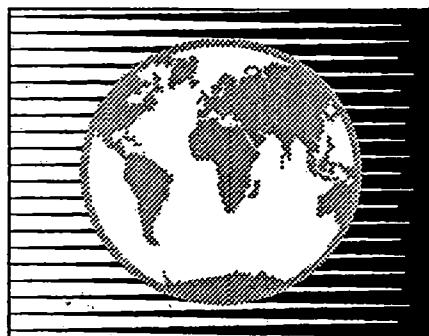
**FROM: KENNETH P. YALE
Chief of Staff**

FYI

Last month Dr. Bromley sent materials to the Governor, at his request, on the matter of scientists who were not supporting the notion that global warming is occurring.

Attached is a brochure on a seminar that is intended to provide a forum for such scientists, and like minded consultants. I understand that the program also includes persons who do believe in global warming -- to keep it somewhat balanced.

GLOBAL ENVIRONMENTAL CRISES:



Science or Politics?

**A Cato Institute Conference
June 5-6, 1991**

**The Capital Hilton Hotel
16th and K Streets, N.W.
Washington, D.C.**

“The notion that global warming is a fact and will be catastrophic is drilled into people to the point where it seems surprising that anyone would question it, and yet, underlying it is very little evidence at all. Nonetheless, there are statements made of such overt unrealism that I feel embarrassed. I feel it discredits science. I think problems will arise when one will need to depend on scientific judgment, and by ruining our credibility now you leave society with a resource of some importance diminished.”

—Richard S. Lindzen

Robert H. Nelson
Author

Patrick J. Michaels
University of Virginia

Richard L. Stroup
Montana State University

Robert W. Brocksen
Brocksen and Brand, Inc.

Richard S. Lindzen
Massachusetts Institute
of Technology

Wilbur A. Steger
CONSAD Research
Corporation

Robert C. Balling, Jr.
Arizona State University

Edward C. Krug
Committee for a
Constructive Tomorrow

Fred L. Smith, Jr.
Competitive Enterprise
Institute

Donald H. Stedman
University of Denver

Dennis T. Avery
Center for Global Food
Issues, Hudson Institute

S. Fred Singer
Washington Institute for
Values in Public Policy

CONFERENCE SCHEDULE

WEDNESDAY, JUNE 5

REGISTRATION

8:00 - 9:00 a.m.

PANEL I

9:00 - 10:30 a.m.

10:45 a.m. - 12:30 p.m.

LUNCHEON

12:45 - 2:15 p.m.

PANEL II

2:30 - 3:30 p.m.

PANEL III

3:45 - 5:15 p.m.

RECEPTION

5:30 - 6:30 p.m.

PANEL IV

9:00 - 10:30 a.m.

10:45 a.m. - 12:15 p.m.

LUNCHEON

12:30 - 2:00 p.m.

DEBATE

2:15 - 4:15 p.m.

Congressional Room

GLOBAL WARMING: CATASTROPHIC? MANAGEABLE CHANGE? BENEFICIAL?

"The Political Science of Global Warming"

Patrick J. Michaels, University of Virginia

"Interpreting the Global Temperature Effect"

Robert C. Balling, Jr., Arizona State University

"Will Rising Atmospheric CO₂ Increase Carbon Accumulation in Terrestrial Ecosystems?"

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Account # _____
Signature _____

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The Capital Hilton
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Attn: Reservations
(202) 393-1000 Fax (202) 393-7992

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By June 1 After June 1

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\$100 \$150

☐ Individual and corporate

☐ Academic, nonprofit, and government

☐ Enclosed is a check payable to the Cato Institute for \$ _____

for _____ registration(s). ☐ Bill my ☐ VISA ☐ MasterCard

Account # _____

Exp. Date _____ Signature _____

Name _____

Affiliation _____

Address _____

City _____

State _____

Zip _____

Phone () _____

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THE WHITE HOUSE
WASHINGTON

THE CHIEF of STAFF
has seen

May 23, 1991

MEMORANDUM TO JOHN H. SUNUNU

FROM: D. ALLAN BROMLEY *Alan*
SUBJECT: ALTERNATIVE PERSPECTIVES ON GLOBAL WARMING

Enclosed herewith is a memorandum prepared by Dr. Maynard of my staff concerning the matter we discussed recently.

We have suggested 5 persons whom we believe could provide the best overview of global warming from the viewpoints featured in the Cato Symposium and have tentatively booked time on June 5 and June 6 when all will be here in Washington at the symposium.

We have not been able to obtain biographical data on Balling or Ellsaesev but will provide them as soon as possible.

The listed participants in the symposium provide a much greater pool from which we could draw and you may wish to add or replace persons on our suggested list.

If either of the suggested times is possible within your calendar then we will proceed to make the necessary arrangements. Unfortunately, I am committed to commencement talks on both June 5 and 6 but Dr. Maynard and Dr. Ratchford will take care of all details.

Please let me know how you would prefer that the participants be invited (by you or by me) and what press coverage (if any) you would wish.

Enclosure