

Originally Processed With FOIA(s):
2017-0310-F

FOIA Number:
2017-0310-F

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OA/ID Number: 45131
Folder ID Number: 45131-005

Folder Title:
Global Climate Change [3][2]

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Doc. No. / Type	Subject/Title	Date	Restriction	Classification
01. Resume	John W. Martin, Jr [FOIA Exemptions Redacted] (1 pp.)	n.d.	(b)(6)	
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Collection:

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WHORM Cat.:
File Location: Global Climate Change [3][2]

Pinksheet Number: ES797
OA/ID Number: 45131-005
Date Closed: 2/7/2018
FOIA/Sys Case #: 2017-0310-F
Re-review Case #:
P-2/P-5 Review Case #:



U.S. Department of Justice

Environment and Natural Resources Division

Office of the Assistant Attorney General

Washington, D.C. 20530

August 14, 1991

To: Jeff Holmstead
From: Jonathan Wiener *JW*
Subject: Speech by Mr. Major on the Global Environment

UK Prime Minister John Major's July 8 speech on the global environment was reported by the news media to be an attack on U.S. climate policy. Yet the speech contains some elements worth highlighting that may be of use in further conversations with the British and others.

1. Targets. The statement of the UK CO2 target (page 1, bottom) seems no different than its formulation a year ago -- and still the UK has not explained what concrete steps it will take to achieve it. The reference to US CO2 emissions (page 2, paragraph 5) is quite short and is almost a passing reference.

2. Comprehensive approach. This focus on CO2 alone, rather than a comprehensive approach, is odd. Earlier this spring the UK had quietly floated a draft of a "phased comprehensive approach" which, while inadequately comprehensive, moved in the right direction. Indeed, later in the July 8 speech Major makes a proud claim for "integrated pollution control" (page 5, last two paragraphs), a concept quite similar to our "comprehensive approach." He says Britain has taken "integrated pollution control" "further, faster than anyone else." He refers to the "integrity and indivisibility" of the environment and the need to manage air, land and water emissions in a unified manner, just the historical example we cite for addressing all greenhouse gases, sources and sinks together.

We could emphasize our agreement with the "integrated" approach to environmental policy, and remind the UK of our similar advocacy of the comprehensive approach to climate change. We could put it to the UK that the CO2-only approach to the climate debate is incompatible with the "integrated" approach of which they are so proud.

3. Market-based policies. Major's speech also lionizes market-based approaches to environmental policy (page 6). Here again we are on common ground, in the climate context and in other environmental policy areas.

NOT FOR PUBLICATION, BROADCAST OR USE ON CLUB TAPES BEFORE
09.35 HOURS BST ON MONDAY 8 JULY 1991. PLEASE CHECK AGAINST
DELIVERY

TEXT OF A SPEECH
MADE BY THE PRIME MINISTER
THE RT HON JOHN MAJOR
ON THE GLOBAL ENVIRONMENT
AT THE SUNDAY TIMES ENVIRONMENT EXHIBITION
AT OLYMPIA
ON
MONDAY 8 JULY 1991

PRESS OFFICE
PRIME MINISTER'S OFFICE
10 DOWNING STREET
LONDON
SW1A 2AA

PLEASE CHECK AGAINST DELIVERY

THE GLOBAL ENVIRONMENT

I should like to begin by congratulating the Sunday Times on its sense of timing - as crucial for a newspaper, as for politicians. We are in a period of intense international activity on the environment. The past few weeks have seen negotiations on climate change, biodiversity and Antarctica. Next month will see further preparations for the UN Conference on Environment and Development. And in a few days, the leaders of the G7 countries will gather in England for our annual summit, when the environment will feature strongly on our agenda. So I welcome this chance to set out where Britain stands in advance of these further discussions. This conference could not be more timely.

A few years ago, it would have been unthinkable for hard headed world leaders to debate the environment. Not any more. A global, environmental vision is no longer a luxury for idealistic dreamers. It has become an essential compass to guide our society. The reason is very simple. The scale of human activity is now so great that it affects the whole world environment. We are realising that what unites us is greater than what divides us. In this respect, I was delighted with President Bush's announcement last week that the United States would, after all, join the other members of the Antarctic Treaty in signing the Environment Protocol.

Your theme for the Conference is apt: "The Global Environment". That is the essence. We must be global. We cannot wrap the environment up into neat, national parcels. We cannot say this is 'mine', and that is 'yours'. What happens in Darlington or Detroit today may affect Dakhla or Djibouti tomorrow - and vice versa. We can no more protect our planet on our own than we can ensure our security, or develop our economy, on our own.

No problem shows this more clearly than that of global warming. I think it wrong to call it the greenhouse effect. I dislike the term. That image is far too cosy, far too domestic, far too complacent. Begonias and petunias it is not. The threat of global warming is real. The spread of deserts. Changed weather patterns, with potentially more storms and hurricanes. Perhaps more flooding of low lying areas. Possibly the disappearance of some island states.

Of course more research is needed to increase our understanding of the problem. But research cannot excuse inaction - the threat is too serious. Without panic, we must start now to make our dispositions for tackling this threat as the information about it improves. The United Kingdom has committed itself to act. We have said that, if others do their part, we shall return emissions of CO₂ to 1990 levels by 2005. We shall monitor our action to achieve this target and, if possible, improve on it. But it has to be a shared venture to be effective.

This desire for a common resolve is not simply idealism. It is enlightened, mutual self interest. No 'cordon sanitaire' protects any country from climate change. True, we in the industrialised countries can build defences against rising sea levels. We can construct desalination plants. We can instal sophisticated irrigation schemes if our land starts to dry out. Many other countries cannot afford these things. But is their plight theirs alone? I think not. Quite apart from the moral imperative to help less fortunate nations, it is in the interest of the industrial world to do so. As countries become poorer, so world trade diminishes. Instability grows. The threat of regional unrest becomes more real.

We in Britain have set out the first set of measures to limit our CO² emissions, in last year's White Paper on the Environment. In the Autumn we shall publish a Report showing how our efforts are being put into practice. Our initial measures concentrate on energy efficiency, on developing renewable energy sources, on transport, and on forestry. These are measures which will also bring a worthwhile economic pay-off to the country, to business and to ordinary people.

Energy efficiency in particular is an area where we in Britain could do more. We should do more. For our part, we in Government will continue to examine our existing efforts to encourage more efficient use of energy. We will improve and augment these as necessary.

All these measures make good sense, and are cost effective. Other measures will involve costs. That is unavoidable. Here too we have said that, if other leading countries do their part, we will not shirk more difficult options. The price will need to be balanced against the perceived level of threat.

But action by this country alone will not even dent the problem. We produce only 3 per cent of the world's CO₂. So we are working with our Community partners to develop a wider European strategy. But even the Community accounts for only 13 per cent of global CO₂ emissions. The United States accounts for 23 per cent. The world looks to them for decisive leadership on this issue, as on others.

Nor is that enough. The USSR and Eastern Europe must make real efforts to control their greenhouse gases. And we must encourage and assist the so-called Third World to develop in an energy efficient way. I say "so called", because in environmental matters especially, there is no Third World. We have only one world. And China and India are major industrial nations by any standard. It is in their national interests to develop their energy efficiency. It saves their resources, and global warming will be felt at least as keenly in the non-industrialised countries as here. China has recently indicated its intention to join the Montreal Convention to protect the ozone layer. I hope China will be equally positive in tackling, with us, the problems of climate change.

We accept that the industrialised countries will have to give a strong lead as well as an example. Britain and the rest of the European Community are doing so. We must continue our efforts to ensure that all of the world's leading economies pull

together.

Global warming is not the only challenge to our sense of interdependence. Take destruction of tropical forests. Brazil's loss, or Malaysia's loss, are our loss too. We are destroying the world's lungs. And we are burning our knowledge bank. We voyage into outer space, yet much of the natural world on our doorstep remains unknown. Thousands of plant species have edible parts. Yet we only use a few dozen.

We may be destroying plants that could help us to adapt to environmental change. We are losing species faster than we can catalogue them. It is as if the owner of a great gallery of pictures were to slash or destroy a Renoir or a Rembrandt every day. Such destruction betrays our future.

And that is why we must help developing countries manage their forests, for their benefit, for our benefit. In just over two years Britain has doubled the number of forest projects we finance for developing countries. I welcome the willingness of Brazil, under President Collor, to collaborate with other countries on the Amazon rainforest. Britain was the first country to sign a special agreement with Brazil on environmental cooperation. The key will be for Brazil to design the right policies, involving local people. We look forward to working further with them on their ideas.

We must also learn to live within our environmental means. That is the simple message of sustainable development. If we live beyond our means, future generations pay for our present extravagance. The living standards and mobility that we in industrial countries expect, all have an environmental price. We can no longer consume without reckoning the cost.

I was asked, recently, to contribute one of my childhood books to an auction for a children's charity. I sent a Bunter book. And it occurred to me that we have been too much like Bunter. We have happily consumed without reckoning the cost. We have been waiting for a postal order to turn up.

But not any more. We are no longer waiting. We are doing. And we should not underestimate our capabilities.

The Stockholm Conference brought these matters to our attention, almost twenty years ago. Then, there was not much national or international law on the environment. The public knew little about it. The environmental lobby was weak and regarded with suspicion - they were parodied as beards and beads. Politicians paid only fragmentary attention. The time spans involved were too long. Sometimes 24 hours can be a long time in politics. The ability to look much beyond the next election is not something for which we politicians are renowned!

The prospect has changed beyond all recognition. Today, there is a large body of environmental law. The public is alert to environmental abuse and quick to demand action. The environmental lobbies are large and influential. Politicians pay attention and, even, act.

In exactly eleven months time, there will be another global meeting on the environment. I hope to be there myself. I hope that national leaders from every country on earth will attend the United Nations Conference on the Environment and Development in Brazil. Fittingly, it has become known as the Earth Summit. There could be no greater sign of the serious attention which Governments accord the environment, than that it should be the occasion for the first ever meeting of all the world's leaders.

We have three main goals for the Conference:-

- * first, international agreements on tackling climate change, safeguarding tropical forests, maintaining biological diversity. These measures would represent an historic extension of the rule of law to the global commons;

- * second, an agreement to strengthen the international institutions responsible for the environment, in particular the United Nations Environment Programme in Nairobi; and to strengthen the arrangements for ensuring that the UN machinery takes account of environmental concerns.

- * third, more effective help for developing countries to take part in meeting the global environmental challenge. Britain has already committed £40 million, in addition to the existing aid programme, to the new Global Environment Facility of the United Nations and World Bank. And we are integrating environmental concerns into all bilateral and multi-lateral aid programmes.

At our meeting next week, I will be working with the other leaders of the major industrial countries to give added impetus to these aims.

Let me turn now to the national and the local scene - because we cannot sensibly talk about the environment globally, without considering the national and the local too. The environment embraces the street corner as well as the stratosphere.

It is government's task to provide leadership on the environment, to set a clear framework of expectations within which every one of us can best contribute to our common good. Leadership is what this Government has set out to provide.

We did this most emphatically with our White Paper - 'This Common Inheritance'. This was the first ever comprehensive statement of environmental policy by a British Government. Indeed, we are one of only a handful of Governments anywhere to have published such a document. It sets out 350 action points for Government. We put our money where our mouth was and announced a 33 per cent increase in expenditure on environmental protection and improvement last November - an extra £130 million.

The White Paper sets out the direction in which the nation must move. It also puts environmental concern at the heart of Government. Margaret Thatcher set up two Ministerial

Committees to consider environmental policies. One, which I now chair, lays down the overall strategy. The other, chaired by Michael Heseltine, keeps up the pressure to deliver the detailed policies in the White Paper. In addition each Government department now contains a 'Green Minister', responsible for that Department's environmental performance. Departments will now publish regular reports on their environmental stewardship and objectives.

The environment is no longer an optional, add-on, peel-off extra. It is no longer the easy option - the option which it's easy not to take. Our recent Green Paper on health policy, for example, includes a significant section on health and the environment. Keeping up the pressure is vital. We have already issued an interim report showing our progress on over one hundred of the White Paper's action points.

But I am announcing today that, in September, we will publish a report to mark the anniversary of the White Paper. It will take stock. It will indicate further ways forward. And I intend that this should be the first of a regular series of reports, accounting for the Government's stewardship of the environment. These will enable the nation to audit our progress towards our environmental objectives. The White Paper is a start, not a full stop. It is a foundation, on which we will build.

I can tell you today of one way in which we intend to do so. The Environmental Protection Act established Integrated Pollution Control - a new approach to the environment, which Britain has taken further, faster than anyone else. And we have created strong, new agencies to protect the environment. Her Majesty's Inspectorate of Pollution controls all the major emissions to air, land and water from the most polluting industrial processes. The National Rivers Authority protects and improves the water environment. These arrangements, with integrated pollution control, have given a keen cutting edge to our environmental efforts in this country.

But there is scope to achieve even better integration between the different agencies, as foreshadowed in last year's White Paper on the Environment. I can announce today that we plan to set up an Environment Agency. This will bring together Her Majesty's Inspectorate of Pollution, and related functions of the National Rivers Authority, to create a new agency for environmental protection and enhancement. It would have responsibilities for monitoring the state of air and water. It would make proposals to Government on standards. It would regulate emissions and discharges to achieve the standards set by Government. Again, as foreshadowed in the White Paper, we are also minded to give the new agency responsibility for regulating the handling and disposal of waste, which is currently under the combined supervision of local authorities and HMIP. It is right that the integrity and indivisibility of the environment should now be reflected in a unified agency. I am confident that this will be a significant step forward. We hope to issue a consultation document setting out our thinking more fully later in the year. But the new agency will not affect the current balance of responsibilities between the pollution enforcement agencies and the Health and Safety

Executive.

The Secretary of State for Scotland has also been giving consideration to the position in Scotland where the institutional framework is quite different. He will announce his proposals in due course.

Thus far, I have talked about action by Government. But much more than that is needed.

One of the most marked changes in the environmental debate over the last twenty years has been the changing view of the role of Government. Before, most people thought that Government action would 'green' the world. Now, people are as likely to see Governments as one of the main perpetrators of environmental problems. It is no accident that this perception has changed just when the failure of socialism to deliver either economic or environmental success has become so dramatically apparent..

The fact is that the success of market based economies is a necessary precondition for protecting the environment. Just look at the environmental disaster zones of Eastern Europe. The key to our planet's future lies in harnessing the great creative energies of the market place to a new task, not in some futile and self-defeating attempt to bind up this friendly Leviathan. That is why we announced last week a new Fund of £5 million, specifically directed to environmental work in Eastern Europe. It will help those countries to harness market forces and private sector skills to environmental improvement.

Britain is developing new, market-based policy instruments. Let me quote just three examples. First, tax differentials have massively boosted the sales of lead free petrol. Second, the measures in the last budget, to increase petrol duty and to change the tax treatment of company cars, continue to bring home to people the social and economic costs of motoring, and help to improve the relative attractiveness of public transport. Third, a new system of recycling credits will increase recycling and reduce waste. These are just three ways of helping the market work for the environment. As promised in the White Paper, we will continue to look for new ways to control pollution cost-effectively by working with the grain of the market, not against it.

For it is now clear that the principal task of delivering sustainable development will fall to business. I am immensely heartened by the way the business community has responded to this challenge. I am optimistic that we are on the way to forming that "Green Alliance between companies and governments" which Frances Cairncross envisages in her recent book called "Costing the Earth".

It is wrong to see modern business as the enemy of the environment. A recent study by Touche Ross shows that over $\frac{2}{3}$ of companies now have environmental strategies, compared to less than one-third just a year or so ago. These companies are building the environment into their calculations and into their success. Our leading firms, collectively, are now shaping the necessary new approaches to environmental management.

Excellent work has been done by the Business and Environment group. And the new Advisory Committee on Business and the Environment, which Michael Heseltine and Peter Lilley recently set up, is poised to make a big impact too.

Environmental concerns are not a drag on business. Commercial instincts could do as much, if not more, to advance the cause of the environment as Government regulation. Regulation must set a level playing field. It must set minimum standards and stimulate new, environmentally friendly technology. But business ingenuity must have maximum scope to find the best way of reaching the goal at least cost, both environmentally and economically.

One recent estimate put the size of the market for environmental goods and services, in the UK alone, at £140 billion over the next nine years. This is a sizeable business opportunity by any standards. Someone will seize these markets. British business must be in a position to get its share.

Nor is it always the case that higher standards involve higher prices. After initial development, a new and "greener" product may actually cost no more to produce. But these opportunities will only be available to those companies geared up to take them.

But, in the final analysis, the future rests not in the hands of Government, or of business, but in the hands of each one of us. It depends on our every day decisions - in our homes, at work, when we go shopping or do the garden. Companies, schools, churches, trades unions, women's organisations, must put the environment on their agendas. So, too, must each one of us, as consumers, employees, or parents. Quite simply, at the heart of our environmental problems are people. That is why I welcome the emergence of the green consumer. Last year over half the population made a consumer choice on environmental grounds. I know, too, of the strength of the green consumer from within my own family.

This government sets great store in giving back the power of choice to consumers - in housing, health, education and elsewhere. We must go on extending that power. The emergence of a green market place means that consumers can now exercise their power to choose in ways that can benefit the environment.

Retailers, and manufacturers, have not been slow to notice the enormous purchasing power this represents. It can be seen in the ranks of green products now to be found on any supermarket shelf in the country - tangible proof of how we can harness the power of the market place to our moral purposes.

But we are not only important as consumers. We also matter as citizens. No Government has done more to help the citizen help himself or herself to obtain a better environment.

We have opened the door to environmental information. Every individual, every group, will in future have access to the information they need in order to act as an environmental watchdog. That information is the citizen's right, and the

Active Citizen will use that right constructively.

Legislation passed last year gives the public new powers to take their council to court if it does not clean its public areas and keep them litter free. These powers are a citizen's right, and the Active Citizen will use that right constructively.

But as citizens we have obligations too. Obligations not to drop litter. Obligations to recycle our household waste where possible. Obligations to conserve energy. Obligations to help protect our common inheritance.

There is a Victorian picture, which many of you may know. It is called "The Last Day in the Old Home". The ancestral home has been sold up. The removal men are in the hall. The feckless father is toasting the future, while his wife weeps. His small son and heir stands at his knee, half excited, half bemused.

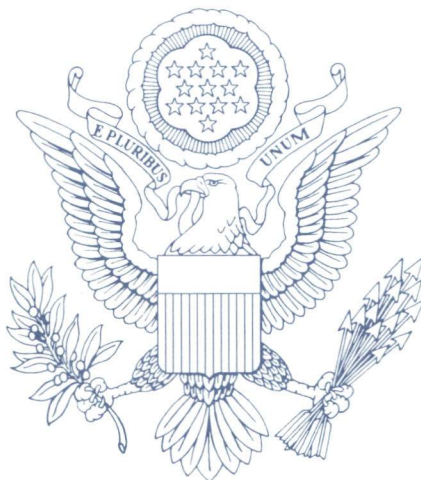
I do not want to be in the position of that father, squandering my children's global home and inheritance for my own immediate wants.

Nor, I am sure, do you.

Environmental issues touch all of us and every aspect of our lives. They touch our hopes for our children and our fears for the future. These are global challenges, which require global responses. But, they require local responses too. Each of us as individuals must do his or her part. I can promise you that we in Government will do ours.

Action on the Environment

U.S. Steps to Implement
Environmental Commitments
Made at the 1990 G-7 Summit



July 1991

Action on the Environment

U.S. Steps to Implement Environmental Commitments Made at the 1990 G-7 Summit

“One of our most important responsibilities is to pass on to future generations an environment whose health, beauty, and economic potential are not threatened. Environmental challenges such as climate change, ozone depletion, deforestation, marine pollution, and loss of biological diversity require closer and more effective international cooperation and concrete action. We as industrialized countries have an obligation to be leaders in meeting these challenges.”

*—Houston Economic Declaration
July 1990*

July 1991

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Summary of the Houston Summit Communique

Climate Change

- Negotiate, by 1992, a framework convention on climate change.
- Consider strategies and measures for common efforts to limit greenhouse gas emissions.
- Support scientific and economic research on climate change, on its impacts, and on potential responses of developed and developing countries.
- Give priority in R&D to energy efficiency, alternative energy sources, and other new technologies and methods which reduce greenhouse gas emissions. Ensure highest standards for health and environmental safety of nuclear power, so it may continue to be an energy source and reduce greenhouse gas emissions.

Ozone Protection

- Phase out the use of chlorofluorocarbons (CFCs) by 2000, extend coverage of the Montreal Protocol to other ozone depleting substances, and ratify the amended Protocol as soon as possible.

Forests

- Act to increase forests, protect existing ones, and recognize the sovereign rights of all countries to use their natural resources.
- Negotiate by 1992 a global forest convention to stimulate positive forest actions, and to address threats to the world's forests.
- Emphasize forest sustainability and conservation by supporting reform of the Tropical Forestry Action Plan (TFAP), the International Tropical Timber Organization (ITTO) action plan, and pilot forest management programs with the Government of Brazil.

Actions Taken by the United States

Climate Change

- Hosted 1st session of negotiations toward a multilateral framework convention on climate change. U. S. seeks completion of convention in time for signing by the 1992 U. N. Conference on Environment and Development.
- Established "America's Climate Change Strategy" and the National Energy Strategy (NES), which will *hold U. S. net greenhouse gas emissions at or below current levels through 2030.*
- Signed legislation to phase out CFC's altogether by the year 2000.
- Signed Clean Air Act to reduce emissions of VOC's, CO, SO₂, NO_x, and other pollutants.
- Won enactment of first phase of major tree planting program.
- Funded global change scientific and economic research at \$ 954 million in fiscal 1991. Requested a 24 percent increase in fiscal 1992 to \$1.2 billion.
- Proposed \$ 900 million in fiscal 1992 for research and development in energy efficiency, alternative fuels, vehicle batteries, and advanced electricity technologies.

Ozone Protection

- Signed amendments to the Clean Air Act which phase out ozone depleting compounds such as CFCs. Committed to phase out HCFCs, which are not included in the Protocol, by 2015.
- Enacted fee on U. S. CFC production which, in year ending June 1990, helped reduce production 23 percent *below* levels permitted by the Montreal Protocol.
- To date, the U.S. is the only G-7 country to provide its actual contribution for the Montreal Protocol Multilateral Fund for developing countries.

Forests

- Enacted the National Tree Trust Foundation and capitalized it at \$ 20 million.
- Secured funding of \$ 70 million in fiscal 1991 to begin national tree planting program. Proposed full funding beginning in fiscal 1992 to plant 1 billion trees per year.
- Signed Tongass Timber Reform Act to protect North America's largest temperate rain forest.
- Developed U. S. draft of Principles for a Global Forests Convention and Potential Actions to Implement Principles of a Global Forest Convention. U. S. seeks signing of a Convention at the 1992 United Nations Conference on Environment and Development.
- Proposed in fiscal 1992 to triple funding for the Tropical Forestry Initiative to provide technical assistance, training and support to developing countries, international, and nongovernmental organizations.
- Pushed for revision of TFAP and ITTO guidelines to make forest stewardship and sustainable management a main priority.

Summary of the Houston Summit Communique

Marine Pollution

- Develop a strategy to address land-based sources of pollution, avoid oil spills, and welcome the work of the International Maritime Organization in developing an international oil spills convention.
- Support cooperation in the conservation of living marine resources and call on all countries to respect international conservation regimes.

Resource Protection

- Expand cooperation to combat desertification and expand projects to conserve biological diversity;
- Protect the Antarctic.

Development and Financial Assistance

- Strengthen multilateral development bank programs to assist developing countries in their environmental efforts, including environmental assessments and action plans and promotion of energy efficiency.
- Use debt-for-nature swaps in protecting the environment.

Actions Taken by the United States

Marine Pollution

- Enacted Oil Pollution Act to require double hulls on new tankers, improve oil spill response capability, and increase liability of spillers.
- Led negotiations and signed an international convention on oil pollution preparedness and response.
- Postponed for at least ten years offshore oil and gas leasing in tracts comprising 99 percent of West Coast, the southwest coast of Florida, and the Georges Bank area off New England. Enacted Florida Keys National Marine Sanctuary.
- Began coordinated Coastal America initiative to protect coasts and marine living resources.
- Signed reauthorization of Coastal Zone Management Act and enacted Great Lakes Critical Programs Act. Proposed fiscal 1992 wastewater treatment funding at \$ 1.9 billion to accelerate secondary sewage treatment in several major coastal cities..

Resource Protection

- Signed most environmentally-sensitive farm bill ever, which establishes a wetlands reserve program to provide permanent protective easements for wetlands in agricultural areas.
- Increased acquisitions of protected wetlands habitat; and requested 48 percent increase for wetlands programs in fiscal 1992.
- Enacted legislation prohibiting indefinitely U. S. mineral resource exploration and development in Antarctica. Agreed to sign an environmental protection Protocol to the Antarctic Treaty, which is based on a U.S. initiative.
- Tripled the size of the Coastal Barrier Resource System to over 1.25 million acres.
- Submitted to Congress legislation to implement Basel Convention on transboundary movement of hazardous wastes.

Development and Financial Assistance

- Proposed Enterprise for the Americas with innovative environmental and debt-for-nature components.
- Endorsed the Global Environment Facility, pledging a 3-year contribution of up to \$ 150 million.
- Sought increased World Bank emphasis on environmental impact assessments and action plans, energy efficiency, and sustainable development.
- Assisted in opening a regional environmental center in Eastern Europe and expanded U. S.-Soviet environmental cooperation.

Summary of the Houston Summit Communique

Market-Oriented Approaches

- Involve the private sector, which has a key role in developing solutions to environmental problems.
- Support voluntary environmental labelling as a useful market mechanism which satisfies consumer demand and producer requirements and promotes market innovation.

Scientific Cooperation

- Expand cooperative scientific and economic research and analysis of the environment.
- Recognize the importance of coordinating and sharing the collection of satellite data and establishing an international data network.
- Encourage the OECD to accelerate its economic research work on environment and the economy, especially environmental indicators and market-oriented approaches to environmental objectives.

Actions Taken by the United States

Market-Oriented Approaches

- Established a trading system for utility sulphur dioxide emissions allowances under CAA to create strong financial incentives for energy conservation and technological innovation.
- Established the "33/50" Project for Voluntary Toxics Reductions that seeks emission reduction of pollution caused by 17 high-priority toxic chemicals—up to one half by 1995.
- Established the President's Commission on Environmental Quality for public-private partnerships in pollution prevention, conservation, education, and international cooperation.
- Helped create a private investment fund through the Overseas Private Investment Corporation for certain investments in developing countries emphasizing sensitive environmental management.

Scientific Cooperation

- Proposed funding in fiscal 1992 to create research institutes to address regional implications of global change in developing countries.
- Initiated the Earth Observing System (EOS) as a U. S.-Japanese-European effort for monitoring earth processes, managing data, and supporting analysis by researchers.
- Proposed global change scientific and economic research in fiscal 1992 at \$ 1.2 billion, a 24 percent increase, including substantial international scientific cooperative efforts.
- Proposed in fiscal 1992 to more than double funding for economic research relating to global change. Initiated, with OECD, informal technical discussions on economic studies relating to climate change.

Other Areas of U. S. Leadership

- *Trade:* Established a cooperative environmental action plan with Mexico and pledged environmental review of the potential North American Free Trade Agreement. Advocated stronger guarantees of intellectual property rights in global trade agreements, which would facilitate technology transfer to developing countries. Strongly supported work in both the OECD and the GATT to develop a multilateral consensus on the interrelationship of trade and environmental policies, including natural resource conservation policies.
- *Pollution prevention:* Enacted legislation to advance industrial prevention of air, water, and solid wastes. Awarded over 30 grants to state governments to boost pollution prevention programs. Integrated pollution prevention into overall technology development programs. Increased environmental enforcement to record-breaking levels.
- *Transportation:* Strengthened requirements and proposed increased grants for regional transportation planning to meet air quality goals. Proposed giving state and local governments greater flexibility to spend transportation funds on non-highway programs.

CLIMATE CHANGE

Framework Convention

In February 1991, the United States hosted the first session of U. N. negotiations toward a framework convention on climate change. Delegates from more than 100 countries established rules of procedure, guidelines, and working groups. The U. S. hopes to sign a convention by the June 1992 U. N. Conference on Environment and Development.

America's Strategy

President Bush developed and released in February 1991 *America's Climate Change Strategy: An Action Agenda*, a series of specific actions already planned or proposed by the U.S., which will hold U.S. net greenhouse gas emissions in the year 2000 to below 1987 levels. Specific actions include:

- Phasing out CFCs and other ozone depleting compounds, which are also greenhouse gases, more quickly than the amended Montreal Protocol requires (signed into law November 1990);
- Imposing a permanent ceiling on sulphur dioxide emissions at reduced levels and allowing emissions allowance trading and other flexibility in meeting the ceilings. Both utilities and consumers will have strong incentives to adopt energy saving measures that will lower greenhouse gas emissions (signed into law November 1990);
- Reducing air pollutants which are greenhouse gases or their precursors: volatile organic compounds, carbon monoxide, and nitrogen oxides (signed into law November 1990);
- Planting a billion trees a year in cities, towns, and rural areas across America and improving forest management (initiated fiscal year 1991);
- Increasing the use of energy efficient technologies and practices in homes and businesses and increasing the use of renewable and non-fossil fuels;
- Increasing funding for research and development of new energy technologies that conserve energy or do not cause greenhouse gas emissions;
- Regulatory controls on methane emissions from landfills (proposed rules promulgated May 1991).
- Increased research on climate change and energy efficiency. \$ 1.2 billion in global change research and more than \$ 900 million in spending on new energy technologies for efficiency and conservation are proposed in the President's fiscal year 1992 budget.

National Energy Strategy

In order both to reduce its dependence on unstable sources of energy and to reduce emissions of various pollutants, the U.S. Administration proposed to the Congress at the beginning of 1991 a new national energy strategy. The Strategy includes:

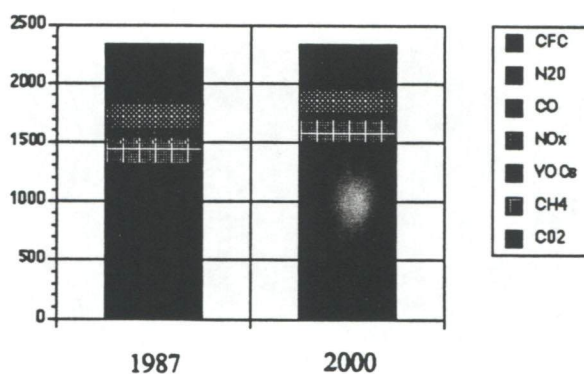
- Transportation energy efficiency measures: (1) accelerate scrappage of older cars, (2) permit increased tax-free employer subsidies for mass transit, (3) pursue research to develop new transportation technologies, including electric vehicles, high speed rail/mag lev trains, gas turbine engines, intelligent vehicle/highway systems;
- Electric energy efficiency measures: (1) increase Federal support for utility Integrated Resource Planning, (2) provide tax-free treatment for discounts on utility bills for energy conservation investments, (3) develop and implement energy efficiency standards for appliances, (4) require energy efficiency labeling for various products, including light bulbs;
- Building energy efficiency: (1) increase public housing energy efficiency, (2) devise and apply new building energy efficiency standards, (3) expand the use of mortgage financing incentives for enhanced residential energy efficiency, and (4) improving energy efficiency in Federal facilities;
- Increased use of alternative fuels: (1) remove caps on corporate average fuel economy (CAFE) credits for vehicles with alternative fuel capabilities, (2) expand alternative-fueled vehicles in Federal fleet, (3) require by 2000 that 90 % of new vehicles purchases for centrally fueled fleets must be capable of using alternative fuels;
- Increased supplies of fuels that generate less greenhouse gas emissions: (1) remove constraints to natural gas production, transmission, and use, (2) reduce constraints to more hydroelectric power from existing dams, (3) extend through 1992 the investment tax credit for solar and geothermal electric energy technologies, (4) continue research and development for photovoltaic, wind, solar thermal, biomass, and geothermal technologies, (5) expand the use of waste-to-energy facilities;

PROJECTED U.S. GREENHOUSE GAS EMISSIONS

(With Current Policy Commitments)

Based on IPCC CO₂ Baseline Estimate

Millions of metric tonnes carbon equivalents



SOURCE: U.S. EPA

- Support for nuclear power as a viable option: (1) improve licensing procedures, (2) develop standardized advanced light water reactor plant designs with improved safety and economic features, (3) prepare comprehensive solutions to the high-level waste management problem, (4) develop two types of advanced reactor technologies with passive safety features;
- Increased deployment of more efficient clean coal technologies.

Without these National Energy Strategy actions it is estimated that U. S. greenhouse gas emissions would increase by 40 percent over 1990 levels by 2030. If both the actions included in the Action Agenda and those included in the National Energy Strategy are implemented, total U. S. man-made greenhouse gases should not grow from today's level through 2030. This is a one-third reduction below the levels that would otherwise occur.

OZONE PROTECTION

The U. S. has long taken a leadership role in addressing the problem of stratospheric ozone depletion. In 1978, the U. S. banned the use of CFCs as propellants in spray can products. Most other countries continued to use CFCs as propellants.

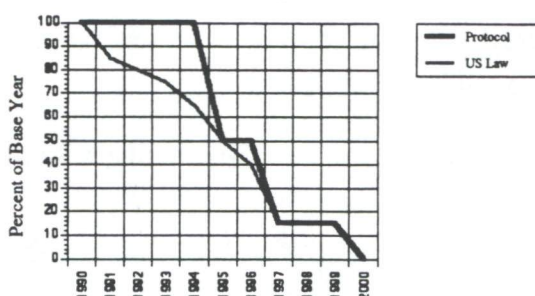
As early as 1987, the U. S. and all G-7 members supported a complete world-wide phase-out of CFCs, halons, and certain other ozone-depleting substances such as carbon tetrachloride and methyl chloroform. At the London Meeting of Parties to the Montreal Protocol in 1990, the Protocol was amended to achieve that objective.

CFC Phaseout

In November 1990, President Bush signed into law provisions in the Clean Air Act Amendments which will phase out U. S. production and consumption of ozone-depleting compounds more quickly than the amended Montreal Protocol provisions. Under the mandates of the Clean Air Act, the U.S. must reduce production below what is permitted by the Montreal Protocol by at least the following amounts:

- major CFCs - 19 %
- carbon tetrachloride - 13 %
- halons - 32 %
- methyl chloroform - 20 %
- other CFCs - 22 %

Phase-Out of Major CFCs



CFC Taxes

In addition to the more restrictive phase-out schedules required by the Clean Air Act, the U.S. has enacted a tax on ozone-depleting chemicals. The tax rates on each compound are its ozone-depleting potential (ODP) multiplied by \$ 1.37 per pound in 1990 and 1991, \$ 1.67 in 1992, \$ 2.65 in 1993 and 1994, and an increase of an additional \$ 0.45 in each year after 1994.

This tax has already helped to reduce U. S. CFC production in the 12-month period ending June 30, 1990 to 23 percent below the levels permitted by the Montreal Protocol and other U. S. law.

CFC Fund

The Montreal Protocol Multilateral Fund has been established as a means for assisting developing countries pay the incremental costs of eliminating ozone-depleting chemicals. The U. S. contribution will be 25 percent of the total \$ 160 to \$ 240 million fund. To date, the U.S. is the only G-7 country to provide its actual contribution for the Montreal Protocol Multilateral Fund for developing countries.

FORESTS

Tree Planting

The President proposed and signed into law in 1990 a bill creating a National Tree Trust Foundation, which will mobilize private efforts and resources to encourage Americans to plant and care for trees in cities and towns. The Foundation has been funded with a one-time seed-money appropriation of \$ 20 million.

The President has launched a National Tree Planting program, a long-range forest management improvement and reforestation initiative for private non-industrial forest lands in rural America. The goal of the program is to plant one billion trees per year for the next 20 years. In the fiscal 1991 budget \$ 70 million was appropriated to begin tree planting. The Presidents's 1992 budget proposed full funding of \$ 140 million to achieve the target level of planting one billion trees a year.

Tongass Forest

In November 1990, President Bush signed the Tongass Timber Reform Act which:

- Withdrew 1 million acres of temperate rain forest from logging and designated 296,000 of these acres as wilderness;
- Repealed a legislative requirement that 4.5 billion board feet of timber be harvested each decade.
- Required no-logging buffer zones along major salmon streams.

Global Forest Convention

The G-7 adopted at Houston the U.S. call to negotiate a global forest convention or agreement by 1992, indicating a commitment to responsible stewardship of the world's forests, promoting both sound economic growth and sound environmental policies.

To begin discussion of the key features of a forests convention, the U. S. drafted "Principles of a Global Forest Convention." Included are "General Principles" describing the nature and structure of a convention and "Specific Principles Relating to Particular Forest Concerns," suggesting areas which the convention should address in forest management and protection. Areas addressed are:

- *General Principles:* Global Stewardship; Global Participation; International Cooperation; Comprehensive Coverage; Flexible, Performance-Based Approach; Use of Market Mechanisms; Integration of Policies;

- *Specific Principles Relating to Particular Forest Concerns:* Sustainable Management; Conservation of Forest Diversity; Reforestation and Rehabilitation; Climate Change; Air Pollution; Indigenous Peoples and Established Local Communities; Fuelwood and Energy; Economics and Trade; Research and Inventory; Education and Training; Financial and Technical Assistance.

The U. S. also drafted a list of "Potential Actions to Implement Principles of a Global Forest Convention" for countries to consider in developing their national strategies or plans for forest protection and improvement. The U. S. believes these principles and actions can serve as the basis for discussion and negotiation leading to the signing of a forest convention at the 1992 U. N. Conference on Environment and Development.

Tropical Forestry Action Plan

The U. S. and others asked for a strengthening of the Tropical Forestry Action Plan (TFAP). Actions are under way to:

- Assess accomplishments, strengths and weaknesses to date, particularly the Plan's coordination and leadership; and
- Revise the TFAP guidelines to represent concerns expressed at the Houston Summit relating to wise stewardship and sustainable management.

Other Forest Initiatives

The U. S. and others proposed that the International Tropical Timber Organization develop guidelines for sustainable management of natural tropical forests. The U. S. took part in developing the guidelines published in December 1990 and continues to work toward implementation of standards for sustainable management.

The fiscal 1992 budget proposes funds for a Tropical Forestry Initiative, including the establishment of an International Institute of Tropical Forestry in Puerto Rico, to provide assistance to developing countries in managing, using and protecting tropical forest resources. The initiative includes:

- Cooperation in Central and South America in management of tropical forests, especially in sustainability of existing natural forests, and in rehabilitation of secondary forests;
- Expansion of forest mapping in cooperation with the Food and Agriculture Organization;
- Expansion of wildlife management efforts and surveys of migratory birds in the Western Hemisphere; and
- Expansion of training for developing countries in conjunction with local and regional initiatives.

With active U.S. participation, a proposal for a pilot project in the Brazilian Amazon has been prepared for consideration by the G-7.

MARINE POLLUTION

Oil Spill Bill

President Bush signed into law the Oil Pollution Act of 1990, a comprehensive measure which strengthens oil spill liability, compensation, response, and prevention. Major provisions are:

- establishing a phased-in requirement for double hulls on tankers;
- a \$ 1 billion fund to pay for cleanup of the environment;
- increased liability and penalties of oil spillers;
- better emergency planning and preparedness on the part of potential spillers and Federal, state and local governments;
- a clear Federal responsibility for directing the cleanup of oil spills;
- increased penalties for spills;
- increases standards for navigational safety, including new standards for crew licensing;
- increased research on oil pollution and on cleanup methods.

Also, pursuant to President Bush's proposal at the 1989 G-7 Summit in Paris, the U.S. and 79 other nations adopted in November 1990 an International Convention on Oil Pollution Preparedness, Response and Cooperation.

Moratorium on Offshore Drilling

In 1990, President Bush proposed a moratorium for at least ten years on offshore oil and gas leasing and development in several environmentally sensitive areas. He also required that more extensive environmental and resource analysis be completed for all tracts in the U.S. program. The moratorium will affect 99 percent of the California coast, all of the Washington and Oregon coast, the southwest coast of Florida, and the Georges Bank area off New England.

Coastal America

President Bush has developed a comprehensive initiative, Coastal America — A Partnership For Action, to address environmental problems along the U. S. shoreline, by close cooperation among Federal, state and local agencies, the private sector and citizens. Three widespread problems will be addressed:

- Loss and degradation of habitat;
- Pollution from non-point sources, such as runoff from urban and agricultural lands;
- Contaminated sediments.

The strategy for action will include:

- at the national level: the development of biologically-based criteria to measure ecosystem health, a nationwide approach for tracking coastal management actions to provide for accountability, and a national focus on public education and outreach;
- at the level of seven geographic regions: the Coastal America partners will flexibly address specific coastal problems of their region by establishing regional needs and priorities;
- within each region: site-specific problems will be addressed on a watershed basis through cooperative efforts.

RESOURCE PROTECTION

Farm Bill

The 1990 farm bill, signed by President Bush, contributes to progress toward protecting sensitive areas and resources by:

- Continuing the goal of a 40 to 45 million acre Conservation Reserve, helping to prevent soil erosion by paying farmers to take out of production for 10 years croplands that are highly erodible;
- Strengthening the swampbuster program to increase protection of fragile wetlands;
- Establishing the Wetlands Reserve Program providing permanent easements to protect wetlands, for which the Administration is committed to request during fiscal 1992 to 1995 \$ 500 million to enroll 600,000 acres.

Wetlands

President Bush has taken several steps toward his goal of no net loss of wetlands:

- Fiscal year 1991 appropriation for wetlands programs included a 17 percent increase over 1990. The President's request for 1992 for all wetlands programs includes a 48 percent increase over 1991 enacted levels, to a total of \$ 709 million.
- The President signed the North American Wetlands Conservation Act, authorizing the U. S. to spend \$ 26 million a year to purchase wetlands to implement a 1986 U.S.-Canadian agreement called the North American Waterfowl Management Plan.
- Protecting wetlands and acquiring critical habitat has become, under the Bush Administration, a key feature of the U.S. land acquisition strategy.
- Under this administration, the U.S. has added over three-quarters of a billion dollars worth of acquisitions to its treasury of wildlife refuges, forests, parks, and other public lands.

Antarctica

President Bush signed the Antarctica Protection Act of 1990 which prohibits indefinitely United States mineral resources exploration and development in Antarctica. The U.S. has also agreed to sign an environmental protection Protocol, based on a U.S. initiative, to the Antarctic Treaty.

Coastal Barriers

The President signed legislation which more than doubled the Coastal Barrier Resource System to over 1.2 million acres and over 1000 shoreline miles. Coastal barrier habitats and their associated wetlands support millions of fish, shellfish, birds, mammals, and other wildlife that depend on barriers and their wetlands for vital feeding, spawning, nesting, nursery, and resting habitat.

Transboundary Movement of Hazardous Wastes

The Administration in the spring of 1991 proposed legislation which provides for immediate compliance with the basic provisions of the Basel Convention by prohibiting all exports of hazardous wastes in the absence of a bilateral agreement with the importing country.

DEVELOPMENT AND FINANCIAL ASSISTANCE

"Green Fund"

The U. S. has endorsed the Global Environmental Facility (GEF) and pledges a 3-year contribution of up to \$ 150 million. The GEF has the objective of helping developing countries with the incremental costs of contributing to global environmental benefits.

The U. S. has sought increased World Bank emphasis on environmental impact assessments and action plans, energy efficiency, and sustainable development. It continues to encourage the Bank to develop environmental action plans for all member countries.

The U. S. has taken a strong lead in pressing all development banks to make more progress on environmental impact assessments. This issue was addressed in the World Bank and InterAmerican Development Bank. It was stressed by the U. S. in negotiating replenishments for the African Development Bank and the Asian Development Bank and also in discussions with the European Development Bank.

The U. S. has pressed for improvements in policies affecting or related to forests and forest resources, both in the World Bank and the InterAmerican Development Bank. The World Bank has developed a new Forest Policy which is expected to be approved on July 18. The U. S. also pressed for reform and strengthening of the Tropical Forestry Action Plan and for improvements in the Energy Sector Management Assistance Program (ESMAP). Two meetings among interested parties concerning the strengthening of TFAP have been held. Improvements in ESMAP, sought by the U.S., have been achieved.

Enterprise for the Americas

The Bush Administration proposed the Enterprise for the Americas initiative. A major environmental component will support environmental programs and projects in Latin America and Caribbean nations.

- Countries can enter into a broad environmental agreement with the U. S. under which interest payments due on restructured concessional obligations can be paid in local currency into an Environmental Fund owned by the debtor country.
- These funds will support environmental projects in the individual countries identified by local administering bodies made up of a majority of non-governmental organization representatives. A

public/private Environment for the Americas Board in Washington will help insure that appropriate local administering bodies are established and will review their annual programs.

- A debt-for-nature swap component provides an important opportunity to protect valuable ecosystems in the region.

Budapest Center and Bilateral Cooperation

In September 1990, the U. S. provided significant assistance in the opening of an independent, non-governmental regional environmental center in Budapest, Hungary. The center will address pollution problems in the region through education, training, and technology transfer.

In Krakow, Poland, the U.S. is working to implement President Bush's initiative to demonstrate a clean coal technology project to control emissions from an existing powerplant. In Mexico City, the U.S. has begun a 3-year study to assist the Mexican government design measures and advanced techniques for assessing and reducing air pollution.

In 1990, the U. S. and Soviet Union expanded an environmental agreement to include more than 55 projects in such areas as pollution prevention, environmental law, marine mammal and fisheries conservation, and Arctic accumulation of air toxics.

Multilateral Banks

At U.S. urging, the World Bank prepared a paper describing debt-for-nature possibilities. The Global Environmental Facility has been asked to support debt-for-nature operations.

U.S. Treasury Department adopted standards for reviewing loans of Multilateral Development Banks in connection with marine pollution and ecosystems.

MARKET-ORIENTED APPROACHES

Until recently, the U. S. used primarily a command-and-control approach to pollution control. While this approach served to abate the largest and most obvious forms of pollution, it did not allow the flexibility needed to implement the least-cost methods to reduce pollution, nor did it encourage innovation and voluntary initiatives.

Further progress in environmental protection will be difficult and costly unless attention is paid to market forces and innovation. Hence, market incentives and voluntary initiatives, which promise environmental benefits at lower cost, are being given much attention.

Sulfur Dioxide Emissions Trading

- The U. S. Clean Air Act acid rain program, signed into law by President Bush in November 1990, is the first large-scale use of market incentives in environmental protection. The Act will cut U.S. emissions of sulfur dioxide in half—reducing them by 10 million tons per year by the year 2000. Tradable sulphur dioxide emissions allowances within sharply reduced emissions limits will be allocated to electric utilities.
 - A utility that can reduce its emissions below its allowable level can do so and sell its surplus allowances;
 - Utilities can use whatever means of pollution control is most effective for them—energy conservation, different fuels, new technology—as long as they meet their emission limitations;
 - A utility can offer to purchase surplus allowances from anyone who holds them if it finds that its cost of reducing emissions is higher than the cost of purchasing surplus allowances;
- Reducing national emissions in this flexible, market-oriented fashion is expected to save the nation 20 percent annually or roughly \$ 1 billion compared to the cost of achieving the same level of pollution control through government-mandated technologies.

CFC Controls

The U. S. is using market mechanisms to reduce emissions of ozone depleting substances (CFCs) under the Montreal Protocol.

- Producers receive tradable allowances in proportion to their base period market shares.
- As supply is restricted under the Protocol or the more stringent Clean Air Act requirements, and as substitutes are developed, trades of scarce allowances can occur between producers supplying lower-valued and more easily substituted uses and those supplying more highly valued and less easily substituted uses.

Voluntary Toxics Reduction

The U.S. announced in the spring of 1991 a program for sharply reducing air toxics emissions through a system of credits for early reductions. The 33/50 Project is a voluntary program for 600 U. S. companies to reduce by one-third the pollution caused by releases of 17 high-priority chemicals by 1992, and to reduce them by one-half by 1995.

Free Trade Agreement

As part of its efforts to negotiate a North American Free Trade Agreement with Mexico, the United States has developed an environmental action plan, which will include expanded cooperation in controlling border pollution, appointments of environmental NGO representatives to trade advisory committees, and an environmental review of this trade agreement.

Presidential Commission

The President's Commission on Environmental Quality, established by Executive Order in December 1990, is made up of leaders from the educational, business, and environmental communities. It will build public-private partnerships to promote effective and cost efficient initiatives in pollution prevention, natural resource management, education, and international cooperation.

OPIC-Assisted Environmental Fund

In 1990, the Overseas Private Investment Corporation (OPIC) helped to create a \$ 100 million privately owned and managed investment fund to support new and developing enterprises in developing countries that emphasize sensitive environmental management. Investment, supported by OPIC's \$ 40 million contribution to the fund, will be directed to:

- sustainable agriculture and forest management;
- ecologically oriented tourism;
- renewable and alternative energy technologies; and
- pollution prevention technologies.

SCIENTIFIC COOPERATION

The United States continues to increase its commitment to global change research, earth observation and monitoring, and international cooperation in these areas.

- The U. S. Global Change Research Program (USGCRP) was funded in fiscal 1990 at \$ 659 million and at \$ 954 million in 1991. The President's budget for fiscal 1992 proposed an increase to \$ 1.2 billion.
- The USGCRP has been established in cooperation with such intergovernmental organizations as the International Council of Scientific Unions, the World Meteorological Organization, the United Nations Environment Programme, and others.
- A critical component of the USGCRP is the development of the Earth Observing System. The President's fiscal year 1991 budget proposed \$ 191 million, and his fiscal year 1992 budget proposed an increase to \$ 336 million for EOS, which will be developed in cooperation with America's international partners.
- The proposed 1992 program explicitly supports international research activities and regional scale U. S. research activities that will address issues identified by the Intergovernmental Panel on Climate Change.
- The proposal includes \$ 2 million to establish International Institutes to carry on and to coordinate international scientific and economic research on global change.
- High priority is given to supporting efforts of the World Climate Research Programme and the International Geosphere-Biosphere Programme. The U. S. provides about 50 percent of the financial support for these programs.
- The proposal for fiscal 1992 includes \$ 17 million for economic research. This funding will begin to reduce the very substantial uncertainties about the economic sources of climate change, the effects of climate change on human economic activities, and the economic and other implications of actions which might be taken to address climate change.
- In 1991, the U.S. has voluntarily provided over \$ 14 million for support of the United Nations Environmental Program—more than twice the amount provided by any other nation and more than 20% of UNEP's budget.
- A U.S. proposal to restructure and strengthen the Committee on Earth Observations Satellites (CEOS) was successfully implemented. CEOS serves as the focal point for international coordination of space-agency Earth observation activities.
- The U.S. has endorsed a set of data management policy statements to facilitate full and open access to data for global change research.

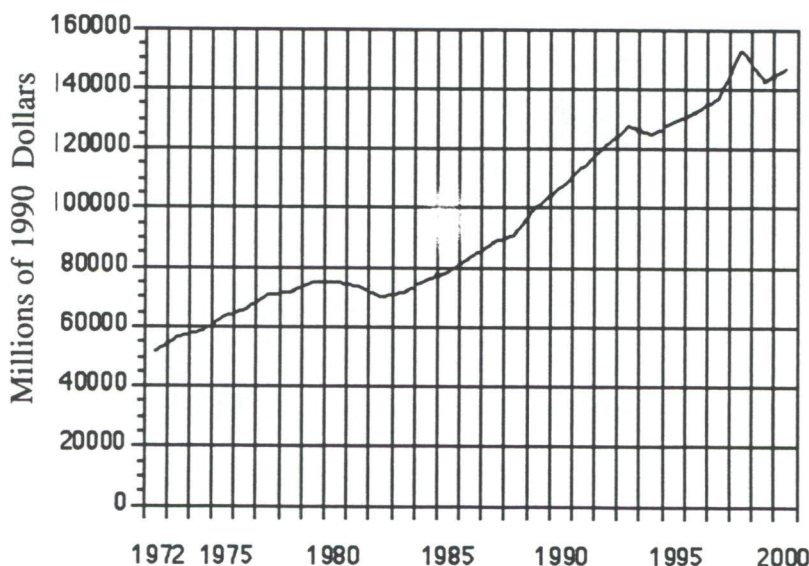
THE U.S. COMMITMENT

The United States has had a long-standing commitment to protect and to clean up the environment. U. S. spending for all pollution control purposes has grown from \$ 52 billion in 1972 (1990 \$) to an estimated \$ 107 billion in 1990. This amount represented 1.5 percent of the Nation's gross national product (GNP) in 1972 and grew to an estimated 2 percent in 1990.

The Clean Air Act amendments alone, signed in November 1990, will require additional expenditures which are conservatively estimated at \$ 25 billion a year for full implementation, reached by the year 2005. Some industry estimates conclude that these costs will be higher, centering around \$ 50 billion a year.

U. S. pollution control expenditures are therefore expected to increase in the years ahead, both in absolute level and as a percentage of GNP. A recent estimate by the U. S. E.P.A. concluded that pollution control expenditures based on current policy commitments alone will grow to 2.3 percent by the end of the decade.

U.S. Pollution Control Expenditures



SOURCE: U.S. EPA

TECHNOLOGY TRANSFER AND FINANCIAL RESOURCES

U.S. Intervention at the INC

June 26, 1991

Mr. Chairman, the United States recognizes that these questions are central to the issue of potential climate change. This is a long-term issue requiring long-term responses. The Intergovernmental Panel on Climate Change (IPCC) has noted that, if the science confirms that we have a problem, it may be necessary to reduce emissions of greenhouse gases by as much as 60% in order to stabilize atmospheric concentrations at current levels. But currently no technology exists that would allow us to do so, if the science some day indicates it is necessary. Thus, technology development and dissemination is crucial. These technologies will need to address all greenhouse gases, their sources and sinks. It must include technology for both mitigation and adaptation.

To provide for the development of this technology, we must guarantee adequate and effective protection of intellectual property rights on a global basis, and the transfer of technology on a commercial basis. These are essential conditions for encouraging the development of the new technology that will be required. It is important to remember that governments in market economies do not always own the relevant technology and cannot therefore guarantee its transfer. Nonetheless, governments can, and should, facilitate technology transfer and cooperation as much as possible.

This transfer should take place in the context of broader technology cooperation, reflecting a real partnership of equals. Technology transfer to developing countries and to

countries with economies in transition on a priority basis must be the central aspect of this cooperation. It will certainly be fair - even more than fair.

Sharing of know-how, environmentally beneficial techniques and practices, information and data related to technology and other joint efforts must also be part of such cooperation. Institution-building is another key component of technology cooperation. Private joint ventures will also have an important role to play in providing for this technology cooperation; companies in developing and developed countries can share their experience in a mutually beneficial way.

Financial resources to support this effort should make maximum use of existing bilateral and multilateral institutions in order to minimize the overall cost of addressing environmental concerns within the context of economic decision-making. In general, the integration of economic and environmental decision-making must continue. For several years, the Organization of Economic Cooperation and Development (OECD) has recognized the importance of this integration.

The United States recognizes the development needs of developing countries, as well as the special, temporary problems of countries with economies in transition. Financial support for environmental purposes should be integrated in such a way that support for general development purposes is in no way diminished.

Thank you very much, Mr. Chairman.

PRINCIPLES
for a
FRAMEWORK CONVENTION ON CLIMATE CHANGE

Submitted by the United States

The Framework Convention on Climate Change should:

- 1) be global, acknowledging that climate change is a common concern of the international community and that all nations need to participate in any international response, in accordance with the means at their disposal and their capabilities.
- 2) respect national autonomy in accordance with principle 21 of the Stockholm Declaration, recognizing that nations have different social, economic and other circumstances, including different sets of net greenhouse gas emissions, and need flexibility in the choice of any response options.
- 3) be comprehensive, recognizing that several greenhouse gases, each with different impacts on the environment, arise from numerous human activities and natural processes worldwide; and that strategies to understand and address climate change will be most environmentally effective and economical if they encompass all the greenhouse gases, their sources and sinks.
- 4) be flexible, recognizing that strategies to understand and address climate change will be most environmentally effective and most economical if they are based on, and continually reevaluated in light of, relevant scientific, technical, and economic considerations.
- 5) foster global stewardship, recognizing the interdependence of environmental protection and economic growth, and the need to pursue strategies that advance both goals if we are to protect global resources for present and future generations.
- 6) reflect the long term nature of climate change, building the knowledge, technology and resources needed to achieve sustainable development.

- 7) spur needed technologies through technology cooperation and appropriate incentives for their development and dissemination, including adequate and effective protection of intellectual property rights.
- 8) foster international cooperation, enabling cooperative arrangements for understanding and addressing potential climate change in the most effective and efficient manner.
- 9) recognize and encourage other measures that may be taken or have already been taken at the national, regional and international levels that help address the issue of climate change.
- 10) encourage nations to use market mechanisms, as appropriate, to foster expanding free trade and to achieve cost-effective results.
- 11) promote sound science and economics, encouraging appropriate bodies to undertake vigorous research, systematic observation and analysis, including full and open exchange of data among parties and cooperation among all nations.
- 12) take a precautionary approach, reaffirming that lack of full scientific certainty should not be used as a reason for postponing measures that are commensurate with the expected extent and likelihood of any adverse impact of climate change, that reflect the costs and benefits of such measures, and that are directed, as appropriate, toward understanding, limiting, reducing, adapting to or preventing such adverse impacts.
- 13) foster an open process, allowing appropriate input from non-governmental organizations, public access to decision-making deliberations where appropriate, and outreach and education of the interested global citizenry.

U.S. INTERVENTION
Intergovernmental Negotiating Committee
June 28, 1991.

Mr. Chairman, the United States is pleased and impressed with our progress this session. We have begun serious work on the substance of the convention in a positive and constructive manner. Many countries have made clear and useful proposals, indicating a widespread desire to advance the process.

We must now work towards agreement on commitments that reflect the individual situation of different countries. The participation of developing countries is essential to the long-term success of the convention; this convention must be structured so that it in no way compromises their development needs.

During this meeting, the United States shared our thoughts on technology cooperation to help focus discussions and thus advance the process. Technology development and transfer must be an essential part of the convention. This is an area in which developed and developing countries can work together toward a full partnership of equals. Our suggestions are meant to help others focus on this important aspect of the convention.

We need to go back to our capitals now and reflect on the results we have achieved this session and to work further on the materials we have developed here. If we continue to work hard in the spirit of cooperation that prevailed here, we will be able to continue this progress in Nairobi and end that session with a real negotiating text. The United States looks forward to continuing to participate in that process.

Thank you very much.

Jennifer -

Do you want a job at
Watts Lane Communications?

7/26/91

Talking Points for Aspen Institute on:

Including Montreal Protocol Gases in a Climate Treaty

- CFCs are important Greenhouse Gases (GHGs). CFCs now account for about 24% of contributions to potential warming. Further, some nations are eliminating more CFC production than others are, and faster, at their own expense; they should get recognition for their efforts.
- No backsliding. Including CFCs in a comprehensive approach to climate change does not mean that nations could do less than they have committed to do under the Montreal Protocol.
- Looking forward: Incentive effects.
 - Excluding CFCs, HCFCs and HFCs ("halocarbons") entirely from the climate agreement would fail to provide additional incentives for their reduction.
 - Allowing credit only for reductions that are larger or faster than those required by the Montreal Protocol would encourage individual parties to the Montreal Protocol to move ahead more aggressively, but it would perversely discourage them from amending the Protocol to require an even faster global phaseout. And it could perversely discourage nations who have not yet joined the Montreal Protocol from doing so (lest they lose credit for CFC reductions taken under the climate treaty).
 - Including the greenhouse contribution of halocarbons in a climate treaty would provide appropriate incentives for any measures to limit potential warming. What matters is the overall effect on climate, not the choice of one gas or another for political reasons.
 - These incentive effects are important, given the recent evidence that ozone depletion is occurring about twice as fast as had been anticipated.¹
- Limiting production vs. destruction of reservoirs. The Montreal Protocol only regulates production of new CFCs. It does not address the very large reservoirs of existing CFCs, such as those in operating and abandoned refrigerators and air conditioners. Including CFCs under a climate treaty would provide incentives to address these reservoirs, which will otherwise leak into the atmosphere.

¹ See, e.g., "Ozone Destruction Worsens," 252 Science 204 (April 12, 1991).

- 2 -

o CFC-substitutes could increase net GWP.

-- Since the Montreal Protocol only regulates the Ozone Depleting Potential (ODP) of the gases, and not their Global Warming Potential (GWP), counting the warming potential of Montreal Protocol gases under any treaty limiting greenhouse gases would not be "double counting," but rather would provide appropriate incentives to address the climate impacts of CFCs, HCFCs and HFCs that the Montreal Protocol omits.

-- Gases may have quite different ODPs and GWPs. Replacing one unit of a CFC with the same quantity of a CFC-substitute (e.g., an HCFC) could reduce ODP without reducing, or even increasing, GWP.²

-- CFCs and their substitutes are not interchangeable at identical usage rates: it may take more kilograms of a CFC substitute to deliver the same services (e.g., refrigeration) as the original CFC. A recent paper by Dutch scientist Carolien Kroeze³ finds that the current Montreal Protocol's plan to phase out CFCs and allow use of HCFCs and HFCs would lower ODP but could even increase net GWP contributions in the next century. She calculates:

Ultimate equilibrium warming effect of:

(1) Present halocarbon emissions (including current treaty phaseout): 0.10 - 0.21 degrees C

(2) Substitute halocarbon emissions, assuming ...

No restriction on HCFCs: 0.38 - 0.75 degrees C
(current treaty)

HCFC phaseout by 2035: 0.24 - 1.16 degrees C
(entails greater HFC use)

² See Donald A. Fisher, et al., "Model Calculations of the Relative Effects of CFCs and their Replacements on Stratospheric Ozone," 344 Nature 508 (April 5, 1990); and Fisher, et al., "Model Calculations of the Relative Effects of CFCs and Their Replacements on Global Warming," 344 Nature 523 (April 5, 1990).

³ See Carolien Kroeze, "Limiting the Greenhouse Effect of CFCs, Halons and H(C)FCs," Interfaculty Dept. of Environmental Science, University of Amsterdam, paper 91-125.5 presented at the Air & Waste Management Association annual meeting, Vancouver, BC, June 20, 1991.

TALKING POINTS FOR ASPEN

o In 1950, the U.S. economy generated nine-tenths of a pound of CO₂ emissions for every dollar of Gross National Product (GNP) produced. Today, a dollar of GNP can be produced for about half a pound of CO₂. In the first decade of the next century, both EPA and DOE expect that this ratio will drop to around a third of a pound. This expectation is based only on actions this Administration has already undertaken -- not on new energy legislation.

o A similar story can be told for total greenhouse gases (GHGs). Currently, the U.S. generates roughly nine tenths of a pound of carbon-weighted GHGs for every dollar of GNP. In ten years this should drop to around two thirds of a pound. In twenty years to one half a pound. Again, this is based solely on actions to which the Administration has already committed.

o For comparative purposes, CO₂ per dollar of GNP in other countries (1985 dollars and exchange rates):

Country	lbs CO ₂ /\$ of GNP
U.K.	0.62
Netherlands	0.62
Japan	0.50 0.32
Italy	0.46
W. Germany	0.58
Canada	0.62
Australia	0.80
U.S.	0.50 0.46

OTHER POSSIBLE NO REGRETS OPTIONS

TAX POLICY

o There are currently several taxes in the United States that depress economic growth because of their effect on investment. The capital gains tax and the double taxation of corporate profits have often been mentioned in this regard. One possible option would be to lessen these taxes and to make up for any possible revenue losses through levies on greenhouse gas emissions. The net effect of such a policy would be to improve economic growth -- taxes would be shifted away from capital and investment and directed more towards consumption.

o Preliminary work conducted by a firm specializing in macroeconomic modeling indicates that such a policy could actually raise the level of GNP while simultaneously reducing greenhouse gas emissions. The total amount of revenues raised by the government would be unaffected.

Britain Censures U.S. Global Warming View

Cabinet Secretary's Letter, Prime Minister's Speech Indicate Break With Previous Policy

By Glenn Frankel
Washington Post Foreign Service

LONDON, July 13—Britain has sent a strongly worded letter to the White House criticizing the American position on global warming and signaling that Britain will no longer side automatically with the United States on the issue at such international conferences as this week's Group of Seven summit here, according to informed British sources.

They said British environment secretary Michael Heseltine sent the letter to White House Chief of Staff John Sununu earlier this week. It accompanied a copy of a speech Prime Minister John Major gave Monday in which he called on the United States to join Britain in setting limits on carbon dioxide emissions, an issue the Bush administration so far has resisted taking action on.

Major, at a conference organized by the Sunday Times, noted that the United States accounts for 23 percent of the world's CO₂ emissions—by far the largest polluter—and said, "The world looks to them for decisive leadership on this issue, as on others." He also said that while more research was needed on the issue, "research cannot excuse inaction—the threat is too serious."

The speech marked a sharp break with the policy of his predecessor, Margaret Thatcher, whose government gave virtually automatic support to the United States when global warming and other environmental issues arose at conferences.

The speech and the Heseltine letter are the latest round in a British campaign to compel the Bush administration to reconsider its stand on global warming. Heseltine, who



More research on emissions is needed, says Prime Minister John Major, but "research cannot excuse inaction—the threat is too serious."

became environment secretary after helping engineer Thatcher's downfall last November, traveled to Washington last month to try to convince the White House that it had become isolated from the rest of the world community on the issue and to offer Britain's help in arranging a compromise.

Heseltine saw a number of senior administration officials, including Sununu, Office of Management and Budget Director Richard G. Darman and Environmental Protection Agency Administrator William K. Reilly. Sources said his most contentious meeting was with Sununu, who has insisted that scientific evidence is not yet conclusive in documenting the so-called "greenhouse effect" and who has taken the lead in opposing setting a U.S. target for the reduction of carbon dioxide emissions.

Sources said Heseltine came

of the global warming and energy program for the Sierra Club. "Major's speech signals the end of the road. It shows the extent to which the United States is now isolated on this issue."

At their Paris summit two years ago, the leaders of the Group of Seven major industrialized nations promised "decisive action" to curb global warming. Major, who is hosting this year's summit, has promised he will raise the issue again this week. He has also said he will ask the G-7 leaders to pledge to attend next year's environmental summit in Rio de Janeiro. The United States in the past has been reluctant to send high-level officials to such sessions because it has often taken an unpopular and isolated position on the issues under discussion, administration officials have said.

Britain has committed itself to stabilizing carbon dioxide emissions at their present level by the year 2005, while other European Community members say they will do so by 2000. The United States has set no target, and U.S. environmental groups contend that current administration policies would lead to a 15 percent increase in emissions by 2005.

Officials in Heseltine's ministry confirmed the sending of the letter, which was first reported in the Times of London. Although they would not divulge its contents, officials said the Times article, which characterized the letter as "unusually tough and personal," was substantially accurate.

One British source said the speech and the accompanying letter amounted to "not a rupture" between Britain and the United States, "but a toughening of the posture."



Methane Reductions: Cost-Effective Options for Environmental Problems

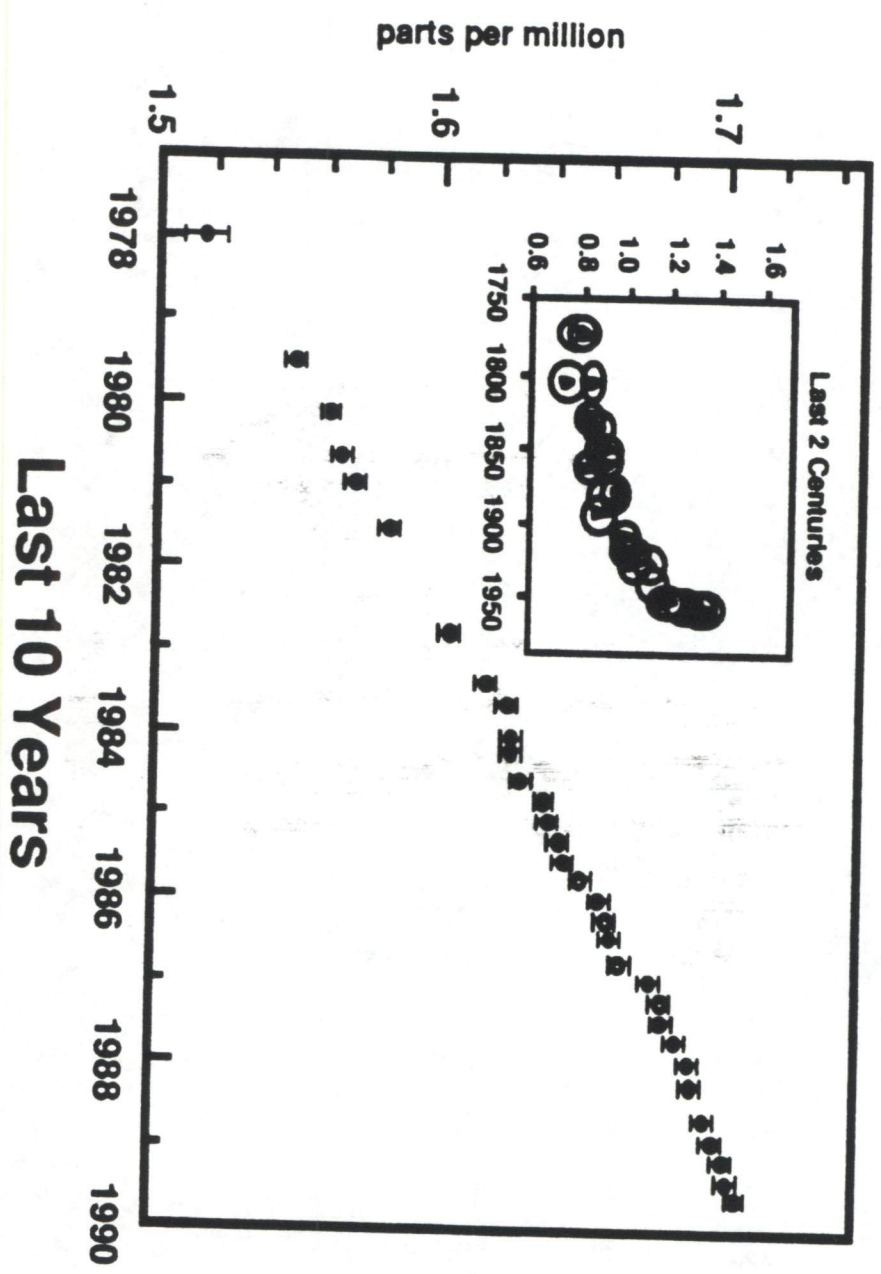
Office of Air and Radiation



Briefing Outline

- **Methane as an environmental problem**
- **Profitable reductions/ obstacles/ immediate and near-term steps**
- **Key strategies and issues**

Methane Concentrations Are Rising



Sources: Stauffer et al, 1985; Blake & Rowland, 1990

Methane's Tropospheric Chemistry



Ozone Formation

Acid Rain

Ozone Formation



Leads to H_2O_2 ↓,
primary oxidant
for $\text{SO}_2 \longrightarrow \text{H}_2\text{SO}_4$



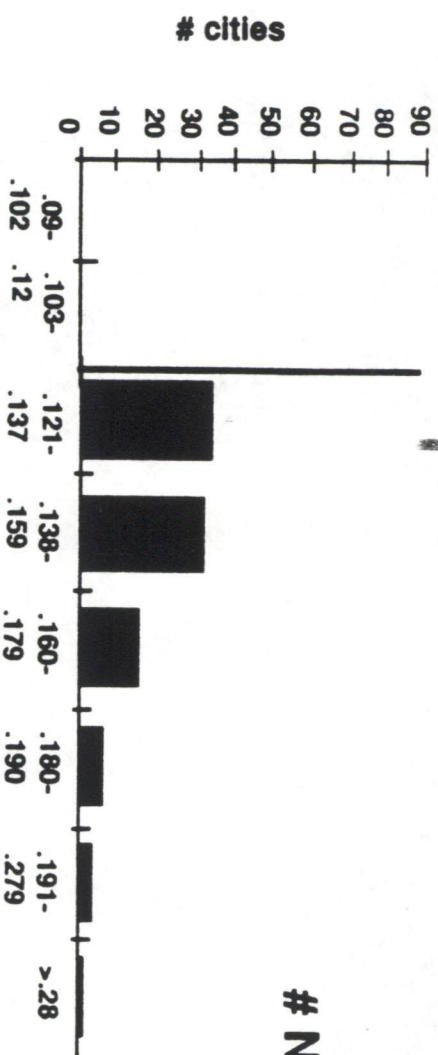
Sources:

Dak Sze (1977); Cruizen (1985); Thompson (1987, 1988, 1989)

Rising Methane Worsens Ozone Problems:

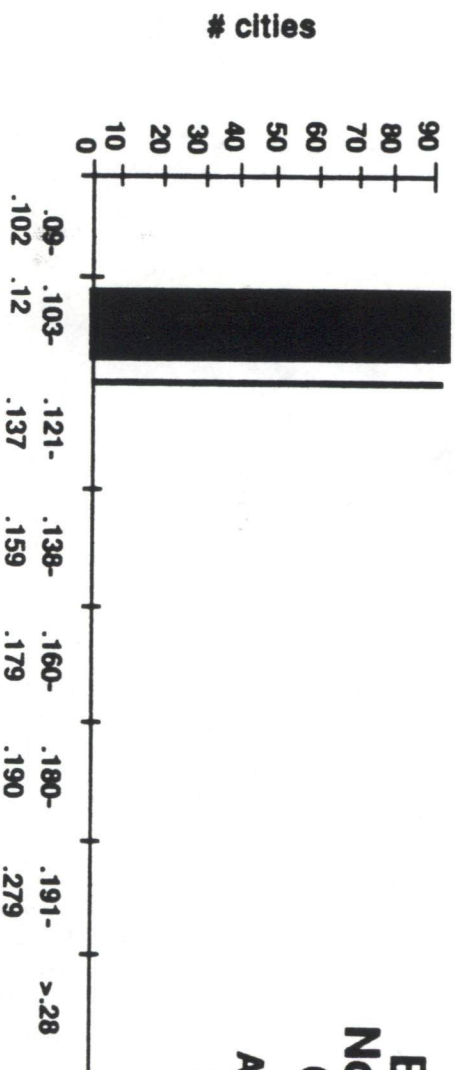
NOW

**# Non-attainment
Cities = 94**



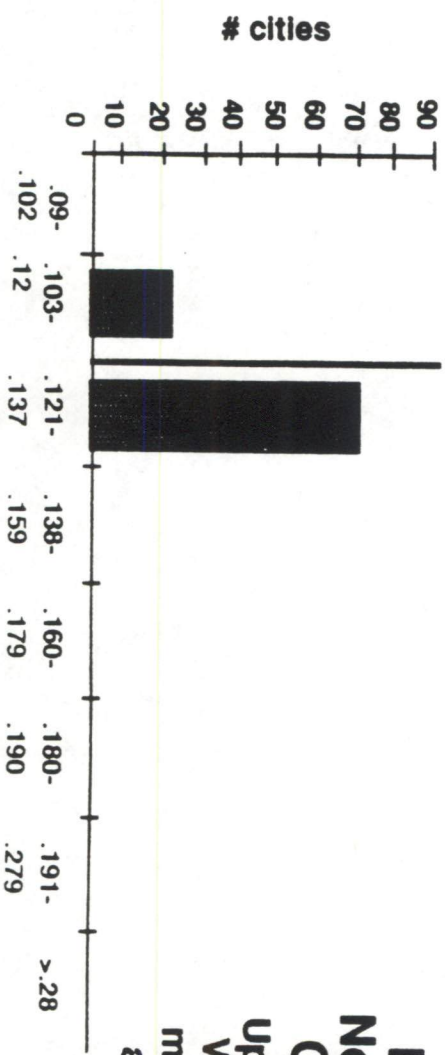
**2010
WITH
CAA**

**Estimated #
Non-attainment
Cities = 0**
At a cost of about
\$10 billion/year
in 2005

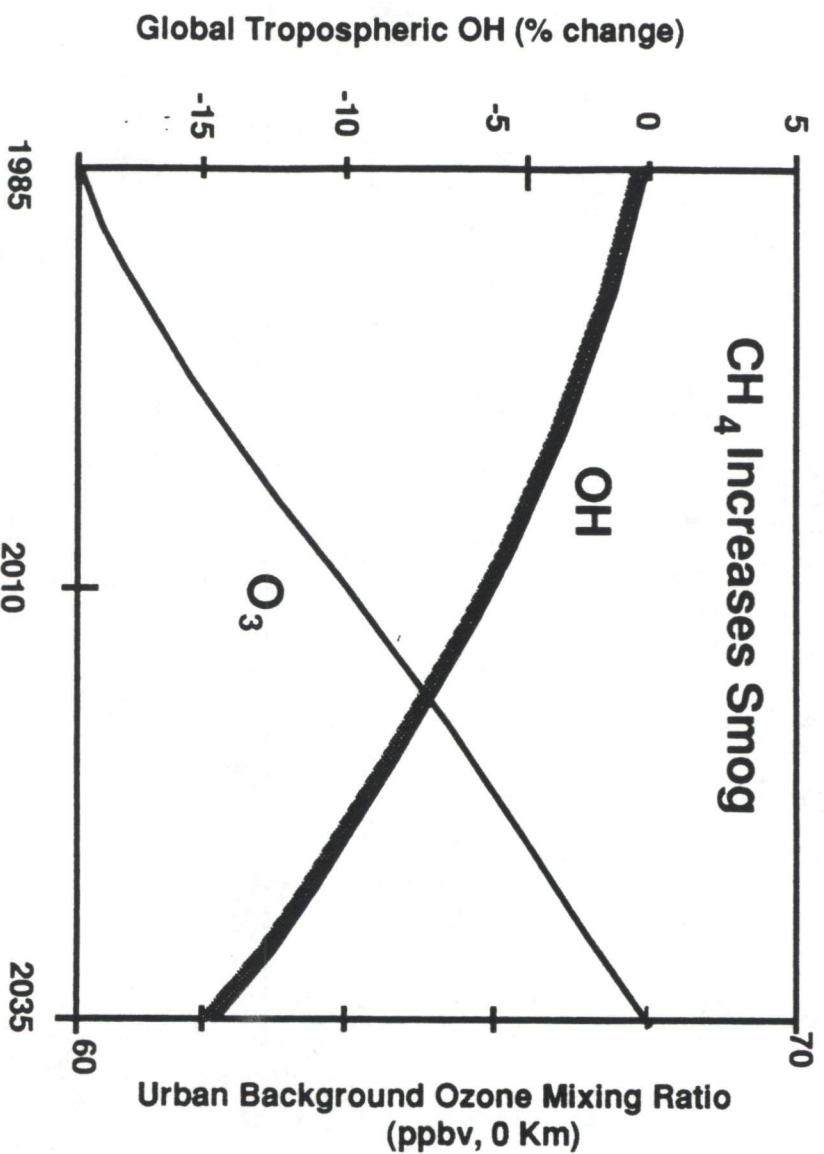


**2010
WITH
INCREASING
METHANE**

**Estimated #
Non-attainment
Cities = 45-75**
Up to 10% greater
VOC reductions
may be required
at much more
than \$10
billion/year



Rising Methane May Lead to...



Longer Lifetime

- Air Toxics
- CO
- CFC Substitutes

Source: Thompson, Huntley and Stewart, 1989

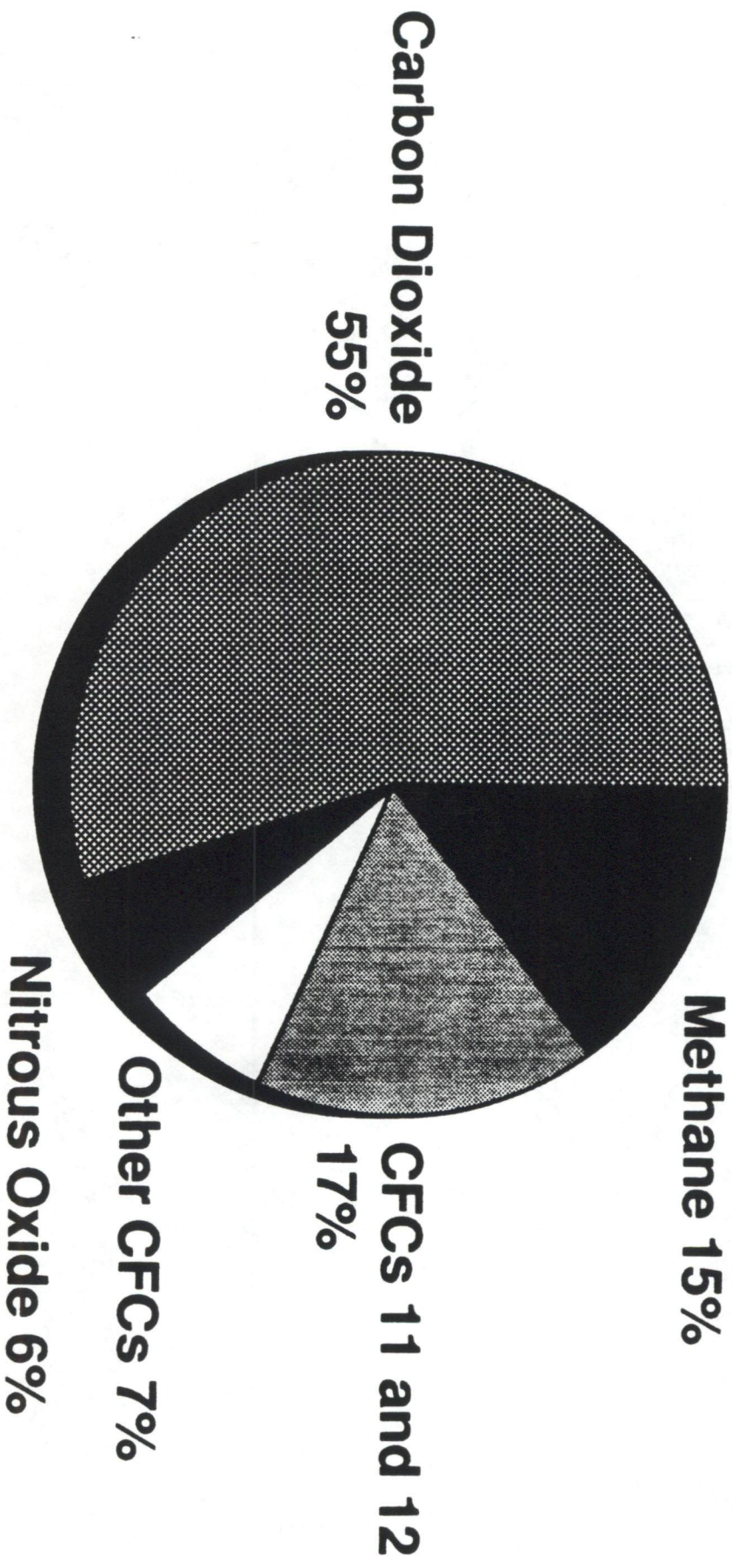


Stratospheric Ozone Impacts: Current Picture

- **Mid and Lower Latitudes**
 - **Methane $\Rightarrow$ Traps Cl_x**
- **Polar Regions**
 - **Methane contributes to polar stratospheric clouds and potentially to ozone hole**
- **HCFCs and HFCs will become worse (10% $\Rightarrow$ 20%)**

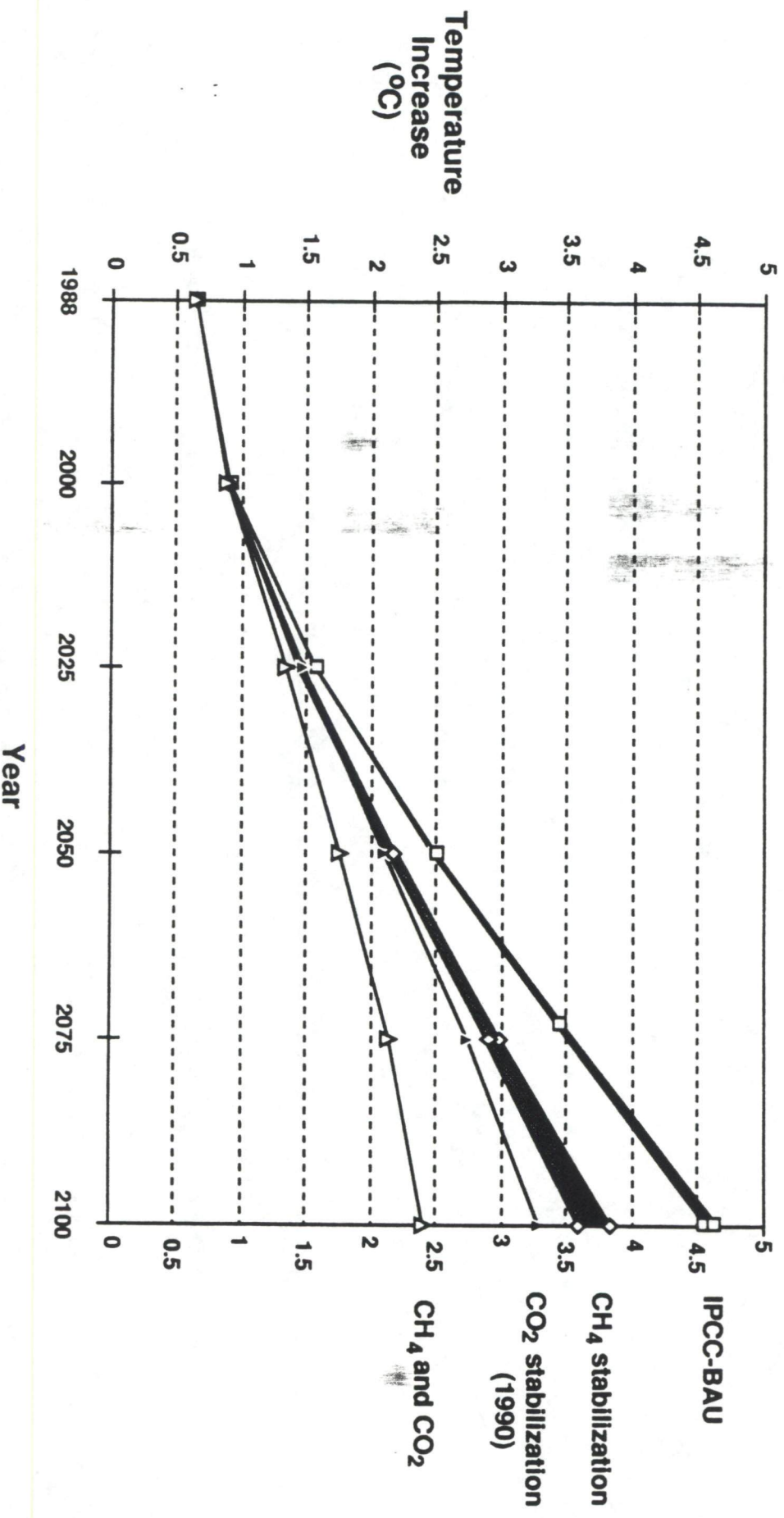


Methane Viewed as Large Contributor to Global Warming



Source: IPCC (1990)

BUT Benefits of Methane Stabilization Are Large

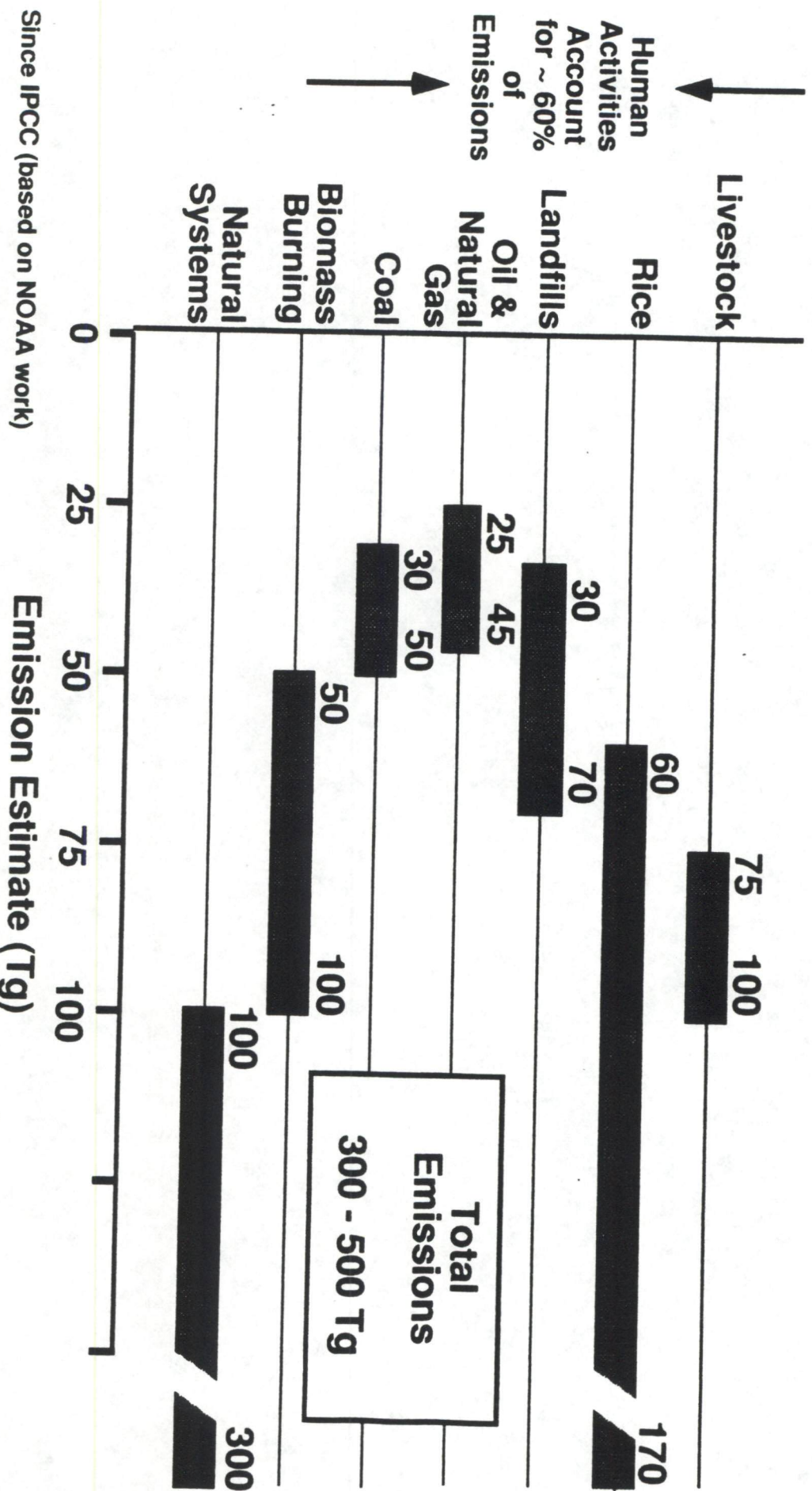


Sources: IPCC (1990); Communications with Prather (1991)

Conventional Wisdom ...

Uncertainty About Methane Sources

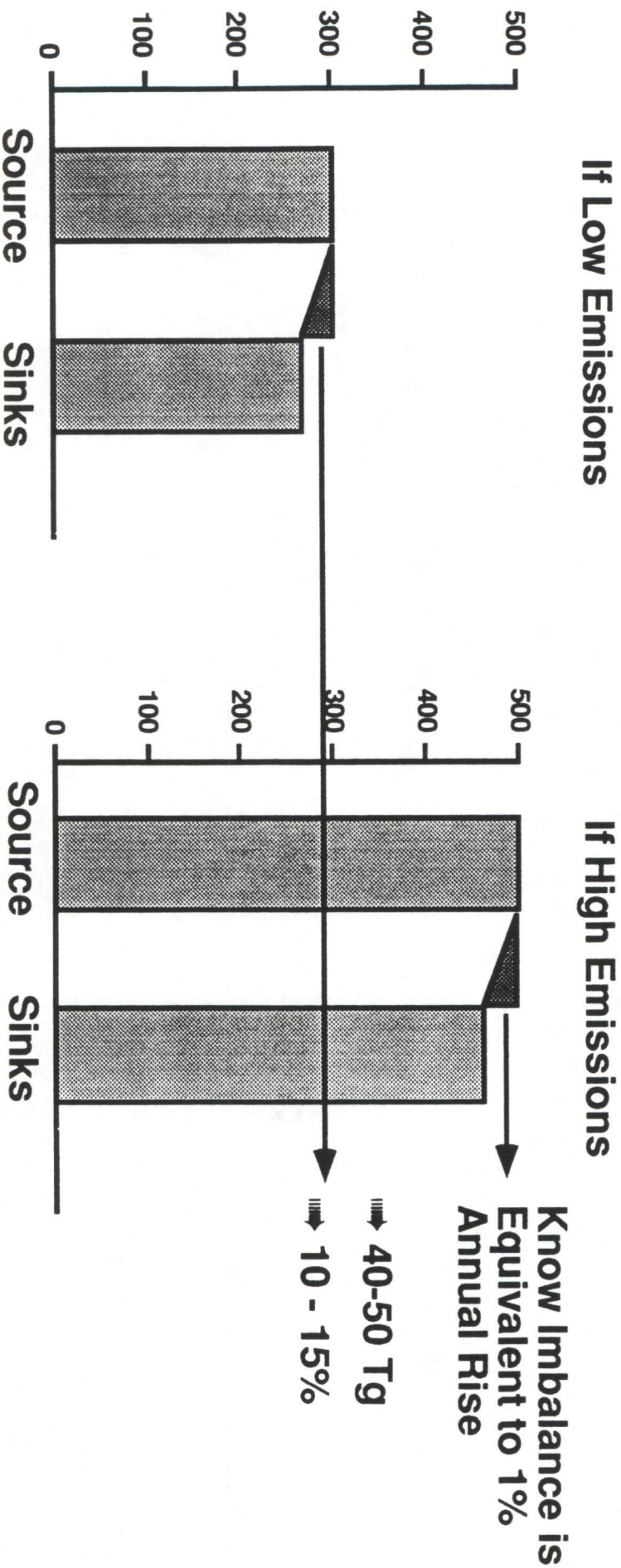
Must be Resolved Before Moving Forward





Reality...

We Know Reductions Needed to Reduce Methane Concentrations are Small



**General Theme:
Many Profitable Options Available IF
Institutional Obstacles Can Be Overcome**

... Lack knowledge

... Lack technology

... Legal/regulatory issues

- energy regulation

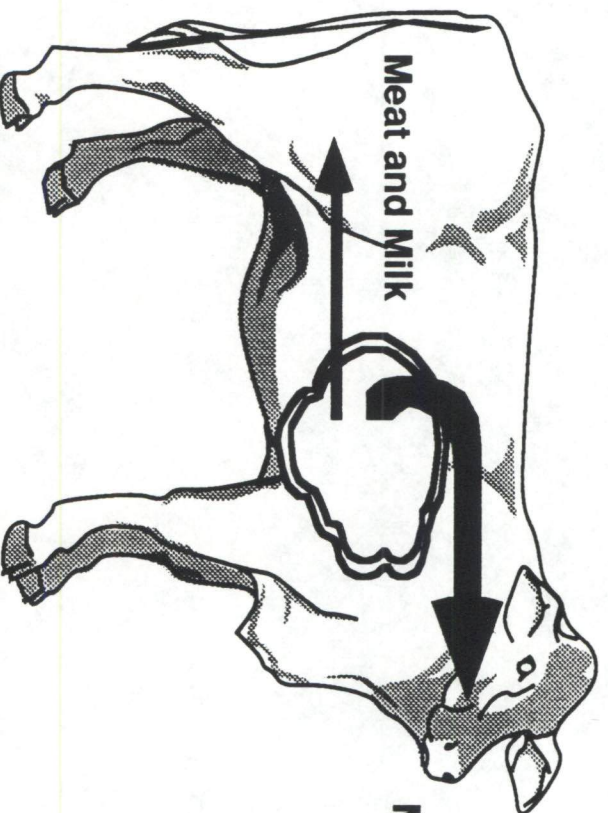
- biotechnology regulation

... Financing channels

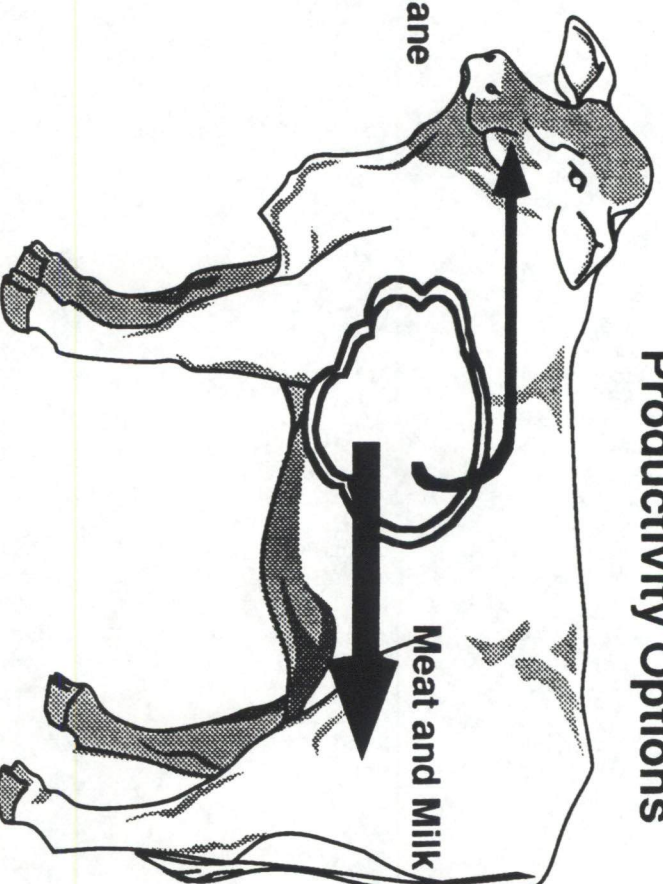
Livestock: Ruminants

**Many options direct more carbon to products
and less to methane**

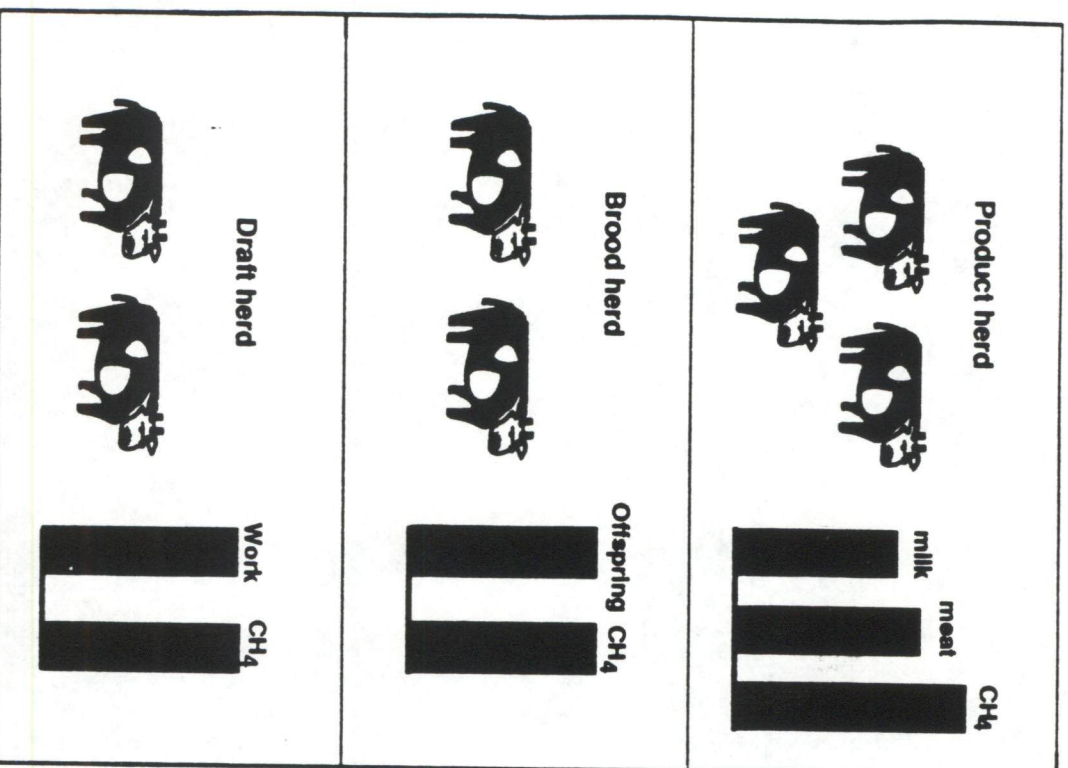
**Current
Situation**



**Improved
Productivity Options**

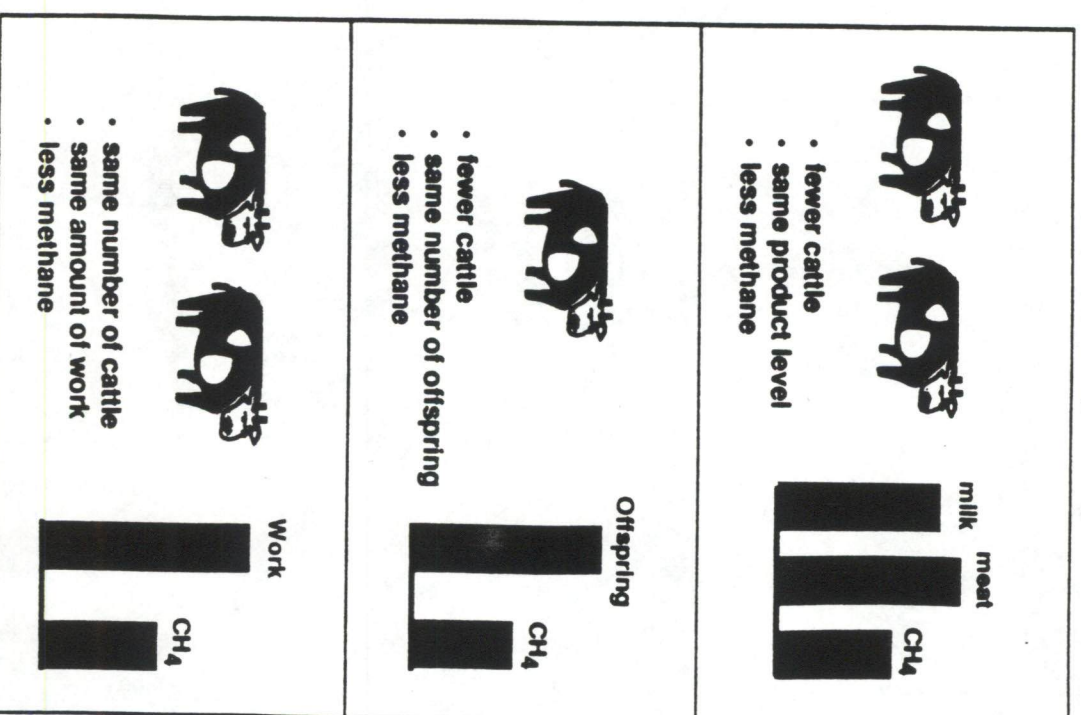


Cost-Effective Options for Livestock



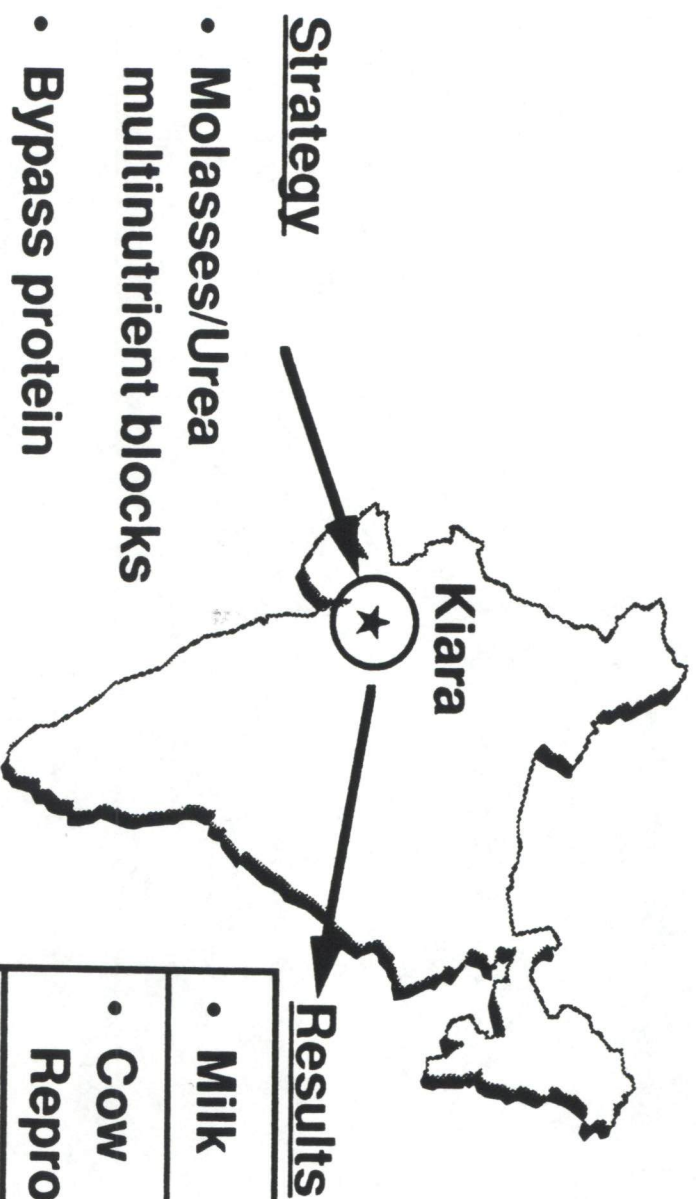
Selected Options

- Diet modification
 - Productivity enhancers
 - Strategic supplementation
- 
- Methane inhibitors
 - Improve forage digestibility
 - Genetic engineering



U.S. dairy herd: more milk with less than 1/2 the cows since 1940

Case Study: Kiara District, India



• Milk	↑ 30%
• Cow Reproductivity	↑
• Methane	↓ 60%/gal milk

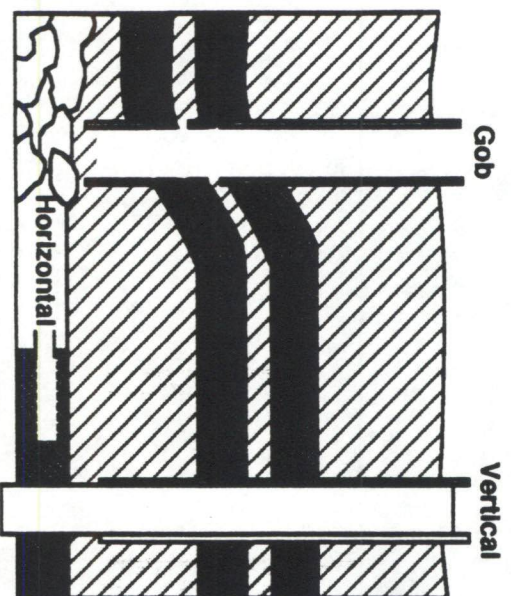
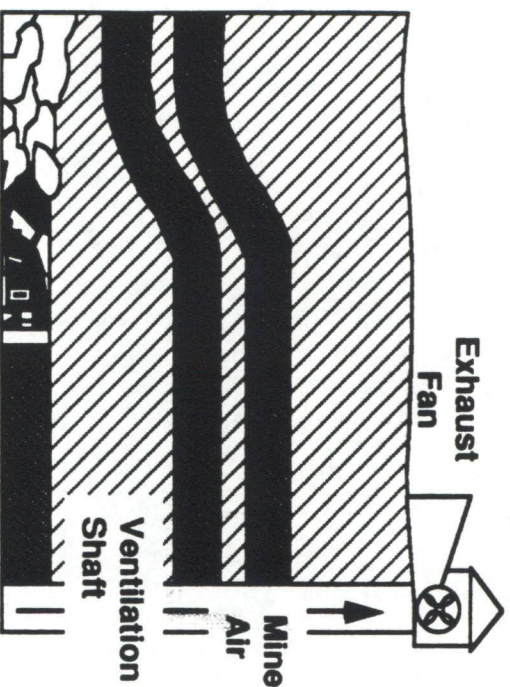
(Total reduction less than 60% due to increased consumption)

Livestock:

Steps Underway/ Possible to Capture Reductions

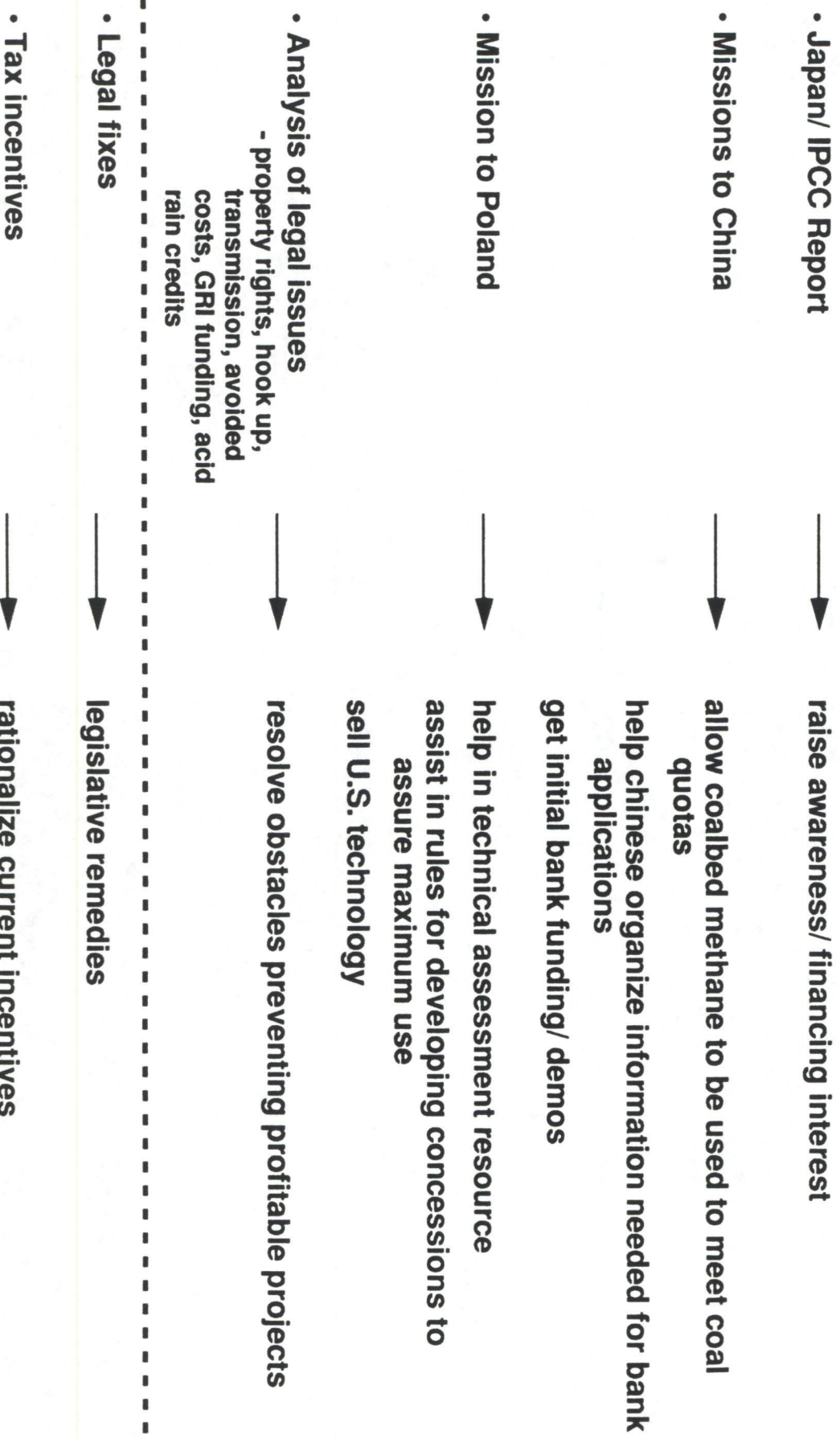
- Rumen model, animal measurements → revise National Research Council dietary recommendations
- Reports published, workshops held → inform researchers, agricultural networks- domestic and international
- India case study → move World Bank, aid agencies, Japan to greater lending/ assistance
- BGH analysis to start → win approval of BGH use,
- Increased USDA R, D & D → create successful demonstrations
improve range management
find better forages
increase twinning
- Analysis of subsidies → determine if they can be configured to gain advantage
- Position paper for GATT → extend agriculture debate with EC to environment

Methane Recovery from Coal Mines



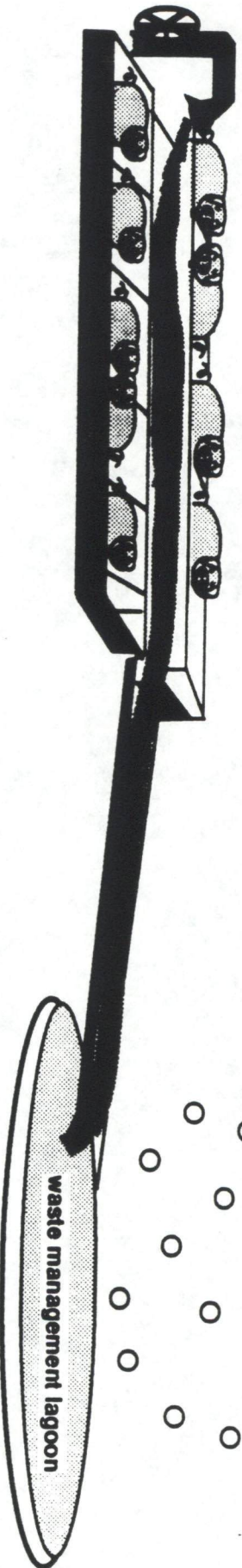
- Technologies are commercial and cost-effective
- Many additional opportunities for methane recovery
- Can recover 50% or more from gassy mines
- Many utilization options
 - power generation
 - chemical feedstock
 - direct use

Coalbed Methane: Steps Underway/ Possible



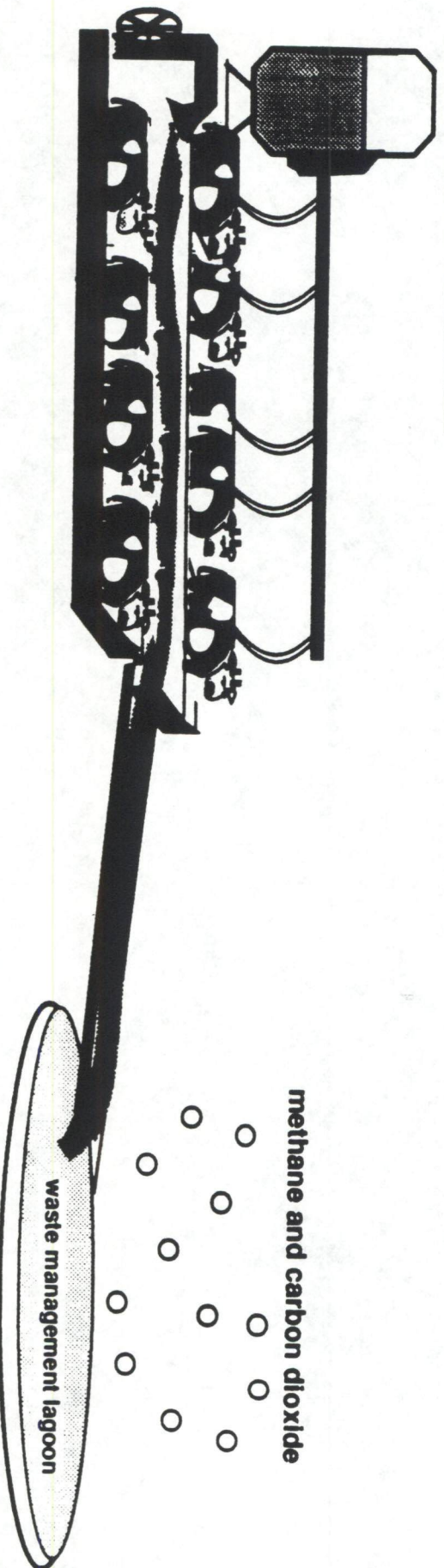
Animal Wastes: Now

Hogs

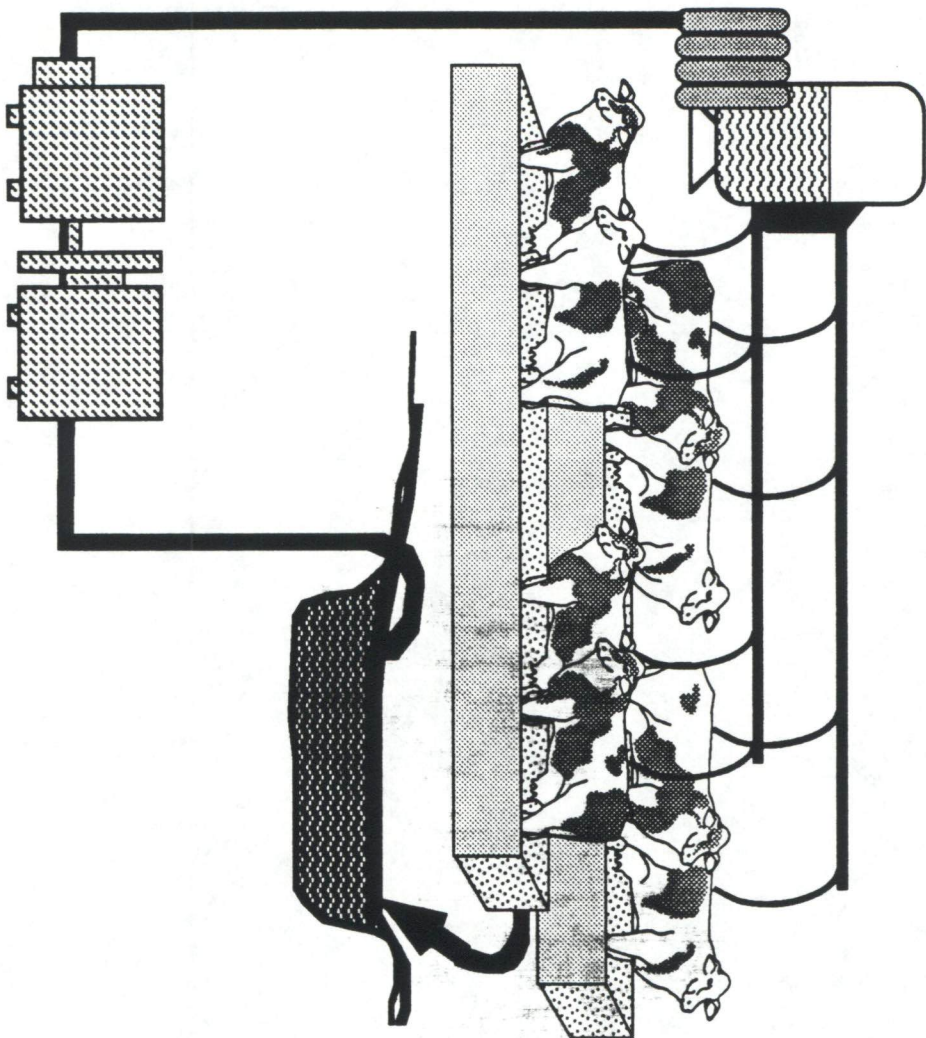


Dairy: Milking Parlor

- Air and water regulations pushing farmers to lagoons

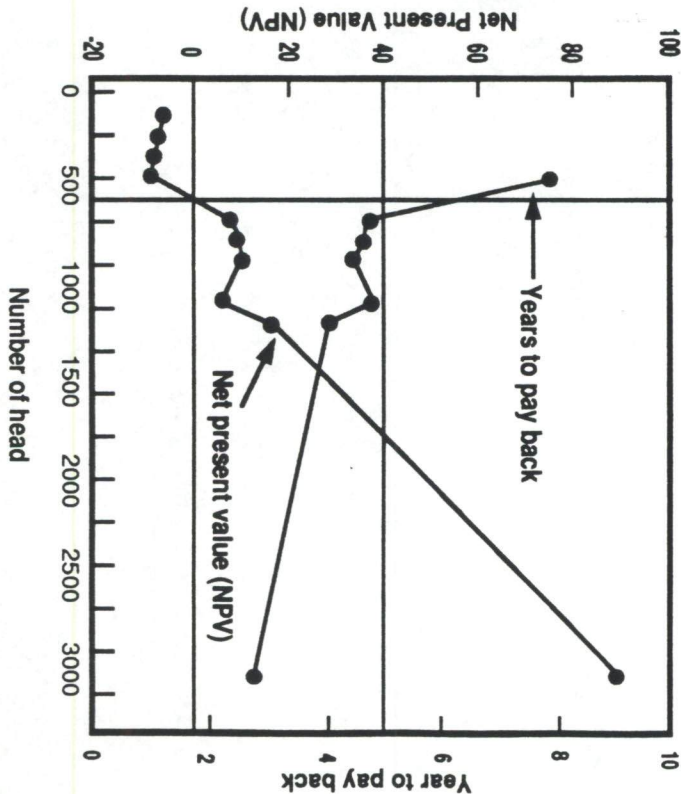


Animal Wastes: Methane Reductions



Dairy: Milking Parlor Reductions

- cost-effective at dairy farms
- 50-90% reductions possible

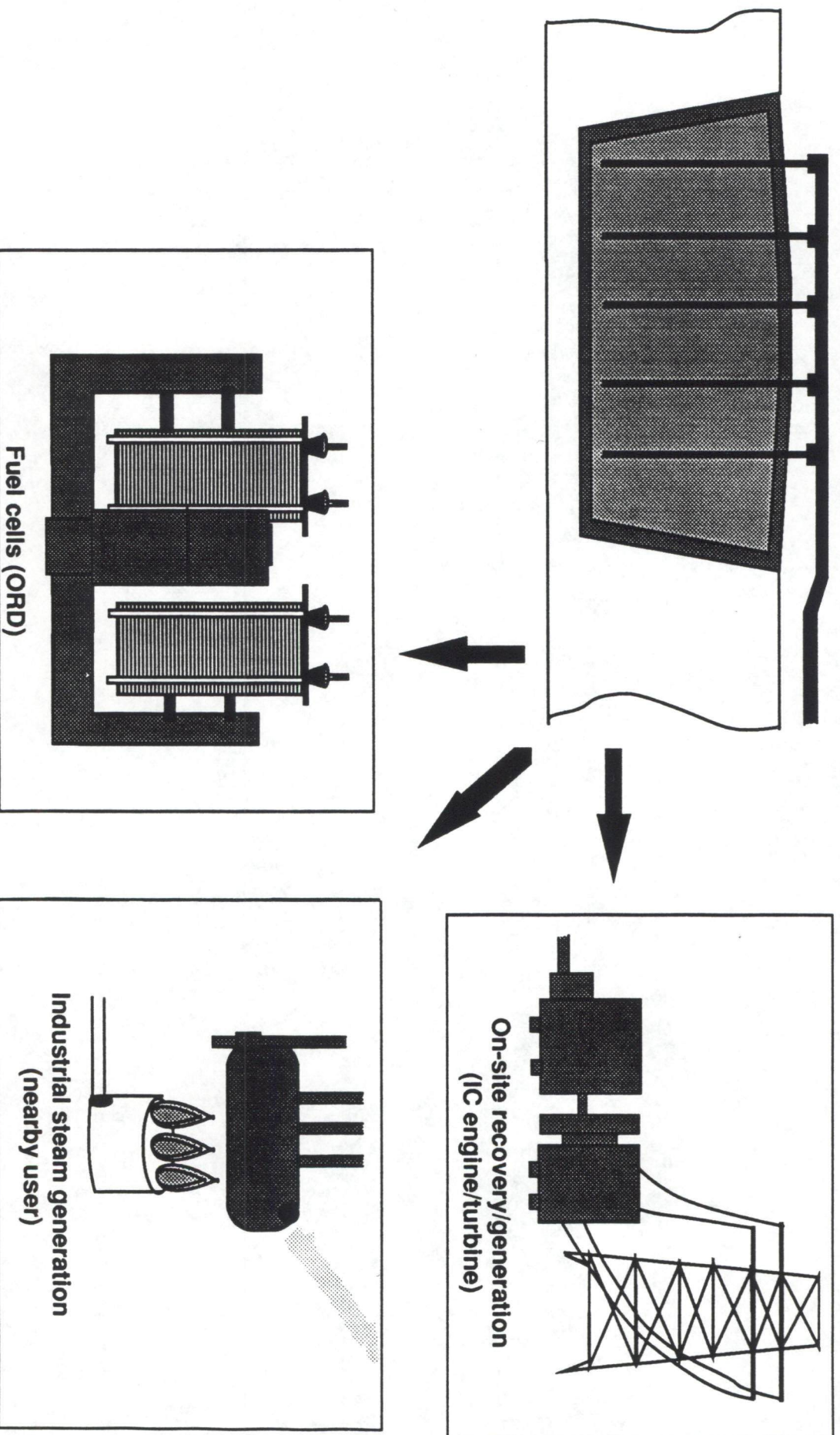


Animal Waste: Steps Underway/ Possible

- **Global emission report** → **raise interest, financing, demonstrations**
 - **Texas case study** → **financial feasibility analysis**
-
- **Enhanced R, D & D** → **demonstrations extension services**
 - **Regulatory reforms** → **analyze how to remove inhibitions**

Landfills: Reductions Cost-Effective

- U.S. emits ~ 35% of world Landfill Methane Emissions



Landfill Gas Regulations Being Proposed... Greater Stringency Justified

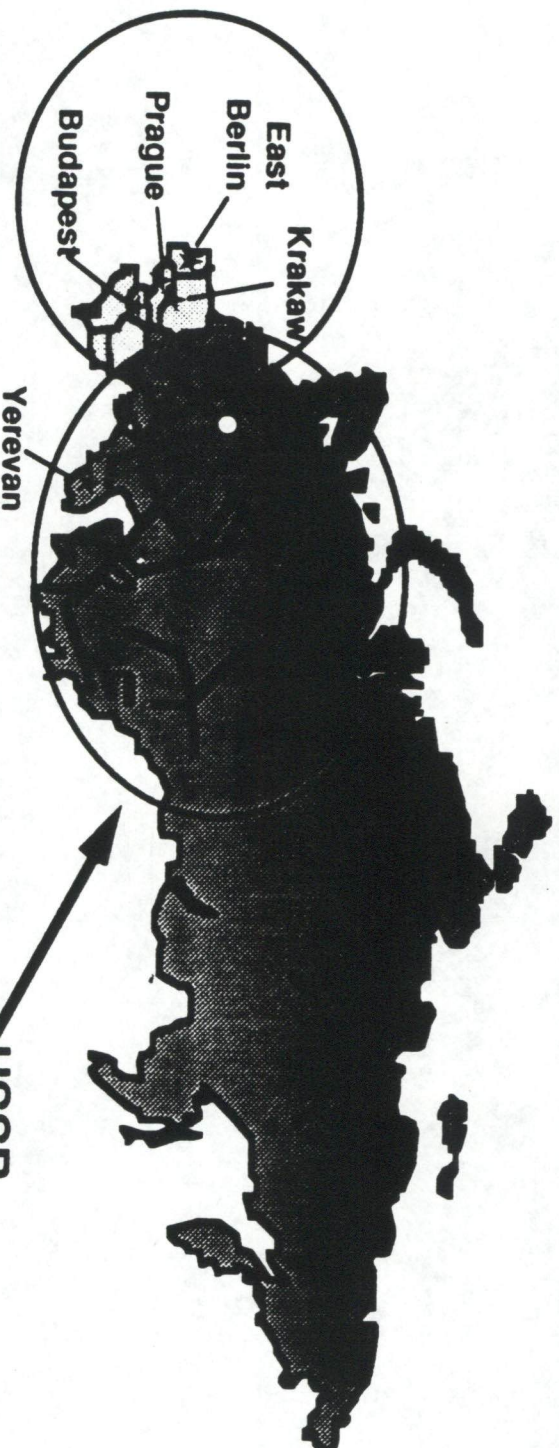
Landfills: Steps Underway

- Regulation under consideration → will reduce methane
- Analysis of cutoff limit/ways to fashion/avoided costs/ hook-up fees/ market capability → will identify range of profitable reductions
- Up to 2 teragrams at stake
- International precedent (U.S. level could reduce efforts in other nations)

Natural Gas: U.S.A.

- Paper studies indicate low emissions
- EPA/GRI study underway to validate
- Major goal of study →
To show natural
gas expansion makes
environmental sense
- If reductions available, likely to be small; industry
likely to want to do them

Natural Gas Systems: USSR and Eastern Europe



Eastern Europe

- cities with 30% higher methane concentration
- cost-effective reductions possible

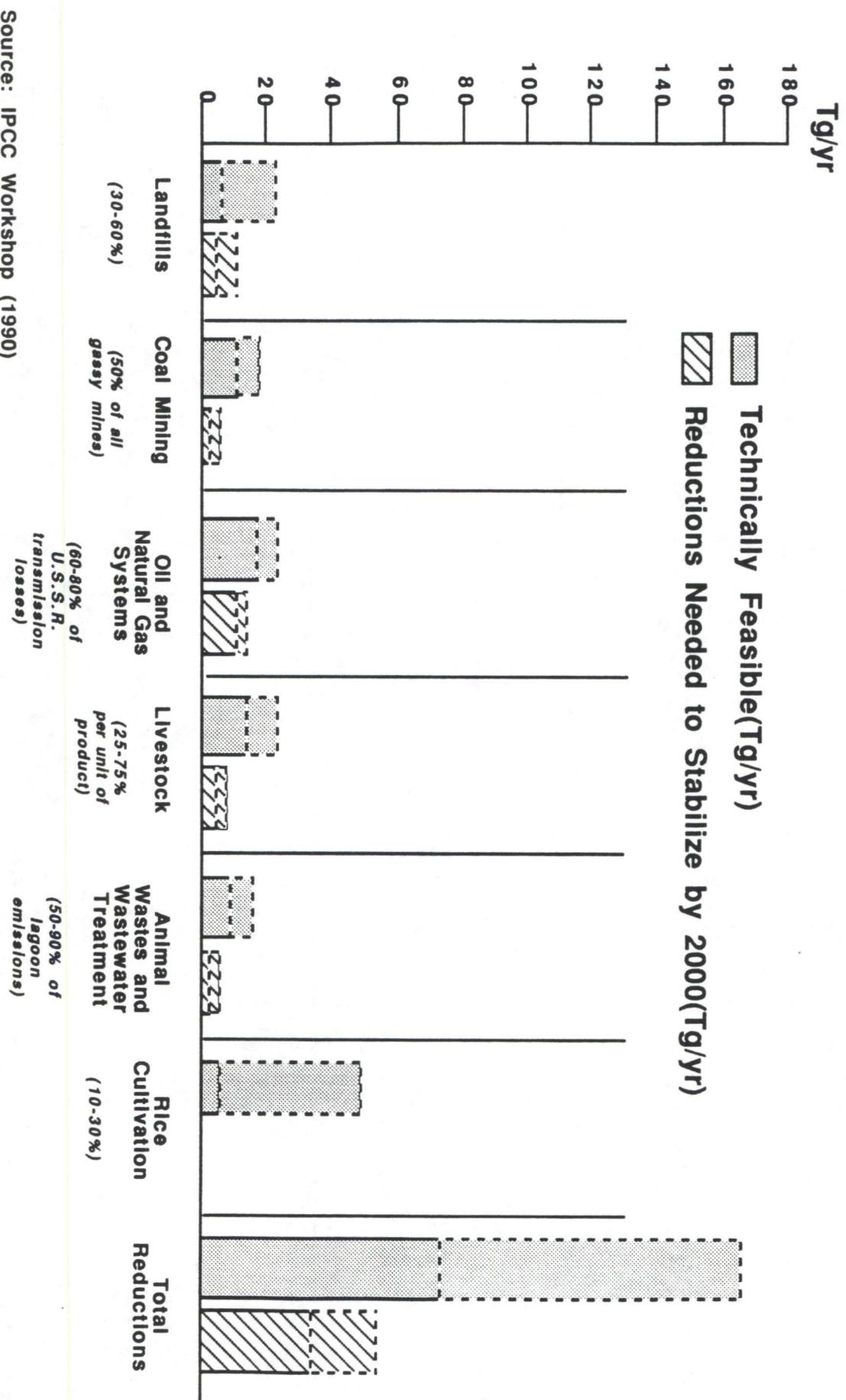
USSR

- ~30Tg leaked (6% of production)
- ~10% used for compression
- 60-80% reduction possible, largely cost-effective

Natural Gas: Steps Underway

- **Measurement study to begin** → **validate large estimates and opportunities**
- **Mission scheduled** → **begin process of selling solution/ U.S technology**
- **Informal discussions with Germans on purchase/finance** → **begin process of organizing financing/ purchase**

Options for Reductions



International Aspects of Methane Reduction Options

	 United States	 Western Europe	 Eastern Europe	 U.S.S.R.	 China	 India	 Australia
Landfills 5-15 Tg	✓	✓	✓	✓			
Animal wastes 3-10 Tg	✓	✓	✓	✓	✓		
Oil and natural gas systems 15-20 Tg			✓	✓			
Coal mining 10-15 Tg	✓		✓	✓	✓		
Livestock 3-10 Tg	✓	✓	✓	✓		✓	✓

Traditional Regulations Inappropriate

- - Sources diffuse
- - Emissions vary



day to day
season to season
site to site

- - Baselines difficult to establish
- - Monitoring untenable
- - Will alienate groups that need to work constructively

Incentives-Based Approach Desirable

Keys to Success

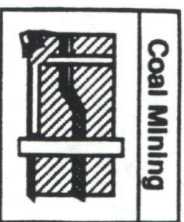
- Demonstrations that create market followers
 - Extension services for technology
 - Removal of property rights barriers
 - Coalbed methane
 - Transmission
- 
- Enhance
market
choices**
- Finance technology transfer

Importance of Continuing Science

- **Biosphere feedbacks uncertain**
- **Inventories/ Measurement techniques need improvement**
- **Resolution of uncertainties will help with reductions**

OAR/ORD/NASA/NOAA/OPPE

OAR Program: Coordination



U.S.	:	Adhoc Technical Working Group, DOE, USBM
Poland	:	U.S.AID, World Bank, Poland Ministry of Environment
China	:	Ministry of Energy, UNDP, World Bank
U.S.S.R.	:	To be developed



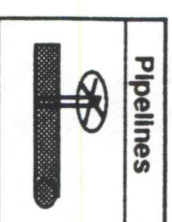
U.S.	:	USDA, National Cattlemen Association
Intn'l	:	Australia, FAO



U.S.	:	USDA, DOE, University Systems, Pork Producers Assn., Tarleton State University, Texas Water Commission, TVA
Intn'l	:	Winrock, European scientists



U.S.	:	U.S. EPA/OAR Rule
Intn'l	:	



U.S.	:	AGA, GRI, Gas Companies
	:	U.S.S.R. Environment Ministry, U.S. Corps of Engineers

Summary: Methane

- Critical part to solving global warming issue
- ORPHAN IN IPCC (EXCEPT JAPAN/EPA JOINT REPORT)
 - ➡ Must raise to own sub-group level
- No regrets efforts underway
 - ➡ Will produce results
 - ➡ OPPORTUNITIES TO DO MORE EXIST
 - redirected aid/loans
 - demonstrations
 - barrier removal
- U.S. initiative possible
 - ➡ OPPORTUNITY FOR ACTION AT A PROFIT

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
01. Resume	John W. Martin, Jr [FOIA Exemptions Redacted] (1 pp.)	n.d.	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Counsels Office, White House
Series: Holmstead, Jeffrey, Files
Subseries: Environmental Subject Files
WHORM Cat.:
File Location: Global Climate Change [3][2]

Date Closed: 2/7/2018	OA/ID Number: 45131-005
FOIA/SYS Case #: 2017-0310-F	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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- (b)(4) Release would disclose trade secrets or confidential or financial information
- (b)(6) Release would constitute a clearly unwarranted invasion of personal privacy
- (b)(7) Release would disclose information compiled for law enforcement purposes
- (b)(8) Release would disclose information concerning the regulation of financial institutions
- (b)(9) Release would disclose geological or geophysical information concerning wells

Deed of Gift Restrictions

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- C(2) Closed by statute or by the agency which originated the information
- C(3) Closed in accordance with restrictions contained in donor's deed of gift [formerly listed as only C]
- PRM. Removed as a personal record misfile

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

- P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
- P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]



Tues, 7/30
Re Clean Air
w/ Jeff

JOHN W. MARTIN, JR. (JACK)
Vice President - General Counsel
FORD MOTOR COMPANY
The American Road
Dearborn, Michigan 48121-1899
(313) 323-8268

Born Chicago, Illinois, (b)(6). A.B. History, 1958,
J.D. 1961, DePaul University.

Admitted Illinois Bar 1961; District of Columbia Bar 1962; New
York Bar 1964; Michigan Bar 1970. Attorney, Department of
Justice, 1961-62; Associate, Donovan, Leisure, Newton & Irvine,
1962-70; Ford Motor Company: Senior Attorney, 1970-72; Associate
Counsel, 1972-74; Counsel, 1974-76; Associate General Counsel,
1976-89; Vice President - General Counsel, 1989-.

Various scholastic honors in college and law school. Speaker at
continuing education seminars and similar forums, including The
Conference Board, the Practicing Law Institute and American Bar
Association meetings. Service on committees of the Antitrust
Section of the American Bar Association and the U.S. Chamber of
Commerce. Member, The American Law Institute, ABA Committee on
Corporate Law Departments, The Association of General Counsel;
Chairman, Pro Bono Subcommittee of the Senior Justice Committee
of the State Bar of Michigan, Michigan Selection Committee for
Rhodes Scholarships; Director and President, The Center for
Social Gerontology, Inc.; Commissioner, American Bar Association
Commission on Legal Problems of the Elderly; Member, Marshall M.
Fredericks Sculpture Gallery Advisory Board; Trustee, Ford Motor
Company Fund.

Residences:

(b)(6)

Spouse: Joanne Cross Martin

Children: Amanda Hayes Martin
Bartholomew McGuire Martin

91-125.

Limiting the greenhouse effect of CFCs, halons and H(C)FCs.

Carolien Kroeze
Interfaculty Department of Environmental Science
Plantage Muidergracht 14
1018 TV Amsterdam
The Netherlands

(Presented at Air & Waste
Management Ass'n annual
meeting, Vancouver B.C.,
June 20, 1991)

91-125.5

ABSTRACT

Chlorofluorocarbons (CFCs) and chlorobromocarbons (halons) contribute to the deterioration of the ozone layer and the greenhouse effect. Use of CFCs will be restricted in the near future, according to the 1990 London agreement. Hydro(chloro)fluorocarbons, H(C)FCs, are expected to partially replace CFCs.

Using a 0-dimensional computer model, temperature forcing by halocarbons up to 2100 is calculated, assuming different consumption scenarios.

Results indicate that the London agreement is no guarantee for stabilization of global warming by halocarbons. By 2100 equilibrium warming by halocarbons may amount to 0.38-0.75 °C, when H(C)FCs are used unrestrictedly to replace CFCs and halons. Better housekeeping, recycling and destruction of halocarbon wastes are found to reduce this warming by 40% at most. A phase out of HCFCs by 2035, meant to protect the ozone layer, could increase the warming by 55% in case HFCs are used to replace the HCFCs.

Major contributors to future warming by halocarbons are found to be H(C)FCs having a relatively high Global Warming Potential (HCFC-22 and -142b, HFC-125, -134a and -143a) used in applications where emissions are to a large extent unavoidable. If these H(C)FCs are not used in cases where emissions are largely unavoidable and extensive emission control is implemented, long term climatic impact of halocarbons may approach the present impact.

1 INTRODUCTION

Deterioration of the ozone layer is caused mainly by emissions of man made chlorofluorocarbons (CFCs) and chlorobromocarbons (halons)¹. Against this background last summer in London most CFC and halon producing countries agreed on a strengthening of the Montreal Protocol². The resulting London agreement³ includes a virtual phase out of fully halogenated CFCs and halons before the end of this century.

Hydro(chloro)fluorocarbons (HCFCs and HFCs), that are less of a threat to the ozone layer, are expected to replace partially the fully halogenated CFCs and halons. HFCs are compounds having no Ozone Depleting Potential. The chlorine containing HCFCs, however, are still a potential threat to the ozone layer, albeit much less than CFCs and halons. Therefore, in a non-binding resolution, some partners of the Montreal Protocol call for a HCFC phase out by 2030 in order to protect the ozone layer.

Another halocarbon related environmental problem is the enhancement of the greenhouse effect. The temperature of the earth is expected to increase by 0.3 °C per decade during the next century due to emissions of radiatively active 'greenhouse' gases, when current trends continue⁴. 13% of radiative forcing in 1990 was caused by CFCs⁵. Assuming that the earth's surface temperature already increased by 0.6 °C since the start of the industrial revolution, current warming by halocarbons probably does not exceed 0.08 °C.

This study focusses on future warming by CFCs, halons and H(C)FCs, considering several consumption scenarios. Firstly future warming by halocarbons is calculated, assuming that all H(C)FCs currently under development are to be used as CFC and halon replacements. Secondly, climatic implications of a HCFC phase out by 2035, meant to protect the ozone layer is studied. Thirdly, the impact of emission control (better housekeeping, recycling and destruction of halocarbon wastes) on future warming is investigated. It will become apparent that emission control alone will not stabilize the radiative impact of halocarbons at or near its present level. A more preventive approach emphasizing judicious choice of CFC substitutes is necessary to stabilize radiative impact at or near its present level.

2 METHOD

2.1 Model description

The computer model used is described in detail elsewhere⁷. In short, it calculates the equilibrium temperature increase by halocarbons annually, between 1990 and 2100, concerning different consumption scenarios. Figure I shows a schematic representation of the model. The halocarbons considered are CFC-11, -12, -113, -114, -115, halon 1211 and 1301, and the halocarbon substitutes HCFC-22, -123, -134, -141b, -142b and HFC-125, -134a, -143a, 152a. Uses of the halocarbons considered are in aerosols, in cleaning/drying, for blowing open and closed foam, in mobile air conditioning, in refrigeration, as fire extinguisher and in other appliances. Table 1 shows the expected use of H(C)FCs to replace CFCs and halons in case H(C)FCs are to be used unrestrictedly.

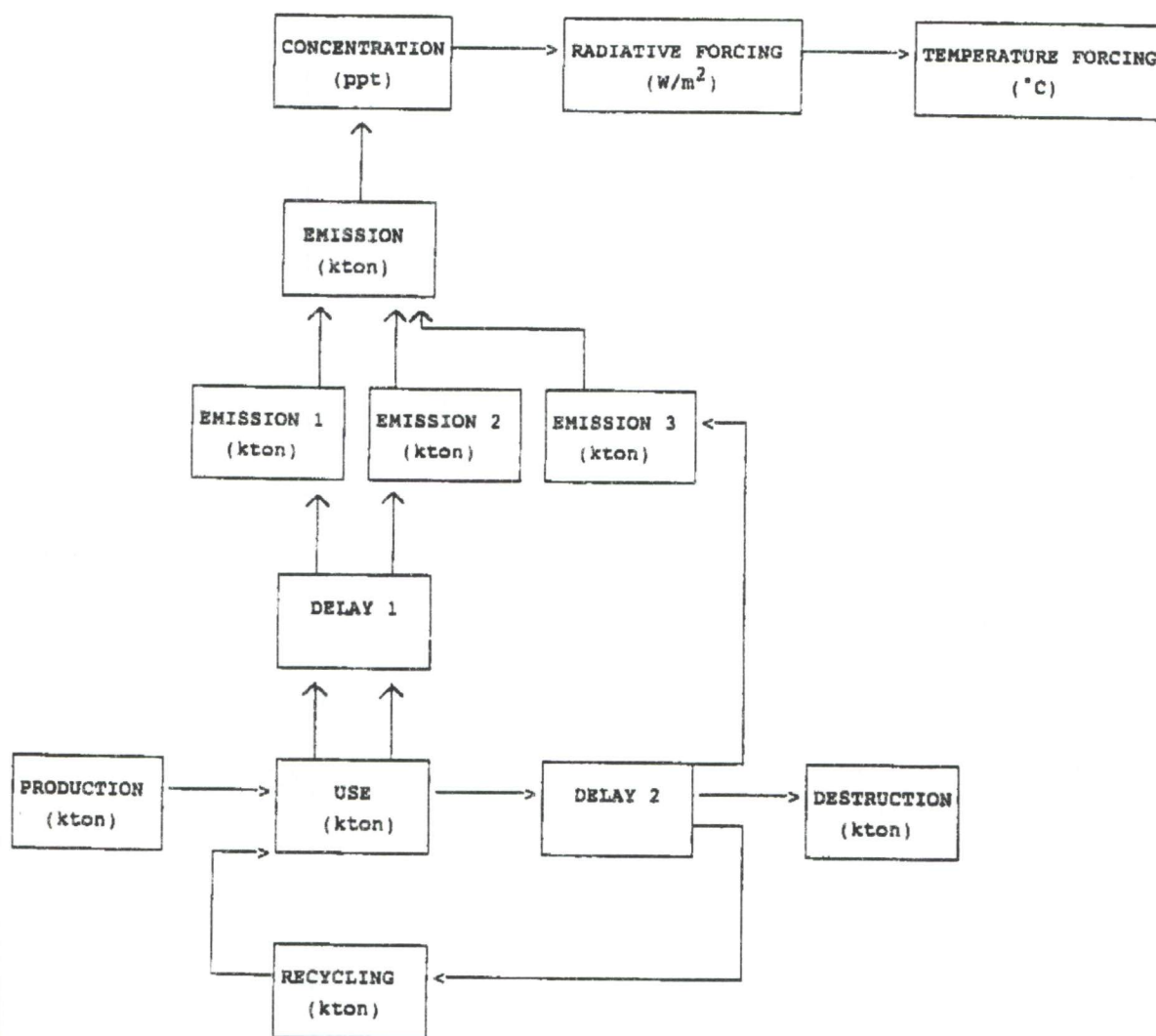
Based on Global Warming Potential (GWP), H(C)FCs can be divided into two groups. Class I H(C)FCs have a GWP that is more than 10% of the GWP of CFC-11 and Class II H(C)FCs have a GWP that is less than 10% of the GWP of CFC-11. Class I H(C)FCs are: HCFC-22, HCFC-142b, HFC-125, HFC-134a and HFC-143a. Class II H(C)FCs are HCFC-123, HCFC-124, HCFC-141b and HFC-152a⁸.

Table 1 Expected substitution of CFCs and halons by H(C)FCs⁶.

	CFC-11	CFC-12	CFC-113	CFC-114	CFC-115	halon 1211	halon 1301
aerosol	HCFC-22 HCFC-142b HFC-152a HFC-125* HFC-134a* HFC-143a*	HCFC-22 HCFC-142b HFC-152a HFC-125* HFC-134a* HFC-143a*	-	-	-	-	-
open foam	HCFC-123 HCFC-141b	HCFC-22 HCFC-141b HCFC-123	-	-	-	-	-
closed foam	HCFC-123 HCFC-141b	HCFC-22 HCFC-142b HFC-134a	HCFC-124 HCFC-142b	HCFC-124 HCFC-142b	-	-	-
cleaning/drying	-	-	HCFC-123 HCFC-141b	-	-	-	-
refrigeration/air conditioning	HCFC-123	HCFC-22 HCFC-124 HFC-134a HFC-152a HFC-125* HFC-143a*	-	HCFC-22	HCFC-22 HFC-125	-	-
fire extinguisher	-	-	-	-	-	HCFC-123	HFC-125

* Long term substitutes

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- Emission 1: Emission as result of halocarbon use that is avoidable by better housekeeping. Emission 1 takes place in the year of production (without delay) or during use (via delay 1).
- Emission 2: Emission as result of halocarbon use that is neither avoidable by better housekeeping, nor available for destruction or recycling after use. Emission 2 takes place in the year of production (without delay) or during use (via delay 1).
- Emission 3: Emission as result of halocarbon use that is not avoidable by better housekeeping, but available for destruction or recycling after use. Emission 3 takes place after use (via delay 2).

Figure I Schematic representation of the model.

2.2 Scenario description

All scenarios are based on the 1990 London agreement to strengthen the Montreal Protocol. Therefore the use of fully halogenated CFCs and halons is nearly phased out by the year 2000 in all scenarios.

The expected use of CFCs, halons and HCFC-22 in 1990 is estimated to amount to 1280 kton/year (not including 60 kton HCFC-22 that is used to replace CFCs). During the next century total annual use of CFCs and halons is assumed to stabilize at 33 kton.

To investigate the impact of emission reductions on temperature forcing, two types of emission reducing measures are distinguished. Firstly, the reduction of emissions 1 and 3 (see Figure I) by better housekeeping, and by recycling and destruction of halocarbons are investigated in scenarios A, B and C. Secondly, in scenarios 1, 2, 3, 4 and 5 the choice of H(C)FCs to replace CFCs is varied, whereas scenario 6 assumes a rapid phase out of all halocarbons studied.

Calculations are performed for scenarios 1A, 1B, 1C, 2A, 3A, 4A, 5C and 6C. The main characteristics of the scenarios are:

Scenario A: no emission controls.

Scenario B: emission 1 and 3 (see Figure I) are reduced by 50%.

Scenario C: emission 1 and 3 (see Figure I) are reduced by 90%.

Scenario 1: this scenario is describing H(C)FC use in the future based on the present trends, assuming that all nine H(C)FCs considered are allowed to replace CFCs and halons during the next century. This results in a 36-42% substitution of the 'current trend' (before the Montreal Protocol) CFC and halon use by H(C)FCs during the next century. The H(C)FCs involved as substitutes in specific applications are given in Table 1.

Scenario 2: the difference between this scenario and scenario 1 is a phase out of HCFCs by 2035; from 2025 HCFC production is decreasing in this scenario. In scenario 2 is assumed that there will be no HFCs replacing HCFCs.

Scenario 3: as scenario 2, except that the following HFCs are replacing all HCFCs after the phase out: HFC-125 (25% per application), HFC-134a (25% per application), HFC-143a (25% per application) and HFC-152a (25% per application). An exception is made for fire extinguishers, for which only HFC-125 is used to replace HCFCs, because some other HFCs considered are too flammable.

Scenario 4: as scenario 2, except that the relatively long living HFC-143a is replacing all HCFCs after the phase out, again except in the case of fire extinguisher, where only HFC-125 is used to replace HCFCs.

Scenario 5: Class I H(C)FCs are not used to replace CFCs and halons in this scenario, and no Class II H(C)FCs are used to replace the Class I H(C)FCs. Use of HCFC-22 is stopped from 1993. H(C)FCs are not used for open foam production in this scenario because non-H(C)FC substitutes are widely available for this application.

Scenario 6: no H(C)FCs are used to replace CFCs and halons. Use of HCFC-22 is stopped from 1993.

Equilibrium temperature increase by halocarbons is depending on the sensitivity of the climate to radiative forcing. Climate sensitivity (S) is the equilibrium temperature increase (°C) due to a doubling of atmospheric CO₂ concentrations. In this study equilibrium warming is calculated for two climate sensitivities, S = 2 and S = 4 (Figure II and VII).

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3 RESULTS

3.1 Scenario 1A.

Scenario 1A describes the situation where all nine H(C)FCs considered are to be used as substitutes for CFCs and halons while no emission control is implemented. Total halocarbon use is calculated to amount to 5944 kton/year by 2100 in this scenario, of which 70% are calculated to be Class I H(C)FCs. Most widely used are HCFC-22 (1520 kton/year), HFC-134a (1693 kton/year), HCFC-123 (997 kton/year) and HCFC-141b (675 kton/year) by 2100.

Figure II shows that annual emissions of all halocarbons considered are calculated to amount to 5562 kton by 2100 in scenario 1A. Halocarbons are found to be emitted mainly from refrigeration (2178 kton), mobile airconditioning (1269 kton) and cleaning/drying (660 kton).

Equilibrium temperature increase due to halocarbons is calculated to amount to 0.38-0.75 °C by 2100 in scenario 1A. Figure IIIa shows that 72% of this warming is caused by halocarbon emissions from refrigeration and mobile airconditioning by 2100. Furthermore, Class I H(C)FCs, especially HCFC-22 and HFC-134a, are calculated to contribute by 79% to future warming (Figure IIIb).

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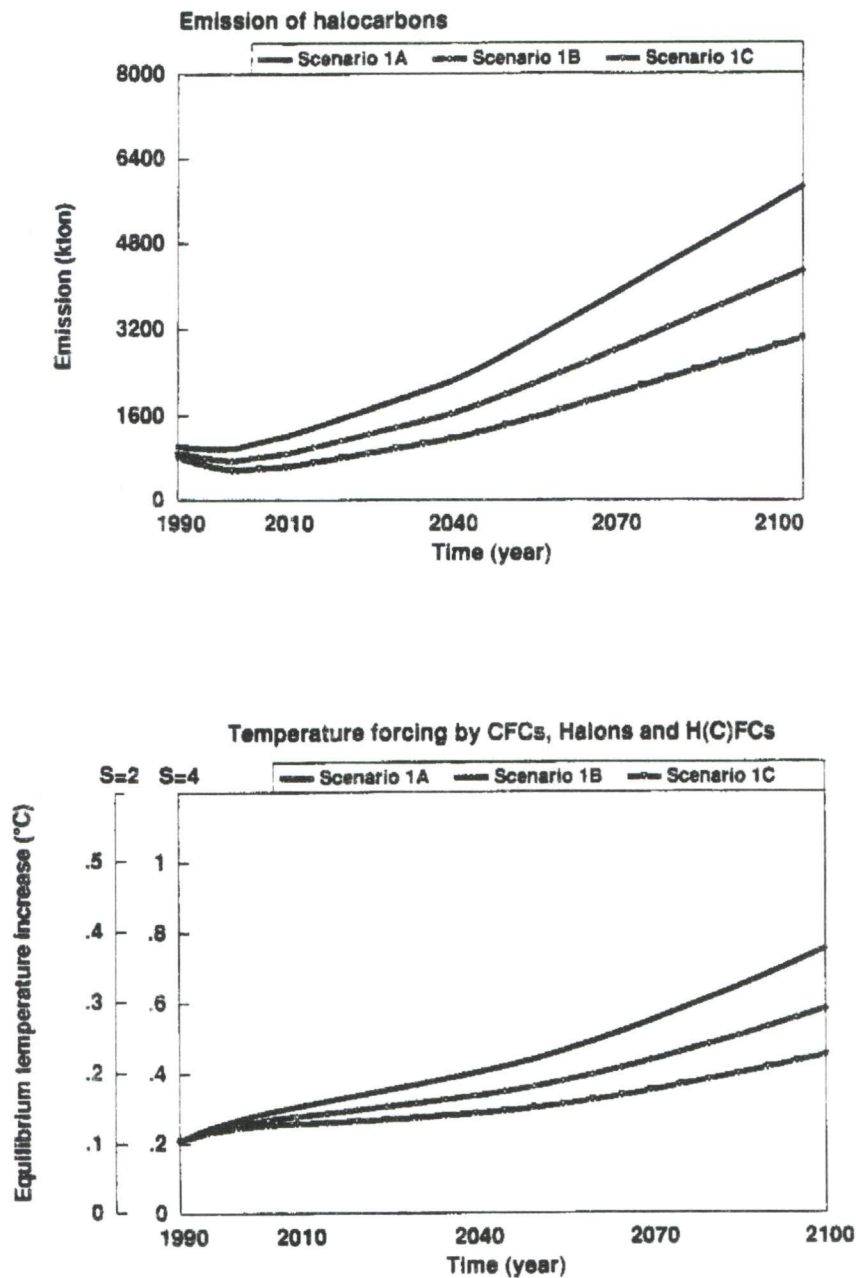


Figure II Emission of halocarbons (kton) and equilibrium temperature increase by halocarbons (°C) as calculated for scenarios 1A, 1B and 1C where all H(C)FCs considered are used to replace CFCs and halons. In scenario 1A emissions are not reduced. In scenario 1B emission 1 and 3, shown in Figure I, are reduced by 50%, and in scenario 1C by 90%.

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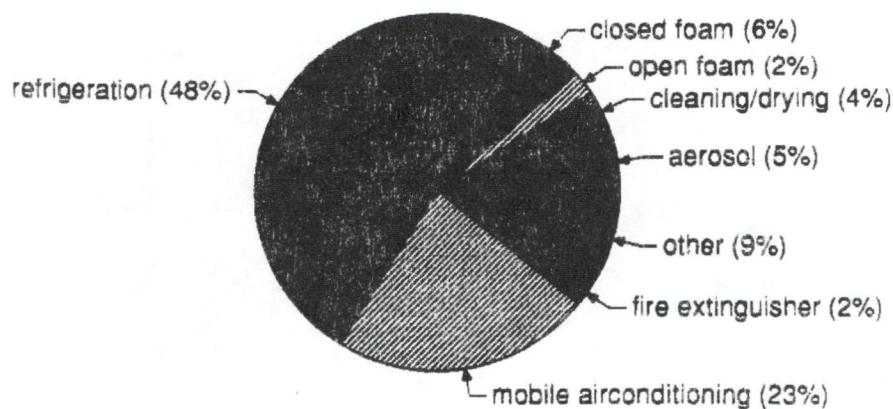


Figure IIIa Share of equilibrium temperature increase by halocarbons (CFCs, halons and H(C)FCs) by application in total halocarbon warming gas calculated for the scenario where all H(C)FCs considered are to be used unrestrictedly to replace CFCs and halons (scenario 1A) in 2100.

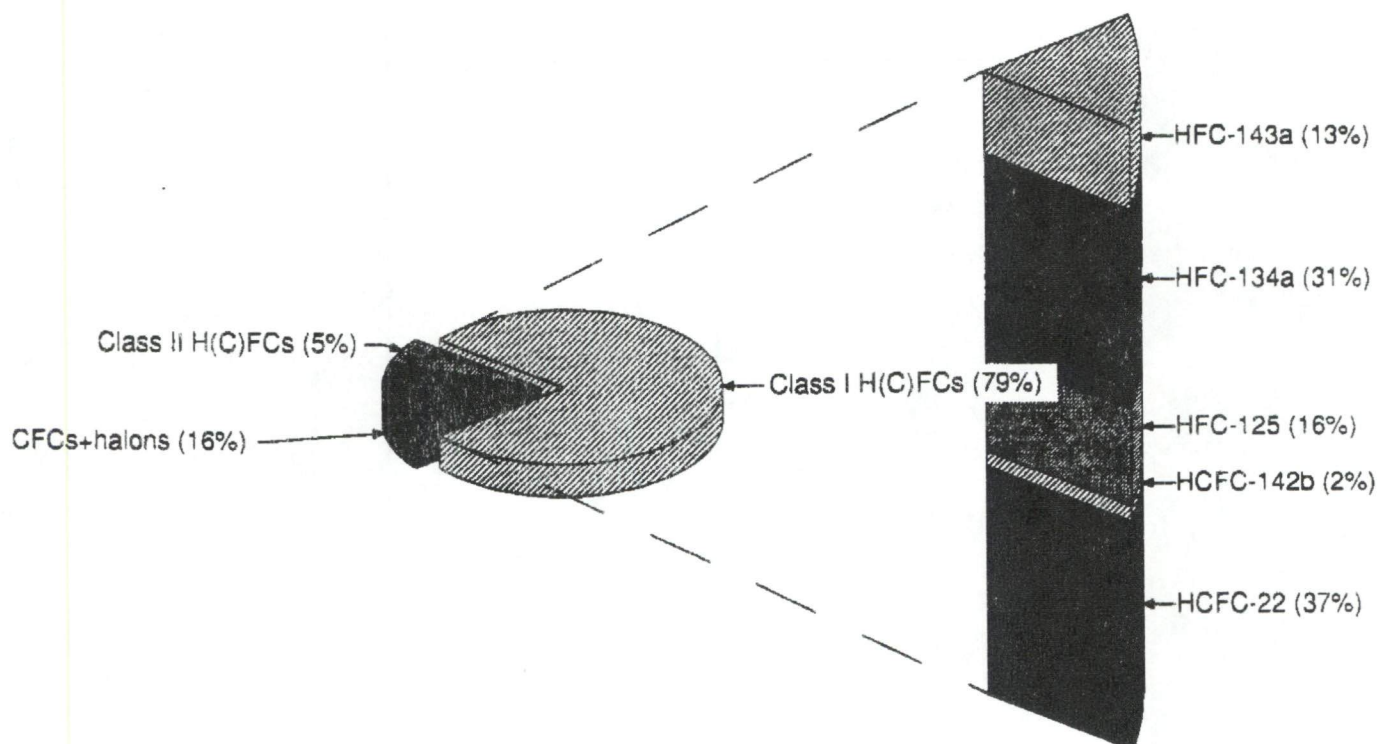


Figure IIIb Share of equilibrium temperature increase by specific halocarbons and groups of halocarbons as calculated for the scenario where all H(C)FCs considered are to be used unrestrictedly to replace CFCs and halons (scenario 1A) in 2100.

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3.2 Scenarios A, B and C.

Scenarios A, B and C describe different modes of emission control. Figure II shows that strongly improved emission control, as simulated in scenario 1C could reduce overall emissions by 48% and temperature forcing by 40% relative to scenario 1A, where all H(C)FCs considered are to be used unrestrictedly. Effects of emission reducing measures are found to differ per application, and therefore per halocarbon. Table 2 shows that in scenario 1C emissions of Class I H(C)FCs are reduced by 43% and of Class II H(C)FCs by 61% relative to scenario 1A.

As shown above, refrigeration, mobile airconditioning and cleaning/drying are calculated to be major contributors to total halocarbon emissions during the next century in scenario 1A.

Refrigeration (Figure IV). CFCs currently used in refrigeration, are expected to be replaced by several H(C)FCs, especially Class I H(C)FCs. Total emissions from refrigeration, amounting to 2178 kton/year by 2100 in scenario 1A, are calculated to be reduced by 44% to 1225 kton/year by extensive emission control (scenario 1C). Figure IVb shows that future emissions from refrigeration will mainly involve HCFC-22, HFC-134a, HFC-143a and HFC-125 in the scenarios where all H(C)FCs are to be used (scenario 1).

Mobile airconditioning (Figure V). The present cooling agent in mobile airconditioning, CFC-12, is expected to be replaced by HFC-134a during the coming century. By 2100 halocarbon emissions from this application are calculated to amount to 1269 kton annually in scenario 1A (Figure Vb). Strongly improved emission control as simulated in scenario 1C may reduce emissions from mobile airconditioning by 30% to 891 kton/year by 2100 (Figure Va).

Cleaning/drying (Figure VI). CFCs used in cleaning/drying are expected to be replaced mainly (75%) by non-H(C)FCs. The remaining 25% is assumed to be replaced by HCFC-123 and HCFC-141b, both Class II H(C)FCs. Calculated emissions from cleaning/drying amount to 660 kton/year by 2100 in scenario 1A. Strongly improved emission control may reduce these emissions by 80% to 131 kton/year in scenario 1C.

Halocarbons used in aerosols, as blowing agents, fire extinguisher and in other applications are calculated to cause 26% of total emissions in scenario 1A during the next century. Better housekeeping, recycling and destruction are found to have varying effects on total emissions for these applications. For instance when used in aerosols, emissions are virtually non-reducible by emission control. On the other hand emissions from fire extinguishers may be reduced by 67% in scenario 1C relative to scenario 1A.

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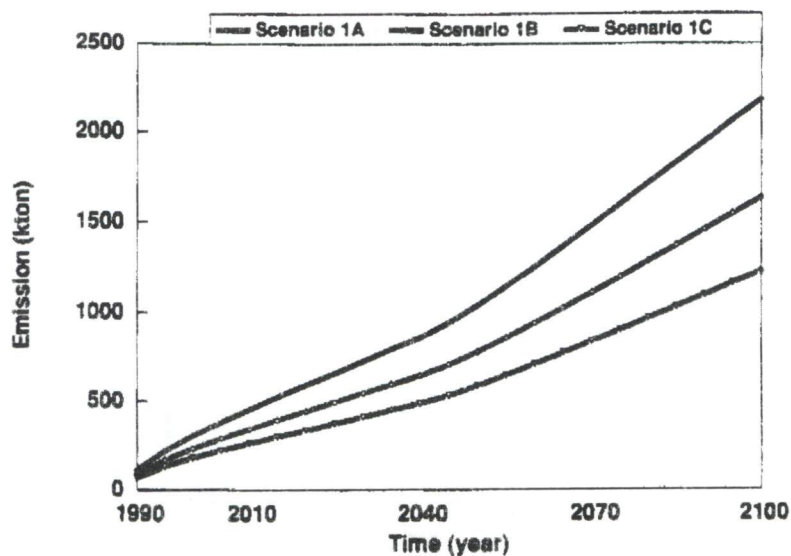


Figure IVa Emission of halocarbons (kton) from refrigeration as calculated for scenarios 1A, 1B and 1C where all H(C)FCs considered are used to replace CFCs and halons. In scenario 1A emissions are not reduced by adding emission controls. In scenario 1B emission 1 and 3, shown in Figure I, are reduced by 50%, and in scenario 1C by 90%.

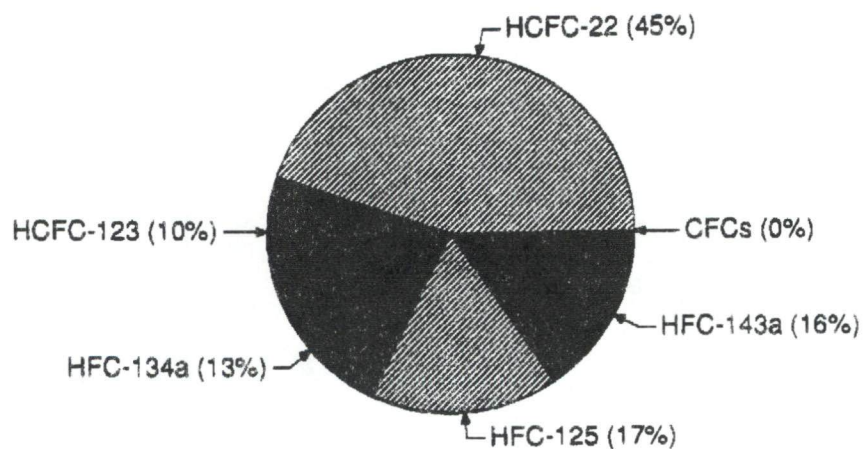


Figure IVb Share of emission from refrigeration by specific halocarbons in 2100 as calculated for the scenarios where all H(C)FCs are used to replace CFCs and halons (scenario 1). From 2000 these percentages are more or less constant.

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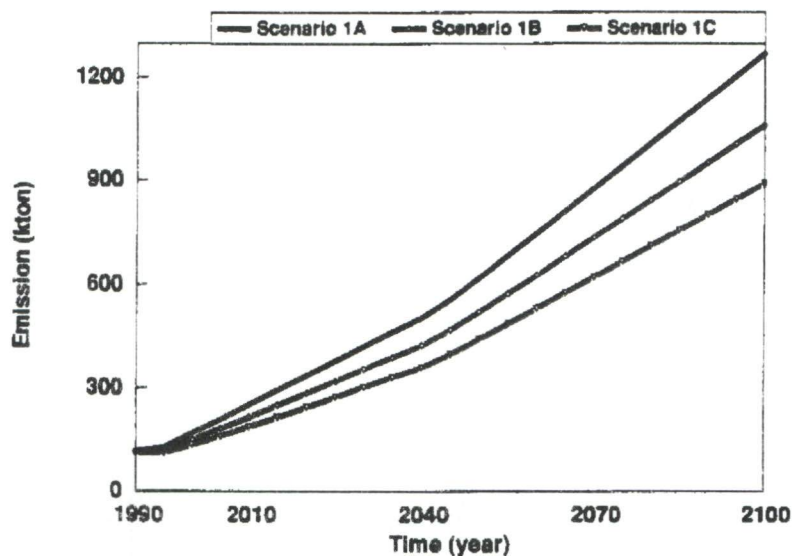


Figure Va Emission of halocarbons (kton) from mobile airconditioning as calculated for scenarios 1A, 1B and 1C where all H(C)FCs considered are used to replace CFCs and halons. In scenario 1A emissions are not reduced by adding emission controls. In scenario 1B emission 1 and 3, shown in Figure I, are reduced by 50%, and in scenario 1C by 90%.

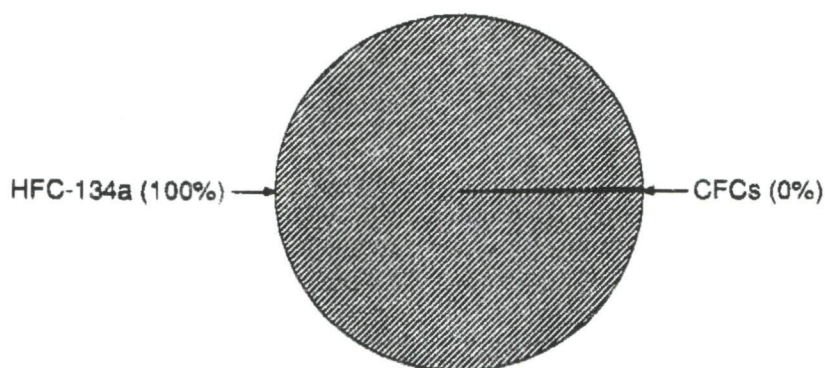


Figure Vb Share of emission from mobile airconditioning by specific halocarbons in 2100 as calculated for the scenarios where all H(C)FCs are used to replace CFCs and halons (scenario 1). From 2000 these percentages are more or less constant.

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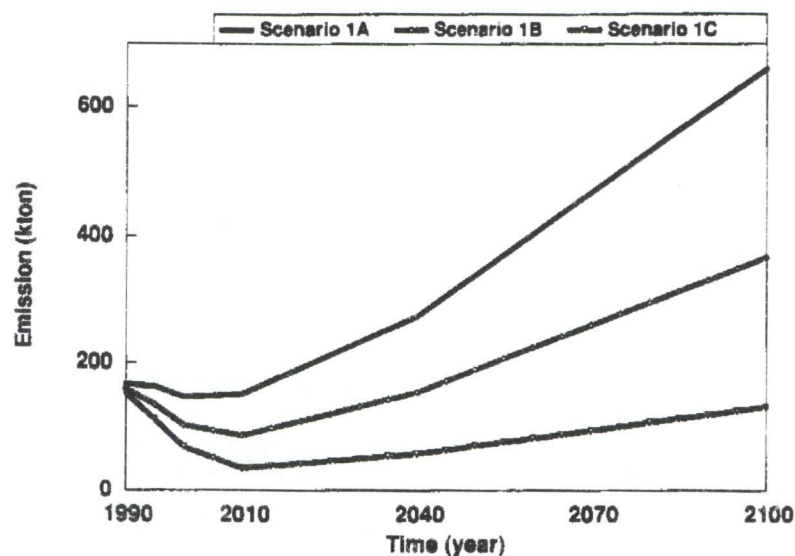


Figure VIa Emission of halocarbons (kton) from cleaning/drying as calculated for scenarios 1A, 1B and 1C where all H(C)FCs considered are used to replace CFCs and halons. In scenario 1A emissions are not reduced by adding emission controls. In scenario 1B emission 1 and 3, shown in Figure I, are reduced by 50%, and in scenario 1C by 90%.

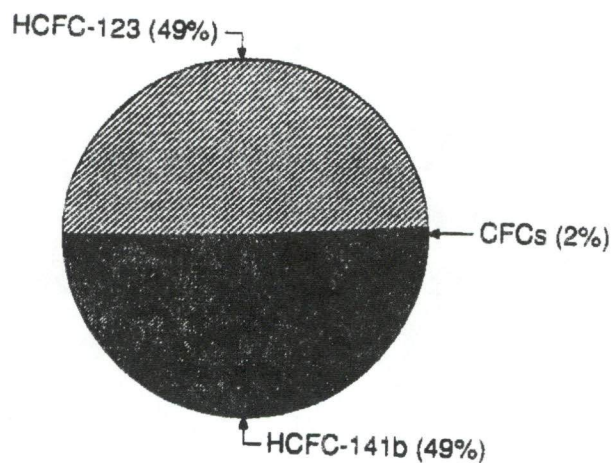


Figure VIb Share of emission from cleaning/drying by specific halocarbons in 2100 as calculated for the scenarios where all H(C)FCs are used to replace CFCs and halons (scenario 1). From 2000 these percentages are more or less constant.

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Table 2 Equilibrium temperature increase by halocarbons in 2100 (°C) and emission of halocarbons and groups of halocarbons (kton) as calculated for scenarios 1A, 1B and 1C where all H(C)FCs considered are used to replace CFCs and halons. In scenario 1A emissions are not reduced. In scenario 1B emission 1 and 3, shown in Figure I, are reduced by 50%, and in scenario 1C by 90%.

	Scenario 1A	Scenario 1B	Scenario 1C
Equilibrium warming in 2100	0.38-0.75	0.29-0.58	0.22-0.45
Total emission of halocarbons	5562	4052	2878
Emission of Class I H(C)FCs	3896	2946	2215
Emission of Class II H(C)FCs	1632	1077	636

3.3 Scenario 2, 3, 4, 5 and 6.

Scenarios 2, 3 and 4 simulate a phase out of HCFCs by 2035. In case HFCs do not replace HCFCs after HCFC phase out (scenario 2A) total halocarbon use is calculated to amount to 2625 kton/year, and total emission to 2461 kton/year by 2100. In scenarios 3A and 4A total use and emission equal those in scenario 1A, because all HCFCs are assumed to be replaced by HFCs (scenario 3A) or by HFC-143a (scenario 4A). From Figure VII is clear that after a phase out of HCFCs the calculated equilibrium warming may amount to 0.24-0.48 °C (scenario 2A), 0.46-0.93 °C (scenario 3A), or 0.58-1.16 °C (scenario 4A) by 2100. When HFCs are to replace HCFCs after a phase out calculated equilibrium warming may be 55% (scenario 4A) higher by 2100 than in scenario 1A.

In scenario 5C only Class II H(C)FCs are used, no H(C)FCs are used for open foam, and extensive emission control is implemented. By phasing out Class I H(C)FCs the use of halocarbon coolants is reduced to 207 kton/year in refrigeration by 2100, while in mobile airconditioning no H(C)FCs are used. Half of the H(C)FCs used are blowing agents. Total halocarbon emissions in scenario 5C are calculated to amount to 592 kton/year by 2100, resulting in an equilibrium warming of 0.06-0.12 °C.

When no H(C)FCs are used at all, as simulated in scenario 6C equilibrium temperature is calculated to amount to 0.05-0.10 °C at the end of the next century.

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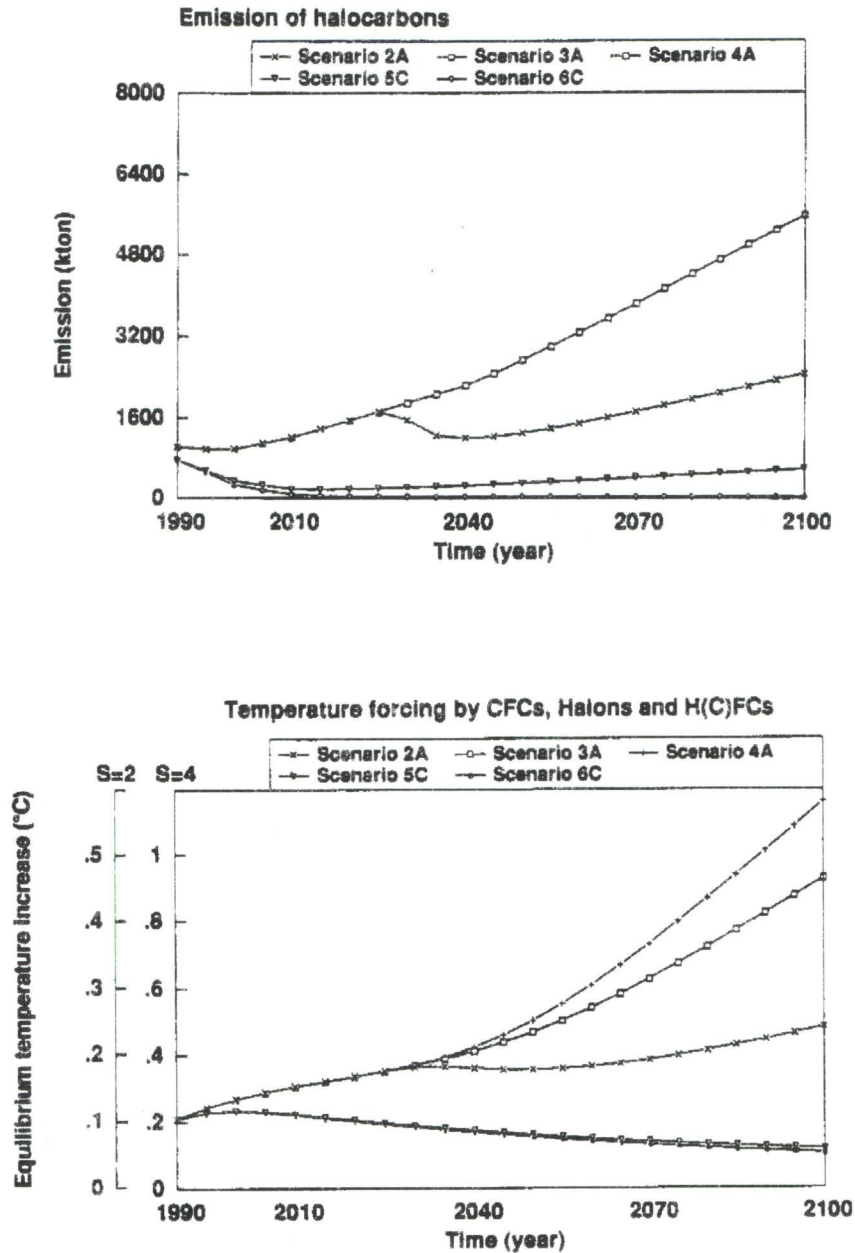


Figure VII Emission of halocarbons (kton) and equilibrium temperature increase by halocarbons (°C) as calculated for scenarios 2A, 3A, 4A, 5C and 6C where all H(C)FCs considered are used to replace CFCs and halons. In scenario 1A emissions are not reduced by adding emission controls. In scenario 1B emission 1 and 3, shown in Figure I, are reduced by 50%, and in scenario 1C by 90%.

4 CONCLUSION AND DISCUSSION

Current warming by halocarbons is caused mainly by the fully halogenated CFCs. The 1990 atmospheric concentrations of halocarbons are calculated to result in an equilibrium warming amounting to 0.10-0.21 °C and an actual warming not higher than 0.08 °C. Unrestricted use of H(C)FCs to replace CFCs and halons is calculated to increase halocarbon emissions up to 5562 kton by 2100, resulting in 0.38-0.75 °C equilibrium warming. This warming exceeds both current equilibrium warming and actual warming. A HCFC phase out by 2035 as meant to protect the ozone layer could increase the warming by halocarbons by 55% relative to scenario 1A, in case Class I HFCs are to replace HCFCs from 2035.

Cooling appliances, refrigeration and automotive airconditioning, are expected to be major contributors to future warming by halocarbons. Furthermore, temperature forcing by 2100 is mainly associated with Class I H(C)FCs, especially HCFC-22 and HFC-134a. It is also clear that emission control by better housekeeping, recycling and destruction alone cannot be expected to stabilize climatic impact of halocarbons at its present level. Emissions are found to be reduced by 48% and future equilibrium warming by 40% at most as result of strongly improved emission control. Furthermore emissions of Class II H(C)FCs are found to be reduced more than emissions of Class I H(C)FCs. For instance emissions from cleaning/drying are calculated to be reduced by 80% in scenario 1C relative to scenario 1A. Future cleaning agents are expected to be Class II HCFCs-123 and -141b, so that considerable emission reductions for cleaning substitutes have only moderate impact on global warming. Emissions from cooling appliances, mainly Class I H(C)FCs, are found to be reduced much less by emission control. This then means that judicious choice of H(C)FCs and their applications is a necessary ingredient in a policy aimed at stabilization of radiative forcing by halocarbons at or near its present level. This is illustrated by scenarios 5C and 6C. In these scenarios where Class I H(C)FCs are not used, and extensive emission control is implemented, future warming approaches stabilization of halocarbon warming at its current level (0.08 °C). Thus it can be argued that there is a case to avoid use of Class I H(C)FCs in applications where emissions are to a large extent unavoidable.

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May 6, 1991

TO: Dan Reifsnyder
State/OES/Global Change

FROM: Jonathan Wiener

SUBJECT: Comments on UK climate papers

Thank you for the opportunity to review the UK's two recent papers on climate, the "UK Paper on Comprehensive Approach -- Contribution to EC Discussion," and the "Participation of Developing Countries -- A Framework for Discussion." In preparation for your office's oral conversation with UK officials regarding these papers, I have the following suggestions.¹

"UK Paper on Comprehensive Approach"

1. We are delighted that the UK now agrees with us that a comprehensive approach is the better strategy on environmental grounds, and that each nation needs the flexibility to design its best policy in light of its unique social and economic circumstances.

But the UK paper limits its own adoption of a comprehensive approach. Our main strategy should be to show interest and appreciation, without agreeing to the UK's limited view of a comprehensive approach, and pull the UK and the EC toward agreement on a full comprehensive approach.

2. We agree with the UK paper that a comprehensive approach offers a design for a climate agreement, but does not itself specify the goal. The goal could be framed in terms of national strategies or otherwise; that is a subject for serious cost-benefit analysis and for the negotiations (and not for the UK or the EC to dictate).

3. In any event, any goal or parameter for national strategies (or other action) should be stated in terms of the variable of environmental interest, net greenhouse gas (GHG) emissions (weighted by an appropriate index). The UK paper occasionally

¹ If you intend to deliver written comments (which I am not recommending here), we would want to provide you with more detailed line-by-line criticisms, and with written elements of a counteroffer. Further, we expect any such counteroffer would have to receive Bromley Group consideration.

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strays into advocating separate treatment of each GHG (see, e.g., paragraph 8 ("exposure of the plans for each individual gas")).

We should strenuously oppose any attempt to divide up a purported comprehensive approach into several separate gas-by-gas international legal instruments. That route would accrue the disadvantages of a piecemeal approach without the advantages of a comprehensive approach. (a) It would provide no flexibility to nations to assemble their chosen portfolio of policies among the GHGs. (b) It would complicate negotiations by requiring agreement on several separate goals, each of which would be too difficult for some key players to achieve, whereas the aggregate might well be achievable by all so long as each had flexibility to devise its own package. (c) The gas-by-gas approach would likely end up omitting one or more gases or sectors that the international community could not agree on but that are relevant in individual nations; this in turn would pose the prospect of counterproductive shifts from a covered gas or sector to an omitted gas or sector. (d) And it would provide no assurance that the aggregate outcome of the several independently defined instruments would achieve a sensible overall climatic result.

Any international accord should therefore rigorously adhere to a fully comprehensive approach; then of course each nation could assemble its policy portfolio from among several domestic programs, each of which might address one subaspect of the whole (so long as side-effects or "shifts" to other gases are accounted for).

4. The ability to measure net GHG emissions is a critical issue: it is the basis on which the UK opts to "phase in" a comprehensive approach starting with just a few subelements. But the UK's position is flawed for several reasons. (a) The UK paper supplies no evidence to substantiate its claim in paragraph 16 that it is "impractical" to cover all gases. (b) The measurement of various gases will no doubt vary from sector to sector and from nation to nation. One cannot categorically include or exclude certain GHGs or sectors. (c) The UK paper ignores a host of projects now underway to improve measurement, including the rice-CH₄ projects in PRC, the biomass burning projects, and the cattle-CH₄ project beginning at Washington State University. These and many others will no doubt bear fruit over the next couple of years, just as nations are implementing the Framework Convention. (d) The UK statement on "impracticality" is belied by their own choice of source categories to count; for example they would count forestry despite the difficulties in measuring CO₂ sequestration (at least such measurements are considerably more uncertain than CFCs, energy sector CO₂, or energy sector CH₄ measurements). This may suggest that the UK list is determined not so much by practicality as by advantage to the UK.

(e) The key is to ensure credible accounting while providing incentives to improve measurement abilities. Categorically excluding certain areas will not provide such incentives.

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Instead, any international document should define the question broadly, in terms of net GHG emissions, and then ask nations to explain how they calculate each proffered limitation measure. If desirable, this accounting could be divided into categories based on general measurability: for example, one category could be counted at face value (e.g. including CFCs and energy sector CO₂); a second category could require an attached written explanation (e.g. including forestry CO₂ and energy sector CH₄, CO, & NO_x); and a third category could require review by an expert panel (e.g. including agricultural CH₄ & N₂O). But such a categorization would have to be determined by an expert group, and be flexible to allow better demonstrated measurements to ascend the ladder toward face-value acceptance.

5. Giving credit for CFCs reduction is certainly a positive step. But it is problematic to give credit for reductions in CFCs only when those reductions exceed or outpace those a nation is bound to achieve under the Montreal Protocol ("MP"), as the UK suggests in paragraph 18. (a) It would provide a perverse incentive among MP signatories to oppose further amendments of the MP that accelerate its schedule, since those new reductions would then no longer count as credit under the climate agreement. (b) It would provide a perverse incentive to non-signatories not to join the MP, since then they would lose credit for virtually all their CFC reductions under the climate agreement. These perverse incentives are especially troubling given the very recent evidence of greater-than-expected stratospheric ozone depletion and the need for more aggressive reductions in ozone-depleting substances. It would be a serious mistake to create obstacles to bolstering and broadening the MP.

Credit for all CFC reductions would not "double count." Credit under the MP is for ODP values; credit under the climate agreement would be for GWP (or similar index) values. There are two distinct environmental concerns posed by CFCs. If a substance poses more overall threat than other substances, it should be addressed more aggressively.

(The arguments for counting all CFC reductions are laid out more fully in the "Comprehensive Approach" Report booklet, Feb. 1991, at pp. 73-75.)

6. We are unsure of the meaning or import of paragraph 9. It should probably be deleted.

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"Participation of Developing Countries -- A Framework for Discussion"

1. There should be some effort to quantify the environmental gains made by each technology cooperation project. What reduction in emissions is achieved? This quantification will serve well to improve the cost-effectiveness of projects chosen, and to ensure that resources are not diverted improperly to private ends.
2. The technology projects should (be able to) address all GHGs, sources and sinks comprehensively.
3. The possibility of bilateral cooperative arrangements -- such as along the lines of debt-for-nature swaps -- should be included as one means for accomplishing technology cooperation. A centralized fund or facility should not be the only option.

A Dynamic Approach to Environmental Problems
Based on Technology Development and Transfer

1. An international consensus is emerging through international forums such as the Houston Summit, OECD and IEA on the importance of technology to lasting solutions for global warming and other global environmental problems. About global environmental problem, it has been also increasingly recognized that it is an energy issue as much as an environmental issue.

Based on this understanding, we have, since last year, advocated the "New Earth 21" concept in the international community, and initiated research and development on new technologies such as clean renewable energy, efficient use of energy and CO2 fixation and utilization.

International mechanisms must be created to bring together the resources to conduct research and development effectively in the newly emerging areas of technologies for the global environment. As one of the steps in this international undertaking, we emphasize the necessity of a Global Environment Research and Development Information Network, and will conduct a feasibility study for this purpose in coordination with the International Energy Agency.

2. Technology transfer to the developing countries is of equal importance in the "New Earth 21".

In the developing countries, the resources allocated to measures in the environment and energy areas are too low compared to the real needs for environmental protection. This gap must be bridged.

It is also clear that how the developed countries aid the developing countries in their response to environmental problems is going to become one of the most important international issues as we approach the UN Conference on Environment and Development in June 1992. This will continue to be at the forefront of the world political agenda.

It is therefore of the utmost importance for the developed countries to take concrete action on technology transfer.

3. There are distinctive characteristics concerning the assistance for environmental protection in the developing countries, compared with other areas of assistance.

First, it is necessary to prepare various types of assistance in line with the level of economic development, since the requirements of the developing countries in meeting their needs increase rapidly in volume and change in nature according to economic growth and rising energy consumption (figure).

Second, the resources required on the global level to meet the needs in the developing countries are enormous, because the burden on the environment which stems from social and economic activities will greatly expand in the developing countries.

Technology transfer, therefore, should be conducted under the following three principles.

— Phased Approach: Technology assistance strategies tailored to levels of economic development

Assistance to bridge the gap between resource requirements and resource availability in the environment and energy areas in the developing countries should be formulated and adapted to meet the specific needs of individual countries according to their levels of economic development.

— Facilitation of Private Technology Transfer: Assistance through transferring the technology belonging to the private sector in the developed countries, rather than physical and financial capital, which enables the developing countries to develop their own environmental protection and environment-oriented energy industries and to overcome their environmental and energy problems by using their capital and human resources.

The costs of installing equipment in the environment and energy areas are enormous; there are limits to the amount of international capital flow that can be provided for the developing countries. This leads to the necessity for them to utilize their own capital and human resources. Therefore:

- assistance must shift its emphasis from physical and financial capital to technology transfer;
- the major initiative must come from the private sector, where the technological resources are, rather than governments; and
- the ultimate objective of the assistance is to create environmental protection and environment-oriented energy industries in the developing countries themselves .

— Commitment Encouragement: Encouraging the commitment of the developing countries to environmental protection

Effective assistance in the environment and energy areas requires sustained commitments from the governments of the developing countries to environmental protection, e.g. through standards setting and implementation and monitoring and observation.

4. Assistance for the developing countries under the three principles is of the utmost urgency. It is necessary to generate a common understanding among the developed countries that governments must take an active role to facilitate the technology transfer in the environment and energy area under those principles.

Based on such an understanding, furthermore, developed countries should work together to explore means for effective action.

PRESENTED AT THE U.S.-JAPAN CONFERENCE ON GLOBAL WARMING
IN ATLANTA, GEORGIA ON JUNE 4, 1991

**A GLOBAL STRATEGY TO ADDRESS GLOBAL WARMING:
THE NEW EARTH 21**

**Mr. Sozaburo Okamatsu
Director-General
Industrial Location and
Environmental Protection
Bureau, MITI**

It is my pleasure and great honor to address such a distinguished gathering of decision makers and opinion leaders of our dearest friend and neighbor, the United States, as well as my friends and colleagues from Japan. I would like to take this opportunity to discuss global warming, focusing mainly on our "New Earth 21" proposal. But before I begin, I wish to offer my heartfelt gratitude to all the people who have worked so hard to bring us together at this conference.

The Crux of the Problem

Now the first point that must be recognized is that global warming cannot be controlled without concerted action by all countries, both developed and developing.

Population and per capita income are expected to grow in the developing countries. Per capita economic growth will bring higher standards of living, which in turn will result in higher per capita energy consumption and CO2 emissions. This means that global CO2 emissions could continue to grow drastically, even if the developed countries maintain emissions at current levels.

Let me show you some projections. First, let us divide the world into three categories: the developing countries; The what used to be called the communist countries, including China; and the developed

market economy countries. The latest World Bank forecasts will be used for future population growth. According to the World Bank, the world population will double between 1987 and the year 2050. The population will grow 157% in the developing countries in this period, 60% in the former and current communist countries, and 10% in the developed countries.

Next, we shall make the following assumptions, to take into account economic growth:

- per capita CO₂ emissions in the developed countries are frozen at current level;
- per capita CO₂ emissions in the former or current communist countries will grow to 1.5 times current levels by year the 2050 and stabilize thereafter; and
- per capita CO₂ emissions in the developing countries grow to 2 times current levels by the year 2050, with subsequent stabilization.

Under these assumptions, global CO₂ emissions would grow from 6 billion tons-carbon in 1987 to 14.2 billion tons-carbon in the year 2050. this is a 136% increase, but also how the developing countries will respond to this issue.

The Unique Features of the Global Warming Issue

The unique nature of the issue must also be taken into account in addressing global warming. Among the major greenhouse gases, there already is an international agreement on chlorofluorocarbons in the form of the Vienna Conventions and the Montreal Protocol. On the other hand, too little is known at present about a couple of other major greenhouse gases, N₂O and CH₄, and the means to control them. CO₂, therefore, will be the main focus of our response to global warming and my thoughts on this issue, which I would like to share with you.

Now I would like to touch upon three elements which I believe are unique to CO₂.

(1) The inseparable link between CO₂ and human activities

First, CO₂ is intertwined with every aspect of human activities through energy, more specifically fossil fuel use. After all, energy consumption is the barometer of living standards, a relationship going all the way back to the time when man began to first use fire. Here, there is a great difference from another major greenhouse gas, chlorofluorocarbons, a synthetic substance that was invented in the 1930s. Being a synthetic substance, it can be removed and replaced without a fundamental change in the way we live. CO₂, on the other hand, is rooted at the very foundation of civilization, and cannot be controlled with ease. It simply cannot be treated in the same manner as chlorofluorocarbons, where a complete phaseout by the year 2000 is agreed upon.

(2) The direct link between CO₂ emissions and the economy

Second, CO₂ emissions are directly linked to the economy through energy consumption. Therefore, measures must be taken while bearing in mind the potential impact on the world economy, including the possibility that short-sighted action could lead to global economic stagnation.

(3) The major scientific uncertainties concerning CO₂

Third, there are major scientific uncertainties surrounding the relationship between CO₂ emissions and changes in the global environment. The First Assessment Report of the Intergovernmental Panel on Climate Change, completed last August, refers to various uncertainties, the greatest of which are the roles of the oceans and water vapor.

As I referred to before, the major part of CO₂ emissions are the result of fossil fuel use. It is possible to estimate the total amount of fossil fuel consumption, from which gross CO₂ emissions can be calculated. Comparing this figure with the amount of CO₂ currently in the atmosphere, more than 40% is unaccounted for. This is the so-called "missing sink". Many scientist say that this probably has been absorbed by the oceans, but there is nothing close to a consensus. This is the uncertainty of the oceans.

The other element is the effect of water vapor. Evaporation increases with temperature rise. Water vapor is also a greenhouse gas. On the other hand, water vapor forms clouds. Now thick clouds will prevent sunlight from reaching the Earth's surface, which will have a cooling effect. But thin clouds will let sunlight through, and prevent radiative heat from escaping. therefore, the role of water vapor cannot be identified until we know how clouds will form as the result of increased evaporation due to temperature rise.

These are the three unique features of the global warming issue. The major difficulties in dealing with global warming derive from these three points.

Global Warming on the International Scene

Different National Perspectives

Countries have staked out various positions on this issue. There are differences among developed countries, as well as between developed and developing.

(1) Europe

Among the developed countries, there is a tendency in Europe to take up radical positions on the reduction of CO₂ emissions and emissions targets. This must be considered against a European backdrop of stable populations and low economic growth. The fact

that the environment has become a serious political issue in Europe because of the delay in taking measures for the protection of the environment is probably another important factor in this respect. However, it is not yet clear how such countries intend to realize the targets that they have adopted.

(2) The United States

The United States is taking a more deliberate approach to emissions reductions. The U.S. is of view that there is insufficient knowledge on the science of global warming, and that the economics must also be given more attention. And the U.S. population, unlike in Europe, is expected to grow.

The U.S., in designing response strategies, also proposes a "comprehensive approach". That is, not only CO₂, but also all greenhouse gases and both emissions and sinks should be taken into consideration together.

(3) The developing countries

The developing countries take a completely different tack. The developing countries stated that the developed countries bear most of the responsibility for global warming.

The claims of the developing countries are twofold. First, global warming is the result of CO₂ emissions as the result of the massive consumption of fossil fuel by the developed countries in achieving economic growth. Therefore, it is the developed countries that must take action to prevent global warming. Second, if developing countries are requested to take action, the developed countries must provide adequate assistance, since the developing countries do not have the funds and technologies.

These demands must be considered in the context of the fact that, in developing countries, emissions are expected to grow both in

absolute and per capita terms, due to greater energy consumption as the result of population and economic growth.

(4) Japan

Japan developed and adopted its "Action Program to Arrest Global Warming" last October. As part of this Action Program, which covers the years 1991 to 2010, the public and private sectors, taking the Long-Term Energy Outlook as the starting point, will make all efforts to stabilize per capita CO2 emissions at 1990 levels by the year 2000.

"Pledge and Review": Whither the Framework Convention

This is the situation with which the negotiations for a framework convention are being conducted, with the UN conference on Environment and Development in Rio de Janeiro in June, 1992 as the target date.

Now in our negotiations, the first thing that we have to keep in mind is that there cannot be an effective convention without the participation of the U.S., the U.S.S.R. and China, which together account for about half of global CO2 emissions. In other words, we need a convention which can accommodate the differing situations of these and other countries.

A framework convention must also meet the following three fundamental criteria.

First comes equity. An equitable distribution of the burden must recognize the fact that each country faces different situations. Past efforts, for example, that have contributed to the reduction of CO2 emissions must be taken into consideration in determining the obligations of participating countries.

Second is the need for a sound scientific basis for our responses. Actions on global warming could, as I mentioned before, have serious consequences on the global economy. This calls for a greater emphasis on the need for a sound scientific basis.

Third is the need for effective actions. The response to global warming requires a cooperative effort by the global community. This calls for a system in which we can keep a friendly eye on each other, if only to ensure that each country is carrying its fair share of the burden.

So the question is: How can we design a mechanism in which these objectives can be met while reconciling the different perspectives of European countries and the U.S., and ensuring the participation of the U.S.S.R. and China. Our proposal for this is a mechanism in which each country announces its commitment to targets, strategies, actions and measures to be taken, tailored to its individual circumstances, in the form of a pledge. This "pledge" would be subjected to a review in terms of feasibility and effectiveness. We are calling this the "pledge and review" system. I intend to advocate this to the international community.

A Lasting Solution: The New Earth 21

A lasting solution to global warming must meet the twofold goals of economic development and environmental protection. Attempts at drastic reductions in CO₂ emissions by the developed countries could result in economic stagnation there, which would make it difficult for them to provide markets and development aid. This will have a negative effect on the developing economies, taking us further from the solution that we are seeking. In other words, we would run the risk of perpetuating the vicious circle between poverty, population and pollution.

A lasting solution that reconciles the two objectives requires technological breakthrough. This is the basis for the "New Earth 21", which we have proposed at the Houston Summit and other international forums.

The "New Earth 21" is a concept that consists of five elements: global promotion of energy efficiency; massive introduction of clean energy sources; development of innovative environment-oriented technologies; enhancement of sinks; and development of energy-related technologies that will carry us into the future. The development of innovative technologies and diffusion of energy-related technologies in the developed countries, and the transfer of environment and energy-related technologies to developing countries are the two sides of this technological breakthrough.

Global warming is to a great extent the result of the burden humankind imposes on the global environment through energy use. In other words, global warming and energy consumption are two sides of the same coin. This is why energy-related technologies have a major role in the "New Earth 21".

Let me elaborate on these two pillars of this strategy.

The Development of Innovative Environment and Energy-Related Technologies and the Diffusion of Energy-Related Technologies in the Developed Countries

First, I wish to explain the development of innovative technologies and diffusion of energy-related technologies in the developed countries.

- (1) The development of innovative environment and energy-related technologies

Energy efficiency and clean energy sources can go a long way in limiting the growth of emissions, but they will be insufficient to reduce them in the long run, if we want both economic growth and environmental protection. Therefore, we must promote international cooperation among the developed countries to develop innovative technologies to protect the environment, including CO₂ fixation and utilization, and future generation energy-related technologies. The results of such efforts may not be evident for some time, but it is essential to start now.

(2) The diffusion of energy-related technologies

Of course, the promotion of energy efficiency and the introduction of clean energy sources are extremely important steps in our efforts to address global warming. And since economic growth will require energy consumption, energy sources with low CO₂ emissions will be of particular importance to our long-term response.

For this purpose, we need the rapid commercialization of technologies in the new energy area. Nuclear power must also be promoted, with safety, of course, as the prerequisite.

(3) What Japan is doing

Japan is already taking its accumulated technological resources to promote research and development, through the newly-established Research Institute of Innovative Technology for the Earth (RITE) and other institutions. RITE is already undertaking research and development in four areas: CO₂ fixation and utilization; non-greenhouse gas CFC substitutes; biodegradable plastics; and environment-oriented bioreactors.

As for domestic diffusion of energy-related technologies, Japan will attempt to repeat the world-leading gains in energy efficiency after the first oil crisis in 1973, and will continue its efforts to develop and introduce new energy sources.

We believe that it is important to continue our efforts in the following direction.

First, we believe that effort to develop innovative environment and energy-related technologies should be coordinated internationally. In this respect, it is important to promote international R&D cooperation projects. Another important item here is the establishment of a Global Environment Research and Development Information Network as an essential part of the infrastructure for efficient research and development by the developed countries, and we have announced our intent to start a feasibility study for such a system.

Second, measures will be taken to encourage the diffusion of new energy sources and energy-efficient equipment.

Transfer of Environment and Energy-Related Technologies to Developing Countries.

Next, let me go on to technology transfer to the developing countries in the environment and energy areas.

(1) The three principles

I have already emphasized the importance of action by the developing countries in coming to grips with global warming. However, it is a fact of life that the developing countries place a higher priority on economic development over environmental protection. There are limits to the funds and technologies that they can devote to environmental protection, leaving a gap between this and the necessary funds and technologies.

Therefore, an adequate solution requires technological support, that is technology transfer, from the developed countries that have the

economic and technological ways and means. Of course, there are also limits to the funds and technologies that the developed countries can provide in the form of aid. Therefore, the following three principles should be followed to effectively transfer technologies from the developed countries to the developing countries, utilizing the resources that are available.

- 1) A "phased approach": Technological support strategies tailored to levels of economic development in order to bridge the gap

The first principle is the need to develop technological support strategies tailored to levels of economic development in order to bridge the gap. This is what I call the "phased approach" principle.

The traditional aid policy of raising concessionality for countries at lower stages of development will create a greater gap between availability and actual needs in the case of the environment. New aid strategies that are closely tailored to the development stage of each country are required to bridge this gap.

For example, in the least developed countries, the emphasis should be on infrastructure to meet basic human needs, rather than purely environmental objectives.

Next, in countries which have reached a certain stage of economic development but where environmental problems have barely begun to be addressed, awareness raising on the need for environmental protection, transfer of observation and monitoring technology, creating master plans, and other forms of what I would call the "software" side of environmental aid should be given emphasis.

In countries where the need for environmental protection is rapidly on the rise because of expected high growth rates, not only the "software" side, but also the introduction and diffusion of environment and energy-related equipment and technologies, what I would call the "hardware" side, also requires adequate assistance.

- 2) "Private sector initiative": Aiming at the development of environment and energy-related industries through technological cooperation by the private sector

Second is the need to aim at the development of environment and energy-related industries through technological cooperation through the private sector. This is what I call the "private sector initiative" principle.

It is difficult to meet the enormous financial requirements of the developing countries in meeting their environmental and energy policy requirements. This cannot all be met through official development aid.

In order to meet this need, the development of environment and energy industries in the developing countries themselves, which generate their own environment and energy equipment and technologies, so that the developing countries can be able to meet their own needs is necessary. This is the long-term objective. More specifically, there is a need for the private sector to transfer technology and know-how through R&D cooperation and other means.

- 3) "Commitment Encouragement": Towards a mutual partnership

Third is the need to develop a mutual partnership between the two sides. This is the "commitment encouragement" principle. For without a sustained commitment to environmental protection from the developing countries, assistance will not be effective, since the equipment and technology will fall into disuse.

Therefore, environment and energy assistance must be met by action on the part of the developing countries to create the following two domestic conditions.

First is the disclosure of information concerning the environment, which flows from the very principles of democracy. Second is the establishment of strict and objective self-control in the form of the development and implementation of legislation and other means.

(2) What Japan is doing

We in Japan are proud of the results that we have achieved in pollution prevention and energy conservation. An international comparison shows that SOx and NOx emissions per unit of electricity generated in Japan are one eighth and one fifth, respectively, of the overall average emissions of Canada, France, Great Britain, the United States and former West Germany. I have already referred to the high marks Japan has scored in energy efficiency gains among the developed countries since the first oil crisis.

We are drawing on our technological and economic resources to promote technology transfer in the environment and energy areas. As one of the steps, we have established a non-profit organization, named the "International Center for Environmental Technology Transfer", to facilitate the technology transfer to the developing countries. They have initiated a plan to provide the training programs of ten thousand people in this decade. We intend to continue our efforts in this respect, beefing up measures to encourage technology transfer to the developing countries.

Recycling: The Law for the Promotion of Utilization of Recycled Resources

The "Action Plan" and the "New Earth 21" are not, of course, the only new major environmental initiatives that we in Japan are undertaking. Think globally, act locally, as they say, and so we are; aggressively promoting recycling. A national movement for recycling is taking root, with "What comes out as garbage when mixed, is a resource when sorted" as the key phrase. This is quite relevant to

the subject of this conference, since recycling cuts down the burden on the environment, contributing in various ways to mitigating global warming, among other things.

The focus of our efforts in this respect is the Law for the Promotion of Utilization of Recycled Resources, newly adopted this April. Let me explain briefly the three main elements of the law.

First, the Government will elaborate and publicize fundamental principles to indicate directions for the comprehensive promotion of the utilization of recycled resources, that is recycling.

Second, action by businesses and consumers is, of course, essential to promote recycling. The law also lays out the basic philosophy for this purpose.

Third are the concrete measures that businesses will be encouraged to undertake. Some examples to be laid out in more detail under the Law are: raising the recycling rate of used paper in the pulp and paper industry; improving the structure and materials for large home electric appliances to facilitate recycling; and labeling aluminum and steel cans to facilitate sorting, which is necessary for recycling purposes.

We believe that this is the first such undertaking on the national level in this field. Japan took the lead in overcoming pollution. We intend to act aggressively through the recycling initiative, not least because of its importance to the protection of the global environment.

Actions in the Private Sector

I have so far explained the Japanese perspective on global warming, and what the Government is doing on this front. But the ultimate choice of what we do to provide a solution to global warming is

made by the public. And the solution will require a broad array of responses from there, including changes in lifestyles.

The Japanese business sector is also moving forward in this respect. This April, the Federation of Economic Organizations, or Keidanren, issued the Keidanren Global Environment Charter. The Charter takes up 11 issues, including: the development of innovative technologies for energy and resources conservation and the protection of the environment; technology transfer on the domestic and international fronts; and participation in the scientific and economic analyses of global warming. The Charter is an explicit recognition of the fact that all business activities must be undertaken taking into full account global warming and other global environmental problems, and a demonstration of the willingness of the business sector to do so.

Conclusions...The U.S.-Japanese Role

So far, I have explained global warming from the Japanese perspective, our views and actions. Finally, I would like to say a few words on the U.S.-Japanese role.

The two countries have much in common. We lead the world in technological and economic power. Global warming requires a technological breakthrough. If we jointly bring our technological and economic forces to bear on global warming, I do believe that we shall succeed in our global task. We are already cooperating on nuclear fusion. I now propose that the U.S. and Japan come together in all areas to lead the world in technology development and transfer to preserve and improve our environment.

In closing, I would like to quote President Jimmy Carter: "Why Not the Best?" Indeed, why not? For the best is the least that our two great nations, in cooperation, can do for present and future

generations to find and lead the way to a lasting solution to global warming.

Thank you for your kind attention.

Promotion of the "New Earth 21"

1. The Need for Technological Breakthrough and International Cooperation

A lasting solution to global warming requires an undertaking within a framework of international cooperation, not only among the developed countries but also developing countries. Since CO₂ emissions are expected to increase in step with economic growth in the developing countries, technological breakthrough is necessary to reconcile economic development and environmental protection on the global level.

Technological assistance to the developing countries, utilizing the technological resources of the private sector, should be promoted.

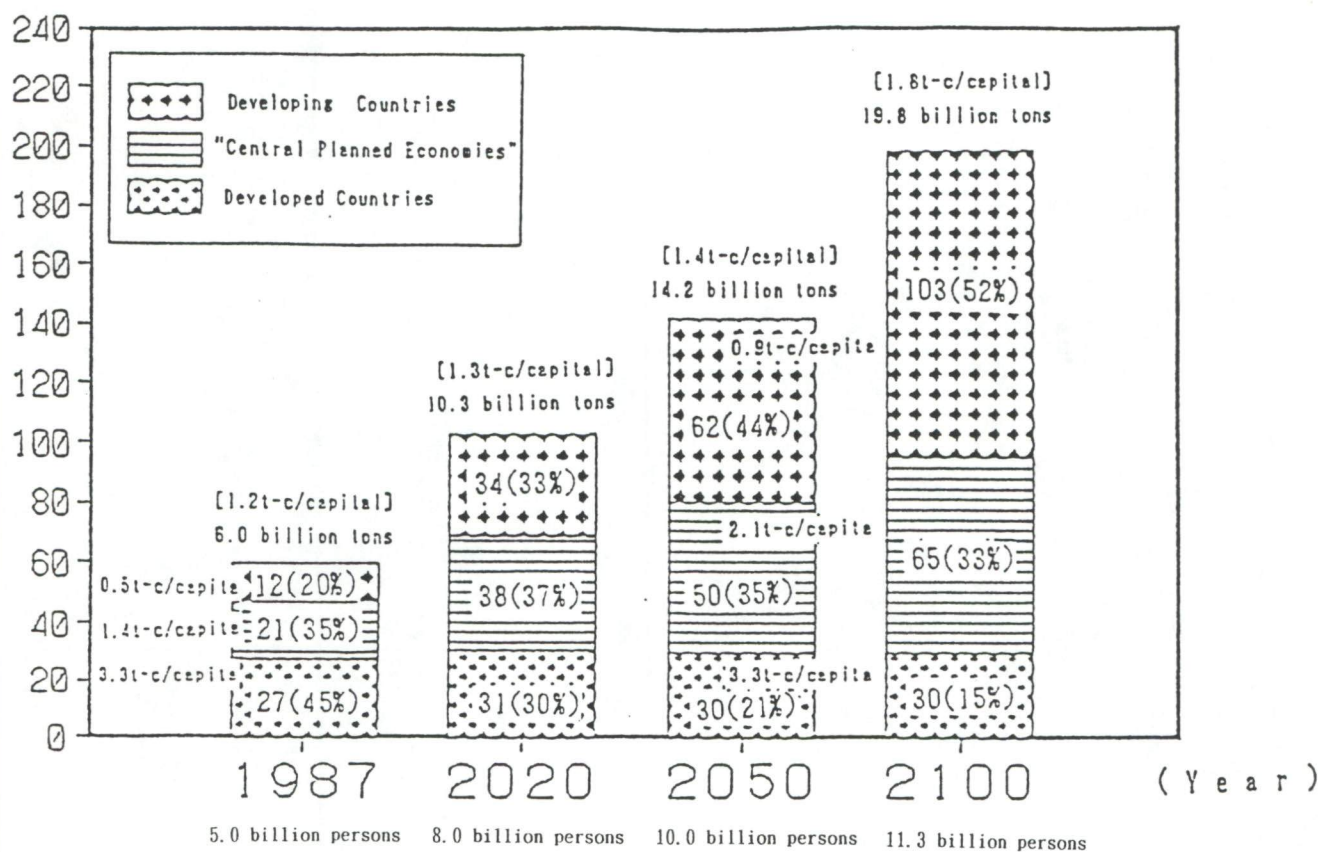
The global population will double by 2050, reaching 10 billion. CO₂ emissions will more than double by then, even if the developed countries stabilize emissions at current levels.

(A projection of CO₂ emissions under the assumption that developed countries will stabilize emissions at current levels)

Please refer to Graph 1

Graph 1

Unit: billion tons of carbon



(source) estimates based on World Bank and other data

(note) Assumptions for the future CO₂ emissions per capita are as follows:

- *Developed Countries: stabilization at current levels
- *Developing Countries: increase to double current levels by 2050
- *Central Planned Economies: increase to 50% over current levels by 2050

2. The Basic Concept of the "New Earth 21"

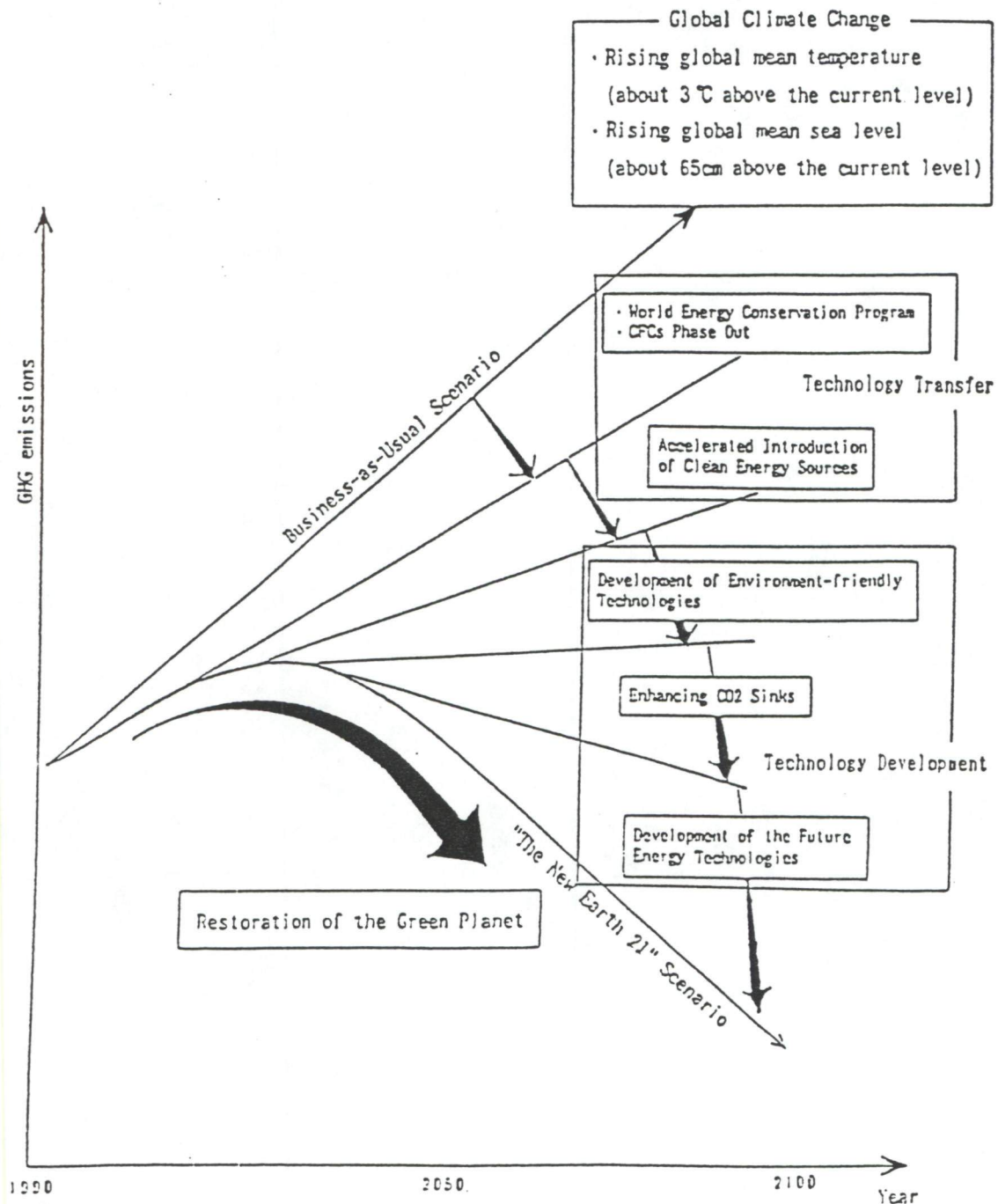
"New Earth 21", the Japanese proposal to the global community, is a dynamic and evolving strategy for international cooperation to restore the earth over the future decades through the reduction of greenhouse gases accumulated during the two centuries since the Industrial Revolution.

"New Earth 21" consists of: 1) global promotion of energy efficiency and conservation, 2) massive introduction of clean energy sources, 3) development of innovative environment-oriented technologies, 4) enhancement of sinks, and 5) energy-related technologies that will carry us into the future. Its essence is 1) the promotion of world-wide diffusion of environment and energy technologies and 2) the development of innovative environment-oriented technologies.

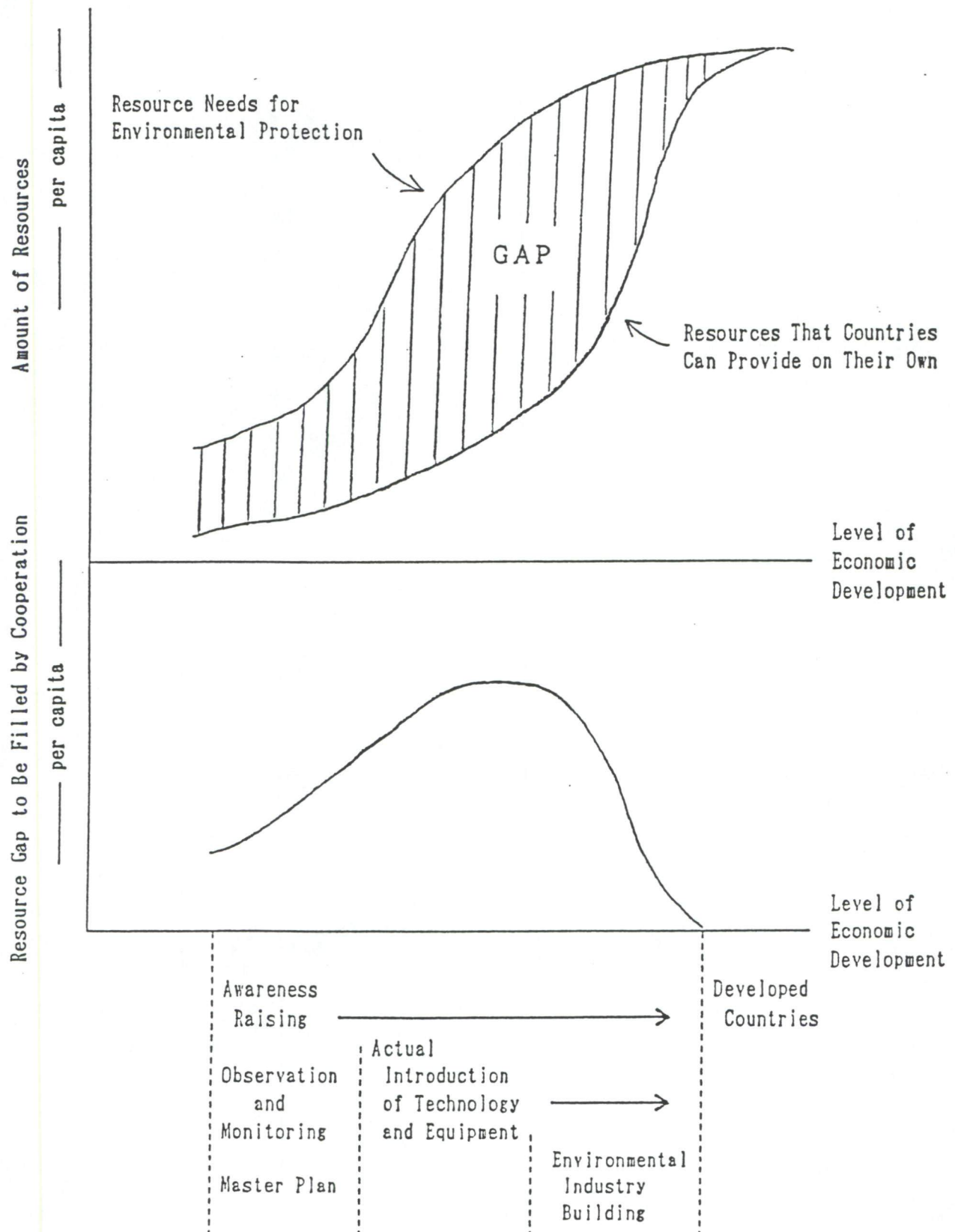
Please refer to Graph 2

Graph 2

Conceptual Framework of "The New Earth 21" (An Illustration)



CONCEPTUAL FRAMEWORK



Promotion of the "New Earth 21"

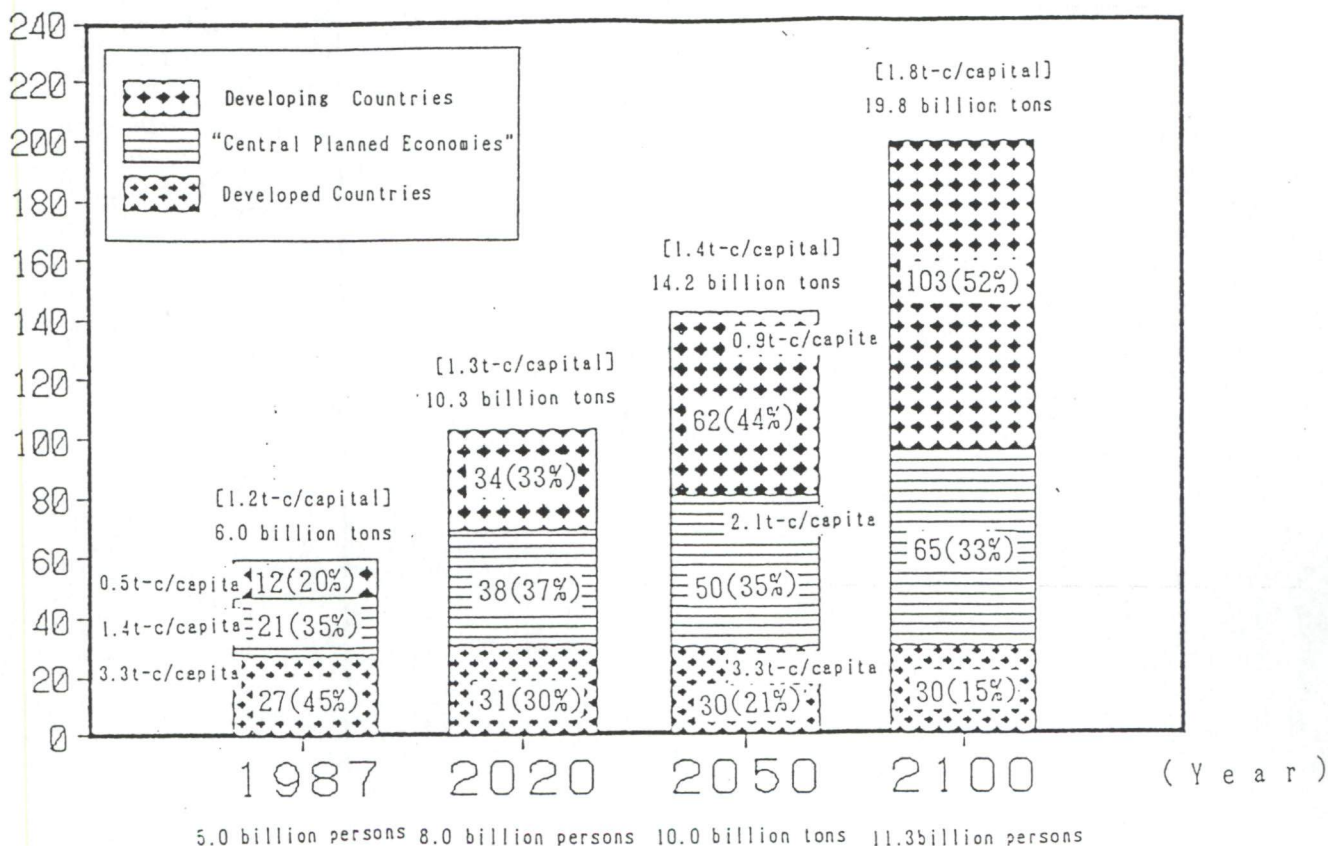
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Technological assistance to the developing countries, utilizing the technological resources of the private sector, should be promoted.

(A projection of CO₂ emissions under the assumption that developed countries stabilize emissions at current levels)

Unit: billion tons of carbon



(source) estimates based on World Bank and other data

(note) Assumptions for the future CO₂ emissions per capita are as follows:

- * Developed Countries : stabilization at current levels
- * Developing Countries: increase to double current levels by 2050
- * Central Planned Economies: increase to 50% over current levels by 2050

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Jeff

Emb. of Japan
939-6700T.W.
VI 172Mr. Goto
939-6726**Sozaburo OKAMATSU**

Director-General, Industrial Location and Environmental Protection Bureau

Born:
1960

(b)(6)

Graduated from Tokyo University,
Degree in Law

1960 Joined the Ministry of International Trade and Industry.
 1978 Dir., Electric Power Development Div., Public Utilities Dept., Agency of Natural Resources and Energy
 1980 Dir., Electronics Policy Div., Machinery and Information Industries Bureau
 1982 Dir., Industrial Finance Div., Industrial Policy Bureau
 1983 Dir., General Affairs Div., International Trade Administration Bureau
 1984 Dir., Personnel Div., Minister's Secretariat
 1985 Dir.-Gen., Economic Cooperation Dept., International Trade Policy Bureau
 1986 Dir.-Gen., Public Utilities Dept., Agency of Natural Resources and Energy
 1987 Dep. Dir.-Gen., Machinery and Information Industries Bureau
 1988 Dir.-Gen., Consumer Good Industries Bureau
 1989 Dir.-Gen., Industrial Location and Environmental Protection Bureau

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OK

Mainly?

- o Head of Delegation: Mr. Sozaburo Okamatsu
Director-General, Industrial Location
and Environmental Protection Bureau,
MITI
- o Date: June 5 (Wed.)
- o Purpose of Meeting:
 1. To explain how the Japanese Government plans to implement a one-hundred-year action program to revitalize "The New Earth 21" Project, concerning the environmental conditions of the Earth,
 2. To exchange views' on how to promote a discussion about the Framework Convention on Climate Change, and
 3. To informally discuss the London Summit, particularly on the part of R&D promotion and technology transfer.

**Lessons from U.S. Experiments
in Environmental Reform**

by

Daniel J. Dudek

ENVIRONMENTAL DEFENSE FUND
New York, New York

paper presented at the international workshop
on Institutional Design for Environmental Protection in Poland

Bialowieza, Poland
September 17-20, 1990

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1 INTRODUCTION

To view environmental protection from a grand vantage, one can discern two distinct revolutions in policy. The first, occurring roughly twenty years ago, created the first set of dedicated and effective institutions for environmental protection. These first set of changes saw the transfer of control authorities from traditional resource management or public works agencies to new administrative entities devoted to pollution control. The second large thread in this movement is occurring now as those pollution control agencies are faced with increasing demands and ever more complex environmental problems. The production of environmental protection is moving from a command economy to economic incentives designed to harness polluters' self-interest in the search for improved environmental quality.

This second stage¹ of development in environmental management is just beginning to appear throughout the world. Policy experiments in this arena began modestly almost always springing from the necessity to lessen conflicts between the economy and the environment. For example, the collection of policy tools known as emissions trading began in urban areas plagued with severe air pollution and growing economies. Lead rights trading was introduced to reduce the economic impact upon small refiners of reducing the lead content in gasoline.

However, these policy reforms have not always been universally acclaimed. In fact, many have been the subject of legal challenges by environmental advocates concerned about the environmental integrity of these programs. Other objections have included the reduced emphasis upon the environment as a civic responsibility and its relegation to the status of a normal economic commodity. Some have seen the rise of benefit/cost analysis as an outgrowth of economic incentive based policy reforms and a threat to environmental objectives.² Others have expressed concern about the equity implications of economic instruments.

All of these concerns are legitimate. In the process of addressing these issues, policy reforms have frequently been strengthened. It is the intent of this short paper to look over the U.S. experience with these reforms and to identify potentially useful implementation lessons for others contemplating their application.

2 POLICY EXPERIMENTS

U.S. environmental policy has evolved from an early fight to establish its status as a legitimate public policy objective to a set of bureaucratic institutions. As the institutions charged with environmental management have acquired political status and clout, they have become increasingly resistant to change. However, these same agencies have been faced with rising expectations and increased competition for funding. Personnel ceilings have not helped to control program costs as outside contractors are added to the payroll and to the agency's constituency.

1 From a strictly U.S. perspective, this has been described as the third stage of environmentalism (Krupp, 1986). The first stage is thought to have occurred roughly at the turn of the last century when a resource conservation movement appeared. This movement was concerned with the availability of raw materials such as timber and is perhaps best known for public investments in a series of national parks and forests.

2 Benefit-cost analysis as a concept is important in understanding the relationship between alternative environmental investments. However, in actual implementation, benefit-cost suffers from a number of serious deficiencies, not the least of which is the imprecision of nonmarket valuations for environmental goods and services.

Increasingly complex environmental problems are forcing a focus on performance. However, in the absence of a revolution like Poland's, change has been slow.

2.1 Urban Air Quality

Dissatisfaction with politically established urban air quality goals and the lack of progress toward those goals created demand for policy reform. The Clean Air Act established air quality improvements that could not be accomplished within the allowed regulatory timetables and with the policy resources committed. Cities were required to adhere to these ambient air quality standards or face loss of federal funding and prohibitions on new growth in their local economies. This political pincers on local officials created the opportunity and demand for a series of experiments designed to lessen the trade-offs between environmental quality and economic growth. The result was a series of experiments which ultimately produced the U.S. Environmental Protection Agency's emissions trading policy.³

In each case, firms were given the latitude to expand operations while contributing to improved regional environmental quality. For example, the offset program allowed new entrants into a region despite the region's failure to achieve compliance with ambient air quality limits. The firm could receive the required regulatory permits to construct its proposed facilities if it acquired reductions in emissions from some existing polluter in the airshed in an amount at least as great as their proposed additions. In this fashion, both economic growth and improved environmental quality are promoted. Thus, the environment could be improved without shutting down regional economic growth.

Opponents charged that no emissions reductions were "extra" in an airshed out of compliance with the law. However, the command nature of the regulatory process precluded identification and production of these reductions. The policy conundrum was how to produce emissions reductions without new legislation and without alienating the public support. The offset policy finessed these problems by offering polluters a motive to evaluate their operations and to profit from reductions.

Other fictions within the Clean Air Act include an arbitrary distinction between mobile and stationary sources and the "grandfathering" of existing polluters into new control systems. This latter strategy has increased the political feasibility of environmental legislation by lessening the attacks from existing facility owners. At the same time, it has had the pernicious effect of extending the economic life of old high polluting facilities and increasing emissions over time. This is a classic example of the failure of command environmental policies to engage dynamic behavioral forces in favor of static off-the-shelf solutions.

2.2 Water Quality

Water quality management in the U.S. has been traditionally separated into programs for point and nonpoint source management. Municipal point sources have been controlled by a system which requires a minimum water treatment level, e.g. secondary treatment, largely financed by a federal cost share program which paid up to 90% of construction costs. While widely establishing wastewater treatment, the program has also produced extensive subsidies to industries connected to publicly owned treatment

³ Emissions trading is actually a collection of policy tools. Generally included are netting, offsets, and bubbles (Tietenburg, 1985).

works (POTW). While effluent charge authority has been granted to local and regional authorities for the purposes of raising revenues for operations or expansions, this authority is little used in practice. As a consequence, POTW facilities have reached capacity quickly and industrial effluents have interfered with the effectiveness of biologic treatment processes.

Industrial sources discharging into watercourses have been subject to industry-specific treatment regulations which have generally required the use of specific pollution control technologies. One of the more interesting experiments with this system was conducted in the Fox River in Wisconsin. Along one stretch of the river were several pulp and paper plants. These plants were regulated both by control technologies as well as in-stream ambient standards.

Given the similarity of the plants and their waste discharges, these plants were allowed to propose changes in their waste discharge permits for approval to state regulators. Presumably the proposed changes were the result of private parties negotiating a private exchange of waste discharges and funds. Basically, firms were allowed to take advantage of differences in both the assimilative capacity of the river as well as differences in their costs. However, given the limited number of firms, the secrecy of the process, and its restriction to one reach of the river, the program was never actively exploited either on the Fox River or more widely in the U.S. It should be noted that a few states such as Georgia issue waste discharge permits which vary by month in order to allow firms to take advantage of changes in assimilative capacity according to changes in seasonal flows and temperatures. Inter-firm trading is not permitted, however.

2.3 Water Supply

Water resource supply policies have also exacerbated water quality problems particularly in the western portion of the United States. In this arid region, water is generally produced by massive public investment in dams. The water is then bureaucratically allocated to users on the basis of a system of historic entitlements and modern contracts. While this system served the U.S. reasonably well during the period of westward expansion and settlement, it has not been able to adjust to changing social preferences. Increasingly, wetlands, aquatic habitats, fisheries, water-based recreation, and wild and scenic rivers are the scarce goods and services being demanded by citizens. The bureaucratic command system has not been able to adjust despite changes in its charter and mission. Environmentally, this incentive to excess water use, inefficient by social standards, leads to eutrophication and destruction of natural environments.

The problem is clearly illustrated by the case of irrigation for agriculture in California. The Environmental Defense Fund has been working for over a decade to create the flexibility to transfer water from one user to another within this system. This ability is critical to improving water quality, rehabilitating aquatic habitats, and relieving demand pressures for the development of wild and scenic rivers. For example, if an irrigator were to invest in improving the efficiency of water use, the saved water could not be transferred or sold under existing California water law. The result is no private incentive to save water and to increase the economic supply of water.

2.4 Automobile Emissions

Focusing on the emissions produced from the tailpipe of vehicles have had a number of unfortunate effects on U.S. air quality. First, only the latest generation of vehicles are equipped with the new and generally high marginal cost control technologies. This focus precludes producing reductions wherever they may be most cost-effectively produced in the vehicle or the vehicle fleet. As vehicle production is regionally concentrated, this industry has developed an effective political lobby designed to protect it from regulation and costs of any sort.

Second, within the actual regional airsheds, local control authorities are left with tightening pollution controls and responsibilities on stationary industrial emitters. The regional officials are given the endowment of pollution control devices required through time on vehicles and a mix of vehicle ages. Despite the fact that cost-effective emissions reductions could be produced from retrofitting the individual high emitting vehicles within the fleet, this option is not pursued. One state, California, imposes separate emission controls on new vehicles sold within the state. However, favorable weather conditions extends the normal operating life of vehicles and slows the rate of fleet turnover. Some recent experiments by Stedman with the laser monitoring of tailpipe emissions indicate that pollution control equipment may be irrelevant for carbon monoxide. The state of maintenance of the engine seems to be most critical (The Economist, 1990).

Lastly, basing auto emissions policy upon a simple recipe has had perverse effects upon auto producers. The current environmental policy strategy is to get the toughest tailpipe emission standards that are politically feasible and force the auto manufacturers to meet these requirements. From this recipe has emerged a cosy relationship between the automotive design engineer and the government. The design engineer likes this recipe for environmental policy because it presents him with a clear statement of goals to which his designs must adhere legally. The result is a myopic focus on emissions at the tailpipe rather than from the vehicle as a system. If the engineer is given an overall emissions goal for the entire vehicle, a much more complex design problem with many more options for current and future emission reductions is created. The environment loses because more cost-effective emission reduction opportunities are foreclosed. The economy loses because we are not harnessing all of the creative talent we can to solve environmental problems. The formulation of the problem to be solved is a very significant determinant of the solutions that will be generated.

External and internal incentives to the firm should be aligned. In the case of auto emission standards, the manufacturers face new requirements each time a new Clean Air Act is authorized by Congress. Rather than a periodic event, reauthorization has become a crashshoot waged between titanic interests. Little time or energy is devoted to substantive debate. From this process, new tailpipe emissions standards emerge and the automotive engineers get their marching orders. Alternatively, if companies and engineers were free to make cost-effective reductions wherever they could be found, the incentives and ability to meet the increasing demands for clean air would be coincidentally aligned. Auto manufacturers could compete on a much broader basis for cost savings in incrementally improved environmental performance.

EDF's hypothesis is that technology-based solutions to environmental problems are not the obstacle to improved environmental and economic performance. The rules of the game, the environmental regulatory apparatus, are the effective obstacle to the development and deployment of appropriate technologies. The greatest challenge to those crafting environmental policies is to harness the dynamic response of firms and industries to produce new lower cost solutions.

2.5 Acid Rain

Acid rain has been one of the most politically contentious environmental battles ever fought in the U.S. As most of you know, the U.S. is not a member of the 30% club and while moving closer to the creation of a national SO₂ control program, still does not regulate long distance transport of SO₂. Acid rain has been so difficult to solve because the sources are diffuse, the beneficiaries unorganized, and the science uncertain. In addition, depending upon the control policy selected, strong regional winners and losers would be created. The result was a political gridlock.

This past year has changed much of that deadlock. The SO₂ emissions trading program that I described to you last year as designed by EDF has been adopted by both the House of Representatives and the Senate (Dudek, 1989). All that remains is for the congressional conference committee to resolve minor differences between the 2 bills. Why did this program succeed where agreement had been so elusive? The most critical factor was the desire of the Bush Administration to demonstrate its commitment to environmental protection. Early in that administration, policy concepts were solicited and EDF's emission trading proposal was selected for further development.

EDF performed several critical functions during this process. Perhaps most importantly, we created a public legitimacy for the policy reform that made it difficult for critics to assail as not protective of the environment. Second, we provided an added dimension to the policy fights that raged between the White House and the bureaucracy. The policy innovation reduced the cost of achieving a more ambitious and therefore more credible environmental goal. Lastly, we contributed our own scientific expertise and resources to analyze alternative proposals and to establish the environmental and economic superiority of our policy design. In the absence of these elements, it is unclear whether acid rain emissions trading would have ever been announced or if it had whether it would have survived the partisan political onslaught reserved for environmental policy innovations proposed by the other political party.

2.6 CFCs

Both globally and nationally, regulating chlorofluorocarbons and protecting stratospheric ozone is full of precedent. Internationally, the Montreal Protocol is one of the most sweeping environmental agreements executed. The most recent revision of the Protocol has demonstrated the wisdom of creating revisable policy structures that can evolve over time in response to changing information. Another significant, but little

publicized change, is the ability to move production entitlements between nations so long as the new totals for both nations are no greater than prior to the trade. Could this be a harbinger for global CO₂ policies?⁴

Domestically, the U.S. EPA adopted a marketable permit approach to control CFCs. However, the policy was designed to pass ideological muster with the Reagan Administration and not to seriously engage market forces. With fewer than a half dozen domestic producers, it is unlikely that permits will trade among these oligopolists. EDF had recommended that EPA use an auction of the permits open to all interested parties as a mechanism to guarantee the formation of a market. Alas, this was one innovation too many for the agency. Ironically, it is now fighting for control of the acid rain permit auction program with the Treasury Department whose experience in auctions is unquestioned.

At least one CFC transaction has occurred, however, the identity of the parties and the terms of the transaction have not been released by the EPA. A Freedom of Information request has been submitted to compel the EPA to release this information. Clearly, the marketable permit program for CFCs was never designed to be anything more than a thinly disguised production control regulatory program. Interestingly, the new changes in the Montreal Protocol could end up provoking trading despite the fact that trading was initially included as an afterthought. The U.S. program is likely to languish despite the fact that it was explicitly advertised as a market-based program.

3 LESSONS

Ecology provides us with the most basic lesson for environmental institution building. We should think holistically and recognize the complexity of the natural and social systems we are attempting to manage. Solving one environmental problem at the expense of another is not an acceptable permanent solution. At the same time, a public demand for environmental quality must be created. While the economies of eastern Europe are undergoing tremendous change, when former state enterprises are attempting to cut costs and compete, will there be sufficient political will to ensure environmental compliance? Legal instruments, by themselves, without real economic incentives or force will not necessarily produce environmental quality. But ignoring the deep intertwined interactions of the economy and the environment is also costly.

3.1 The Basics

Develop a credible enforcement and monitoring program. Without a credible and legally demonstrable threat to polluters, the most finely crafted environmental protection system will fail. The ultimate economic incentive is legal liability for damages credibly enforced.

Facilitate a well-developed NGO Community. In concert with public access to information guaranteed by law and a citizen's legal right to bring suit against polluters or agencies charged with protecting the environment, these rights will go a long way toward creating a credible enforcement program. Third party advocacy and independent representation of environmental interests has been central to the production of environmental quality in the U.S. Information is a scarce economic good whose public access and use can bridge otherwise insurmountable obstacles for advocates and markets.

⁴ Dudek (1990) describes several options for the design of CO₂ and greenhouse gas trading programs.

Establish a clear legal system of obligations. Polluters must know their responsibilities under the law. Discretionary authorities and conflicting statutes will only create opportunity for legal evasion and frustration with progress toward environmental protection.

Make sure that the control authority has a well-defined legal basis for control. If the agencies charged with producing environmental protection do not have a clear legal mandate for imposing control upon recalcitrant sources, the best designed institutions will fail.

Substitute markets for bureaucratic whim. Central planning for goods and services has not worked for the Polish people and central planning for the production of environmental quality has been inefficient and sometimes ineffective in the U.S. There are many examples of continuing environmental failures in the U.S. despite strict regulatory structures. The air in many major cities remains more polluted than allowed by the existing air quality standards. Nonpoint sources of pollution are almost completely uncontrolled particularly those from agricultural operations despite the fact that water quality in the U.S. can not improve without such control. Water resources are frequently distributed by executive fiat, are largely unpriced, and are prohibited from private party transfers. The all too frequent result is the diversion of more water than is economically efficient from rivers and streams. Natural aquatic ecosystems have disappeared and the remaining systems are heavily degraded. Other natural resources such as timber are also subsidized by the government. Not only is the resource inefficiently exploited but more environmental damages result. Perhaps most endemic is the lack of any direct linkage between energy and emissions.

3.2 The Fine Points

There is no constituency for efficiency. That is the first and most important lesson that any policy reformer must learn. For economists who spend their professional and intellectual lives devoted to the pursuit of this holy Grail, this is a particularly difficult lesson to learn. But without it, critical implementation steps will not be taken and the best policy design will be doomed. It is a difficult lesson because often "natural" constituents do not emerge. The implication is clear. Reform is complicated by the lack of allies and the ruthlessness of the status quo.

Reform champions are critical. Champions for reform are particularly important among environmental opinion leaders whether in government, academia, politics, industry, or the NGO community.

Pick the reform target carefully. In environmental terms this may mean selecting a problem with special characteristics. For example, in the acid rain case, large scale emissions trading was facilitated by an underlying, operating system of health-based emission controls. Since the environmental problem was to achieve large reductions in emissions transported over long distances, it mattered little where such reductions are produced within the relevant airshed.

Learn from past experiences. As illustrated by the failures of Fox River and for the CFC marketable permit program in the U.S., if you choose to use markets to solve environmental problems make sure that there are enough participants to support a market.

Create administrative structures that ease rather than hinder compliance. De-emphasize planning processes and focus on performance measures and monitoring and enforcement. Planning processes such as the State Implementation Plan (SIP) process for air quality have proved to be cumbersome, barriers to change, and not particularly related to

environmental reality. At a minimum, these planning activities drain resources away from other competing elements of institution building. Frequently, they rely upon estimates of emissions and poor prognostications about the future of the economy. Emission inventories, the primary benefit of these planning activities, have been of notoriously poor quality and entirely unsuited to establishing the legal quality baselines required for emissions trading. Put the resources into monitoring and enforcement.

Keep it simple. For example, effluent charges that may be theoretical delights may require so much data that they can never be implemented. Bochniarz (1990) gives examples of charge systems dependent upon estimates of pollutant quantities, concentrations of emissions, concentration at deposition, and duration. This degree of information would strain any environmental management system no matter how highly developed. What is the marginal gain in efficiency associated with the marginal increase in costs associated with the data required to implement the policy?

Environmental agencies must focus on environmental limits and tolerances, not production or consumption practices. Production decisions in market societies are best made by the firms whose discipline is the market. The most important contribution the environmental control authority can make is to set clear, well publicized emission limits and then enforce them. Environmental regulations can create winners and losers and be manipulated by clever firms engaged in strategic positioning. For example, the wealthiest of U.S. manufacturers urged the most expensive possible option for managing CFCs as a way to raise barriers to entry to potential competitors. The environmental authority should be aware of this potential manipulation and focus solely on performance rather than technique.

An appropriate corollary is that consumption decisions should be made by individual consumers in democratically organized societies. Much potentially productive environmental energy is wasted on attempting to micro-manage the behavior of individual economic agents. Democratic societies should encourage freedom of choice as much as possible even in the environmental arena.

Develop test cases. If time and resources permit, one very effective way to achieve support for a policy innovation is to demonstrate its real world application with real cooperating entities. This is a classic application of diffusion and adoption theory. One of the most difficult obstacles to be overcome is the skepticism of environmentalists who are unwilling to experiment if they perceive environmental quality to be at stake. Test cases create the opportunity for learning by affected parties as well as the innovators.

Business enterprises must be in control of their costs. If firms are not free to determine what they will produce and how they will produce it, how can they be expected to be accountable for the environmental pollution they generate? How can the discipline of market forces through competition for markets, profits, and investment exert their force? Similarly, if important industrial inputs such as water or energy are not priced according to their real value in production, how can the significant externalities associated with these inputs be reduced? Market prices for industrial inputs alone will go a long way toward promoting the efficient use of resources.

Don't keep changing the Rules. Don't renege. Don't expropriate. If you expect to use market forces in any way to achieve environmental ends, a reasonable degree of certainty is required to elicit the private investment needed to solve environmental problems. The history of the U.S. experience in emissions trading in urban areas is littered with

violations of these precepts which have substantially increased the difficulty of introducing policy innovators like SO₂ emissions trading for acid rain control.

Businesses are skeptical that they will be allowed to reap the rewards of their environmental investments. They are asked to make large capital investments in exchange for the opportunity to profit from those investments. If you are in an uncertain or dynamic environment, pre-announce a schedule of emissions limits and gear the length of the periods to the response times of the polluters. If it takes 3 years to build the least expensive pollution control retrofit, that may be the minimum time you can expect action unless industrial shutdowns are politically feasible. If the normal investment period for the firm is 5 years, then try to gear schedule changes on that basis. On the other hand, if payback periods are short due to cost savings, then reduction schedules can be changed over short intervals. Here both government and environmentalists must be vigilant that the most accurate technical information is being employed to set the schedules. A favorite industry game is to wildly overstate the time and costs of response to environmental initiatives. The best counter strategy is to do your homework and use economic forces to cut the cost.

Create holistic policies. In much of the contemporary environmental literature, this approach appears as the cross media problem. One environmental problem is solved at the expense of exacerbating another. In the heated political economy of creating policy, these niceties are often discarded in favor of blunt instruments and coalitions. Advocates become focused on a single issue to the exclusion of all others in the search for a winning political coalition. In the acid rain debates in the U.S., the environmental community was only too willing to side with high sulphur coal interests despite the fact that requiring flue gas desulphurization devices would increase CO₂ emissions. EDF estimated that utility CO₂ emissions could be reduced by 5.4 - 6.0% over a decade if emissions trading rather than technology mandates were implemented (Dudek, *et al*, 1990). A corollary to this observation is that one should understand the interests at play. For example, scrubber manufacturers are only too pleased to sell scrubbers.

4 SUMMARY AND CONCLUSIONS

I have not tried to produce a recipe for institutional reform for Poland. Success in developing effective environmental protection institutions can only come from a careful blending of policy options crafted to suit the people and culture they are designed to affect. The best that I can offer is a set of observations that I take to be lessons from U.S. experience. In general, those experiences have indicated that the environmental community is very conservative in the policies they believe to be acceptable. Environmentalists will be change agents for environmental protection, but not necessarily for policy reform or innovation particularly in the economic dimension. Most environmental policies are static and do little to change behavior over time. More seriously, few policies engage entrepreneurial activity in the search for environmental solutions.

The U.S. is currently engaged in a pitched political battle over reauthorization of the Clean Air Act. This legislation was last approved in 1977. Some of the flavor of the political issues swirling around this legislation have been presented above. Some of the paralysis surrounding this legislation is due to the command-and-control policies entrenched in its history. Once a system is created, it will develop its constituency and fight for its survival. As Poland and its neighbors move to develop

new and more effective systems for environmental protection, I hope that you can avoid our present political gridlock by learning from our history. Create an environmental management system that integrates the environment and the economy rather than one that alienates them.

Poland and others in its situation can dramatically improve competitiveness by integrating across policies. Give polluters the motive and opportunity to act simultaneously across several pollutants and the new round of industrial investments will be more cost-effective than competitors built under uncoordinated pollutant-by-pollutant rules. The best present opportunity for integrated pollution control is a suite of atmospheric pollutants -- SO_2 , NO_x , and CO_2 . Other opportunities exist for nitrogen and phosphorus nutrients discharged to waterways. Creating multiple systems of regulatory credit combined with the flexibility of markets can propel Poland into the forefront of environmental control while avoiding some of the costly mistakes made in the U.S.

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U.S. Department of Justice

Environment and Natural Resources Division

Office of the Assistant Attorney General

Washington, D.C. 20530

5/7/91

FAX NUMBER (202) 514-0557
(FTS) 368-0557

CONFIRMATION NUMBER (202) 514-2701
(FTS) 368-2701

FROM:

Jonathan Warr

NO. OF PAGES:
(INCLUDING
COVER PAGE)

5

TO:

Jeff Holmstead

TELEPHONE NO:

456-7953

FAX NO:

456-7929

MESSAGE:

FYI, our comments to State
on the UK papers (which
I assume you've seen).

PLEASE NOTIFY SENDER IMMEDIATELY IF YOU HAVE ANY PROBLEMS
RECEIVING THESE PAGES.

May 6, 1991

TO: Dan Reifsnyder
State/OES/Global Change

FROM: Jonathan Wiener

SUBJECT: Comments on UK climate papers

Thank you for the opportunity to review the UK's two recent papers on climate, the "UK Paper on Comprehensive Approach -- Contribution to EC Discussion," and the "Participation of Developing Countries -- A Framework for Discussion." In preparation for your office's oral conversation with UK officials regarding these papers, I have the following suggestions.¹

"UK Paper on Comprehensive Approach"

1. We are delighted that the UK now agrees with us that a comprehensive approach is the better strategy on environmental grounds, and that each nation needs the flexibility to design its best policy in light of its unique social and economic circumstances.

But the UK paper limits its own adoption of a comprehensive approach. Our main strategy should be to show interest and appreciation, without agreeing to the UK's limited view of a comprehensive approach, and pull the UK and the EC toward agreement on a full comprehensive approach.

2. We agree with the UK paper that a comprehensive approach offers a design for a climate agreement, but does not itself specify the goal. The goal could be framed in terms of national strategies or otherwise; that is a subject for serious cost-benefit analysis and for the negotiations (and not for the UK or the EC to dictate).

3. In any event, any goal or parameter for national strategies (or other action) should be stated in terms of the variable of environmental interest, net greenhouse gas (GHG) emissions (weighted by an appropriate index). The UK paper occasionally

¹ If you intend to deliver written comments (which I am not recommending here), we would want to provide you with more detailed line-by-line criticisms, and with written elements of a counteroffer. Further, we expect any such counteroffer would have to receive Bromley Group consideration.

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strays into advocating separate treatment of each GHG (see, e.g., paragraph 8 ("exposure of the plans for each individual gas")).

We should strenuously oppose any attempt to divide up a purported comprehensive approach into several separate gas-by-gas international legal instruments. That route would accrue the disadvantages of a piecemeal approach without the advantages of a comprehensive approach. (a) It would provide no flexibility to nations to assemble their chosen portfolio of policies among the GHGs. (b) It would complicate negotiations by requiring agreement on several separate goals, each of which would be too difficult for some key players to achieve, whereas the aggregate might well be achievable by all so long as each had flexibility to devise its own package. (c) The gas-by-gas approach would likely end up omitting one or more gases or sectors that the international community could not agree on but that are relevant in individual nations; this in turn would pose the prospect of counterproductive shifts from a covered gas or sector to an omitted gas or sector. (d) And it would provide no assurance that the aggregate outcome of the several independently defined instruments would achieve a sensible overall climatic result.

Any international accord should therefore rigorously adhere to a fully comprehensive approach; then of course each nation could assemble its policy portfolio from among several domestic programs, each of which might address one subaspect of the whole (so long as side-effects or "shifts" to other gases are accounted for).

4. The ability to measure net GHG emissions is a critical issue: it is the basis on which the UK opts to "phase in" a comprehensive approach starting with just a few subelements. But the UK's position is flawed for several reasons. (a) The UK paper supplies no evidence to substantiate its claim in paragraph 16 that it is "impractical" to cover all gases. (b) The measurement of various gases will no doubt vary from sector to sector and from nation to nation. One cannot categorically include or exclude certain GHGs or sectors. (c) The UK paper ignores a host of projects now underway to improve measurement, including the rice-CH₄ projects in PRC, the biomass burning projects, and the cattle-CH₄ project beginning at Washington State University. These and many others will no doubt bear fruit over the next couple of years, just as nations are implementing the Framework Convention. (d) The UK statement on "impracticality" is belied by their own choice of source categories to count; for example they would count forestry despite the difficulties in measuring CO₂ sequestration (at least such measurements are considerably more uncertain than CFCs, energy sector CO₂, or energy sector CH₄ measurements). This may suggest that the UK list is determined not so much by practicality as by advantage to the UK.

(e) The key is to ensure credible accounting while providing incentives to improve measurement abilities. Categorically excluding certain areas will not provide such incentives.

- 3 -

Instead, any international document should define the question broadly, in terms of net GHG emissions, and then ask nations to explain how they calculate each proffered limitation measure. If desirable, this accounting could be divided into categories based on general measurability: for example, one category could be counted at face value (e.g. including CFCs and energy sector CO₂); a second category could require an attached written explanation (e.g. including forestry CO₂ and energy sector CH₄, CO, & NO_x); and a third category could require review by an expert panel (e.g. including agricultural CH₄ & N₂O). But such a categorization would have to be determined by an expert group, and be flexible to allow better demonstrated measurements to ascend the ladder toward face-value acceptance.

5. Giving credit for CFCs reduction is certainly a positive step. But it is problematic to give credit for reductions in CFCs only when those reductions exceed or outpace those a nation is bound to achieve under the Montreal Protocol ("MP"), as the UK suggests in paragraph 18. (a) It would provide a perverse incentive among MP signatories to oppose further amendments of the MP that accelerate its schedule, since those new reductions would then no longer count as credit under the climate agreement. (b) It would provide a perverse incentive to non-signatories not to join the MP, since then they would lose credit for virtually all their CFC reductions under the climate agreement. These perverse incentives are especially troubling given the very recent evidence of greater-than-expected stratospheric ozone depletion and the need for more aggressive reductions in ozone-depleting substances. It would be a serious mistake to create obstacles to bolstering and broadening the MP.

Credit for all CFC reductions would not "double count." Credit under the MP is for ODP values; credit under the climate agreement would be for GWP (or similar index) values. There are two distinct environmental concerns posed by CFCs. If a substance poses more overall threat than other substances, it should be addressed more aggressively.

(The arguments for counting all CFC reductions are laid out more fully in the "Comprehensive Approach" Report booklet, Feb. 1991, at pp. 73-75.)

6. We are unsure of the meaning or import of paragraph 9. It should probably be deleted.

- 4 -

"Participation of Developing Countries -- A Framework for Discussion"

1. There should be some effort to quantify the environmental gains made by each technology cooperation project. What reduction in emissions is achieved? This quantification will serve well to improve the cost-effectiveness of projects chosen, and to ensure that resources are not diverted improperly to private ends.
2. The technology projects should (be able to) address all GHGs, sources and sinks comprehensively.
3. The possibility of bilateral cooperative arrangements -- such as along the lines of debt-for-nature swaps -- should be included as one means for accomplishing technology cooperation. A centralized fund or facility should not be the only option.

Emissions Trading: Environmental Perestroika or Flimflam?

The author challenges the American utility industry to accept acid rain controls and use creatively the flexibility offered by the Administration's Clean Air Act bill.

Daniel J. Dudek

Dan Dudek is a senior economist with the Environmental Defense Fund. He holds a Ph.D. in agricultural economics from the University of California, Davis where his field of study was resource and environmental economics. He was an assistant professor of resource economics at the University of Massachusetts, Amherst where he taught resource and environmental economics. This article expands upon Dr. Dudek's recent testimony on acid rain emission reduction trading before the U.S. Senate Subcommittee on Environmental Protection.

Signs of change are everywhere in the news. Poland has led eastern Europe into the new era of glasnost by establishing the first post-war non-communist government in that region. East Germany has a new leader. Hungary has moved more rapidly than most to develop a market economy. Western Europe is moving toward complete integration in 1992.

A new spirit stemming from a resurgent interest in democracy and free markets seems to pervade, except in the electric utility industry. There, facing a Presidential proposal for acid rain control that gives it the flexibility it says it wants coupled with credible envi-

ronmental protection goals, the utility industry seems to be yearning for the "good old days" of insider deals and command-and-control environmental management. The arguments being raised in the halls of Congress in opposition to the radical idea that we should use market forces to solve our environmental problems are remarkably similar to the arguments heard in Poland from bloated state enterprises faced with the prospect of a market economy. It is disquieting to hear them in the bastion of free enterprise.

Acid rain legislation will be enacted by this Congress. The ques-

tion is whether the policy that emerges from the current political storm will impose the least burden on the American economy, guarantee both financial and environmental investments, and provide opportunity and latitude for entrepreneurs and innovation.

This past year the Environmental Defense Fund was offered an unusual set of opportunities. These began with an invitation to the White House by the Bush Transition Team to discuss our ideas for environmental policy in general and acid rain in particular. EDF was singled out because its staff had contributed significantly to *Project 88: Harnessing Market Forces to Protect Our Environment: Initiatives for the New President*, a bipartisan public policy study sponsored by Senators Timothy E. Wirth (D-Colo.) and John Heinz (R-Pa.). The innovative ideas in that study captured the imagination of the Transition Team, which asked EDF to transform the concepts in the report into an implementable policy.

The result was a proposal for a mandatory acid rain reduction program that incorporated strong economic incentives for pollution control in the form of marketable emissions permits. This proposal was submitted to officials of the Bush Administration early this year. When finally introduced, President Bush credited EDF's leadership in producing the policy initiative.

Title V of President Bush's Clean Air bill incorporates several crucial elements of the original EDF proposal, namely ambitious reduction goals; strict, enforceable

legal mandates; market-incentive mechanisms for compliance with those mandates; and an ultimate limit on the emission of acid rain precursors.

This article presents the outlines of the proposal submitted to the Bush Administration. It also presents the results of an analysis of the economic and environmental impacts of implementing a market-based acid rain control program of the sort described above. The analysis of EDF's original pro-

Arguments being raised in the halls of Congress are remarkably similar to those heard in Poland from bloated state enterprises faced with the prospect of a market economy.

posal was conducted with a large-scale regional linear programming model of the U.S. coal economy and the electric generating sector. Over the past decade this model—the coal electric utility model, or CEUM—has become the standard by which all acid rain proposals are evaluated.

In this article I hope to make clear why an environmentalist is interested in emissions trading, a traditional industrial policy, and why industry should get with the

program.

I. Overview

In our view, the approach embodied in the President's Clean Air Act proposal—and being considered by Senators Mitchell and Baucus—will lead to a successful and durable acid rain program because it is founded on an iron linkage between environmental protection and powerful economic efficiencies. Tamper with this iron bond and Congress will defeat the goal it shares with the President of ending the acid rain crisis by the turn of the century.

The crucial elements which comprise this iron bond are: (1) substantial required reductions in emissions of sulfur dioxide and oxides of nitrogen; (2) severe, unavoidable penalties for sources that fail to meet reduction requirements; (3) a nationwide cap on total emissions once required emissions reductions have been achieved; and (4) complete flexibility for sources in the means they choose for compliance with their reduction requirements.

Such flexibility would include the ability of sources to "trade" emissions reduction credits—which would be earned by any source that reduced its emissions beyond its reduction requirements—to another source that could use such credits, in lieu of on-site reductions, to meet its reduction obligations.

Such a program would offer a permanent, least-cost solution to the acid rain problem while spurring a number of other environmental and economic benefits. Because

of the limit on the nationwide total of sulfur dioxide emissions, energy efficiency will be called on to play an increasingly important role in the delivery of energy services. As a result, all pollutants associated with fossil fuel combustion, including carbon dioxide, will either be reduced or have their growth slowed.

Since emissions trading will confer an authentic market value on "extra" emissions reductions—enabling profit for clean-up—the program will induce technological and operational innovation to tap that potential profit.

At the same time, maximizing flexibility to the point of permitting emissions trading along with other methods of producing emission reductions will permit sources to use the least costly methods of compliance. This should lower the overall costs of the entire reduction and maintenance program.

Due to the dynamics of a broad, multi-state sulfur dioxide emissions trading market, emissions trading may provide a form of cost sharing for areas like the Midwest, which at one and the same time will shoulder the largest emissions reductions, and realize the greatest opportunities to produce cost-effectively "excess" emissions reductions that could be sold to sources in other regions of the country.

Finally, by making sources strictly liable for severe penalties when they fail to achieve required emissions reductions, the program can relieve both industry sources and the Environmental Protection Agency of overly cum-

bersome compliance planning obligations. As a result, sources have more leeway for innovation and EPA enforcement can concentrate on demonstrated wrongdoers who are subject to virtually automatic sanctions.

Emissions trading may provide a form of cost sharing for areas like the Midwest which will shoulder the largest emissions reductions and realize the greatest opportunities.

II. The Mechanics of Emissions Trading

A. A Short History

Economists are fundamentally concerned with the allocation of scarce resources. Their paradigms of decision making predict that managers will use variable factors of production up to the level at which the additional revenue generated just equals the additional outlay in costs. Use too much and you lose money. Use too little and you sacrifice additional profit.

At this efficient level of operations, the last unit of the factor just pays for itself. It is easy to see how this decision rule applies to priced inputs and outputs, but it is imperative that it applies to all in-

puts and outputs, whether priced or not. Private decision makers typically employ the disposal services of the environment without regard to its value or costs and damage that such use may impose: land, air, and water resources are often overused for disposal activities.

Since the consequences of such use are borne by society as a whole, their efficient use requires reducing the gap between social and private costs. This is the motivation for government intervention.

Economists have also long argued that government intervention in the marketplace should be limited to justifiable circumstances. One such circumstance, which applies to environmental pollution, is market failure. There are a variety of well-known remedies for this problem, involving specially designed taxes or restrictions on the quantities of pollution which can be legally discharged. Selection of the appropriate policy instrument is dictated by the state of knowledge and by technical, economic, and political feasibility. The distributional consequences of any policy are of particular concern. Who will gain and who will pay?

B. How Emissions Trading Can Work in an Emissions Reduction Program: The Title V Model

When President Bush unveiled his Clean Air bill in July, he promised that it would "turn . . . the power of the marketplace to the advantage of the environment." At a time when the war against pollution has taken on global di-

mensions, the proposal added another weapon to our pollution-fighting arsenal.

Emissions trading is not a new concept.¹ Economists have advocated such measures for many years. In fact, emissions trading first came to the fore as a technique for managing air pollution in the late 1970s. Under President Carter, the EPA first attempted to apply the concept to the pollutants that produce tropospheric ozone or smog. In addition to the frank skepticism and opposing litigation positions of environmentalists, the EPA "bubble policy" faced a host of technical problems that crippled it, producing a mixed record of failure and success. In the acid rain context, though the concept is no different from that first embodied in the bubble policy, emissions trading can be made to work quite easily. The danger remains that industry will use the legislative process to plead for special deals and undo the balance of the market, thus repeating the unfortunate history of the bubble policy.

Because current levels of emissions of sulfur dioxide and nitrogen oxides are producing destructive acidic deposition on forests, lakes and estuaries, the objective of any acid rain program is to reduce, by approximately half, the SO₂ and NO_x emissions of utilities and major industrial sources. Accordingly, each major source will be required by a specific deadline to acquire emissions reductions equivalent to the amount by which they exceed a government-established baseline figure.

As long as sources are free to choose how they will meet their control obligations, some may find that the total cost-effective reductions they can achieve exceed the amount they are required to produce. Other sources may find

Making emissions trading workable requires an underlying mandatory reduction program of the highest degree of integrity and reliability—the kind needed with or without emissions trading.

that meeting their reduction requirements on-site is extremely expensive, or at least more so than for sources in the first group.

Under an emissions trading program, the first group of sources would likely achieve greater amounts of emissions reductions than required. They would be motivated to do so because they would be permitted to transfer to other sources, in the form of a credit, the increment of reductions between those required and those actually achieved. By acquiring emissions reduction credits from the first group, the second would be deemed to have complied with their own reduction requirements as if they had achieved real reduc-

tions on-site. Since the credit-transferring sources would actually be achieving "extra" emissions reductions equal to the size of the credit, the total amount of pollution reduced would be the same as would occur if each source were required to make reductions on-site.

Making emissions trading workable requires an underlying mandatory reduction program of the highest degree of integrity and reliability—precisely the kind of program legislators and regulators would design *with or without* emissions trading—simply to ensure that the program succeeds in bringing about the intended reductions and environmental protection.

One additional element is also required: flexibility for sources in the means they choose for fulfilling their reduction obligations. By allowing sources of sulfur dioxide and oxides of nitrogen to "trade" extra emissions reductions, real financial values are created for efforts to reduce pollution, particularly for investments that result in pollution reductions beyond what is minimally required. The nationwide cap on emissions would guarantee that environmental benefits are maintained. The value of excess pollution reduction investments is also maintained, since no one could inflate the emission reduction credit currency by building a new plant outside the overall system.

Two other elements, both included in Title V, are crucial to both a successful emissions reduction program and a viable emissions trading system: (1) permits for

each source that specify emissions limits in tonnage and (2) continuous monitoring and reporting of emissions from each source. These features assure the reductions under the program and enable enforcement authorities to determine whether each source has met its reduction requirements.

III. Policy Performance

The basic program EDF proposed to the Bush Administration would use transferrable permits to distribute emission allowances and, consequently, emissions reductions obligations. The program would use 1985 emissions as a baseline from which reductions would be measured. In order to stimulate the market, the program would operate in six phases over roughly a decade. The larger number of smaller steps would give market participants experience with producing reductions, time to make control investments, and time to learn about the market. In addition, the larger number of sources included in the program would create one of the necessary conditions for successful emissions trading, namely, a market with some depth. For the 31 eastern states, the five phases would be:

Phase I (1991-1993) Average emissions equal to 85% of 1985 levels.

Phase II (1994-1996) Average emissions equal to 70% of 1985 levels.

Phase III (1997-1999) Average emissions equal to 55% of 1985 levels.

Phase IV (2000-beyond) Average

emissions equal to 40% of 1985 levels.

Phase V (2000-beyond) Emissions capped at 2000 levels.

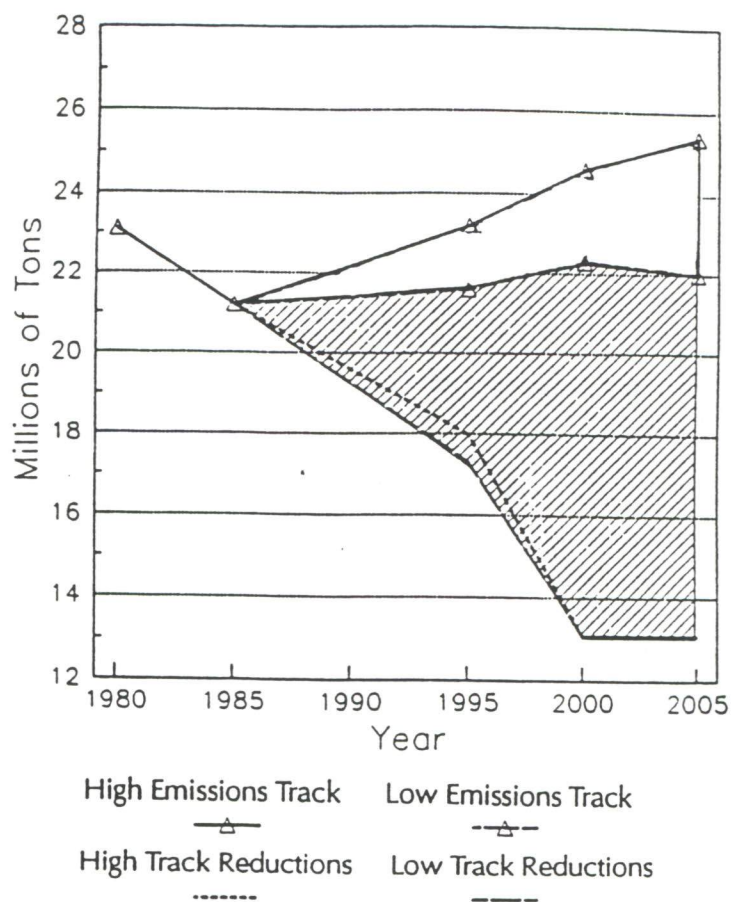
For the 17 western states, total utility emissions would be capped at 1985 levels throughout the program.

All utility sources emitting above 0.5 pounds of SO₂ per million BTU (mmBTU) are covered by the program and would be required to install continuous emissions monitoring systems (CEMS) to provide an instantaneous record of emissions. Industrial

sources could opt into the program voluntarily for purposes of trading emissions reductions; they were not included directly to avoid overburdening the EPA in its permitting responsibilities and because of inadequacies in the industrial emissions database. In the early phases of the program, sources committing to the installation of SO₂ control technology receive credits in order to avoid "whipsawing" the underlying high sulphur coal markets.

Sources committing to the operation of control technology in

FIGURE 1: SO₂ Emission Reductions



Phase III would be exempt from reduction requirements in Phases I and II.

While the federally issued permits would establish reduction obligations on a source-by-source basis, they would not require adoption of specific control technologies, or even reductions at the regulated source. Rather, the transferability of emission reductions would allow utilities to over-control at one source and transfer the excess reductions to cover the obligations at another. These emissions reductions would be transferrable within the 31-state region in the East and within the 17-state region in the West.

Excess emissions reductions once produced would exist until applied against control obligations through the banking provisions of the program. Banking also facilitates intra-phase averaging and eases compliance for sources in the face of operating uncertainties. By accommodating variations in utility operating conditions and demand, large penalties (up to four times marginal cost plus compensating reductions) are politically feasible.

To examine the overall cost-effectiveness of the proposal and its regional impacts, we analyzed a transferrable permit program for SO₂ emissions using EPA's new high and low emissions scenarios,² which differ by 2.3 million tons of SO₂ annually by the year 2000. The analysis represents, in part, an attempt to isolate the overall cost-effectiveness of the proposal and its regional impacts.

For purposes of the analysis, the

key features of the program are: (see Figure 1):

—by 1995, reductions from utility sources of 5.2 million tons of SO₂ would be required under the high emissions case versus 4.3 million tons for low emissions.

—by 2000, reductions from utility sources of 11.5 million tons (high case) and 9.2 million tons (low case) of SO₂ emissions.

The analysis also assumed that 0.5 million tons of SO₂ reduction from industrial sources would occur by the year 2000 and that a cost-effective reduction of an additional 1 million tons from industrial sources could be achieved.

A. Economic and Environmental Impacts

Using a 31-state Eastern trading region and a 17-state Western trading region, the acid rain control program uses transferrable permits to achieve maximum cost-effectiveness. If implemented, the program's annualized cost would be as indicated in Table 1, below.

Other key highlights of the analysis are these:

1. Cost Difference Between Cases.

Present value of utility costs range between \$31.5 billion under high emissions and \$17.2 billion for low emission track. Given the differences in underlying energy demand growth, this \$14.3 billion difference is a good measure of the value of energy efficiency improvements which might be employed to reduce generation and related emissions.

2. *Interregional Equity.* The program achieves an extraordinary degree of interregional equity under a range of emission reduction allocations. In 2000, under the worst case, the median state share of total program costs is 3.7%. Only four states would experience costs accounting for more than 6% of the total; the highest state cost share is 11.7%. The equity of this cost distribution decreases the likelihood of any adverse regional economic impact from acid rain control, an important result for the Administration's "flexible freeze" fiscal strategy.

3. *Rate Increases.* Utility rate changes, another measure of regional equity, mirror the states'

TABLE 1: National Acid Rain Program Costs Under Emissions Trading
(billions of 1988 dollars/yr*)

Year	High Emissions	Low Emissions
1995	0.9	0.6
2000	3.1-3.8	1.9-2.4

*These costs include estimates of cost savings from excess emission reduction credit banking, cost-effective industrial emissions trading, and the impact of clean coal technology, including in duct sorbent injection, a flue gas injection emission control system.

share of regional costs. Almost 90% of all states have rate increases at 3.5% or under. All but one state have rate changes less than 5% and that state has a 5.2% increase. The evenness of these impacts also minimizes the possibility of economic dislocations and any adverse impact of acid rain control costs on regional economies.

4. *Flexibility.* The proposal provides substantially more reductions than many other proposals which, unlike EDF's, fail to provide reductions that would offset forecasted growth in base case emissions. Although the EDF approach requires states that experience growth to secure additional reductions, the analysis shows that interstate trading of emission reduction credits allows those states to mitigate significantly any additional costs due to growth.

As the precontrol emissions distribution data in Figure 2 illustrate, emissions are regionally concentrated no matter which level of emissions is assumed. The bold face numbers reflect the high growth case, and the lighter numbers the low growth case. Not surprisingly, the costs of emission control will also tend to be proportionate to discharges in the absence of subsidies (see also Figure 4).

In Figure 3 the net flows of projected emissions trades between regions is illustrated. Results are presented for two alternative allocations: one using 1.0 lbs. SO_2/mmBTU (shown in the smaller numbers) and one using 0.5 lbs. SO_2/mmBTU (the larger figures). In each case, the num-

bers indicate thousands of tons of SO_2 , with the figures in parentheses indicating sales (excess emissions reductions) and those without, purchases.

The issue of cost-sharing and the distribution of costs from an acid rain program have been prominent issues in the debate over the choice of policy. Figure 4 illustrates the burden of emission control costs, which can be shifted through selection of allocation criteria. Similarly, choosing alternative baseline values will shift costs between regions and sources de-

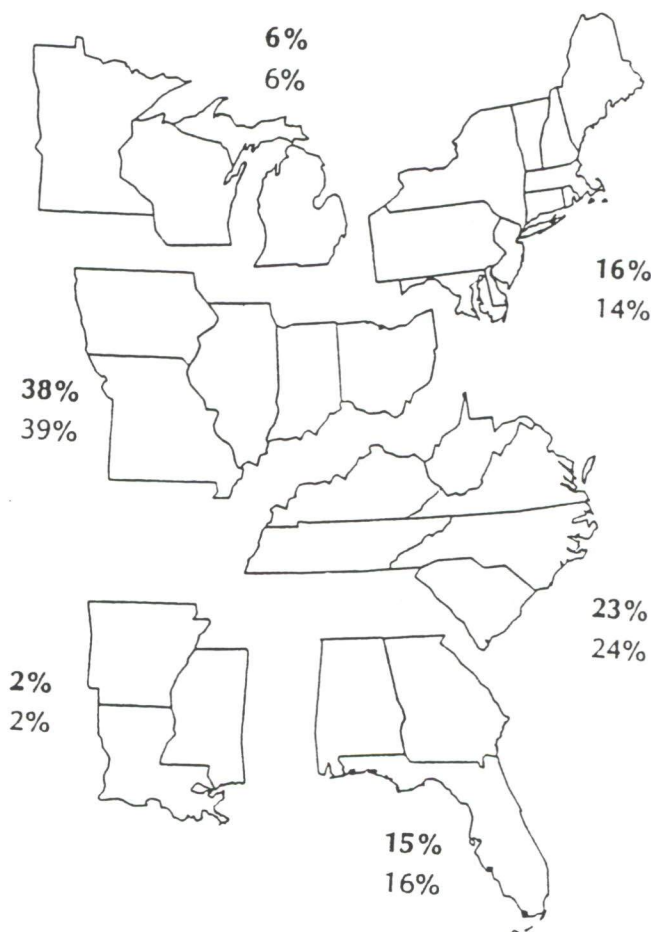
pending upon variations in underlying economic activity.

Irrespective of the allocation of emission reduction obligations, the best opportunity for cost sharing between regions lies with robust emission trading. Those desiring cost sharing would be best served by making the market work, not by restricting its scope, as the results of Figure 5 make abundantly clear.

B. Targeting Versus Trading

One continuing debate in the design of an acid rain control pro-

FIGURE 2: Eastern U.S. Regional Emissions Distribution



High growth case figures are in **bold** type
Low growth case figures are in light type

gram is whether only a few of the very largest sources should be required to produce reductions in the initial phases of a program. This is commonly referred to as a targeting program. The targeting program analyzed in this comparison would require the 20 largest sources of SO₂ emissions to retrofit their plants with scrubbers. Current discussions in the Senate indicate some support for requiring the 20 largest plants to reduce their emissions to 1.1 lbs. SO₂ per mmBTU. Unlike the case analyzed below, these targeted units

presumably would still be allowed the flexibility afforded by emissions trading.

In the near term, the cost-effectiveness of the EDF program would produce annual cost savings greater than \$1 billion when compared to targeting proposals (see Table 2). The targeting proposal presented in Table 2 uses a first phase requiring the top 20 emitting plants to adopt scrubbers and a second phase using emissions trading. Over 20 years, these cost differences would amount to \$4 - \$5 billion in present value terms. If these cost savings

were converted into additional SO₂ reductions, at least another 0.5 million tons of SO₂ could be removed in perpetuity.

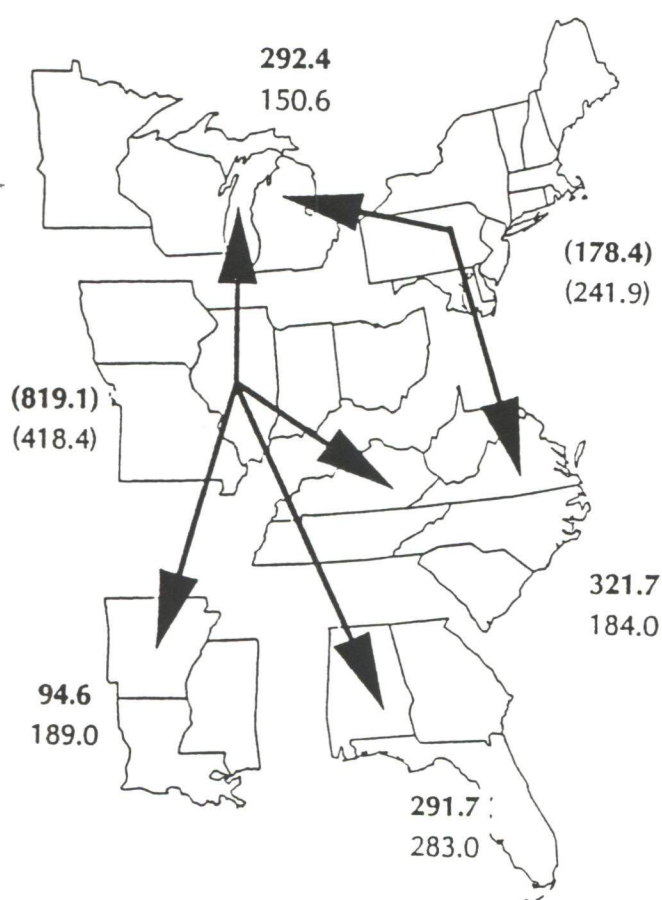
The targeted scrubbing proposals or other policies requiring a few sources to produce large initial reductions have another critical liability. These proposals would severely restrict opportunities to produce excess emissions reductions. This limitation dramatically decreases the quantity of excess reductions which may be banked and saved to meet the new source offset requirement or "cap" as it is commonly termed. The result is that the "cap" becomes more expensive than it need be.

Estimated coal market impacts under EDF's program include shifts in use of 14 to 19% away from northern Appalachian and Midwestern sources (with attendant increases to sources in Central and southern Appalachia and the West), depending upon underlying energy demand growth by 1995.

By 2000, coal market impacts are broadly similar to those forecast under equivalent targeting proposals. The level of scrubbing required to protect high-sulfur coal markets in targeting proposals (e.g., 40-50 gigawatts by 1995) is likely to be very difficult to attain even if mandated. In addition, because of the proposal's control technology incentives, coal market effects between 1997 and 2000 are significantly lower than those produced by alternative "least-cost" proposals.

Beyond the desire to attain efficient outcomes, in the sense of

FIGURE 3: Net Regional Emissions Trading in the Eastern U.S.



High growth case figures are in **bold type**
Low growth case figures are in light type

The northeast and east-central subregions emerge as exporters of emission rights, as the parenthetical numbers indicate. The other subregions are importers.

minimizing the costs of attaining any emission control policy goal, there has been increasing acceptance of the desirability of policies which internalize externalities, i.e. policies under which the polluter pays for reducing pollution and compensation for any remaining damage. The advantages of internalization have been seen to accrue largely in terms of changing the relative costs among alternatives and in the stimulation of opportunities for innovation. In fact, one of the critical advantages

that market-based policies possess is their focus on performance, not pre-specified solutions. The polluter is responsible for determining the most appropriate control strategy, not the government.

As the acid rain problem has dragged on and command-and-control solutions been avoided, examples of new technologies have sprung up to illustrate the importance of technical change in reducing costs. Technical change is notoriously difficult to forecast, yet we know it to be a potent

force shaping both our economy and society. Technical change can reduce costs, expand available options, and ease constraints like the emissions "cap." Given its power, why shouldn't innovation be harnessed to solve environmental problems instead of creating them?

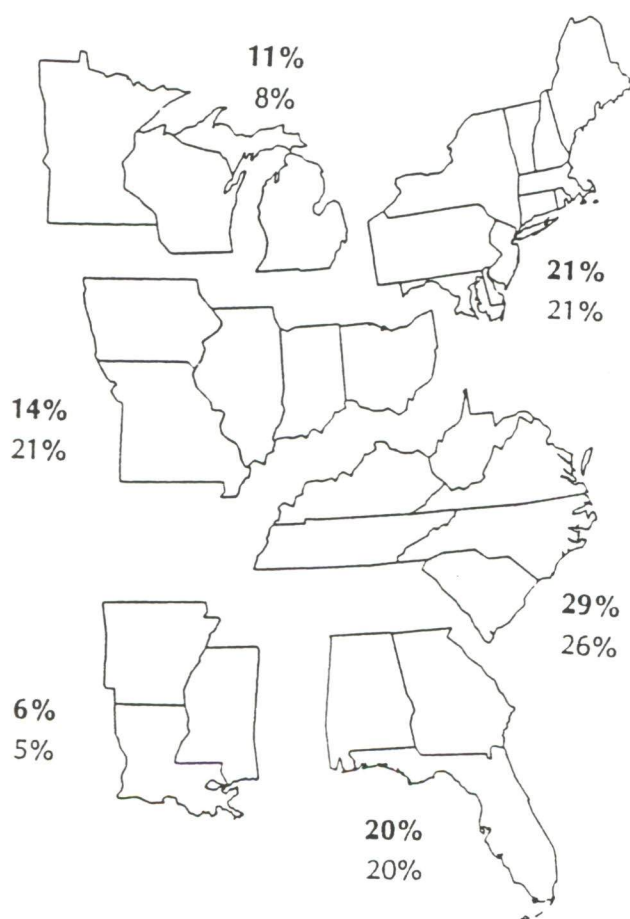
One of the critical advantages of using an economic method to solve the acid rain problem is illustrated in Table 3. Since the policy is performance-based, polluters are not forced to use specific technologies. As a result, institutional innovations like emissions banking and technical innovations like sorbent injection are allowed to develop and penetrate the emissions control market.

To evaluate the importance of allowing innovations to be adopted, a sensitivity analysis of ICF's CEUM linear programming model was conducted. As Table 3 illustrates, basic program costs, already reduced due to the efficiencies of the trading system, would likely be reduced further. Allowing emissions banking, cost-effective industrial trading, and sorbent injection (conservatively available in 1997) would reduce basic program costs by a further 30%.

While some environmentalists remain unconcerned about potential cost savings, cost savings lower consumer and political resistance to otherwise more expensive environmental goals and free up resources to be applied to the solution of other environmental problems.

Until now, opponents to acid rain controls have effectively ar-

FIGURE 4: Regional Cost Distribution Under Alternative Initial Allocations



High growth case figures are in **bold type**
Low growth case figures are in light type

TABLE 2: Alternative Acid Rain Program Performance in 1995

	EDF Proposal	Targeted Scrubbing	Least Cost Intrastate
Change in Emissions			
	(millions of tons of SO ₂)		
31 East (high)	-4.6	-5.2	-4.8
17 West (high)	-0.6		-0.4
Total U.S. (high)	-5.2	-5.2	-5.2
31 East (low)	-3.8	-4.3	-3.9
17 West (low)	-0.5		-0.4
Total U.S. (low)	-4.3	-4.3	-4.3
Change in Costs			
	(billions of 1988 dollars)		
31 East (high)	0.5	2.1	0.7
17 West (high)	0.4		0.3
Total U.S. (high)	0.9	2.1	1.0
31 East (low)	0.3	1.6	0.4
17 West (low)	0.3		0.2
Total U.S. (low)	0.6	1.6	0.6
Change in Coal Use			
	(millions of tons)		
N. App/Midwest (high)	-61.0		-55.0
C. App/West (high)	56.0		55.0
Total U.S. (high)	-5.0		
N. App/Midwest (low)	-43.0		-40.0
C. App/West (low)	40.0		40.0
Total U.S. (low)	-3.0		

gued that the scientific understanding of damages and their causes render the potential benefits uncertain while the costs of policy action are both known and incurred in the present. This argument has carefully avoided any mention of any relationship between the cost of policy action and the choice of policy. For acid rain in particular, numerous studies³ have demonstrated that substantial cost savings up to 75% are possible from the use of economic methods when compared to traditional, inflexible regulatory approaches.

The flip side of the general cost reduction produced by emissions

trading is its implicit cost sharing. Figure 5 displays the cost increases by region in the Eastern U.S. if emissions trading is restricted. The cost estimates for this analysis were taken from an economic analysis of Title V of the Administration's bill.⁴ In that study, the economic effects of intrastate-only trading was compared to interstate trading, thus simulating the suggestion by some utilities and public utility commissioners that emissions trades between states would not be permitted.

As Figure 5 demonstrates, such restrictions would increase costs generally. For example, the Mid-

western states, strong advocates of cost sharing, would experience cost increases of 58% in 1995, 16% in 2000, 10% in 2005, and 13% in 2010. Robust interstate trading would produce cost reductions of exactly these levels for these states. This is much more potent cost sharing than these states are likely to pry from a reluctant Congress.

As the cries against the cap and doubts about trading have risen, EPA and the Administration have been forced to respond to the threat that the legislation may be mortally wounded in Congress. There are two chief remedies under discussion.

The first is an annual hold-back of emission allowances with a subsequent auction of allowances for new sources requiring offsets. Existing sources would receive between 95-98% of the allowances proposed under Title V. Independent power producers and "greenfield sources"—new plants on line—would be eligible to compete in an annual auction for the retained allowances. New source offsets could be produced and the cap maintained without recourse to emissions trading.

The second option is to enable EPA to create and sell allowances at a fixed price, e.g. \$1500 per ton, to new sources unable to secure offsets through trading. At the end of the year, the Administrator would total these transactions and subtract these emissions on a pro rata basis from existing sources receiving allowances. In each case, the market is facilitated by administrative action and the cap is maintained.

In any case we expect the market will be robust, but some of the arguments raised by industry may necessitate these guarantees.

IV. The Stakes on the Table

An emissions trading program based upon transferrable permits of the sort described in this paper has the capacity to transform the electric generating sector.

For utilities, long-term strategic planning is encouraged. They are offered an expanded scope of business opportunities through the fungibility of power and emissions created by the trading system. New business opportunities

in control technologies, operations management systems, emissions brokering and sales are created.

The other critical actors within this system are the state utility regulators who rule on the acceptability of costs incurred by utilities and rates required to allow cost recovery and profit. The regulators will have an important role to play in encouraging innovation and risk taking in the pursuit of solutions to environmental problems. In their oversight capacity, they can promote and encourage the evaluation of the widest scope of alternatives in reducing emissions including energy efficiency investments. For investor owned utilities, incentive rate-of-return systems may be required to facilitate the distribution of gains between consumers and shareholders. Rewards for cooperation, initiative and success are key to the system.

There are those who claim that the interstate trading of emissions will either never develop or never be allowed. They are forgetting

that our nation's supply of electricity is dependent upon power regularly shipped across state lines into grids. The costs of these transfers are accounted as a routine matter of business. What utility would agree to produce and transfer power from one state to another without compensation for the SO₂ produced? If the emissions trading market is alive and well, then money will do just fine in compensation. However, if utilities and regulators act to hamper the market, then emission allowances will have to be transferred across state lines along with the power.

It is always in the interest of regulated entities to squeal loudly before the rules are set in an effort to alter the outcome. Once the rules are set, however, few believe that the industry would behave as irrationally as it claims it would before the fact. However, it is very difficult to separate legitimate concerns from reflexive regulatory posturing.

The emissions trading program offered by the President has given the industry an opportunity to

TABLE 3: Sensitivity Analysis of Potential Innovations
(billions of 1988 dollars)

Other Cost Factors by 2000	High Emission	Low Emissions
Basic Program Cost	4.4	2.8
Clean Coal Technology	-0.4	-0.3
Emissions Banking	-0.5	-0.4
Industrial Trading	-0.4	-0.1
Total	3.1	2.0

alter its posture and to become proactive rather than reactive. Continuing the lowest common denominator politics of the past has hindered the development of a rational, flexible, and economic approach to the problem of acid rain. If industry really wants flexibility in determining solutions to environmental problems, then it must be perceived as willing to shoulder those environmental responsibilities.

The industry is not currently viewed as cooperating in the implementation of the national con-

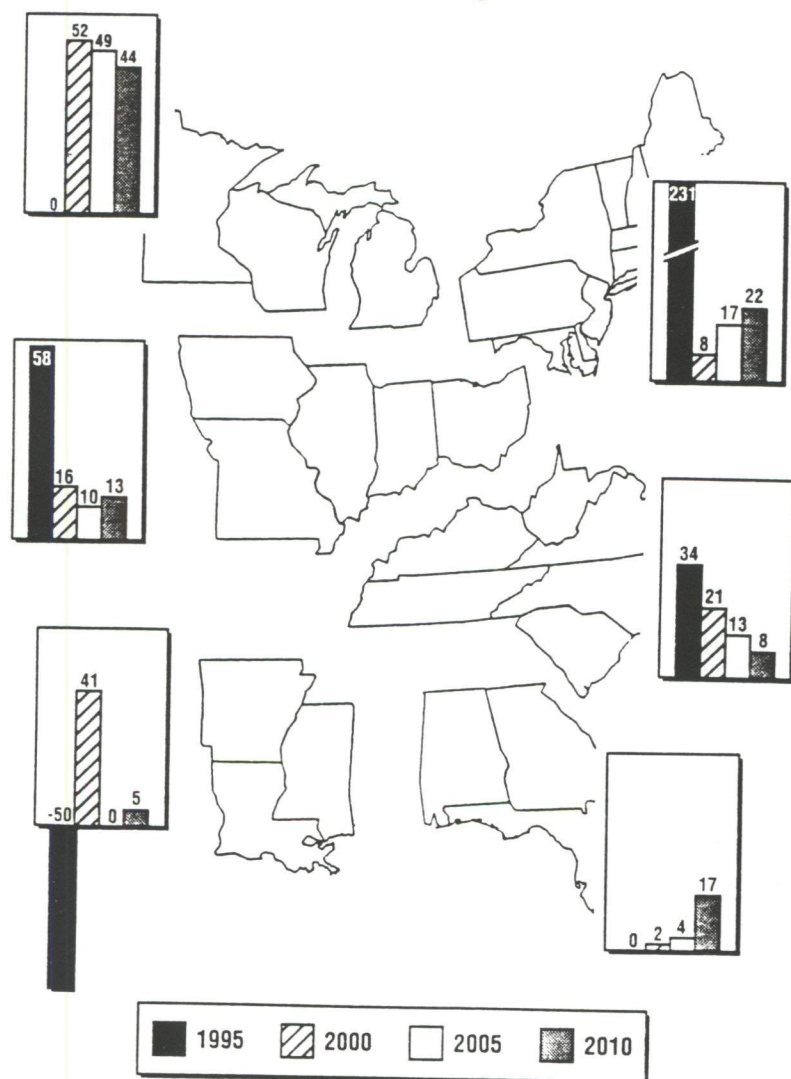
sensus on acid rain. Rather it is operating to weaken and disable critical elements of proposed legislation that would bring about the most cost-effective solutions. If successful in its current attack on the program, the industry will reap the whirlwind from failure to secure real environmental reform when the opportunity was at hand. Rest assured that if reform is unsuccessful, command-and-control will be with us for a long time to come.

If we are to solve the increasingly complex problems of atmospheric pollution, we need to tap

the on-site expertise of plant managers and operators in developing solutions. We must also engage the powerful engine of technical change by creating incentives and markets for new technologies. If we do not now credibly demonstrate the power of markets to solve atmospheric pollution problems, what will policy makers reach for when they control greenhouse gases such as CO₂? Given the global stakes on the table, we need to improve the range of policies in the policy maker's tool kit.

Or would we really prefer command-and-control? ■

FIGURE 5: Acid Rain Program Cost Changes if Trading is Restricted (percent change)



Footnotes:

1. See, e.g., D. J. Dudek and J. Palmisano, *Emissions Trading: Why is this Thoroughbred Hobbled?*, 13 COL. J. OF ENVTL. L., 217-56 (1988); J. Tripp and D. J. Dudek, *Institutional Guidelines for Designing Successful Transferrable Rights Programs*, 6 YALE J. ON REG., 369-91, (1989).
2. U.S. ENVTL PROTECTION AGENCY, BASELINE EMISSIONS PROJECTIONS (1989).
3. See, e.g., B. ELMAN, ECONOMIC, ENVIRONMENTAL, AND COAL MARKET IMPACTS OF SO₂ EMISSIONS TRADING UNDER ALTERNATIVE ACID RAIN CONTROL PROPOSALS, (Study for U.S. Environmental Protection Agency and ICF Resources Inc., 1989); see also ICF Resources, Inc., Analysis of EDF's Acid Rain Control Proposal, (memorandum to B. Elman, T. Pitton, and D. Dudek) May, 1989.
4. ICF RESOURCES, ECONOMIC ANALYSIS OF THE ADMINISTRATION'S PROPOSED CLEAN AIR ACT AMENDMENTS (1989).