



1990

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Recommended Citation

Cohill, Ellen W. (1990) "Global Warming: An International Crisis," *University of Baltimore Law Forum*: Vol. 21 : No. 1 , Article 2.
Available at: <http://scholarworks.law.ubalt.edu/lf/vol21/iss1/2>

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Global Warming: An International Crisis

by Ellen W. Cohill

In the last decade, global climate warming has become an international, scientific, and political concern. The 1980s has been the warmest decade in recorded history, and the weather extraordinary, with unusual ocean currents, floods in Asia and Australia, and drought in the Americas and Africa.¹ In fact, 1988 was the hottest year since recording of temperatures started in the 1860s.² By monitoring the earth's atmosphere, scientists have found that the "global-mean surface air temperature has increased by 0.3 [degree] C to 0.6 [degree] C over the last 100 years," and the "global sea level has increased by 10-20 cm."³ Other evidence of global warming includes increases in "the depth to permafrost in the Alaskan and Canadian Arctic."⁴ The normal temperature of Canadian lakes has risen, sea ice surrounding the Antarctic and in the Arctic seas is decreasing, and inland glaciers throughout the world have receded.⁵

This article discusses the scope and consequences of global warming and examines the steps necessary to curtail the rate of the greenhouse effect. Part I describes the greenhouse effect and scientific evidence of its existence. Part II discusses the causes of the greenhouse effect. Part III addresses the consequences that the greenhouse effect has upon the ecosystem and human beings. Part IV discusses international environmental law responses to the greenhouse effect. Part V examines domestic legislation, both current and pending. This article concludes that domestic legislation, as well as international agreements, are essential if global warming is to be reduced worldwide.

I. The Greenhouse Effect

Global warming, also known as the "greenhouse effect," results from the increasing concentration of certain gas molecules in the atmosphere, allowing sunlight to filter through to the surface of the planet, but preventing the sunlight's radiant infrared energy from returning to space.⁶ The more gas in the atmosphere, the more heat is reflected back to earth, causing the earth's temperature to rise significantly.⁷

According to the Intergovernmental Panel on Climate Change Report on Global Climate Change, if nothing is done about global warming, global temperatures could "increase by about a half a degree per decade on average, resulting in an average global increase of 2 degrees[c] by 2025 and 6 degrees[c] by the end of the 21st century."⁸

II. Causes of the Greenhouse Effect

The "greenhouse gases," whose atmospheric concentrations are causing global warming, are carbon dioxide (CO₂), chlorofluorocarbons (CFCs), methane (CH₄), nitrous oxide (N₂O), and tropospheric ozone (O₃).⁹

A. Carbon Dioxide

Approximately fifty percent of the greenhouse effect is caused by atmospheric increases in carbon dioxide.¹⁰ As a result of the industrial revolution, man-made carbon dioxide emission has increased by twenty-six percent since the 18th century.¹¹ Carbon dioxide is released by the burning of fossil fuels — such as coal, oil, and natural gas to run power plants, homes, automobiles and factories — and deforestation.¹²

Worldwide, fossil fuel combustion accounts for more than seventy percent of all human carbon dioxide emissions, or approximately 5.6 billion metric tons of carbon each year.¹³ Another significant contributor to the increase in carbon dioxide is deforestation, which involves the clearing and burning of trees.¹⁴ Deforestation contributes an estimated 4-6 billion tons of carbon dioxide per year, causing twenty percent of all worldwide carbon dioxide emissions.¹⁵ Tragically, deforestation has reached crisis proportions. Every year, 3.8 million hectares of open forest and 7.5 million hectares of closed forest are cleared in the tropics, particularly in the Amazon Basin, the islands of Southeast Asia, and Africa.¹⁶

B. Chlorofluorocarbons

Another type of greenhouse gas is chlorofluorocarbons (hereinafter "CFCs"), which was introduced into the atmosphere for the first time during this century.¹⁷ CFCs trap heat in the lower atmosphere; however, in the higher atmosphere, CFCs destroy the ozone layer, a thin shield of gas which protects the Earth from ultraviolet radiation.¹⁸ CFCs are long-lasting, man-made chemicals that are used in air conditioners, refrigerators, solvents, plastic packaging, and foam insulation.¹⁹ CFCs represent fifteen to twenty percent of the greenhouse effect and remain in the atmosphere for more than 100 years.²⁰

C. Methane

Levels of methane, one of the more rapidly growing greenhouse gases, have escalated over the past years.²¹ Methane emissions are rising at a rate of about

one percent annually and are responsible for approximately twenty percent of the greenhouse effect.²² Methane is produced by coal mines, cattle, rice fields, and landfills when organic waste breaks down.²³ In addition, methane is released from leaks in natural gas pipelines, leaks of natural gas connected with oil and production, incomplete combustion of vegetation in forests, range fires, and clearing of land.²⁴

D. Nitrous Oxide

Since pre-industrial times, concentrations of nitrous oxide in the atmosphere have increased by more than eight percent.²⁵ The sources of increased nitrous oxide are biomass burning, artificial fertilization of soils, and fossil fuels.²⁶ Nitrous oxide accounts for approximately six percent of the greenhouse effect.²⁷

E. Ground-Level Ozone

Ground-level ozone or smog, occurs when oxides of nitrogen and hydrocarbons interact in the sunlight.²⁸ It is a dangerous pollutant which affects the lungs and causes approximately five percent of the greenhouse effect.²⁹ Ground-level ozone comes from ground-based pollution sources, including motor vehicles, power plants, and oil refineries.³⁰ Since the late 1960s, ground-level ozone levels over North America and Europe have risen between one and two percent each year.³¹

III. Consequences of the Greenhouse Effect

The potential threats to society posed by the greenhouse effect are not only numerous, but may be catastrophic. While the severity of these threats is subject to speculation and disagreement among climatic experts, most believe the climatic changes would inevitably affect sea level, water supplies, agriculture, and the habitats of mankind, plants and animals.³²

One of the most far-reaching of the probable consequences of the greenhouse effect is the rise in sea level.³³ Higher global temperatures may increase the level of ocean water, melt mountain glaciers, and even cause polar ice sheets to melt or slide into the ocean.³⁴ Scientists estimate that global sea level could rise 50 to 200 centime-

ters before the end of the twenty-first century.³⁵ This could cause severe coastal flooding and erosion necessitating massive human migration to inland areas, destroy irreplaceable wetlands, and contaminate water supplies and drainage systems with sea water.³⁶ Ocean water expansion may be enough to submerge the Maldives, the coastal plains of Bangladesh, Egypt, the Netherlands, and the Pacific Islands of Kiribati, Tuvalu, and the Marshalls.³⁷ Cities like New York, New Orleans, Miami, Galveston, Rotterdam, Venice, Bangkok, and Taipei may also be in danger of inundation.³⁸ However, more at risk are third world countries, particularly in Asia, because millions of people live and farm on river deltas and flood plains.

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Agricultural productivity also could be severely affected by changes in temperature, precipitation, and soil moisture.³⁹ Climatic changes could cause weather patterns to shift, thereby potentially altering the international food trade and the location of food-deficit regions.⁴⁰

For example,

[i]n rural areas [of the United States], agricultural activity may decline in the South and may grow in the North. In northern states, such as Minnesota, where crops are currently limited by cold temperatures, climate change is predicted to create more favorable conditions for agriculture: namely, warmer and longer growing seasons.⁴¹

According to the 1988 EPA Effects of Climate Change Report, "[c]rop acreage in Appalachia, the Southeast, and the southern Great Plains could decrease by 5 to 25% and [agricultural] acreage in the northern Great Lakes states, the northern Great Plains, and the Pacific Northwest could increase by 5 to 17%."⁴²

IV. International Environmental Law

Global warming is an international problem requiring countries worldwide to participate in the reduction of greenhouse gas emissions. While no global warming treaty exists, there are substantive legal principles under current international law which may provide guidance toward a convention on global warming.

A. The Stockholm Declaration

The United Nations Conference on the Human Environment met in Stockholm from June 5-16, 1972.⁴³ The conference concluded with a declaration that was considered by authorities to protect the international environment in the future.⁴⁴ The framework of the Declaration contained three parts: (1) seven proclamations concerning the status of mankind and the environment,⁴⁵ which included identifying industrialization causes of pollution; (2) twenty-six principles for formulating important rules of international environmental law;⁴⁶ and (3) a strategy for a realistic approach to enhance the environment ("The Action Plan").⁴⁷ Thus, the Stockholm Declaration is a good starting point for dealing with the global warming issue because it has stipulated responsibilities and liabilities for harm to the earth's environment and has initiated international cooperation and support among nations.

B. United Nations Environment Programme

Shortly after the Stockholm meeting, the United Nations Environment Programme (hereinafter "UNEP") was established in 1973.⁴⁸ The UNEP was established to give the Stockholm Declaration's Action Plan institutional and financial backing.⁴⁹ UNEP's main responsibility, however, is to coordinate, supervise, and encourage the activities of other United Nations agencies, international and regional organizations, and national governments.⁵⁰ In addition, the establishment of UNEP created an international body whose function is to assess and monitor the international environment. Moreover, the UNEP has developed international strategies to deal with climate change through its sponsoring of international conventions, such as the Vienna Convention, the Montreal

Protocol, and more recently, the new international ozone treaty.

C. Vienna Convention

The first international convention confronting the issue of ozone depletion was the Vienna Convention for the Protection of the Ozone Layer, held on March 18-22, 1985 under the auspices of the UNEP.⁵¹ The Convention established obligations for protecting the ozone layer and coordinated international cooperation on systemic monitoring, scientific and technical research, and the exchange of information.⁵² Although the Convention did not include protocols, it created a process of information exchange, technical workshops, and negotiation which led to the adoption of the Montreal Protocol several years later.

D. The Montreal Protocol

Following the Vienna Convention, the Montreal Protocol on Substances that Deplete the Ozone Layer was negotiated.⁵³ The Montreal Protocol establishes worldwide controls on chemicals that destroy the stratospheric ozone layer and contribute to the greenhouse effect.⁵⁴ It also includes provisions that require freezing CFC emissions at the 1986 levels, a fifty percent reduction by 1999, and the development of alternatives to ozone depleting CFCs.⁵⁵

The problems of changes in stratospheric ozone and global warming are linked in several ways. CFCs are a greenhouse gas, as well as a threat to the ozone layer. However, global warming is a more complex issue than protecting the ozone layer, because global warming involves more parties, has wide-ranging uncertain consequences, and more economic constraints. The negotiating process for a global warming treaty may, therefore, be more difficult and time-consuming than the negotiations for the Montreal Protocol. Nevertheless, nations can use the Montreal Protocol as a substantive model for a global warming protocol because like the problem of the ozone layer, there are scientific uncertainties about the causes of global warming that must be weighed against the risks; i.e., shift in global climate, prior to implementation of a world-wide reduction schedule for greenhouse gas emissions.

E. Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (hereinafter "IPCC"), set up in 1987 by the World Meteorological Organization and UNEP, is the leader in handling scientific information and response strategies on global climate change.⁵⁶ IPCC created three working groups⁵⁷ in order to facilitate climate change investigation, discussion, and guidance.⁵⁸ The Working Groups are to present their reports to the Second World Climate Conference, scheduled to meet in Geneva from October 29 through November 7, 1990.⁵⁹

On May 26, 1990, Working Group 1, comprised of the world's leading meteorologists of the United Nations-sponsored IPCC, submitted a report to the IPCC which officially affirmed that global warming was definitely taking place.⁶⁰ The report said that achieving stabilization of atmospheric concentrations of carbon dioxide, nitrous oxide, and chlorofluorocarbons at today's levels would require immediate cuts of more than sixty percent in their output; and that methane would have to be cut by about fifteen to twenty percent.⁶¹ Britain committed itself to a reduction of

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thirty percent from the projected emission levels in the year 2005, while West German officials are considering cutting carbon dioxide twenty-five percent by the year 2005.⁶² By the year 2000, the Netherlands are planning to cut emissions by eight percent.⁶³ In addition, France, Italy, and Denmark support a minimum of stabilization by the year 2000, while the United States has

avoided timetables in favor of continued scientific study.⁶⁴ Although the United States has called for more scientific research to answer the scientific uncertainties involving global warming,⁶⁵ it has taken some steps to combat the problem. These steps include committing the United States to phasing out production of CFCs by the end of the century and contributing \$40 million to the world's first global environmental fund to help save the ozone layer and to speed up the elimination of CFCs.⁶⁶ However, Brazil, China, Japan, and the Soviet Union have done little beyond using strong rhetoric and supporting more research.

F. International Ozone Treaty

As a result of the rising ozone depletion rates, the Montreal Protocol needed to be revised to speed up the reduction schedule.⁶⁷ Thus, on June 27-29, 1990, more than 100 nations participated in an ozone conference, sponsored by the UNEP, to set up a schedule for governmental phaseout of harmful chemicals such as CFCs and to determine the amount of aid industrialized nations would need to give to help developing countries phase out CFCs.⁶⁸ The new treaty calls for a total phaseout of CFCs before the end of the century; however, thirteen countries, including Australia, Canada, Norway, Sweden, and West Germany committed themselves to phasing out the gases by 1997.⁶⁹ In addition, the agreement stipulated that the members would meet in 1992 to speed up the deadlines and created a new international body with a fourteen-member executive committee.⁷⁰ However, the most significant part of the treaty is that the committee will administer an "environmental fund" — the world's first global environmental fund to protect the world's environment — which will help developing countries obtain technologies to replace CFCs. Without such a fund to facilitate the transfer of technology to eliminate CFCs, developing countries would have been reluctant to sign the new treaty. The fund will total \$240 million, with the United States contributing \$40 million.⁷¹ Thus, firm deadlines for the reduction of emissions of potentially damaging chemicals and the establishment of an environmental fund to aid compliance by developing

countries could also be applied to future agreements on global warming.

G. Economic Summit

The seven richest industrial nations (hereinafter "Group of Seven") participated in the annual Economic Summit held in Houston, Texas on July 9-11, 1990.⁷² At the summit, the Group of Seven reiterated its support for a worldwide, United Nations-sponsored convention on global warming by 1992 and urged ratification of the International Ozone Treaty eliminating CFCs by the year 2000.⁷³ The participants also supported the adoption of internationally-binding regulations for the protection of tropical forests and a "comprehensive strategy. . . to address land-based sources of ocean pollution."⁷⁴ Moreover, the Group of Seven called for energy-efficiency improvements, such as the strengthening of multilateral development bank programs to protect the environment, and development of alternative energy sources, such as nuclear energy.⁷⁵ The summit can be called a failure, however, because it did not succeed in producing results on the most important environmental issue, global warming, and other environmental issues, such as agriculture, trade, and economic planning.

V. Domestic Legislation

In the United States Congress, interest has spread among members and committees seeking to acquire scientific information on global climate change, to evaluate the potential economic impacts of a warmer climate, and to conduct scientific research and policy studies on global warming.⁷⁶ The following discussion reviews existing United States environmental statutes that offer help in reducing the greenhouse effect and pending legislation on global warming.

A. Current Legislation

i. National Environmental Policy Act

The National Environmental Policy Act of 1969 (hereinafter "NEPA")⁷⁷ is one of the first federal environmental statutes. NEPA is unique because instead of enacting substantive requirements, it was aimed at activities of the federal government and established procedures for consideration of environmental

values. For example, NEPA requires that federal agencies "utilize a systematic interdisciplinary approach" when making decisions that affect the environment.⁷⁸ Federal agencies are also required to "include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment" a detailed statement regarding the environmental impact of the federal agency's action.⁷⁹

*"the EPA is
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criteria reports...."*

In addition to the environmental impact statement provision, NEPA requires federal agencies to acknowledge the global and far-reaching nature of environmental problems.⁸⁰

[B]ecause of the broad sweep of [NEPA], there has been a controversy from the time NEPA was enacted whether the statute was intended to apply to federal actions that take place outside, or have significant environmental impacts outside, the jurisdiction of the United States. The statute does not otherwise specify the extent of its reach, nor has the issue been clearly resolved by the courts.⁸¹

In order to correct this problem, NEPA should be amended to require federal agencies to complete environmental impact statements on their actions outside the jurisdiction of the United States to the Clean Air Act of 1963 (hereinafter "the Act"),⁸³ which changed the air pollution regulations.⁸⁴ The Environmental Protection Agency (hereinafter "EPA") was given the authority by Congress to administer the Act.⁸⁵ Under the Act, the EPA, in 1971, established national ambient outdoor air quality standards (hereinafter "NAAQS") for six criteria pollutants,⁸⁶ at

levels designed to protect the public health and welfare.

Under the Act, the EPA is responsible for issuing air quality criteria reports that describe the effects of these pollutants and for establishing control techniques in order to achieve and maintain proper ambient air quality standards.⁸⁷ For each criteria pollutant that endangers the public health and welfare, the EPA is responsible for promulgating primary and secondary NAAQS.⁸⁸ Primary NAAQS are those necessary to protect the public health, with an adequate margin of safety.⁸⁹ Secondary NAAQS are those necessary to protect the public welfare.⁹⁰

After the EPA establishes NAAQS for the above-mentioned criteria pollutants, it requires each state to submit to the EPA a State Implementation Plan (hereinafter "SIP") providing for attainment and maintenance of primary and secondary NAAQS within the particular state's air quality control regions.⁹¹ Each SIP had to be submitted to the EPA for approval; the Clean Air Act of 1970 gave states three years after implementation to attain the primary standard.⁹² The state is given a reasonable time to meet the secondary standard.⁹³ However, no ambient air quality standards specifically directed at global warming have been promulgated by the EPA, so SIPs are not required to regulate pollutant emissions for the purpose of reducing global warming.

Finally, the Act is responsible for initiating research by the EPA to develop new technology for the prevention and control of air pollution.⁹⁴ Recently, the EPA has prepared two reports for Congress on global warming issues. The first report focuses on the effects of climate change, and the second report formulates policies and examines options for stabilizing global climate.⁹⁵

ii. Global Climate Protection Act of 1987

On December 22, 1987, Congress enacted the Global Climate Protection Act of 1987 (hereinafter "GCPA").⁹⁶ Under the GCPA, the President, through the EPA, has been given the responsibility to enter into more formal international agreements to promote global cooperation on climate change.⁹⁷ The Secretary of State is to obtain interna-

tional cooperation in limiting global climate change. In addition, the Secretary is to promote the early designation of an International Year of Global Climate Protection within the United Nations system.⁹⁸ Because GCPA encourages consultation, information gathering, and research, the measure provides a good start in studying the global warming problem.

B. Pending Legislation

i. Clean Air Act Amendments of 1990

Congress is once again considering amendments to the Clean Air Act (hereinafter "CAA").⁹⁹ Currently, there are two bills pending, H.R. 3030¹⁰⁰ and S. 1630.¹⁰¹ Both bills would amend the CAA to provide for attainment and maintenance of health-protective national ambient air quality standards, with extensions ranging from five to twenty years, depending on the severity of the problem.¹⁰²

Both bills have identical goals in that they tighten control standards for cities that have not attained federal air quality standards, establish an acid rain control program, and formulate a method for controlling toxic air pollution.¹⁰³ In addition, the two measures would tighten "auto tailpipe standards, mandate cleaner gasoline and clean-fueled vehicles in some cities, and phaseout the production of chemicals that contribute to depletion of the stratospheric ozone layer."¹⁰⁴

Title VII of the bills places five CFCs on a reduction schedule that tracks the phasedown schedule stipulated in the Montreal Protocol, adding requirements for a complete phaseout by the year 2000.¹⁰⁵ Title VII also contains provisions relating to recapture and recycling of CFCs, and provision relating to motor vehicle air conditioners, trade, labelling, other ozone-depleting substances, and emissions of methane, a greenhouse gas.¹⁰⁶ "Both bills set deadlines and control requirements for ozone non-attainment areas — areas where ozone levels exceed the federal air quality standard — that vary according to the severity of the pollution."¹⁰⁷ However, deadlines and control categories are more graduated in the House bill.¹⁰⁸

Although the House bill is tougher on polluters,¹⁰⁹ both bills would severely

curtail emissions nationwide in an effort to rid cities of smog. The Clean Air Amendments passed by the House and Senate would force oil companies to produce cleaner fuels; i.e., blending gasoline with ethanol and methanol. In addition, the House version would push the manufacturing of clean-fuel vehicles, which would benefit producers of compressed natural gas and makers of electric-powered vehicles.

According to the Bush administration, the new CAA will have the effect of holding greenhouse gas emissions to about twenty-five percent below what they would otherwise be by early in the next century.¹¹⁰ Thus, regulations for the production and use of chemicals that destroy the ozone layer, such as CFCs, reformulation of gasoline for vehicles, and reduction in tailpipe emissions, namely nitrous oxide, will help reduce global warming. However, to further reduce global warming, a provision should be added to the CAA to reduce carbon dioxide emissions which result from the burning of fossil fuels and deforestation, especially since carbon dioxide is a major contributor to the greenhouse effect.

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As of this writing, the House and Senate are participating in a conference to reconcile the competing bills before forwarding the final version to the President.¹¹¹ Although there are differences in the two bills which may take some time to compromise the House and Senate are certain to reach a settlement.

ii. Proposed Global Warming Legislation

a. National Energy Policy Act

The National Energy Policy Act,¹¹² sponsored by Senator Timothy Wirth,

would establish as a national policy an immediate reduction in the amount of carbon dioxide in the atmosphere in order to reduce the risks of global warming. The bill seeks to achieve a reduction of carbon dioxide by promoting energy conservation; supporting renewable energy sources such as solar, wind, hydroelectric, and geothermal power; planting of trees; and assisting developing countries in slowing population growth and deforestation.¹¹³ Thus, the bill will have a major impact on both the industrial sector and utility industry. For example, coal may become more expensive while natural gas will become the fuel of choice. Utility-owned cogeneration facilities which use waste heat or fuel from industrial processes to generate electricity — may become commonplace. There may even be a revitalization of nuclear power; however, public perception of nuclear power will determine its future development.

Although Senator Wirth's bill is the most promising comprehensive global warming legislation, even if the Senate passes the bill, it is unlikely that the House will pass this year because of its comprehensive nature.

b. Global Warming Prevention Act

The Global Warming Prevention Act,¹¹⁴ introduced by Representative Schneider, establishes national policies to support and encourage international agreements that implement energy and natural resource conservation strategies to prevent the greenhouse effect.¹¹⁵ The primary goals of the bill include reducing carbon dioxide from 1988 levels by at least twenty percent by the year 2000 through conservation strategies and implementing an international global climate protection agreement by 1992.¹¹⁶ The bill proposes a number of policy measures to overcome current barriers to the reduction of carbon dioxide emissions; such as helping states adopt least-cost planning methods and performance-incentive regulations that make it profitable for utilities to save energy; requiring the Federal Energy Regulatory Commission to implement least-cost planning procedures that include energy efficiency options, such as government subsidies for energy-related expendi-

tures, waste reduction options and recycling, tree planting to offset carbon dioxide emissions, and transportation modes to reduce carbon dioxide emissions; implementing vehicle energy efficiency performance standards; increasing the tax on inefficient vehicles; and offering tax rebates for consumers who purchase fuel-efficient vehicles.¹¹⁷ Unfortunately, this bill faces severe hurdles because of budget constraints and the opposition of very powerful industries.

c. Global Climate Change Prevention Act

The Global Climate Change Prevention Act,¹¹⁸ sponsored by Senator Patrick J. Leahy, is aimed at developing research to determine what effect agriculture may have on global warming and how to prevent global warming from adversely affecting agriculture. "The bill includes incentives for reforestation of at least 3 million acres of farmland in the Conservation Reserve Program, as well as incentives for planting trees in urban areas."¹¹⁹ The legislation also directs the Department of Agriculture to conduct studies, including an evaluation of the greenhouse effect on world agriculture.¹²⁰

d. National Global Change Research Act

The National Global Change Research Act,¹²¹ sponsored by Senator Ernest F. Hollings, if enacted would provide funds for federal global climate change research. In addition, the bill would require coordinating federal research plans on global warming, ozone layer depletion, and other aspects of global change, as well as require the Federal Coordinating Council for Science Environment and Technology to coordinate a plan for a ten-year global research effort.¹²² Finally, the bill contains measures to coordinate, develop, and implement initiatives regarding safe substitutes and new technologies for replacing ozone depleting chemicals, such as CFCs.

e. Global Environment Research & Policy Act

In the House, Representative Walter B. Jones has sponsored the Global Environment Research & Policy Act,¹²³ which is to coordinate global research efforts. Section 101 of the bill would establish the Committee on Earth

Sciences as the lead entity for overseeing the implementation of a ten-year interagency research plan and direct the Council on Environmental Quality (hereinafter "CEQ") to advise the President on policies related to global change.¹²⁴ The bill would require incorporation of international research plans to coordinate oceanographic, atmospheric, terrestrial, and polar research programs.¹²⁵ More importantly, section 301 of the bill would require the CEQ to issue regulations ensuring the consideration of significant effects of major federal actions on the environment outside the jurisdiction of the United States.¹²⁶ Thus, by enacting the Global Environmental Research & Policy Act it would resolve the long-standing controversy regarding the application and effectiveness of NEPA to international actions of the federal government outside the jurisdiction of the United States.

*"scientific evidence
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f. Global Change Research Program Act

Representative Robert A. Roe has sponsored the Global Change Research Program Act.¹²⁷ The bill would establish a National Global Change Research Program geared toward responding to global change, including the cumulative effects of human activity on the environment and discussions toward international protocols in global change research and assessment.¹²⁸ Like the proposed Global Environment Research & Policy Act, sponsored by Representative Jones, Representative Roe's bill would establish a committee on Earth Sciences to develop a global change research plan. However, the differences between Representative Roe's and Representative Jones's bills are that Representative Jones's bill would require federal agencies to consider the effects of their actions on the global environment and give responsibility for coordinating global change policy to the CEQ. Although

the language in Representative Roe's bill is different from Representative Jones's bill, the purpose is the same, which is to coordinate federal global climate change research. Thus, a compromise, resulting in one House global change research bill, will most likely be worked out in the near future.

Conclusion

The weight of scientific evidence gathered over the years suggests that global warming is very real. Timely action to reduce greenhouse gases is crucial to prevent further global warming. Unfortunately, provisions of current legislation, such as NEPA and the CAA, are not sufficient to combat global warming. Global warming is an international problem that requires countries to work together as a world community to reduce global warming. In order to reduce global warming worldwide, the world's largest greenhouse producers, the United States, the Soviet Union, China, Brazil, and Japan, should implement a global warming treaty. The treaty should have specific goals and guidelines for eliminating greenhouse gases, such as: (1) implementing the new International Ozone Treaty to eliminate CFCs; (2) establishing a global warming fund for developing countries; (3) reducing fossil fuel use; (4) encouraging the use of renewable energy sources; and (5) implementing reforestation programs. Since the influence of United States in achieving the Montreal Protocol was tremendous in leading other nations toward establishing firm target dates for CFC emissions reductions, perhaps the rest of the world expects, and would be responsive to, similar United States leadership on global warming.

Endnotes

¹Moore, *The Greenhouse Debate: Does Your Cup of Coffee Cause Forest Fires?*, Int'l Wildlife Mar.-Apr. 1989, at [hereinafter *The Greenhouse Debate*].

²Houghton & Woodwell, *Global Climatic Change*, 260 Sci. Am. 36, 37-38 (1989) (the hottest years on record, starting with the warmest, are 1988, 1987, 1983, 1981, 1980 and 1986.).

³Intergovernmental Panel on Climate Change, *Policymakers Summary of the Scientific Assessment of Climate Change*,

Report to IPCC from Working Group 1, at 3 (June 1990) [hereinafter Scientific Assessment Report].

⁴Houghton & Woodwell, *supra* note 2, at 38 (the increase in permafrost is according to Arthur H. Lachenbruch and B. Vaughn Marshall of the U.S. Geological Survey).

⁵*Id.*

⁶Rind, *A Character Sketch of Greenhouse*, 15 EPA J. 4 (1989).

⁷See MacKenzie, *Breathing Easier: Taking Action on Climate Change, Air Pollution, and Energy Insecurity*, World Resources Institute, July 1989, at 4. Scientists recently found that sulfur dioxide — an air pollutant caused by burning fossil fuels and an ingredient of acid rain — may be cooling the Earth and offsetting global warming, although this may only temporarily delay an inevitable global warming. Booth, *Air Pollutant May Counter Global Heating*, Wash. Post, Sept. 17, 1990, at A1, col. 4.

⁸U.N. Report *Forecasts Dire Global Warming*, Wash. Post, May 26, 1990, at A11, col. 5.

⁹MacKenzie, *supra* note 7, at 4.

¹⁰Morgenstern & Tirpak, *The Greenhouse Gases*, 16 EPA J. 8, 9-10 (1990).

¹¹Scientific Assessment Report, *supra* note 3, at 9.

¹²See The Foundation on Economic Trends, *The Global Greenhouse Network* U.S. Communications Committee Information Kit 9 (1988).

¹³Houghton & Woodwell, *supra* note 2, at 44. The United States emits carbon from fossil fuels at a rate of five tons per person. West Germany and Great Britain emit at the rate of three tons per person, Italy and France at 1.8 tons per person, Mexico and South Korea at one ton per person, India at 0.19 tons per person, Indonesia at 0.16 tons per person, and Africa at 0.10 tons per person. Flavin, *Slowing Global Warming: A Worldwide Strategy*, Worldwatch Paper 91, Oct. 1989, at 25.

¹⁴Morrison, *Global Climate Change*, CRS Issue Brief, Mar. 22, 1990, at 9.

¹⁵*Id.* There are two ways in which deforestation adds to the greenhouse effect. *Id.* First, burning of forests releases vast quantities of carbon dioxide into the atmosphere. *Id.* Second, because trees absorb carbon dioxide in their biomass, large-scale deforestation re-

duces the storage of natural carbon dioxide. *Id.*

¹⁶The Tropical Forestry Action Plan (prepared by FAO in cooperation with the World Resources Institute, the World Bank and the United Nations Development Programme) at 4. Closed forest is where the trees and undergrowth combine to cover the ground. *Id.*

¹⁷Scientific Assessment Report, *supra* note 3, at 10.

¹⁸*The Greenhouse Debate*, *supra* note 1. (Three to five percent of the global ozone layer has been destroyed by CFCs.)

¹⁹Hileman, *Global Warming*, C&EN Special Report, Mar. 13, 1989, at 30.

²⁰The Greenhouse Crisis Foundation, *101 Ways to Help Heal the Earth* 3 (1990) [hereinafter *101 Ways to Help Heal the Earth*].

²¹Hileman, *supra* note 19, at 29.

²²See Office of Policy, Planning, and Evaluation, U.S. Environmental Protection Agency, *Policy Options for Stabilizing Global Climate* 15 (Draft Report to Congress) (Executive Summary) (D. Lashof & D. Tirpak, ed. 1989) [hereinafter *Policy Options Report*].

²³Gibbs & Hogan, *Policy Options: Methane*, 16 EPA J. 23 (1990).

²⁴Hileman, *supra* note 19, at 29.

²⁵Scientific Assessment Report, *supra* note 3, at 10. Nitrous oxide molecules average tropospheric lifetime is about 150 years. Hileman, *supra* note 19, at 29.

²⁶MacKenzie, *supra* note 7, at 6.

Exhaust from supersonic aircraft, such as the Concorde, also contains nitrous oxide, which contributes to depleting the ozone. V. Yannacone, B. Cohen & S. Davison, *Environmental Rights & Remedies* § 8:3 (Cum. Supp. 1988).

"Biomass energy can be derived either from wastes or from trees and plants grown on energy farms." Brower, *Cool Energy, The Renewable Solution to Global Warming*, A Report by the Union of Concerned Scientists, at 54 (1990).

²⁷Morgenstern & Tirpak, *supra* note 10, at 9.

²⁸*The Greenhouse Debate*, *supra* note 1.

²⁹*101 Ways to Help Heal the Earth*, *supra* note 20, at 4.

³⁰*Id.*

³¹Hileman, *supra* note 19, at 29.

³²See *infra* notes 33-42 and accompanying text.

³³See Office of Policy, Planning and Eva-

uation, U.S. Environmental Protection Agency, *The Potential Effects of Global Climate Change on the United States*, at xxxiv (Oct. 1988) (Report to Congress) [hereinafter *Potential Effects Report*].

³⁴Titus, *How It Might Be: Sea Levels*, 15 EPA J. 14 (1989).

³⁵*Potential Effects Report*, *supra* note 33, at xxxiv.

³⁶*Id.* at xxxiv-xxxvi. A 1988 assessment prepared by the EPA projects that if sea level rises one meter, twenty-six to sixty-six percent of the wetlands in the United States will be lost. *Id.* at xxxiv.

³⁷Hileman, *supra* note 19, at 42.

³⁸*Id.*

³⁹Rosenzweig, *How It Might Be: Agriculture*, 15 EPA J. 9 (1989).

⁴⁰*Id.* at 10.

⁴¹*Id.* at 9-10.

⁴²Hileman, *supra* note 19, at 43. Global warming also may cause a "loss of 20 percent of the earth's species before the end of the century." Henderson, *How It Might Be: Species*, 15 EPA J. 21 (1989).

⁴³Stockholm Declaration of the United Nations Conference on the Human Environment, *Report of the United Nations Conference on the Human Environment*, U.N. Doc. A/CONF. 48/14 and Corr. 1 (1972), U.N. Sales No. E. 73. II. A.14 and Corr., *reprinted in* 11 I.L.M. 1416 (1972) [hereinafter *Stockholm Declaration*].

⁴⁴United Nations Conference on the Human Environment, U.N. Monthly Chron., July 1972, at 50.

⁴⁵Stockholm Declaration, *supra* note 43, at 1416-17. (The seven proclamations recognized: (1) the universal requirement for man to live in a safe environment; (2) "industrialization and technological development" cause the majority of environmental problems; and (3) developing countries need to provide their citizens with the basis of life: food, clothing, shelter, education, health and sanitation).

⁴⁶*Id.* at 1417-20. Principles 1, 2, and 6 concerned pollution. Principle 1 declared the right for man to live in a clean environment. See *id.* at 1417-18. Principle 2 recognized air, water, land, flora and fauna as natural resources of the earth. *Id.* at 1418. Principle 6 recognized that the emissions of substances and the release of heat in harmful quantities must be stopped to prevent serious or irreversible damage to the earth's en-

vironment. *Id.* Thus, Principle 6 seems to be applicable to global warming.

Principle 20 recognized that environmental technologies should be made available to all countries, even developing ones, in order to promote wide dissemination of the technology, and such technology should not constitute a financial burden on the developing countries. *Id.* at 1420. The recent international ozone treaty (*see infra* notes 67-71 and accompanying text) seems to have been based on the concept set forth in Principle 20 in that an environmental fund was established to help developing countries with the transfer of technology so that CFCs can be eliminated worldwide.

Principle 21 stated in part: "States have. . . the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction." *Id.* This extra-territorial effect provision seems to be applicable to global environmental problems, such as the greenhouse effect, because of transboundary pollution and other environmentally damaging activities having international consequences. Principle 21 does not allow states to disregard the international effect of their actions. Foreign nations can still regulate their own internal affairs without foreign dictation through the terms of an international global warming treaty, as negotiated by the world's nations.

Principle 22 recognized the need for more international control of the states, possibly through an international agreement, such as a global warming treaty, to protect and safeguard the environment: "States shall cooperate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such states to areas beyond their jurisdiction." *Id.* ⁴⁷*Id.* at 1421. (The third part of the Declaration is The Action Plan, which includes: (1) the global environmental assessment programme; (2) environmental management activities; and (3) international measures to support the national and international actions of

assessment and management).

⁴⁸Johnston, *Systematic Environmental Damage: The Challenge to International Law and Organization*, 12 *Syracuse J. Int'l L. & Comm.* 255, 257 (1985).

⁴⁹Brunee, *Acid Rain and Ozone Depletion: International Law & Regulation* 144 (1988) (UNEP is located in Nairobi and consists of a Governing Council, a small Secretariat and the Environment Fund).

⁵⁰*Id.* at 145-46.

⁵¹Vienna Convention for the Protection of the Ozone Layer, March 22, 1985, 26 *I.L.M.* 1516. The Vienna Convention was opened for signature on March 22, 1985 and was signed by fourteen of the twenty-eight signatories to the Convention. The fourteen signatories include: Australia, Austria, Byelorussian SSR, Canada, Finland, Guatemala, Mexico, New Zealand, Norway, Sweden, Ukrainian SSR, Union of the Soviet Socialist Republics, United Kingdom, and the United States. *Id.*

⁵²*Id.*

⁵³Montreal Protocol on Substances that Deplete the Ozone Layer, *adopted and opened for signature* Sept. 16, 1987, *reprinted in* 26 *I.L.M.* 1541 (1987) (effective Jan. 1, 1989). The Conference met in Montreal, Canada from September 14-16, 1987 under the auspices of the UNEP. *Id.* Of the fifty-six members of the United Nations that attended, only twenty-four nations signed the Montreal Protocol. *Montreal Protocol on Substances that Deplete the Ozone Layer*, 29 *Harv. Int'l L.J.* 185 n.1 (1988). The signing nations are: Belgium, Canada, Denmark, Egypt, Federal Republic of Germany, Finland, France, Ghana, Italy, Japan, Kenya, Mexico, Netherlands, New Zealand, Norway, Panama, Portugal, Senegal, Sweden, Switzerland, Togo, United Kingdom, United States, Venezuela, and the European Economic Community. Since that time, a total of thirty-two nations have ratified the Montreal Protocol and six additional nations indicated on March 5, 1989 they would ratify the Montreal Protocol. The six nations are: Austria, Hungary, Malaysia, Trinidad and Tobago, the Philippines, and Zambia. *L.A. Times*, Mar. 6, 1989, § I, at 1, col. 3.

⁵⁴*Id.*

⁵⁵*Id.*

⁵⁶Morrison, *supra* note 14, at 11.

⁵⁷*Id.* Working Group 1, chaired by the United Kingdom, is to assess the scien-

tific evidence and causes of climate change. *Id.* Working Group 2, chaired by the Soviet Union, is to analyze the environmental, economic, and social effects of climate change. *Id.* Working Group 3, chaired by the United States, is to identify and formulate response strategies. *Id.* As of this writing, the only report available to IPCC was from Working Group 1.

⁵⁸*Id.*

⁵⁹*Id.* The groups responsible for this conference include the WMO, UNEP, and the International Council of Scientific Unions. *Id.*

⁶⁰Clover, *World likely to be 3°C hotter in 100 years*, *The Daily Telegraph* (U.K.), May 26, 1990, at 4.

⁶¹Scientific Assessment Report, *supra* note 3, at 1.

⁶²Weisskopf & Booth, *U.N. Report Predicts Dire Warming; Break with U.S. Seen In Thatcher Response*, *Wash. Post*, May 26, 1990, at A11, col. 6. It is easier for West Germany to set a goal because it can tie into French nuclear power, whereas the United States is much more dependent on fossil fuels. Lancaster, *After Rhetoric of '89, Environment Likely to Take Back Seat at Summit*, *Wash. Post*, July 9, 1990, at A4, col. 3.

⁶³*Id.*

⁶⁴Brown and Williams, *Emissions peg 'too little too late'*, *The Guardian* (U.K.), May 26, 1990, at 2.

⁶⁵Weisskopf & Booth, *supra* note 62, at A1, col. 2.

⁶⁶See Alexander, *A Sizzling Scientific Debate; Skeptics claim that the evidence for global warming is not so hot*, *Time*, Apr. 30, 1990, at 84; *see also* Frankel, *U.S. Stance Criticized at Ozone Conference*, *Wash. Post*, June 28, 1990, at A34, col. 2.

⁶⁷Note, *The Ozone Agreements: A Modern Approach to Building Cooperation and Resolving International Environmental Issues*, 14 *S. Ill. U.L.J.* 265, 273 (1990).

⁶⁸Frankel, *supra* note 66, at A34, col. 1.

⁶⁹Frankel, *Governments Agree on Ozone Fund*, *Wash. Post*, June 30, 1990, at A26, col. 2.

Besides banning the production and use in new products of the five main types of dangerous chemicals, the new agreement calls for a ban by the end of the century of three fire-extinguishing chemicals called halons.

Two other chlorine-based chemicals used as solvents and cleaning agents, methyl chloroform and carbon tetrachloride are to be restricted. The participants agreed to reduce methyl chloroform production by 70 percent by the year 2000 and by 100 percent in 2005. Production of carbon tetrachloride is to be reduced 85 percent by 1995 and 100 percent by 2000.

Browne, *93 Nations Agree to Ban Chemicals that Harm Ozone*, N.Y. Times, June 30, 1990, at 1, col. 3.

⁷⁰Browne, *supra* note 69, at 2, col. 3.

The executive committee will consist of fourteen rotating members, seven industrial and seven poor nations, each serving a three-year term. *Id.* For the first three years, Canada, West Germany, Finland, the Netherlands, Japan, the United States, the Soviet Union, Brazil, Egypt, Ghana, Jordan, Malaysia, Mexico, and Venezuela will serve on the committee. *Id.* In addition, Finland will act as chairman for the first year, and Canada will be the host for the committee's meetings.

Id.

⁷¹*Id.*

⁷²Maraniss, *Environmental 'Report Card' Rates U.S. Poor on Major Global Issues*, Wash. Post, July 9, 1990, at A4, col. 1. The Group of Seven consists of the world's seven richest industrial nations: Canada, France, Italy, Japan, United Kingdom, United States, and West Germany.

⁷³Daily Report for Executives (BNA), July 12, 1990, at A15. The Group of Seven decided to wait for the release of the IPCC report in August, and the Second World Climate Conference, scheduled for October 29 through November 1, 1990 in Geneva, before adopting strategies and measures for reducing global warming. *Id.*

⁷⁴*Id.*

⁷⁵*Id.*

⁷⁶Morrison, *supra* note 14, at 11. The interest evolved into a congressional agenda item in June of 1988 after James Hansen, a NASA scientist, said that it is "99 percent probable that the Earth is warming" due to greenhouse gas emissions. M. Courpas, D. Gushee, & L. Parker, *Air Quality Activities in the 100th Congress*, CRS Report for Congress, June 23, 1989, at 36.

⁷⁷Pub. L. No. 91-190, 83 Stat. 852, 853 (1970) (codified as amended at 42 U.S.C. §§ 4321-4347 (1988)). NEPA is responsible for establishing the Council on Environmental Quality ("CEQ"), pursuant to 42 U.S.C. §§ 4341-4347 (1988), which issues mandatory regulations that implement the procedures of NEPA that are binding on federal agencies. 40 C.F.R. §§ 1500-1508 (1988).

⁷⁸National Environmental Policy Act of 1969, § 102(2)(A), 42 U.S.C. § 4332(2)(A) (1988).

⁷⁹*Id.* § 4332(2)(C) (1988). This section provides:

The Congress authorizes and directs that, to the fullest extent possible... (2) all agencies of the Federal Government shall —

...

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on —

- (i) the environmental impact of the proposed action,
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
- (iii) alternatives to the proposed action,
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Id.

⁸⁰National Environmental Policy Act of 1969, § 102(2)(F), 42 U.S.C. § 4332(2)(F) (1988). This section provides:

The Congress authorizes and directs that, to the fullest extent possible... (2) all agencies of the Federal Government shall —

...

(F) recognize the worldwide and long-range character of environmental problems and, where consis-

tent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment....

Id.

⁸¹H.R. Rep. No. 394, 101st Cong., 1st Sess., pt. 1, at 8 (1989).

⁸²The Global Environment Research & Policy Act has been introduced in the House to correct the controversy regarding the application of NEPA to international actions of the federal government outside the jurisdiction of the United States. See *infra* text accompanying note 126.

⁸³Pub. L. No. 88-206, 77 Stat. 392 (1963).

⁸⁴Pub. L. No. 91-604, 84 Stat. 1676 (1970) (codified as amended at 42 U.S.C. §§ 7401-7626 (1988)).

⁸⁵J. Arbuckle, N. Bryson, D. Case, C. Cherney, R. Hall, J. Martin, J. Miller, M. Miller, W. Pedersen, R. Randle, R. Stoll, T. Sullivan & T. Vanderver, *Env'tl. Law Handbook* 293 (1987).

⁸⁶36 Fed. Reg. 22384 (1971) (codified as amended at 40 C.F.R. §§ 50.4 to 50.12 (1988)). Primary National Ambient Air Quality Standards (NAAQS) are:

- (1) Particulate matter: 150 micrograms per cubic meter-maximum 24-hr. concentration not to be exceeded more than once per year;
- (2) Sulfur oxides: 0.14 parts per million-maximum 24-hr concentration, not to be exceeded more than once per year;
- (3) Nitrogen dioxides: 0.053 parts per million-annual arithmetic mean;
- (4) Lead: 1.5 micrograms per cubic meter, maximum arithmetic mean averaged over a calendar quarter;
- (5) Carbon Monoxide: 35 parts per million-maximum 1-hr. concentration not to be exceeded more than once a year, 9 parts per million-maximum 8-hr. average concentration not to be exceeded more than once per year; and,
- (6) Ozone: 0.12 parts per million — attained when the expected number of days per calendar year with maximum hourly average concen-

trations above 0.12 parts per million is equal to or less than one.

Id.

⁸⁷42 U.S.C. §§ 7408(a)(2) & (d) (1988).

⁸⁸*Id.* § 7409.

⁸⁹*Id.* § 7409 (b)(1).

⁹⁰*Id.* § 7409(b)(2). Public welfare includes, but is not limited to "effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being." *Id.* § 7602(h).

⁹¹*Id.* § 7410(a)(1) (1988).

⁹²*Id.* § 7410(a)(2)(A). The Clean Air Act of 1977 amended the Act to give states more time to achieve compliance with primary (health-protective) ambient air quality standards in non-attainment areas, provided that states added additional provisions to their SIPs. *Id.* § 7501.

⁹³*Id.*

⁹⁴*Id.* § 7403.

⁹⁵See *Potential Effects Report*, *supra* note 33; see also *Policy Options Report*, *supra* note 22.

⁹⁶15 U.S.C. § 2901 (1987).

⁹⁷*Id.* § 1103(b).

⁹⁸*Id.*

⁹⁹The last major amendment to the Clean Air Act was in 1977. M. Courpas, D. Gushee & L. Parker, *supra* note 76, at 1. ¹⁰⁰H.R. 3030, 101st Cong., 1st Sess., 135 Cong. Rec. H4458 (1989). The House approved its version of CAA (H.R. 3030) on May 23, 1990 on a 401 to 21 vote. J. Ketcham-Colwill, *The House and Senate passed clean air bills: a side-by-side comparison*, Environmental and Energy Study Conference Special Report, June 15, 1990.

¹⁰¹S. 1630, 101st Cong., 1st Sess., 135 Cong. Rec. S. 11125 (1989). The Senate approved its version of the bill (S. 1630) on April 3, 1990 by a vote of 89 to 11. J. Ketcham-Colwill, *supra* note 100. The Stratospheric Ozone and Climate Protection Act of 1989 (S. 491) was appended to S. 1630. Both bills have passed the House and Senate and are being considered by a conference.

¹⁰²See, e.g., House version of S. 1630 (formerly H.R. 3030), 101st Cong., 1st Sess. (Administration Bill); S. 1630, 101st Cong., 1st Sess. (Baucus Bill).

¹⁰³J. Ketcham-Colwill, *supra* note 100.

¹⁰⁴J. Ketcham-Colwill, *supra* note 100, at 1. "S. 491-Stratospheric Ozone and Climate Protection Act of 1989 — was appended as title VII to the Senate Clean Air Act Amendments, S. 1630, which was reported Dec. 20, 1989. . . to the Senate for floor debate in the second session." Morrissey, *A Compendium of Legislation Introduced in the 101st Congress, 1st Session, Relating to Global Climate and Atmospheric Change*, CRS Report for Congress, Mar. 1, 1990 at 4 (citation omitted).

¹⁰⁵C. Holly, *Title VII: Stratospheric ozone and global climate protection*, Environmental and Energy Study Conference, Special Report, January 25, 1990 at 3. The five CFCs are -11, -12, -113, -114 and -115. *Id.*

¹⁰⁶*Id.* at 4.

¹⁰⁷J. Ketcham-Colwill, *supra* note 100, at 2.

¹⁰⁸*Id.* at 8.

¹⁰⁹20 Env'tl. L. Rptr. 10216, 10221 (1990). S. 1630 provides for sanctions similar to those under current law, except that EPA would have little discretion for leniency, since the sanctions would become automatic upon the state's failure to meet planning or implementation schedules. On the other hand, House version of S. 1630 (formerly H.R. 3030) gives EPA broad discretion in imposing sanctions. *Id.*

¹¹⁰Atlas, *Experts Warn About Global Warming Costs*, Chicago Tribune, May 26, 1990, at 2.

¹¹¹The House has insisted on its amendments, and therefore, requested a conference with the Senate. On June 6, 1990, the Senate appointed nine Members from its Finance and Environment and Public Works Committee to serve on the conference committee that will iron out differences between the House and Senate versions of the CAA Amendments Bill (S. 1630). BNA Wash. Insider, June 12, 1990.

¹¹²S. 324, 101st Cong., 1st Sess., 135 Cong. Rec. S1024 (1989). S. 324 was introduced as the National Energy Policy Act on February 2, 1989. Morrison, *supra* note 14, at 13. Hearings were held, and the measure was referred to the Senate Committee on Energy and Natural Resources. *Id.* H.R. 3143 was introduced by Representative AuCoin on August 4, 1989, and the bill was referred to numerous House commit-

tees. See H.R. 3143, 101st Cong., 1st Sess., 135 Cong. Rec. 5332 (1989); see also Morrison, *supra* note 14, at 13.

¹¹³*Id.*

¹¹⁴H.R. 1078, 101st Cong., 1st Sess., 135 Cong. Rec. H370 (1989). The bill was introduced on February 22, 1989 and referred to numerous House committees. Morrison, *supra* note 14, at 12.

¹¹⁵19 Env'tl. L. Rptr. 10208, 10209 (1989).

¹¹⁶H.R. 1078, 101st Cong., 1st Sess., 135 Cong. Rec. H370 (1989).

¹¹⁷19 Env'tl. L. Rptr. 10208, 10209 (1989).

¹¹⁸S. 1610, 101st Cong., 1st Sess., 135 Cong. Rec. S10919 (1989). S. 1610 was introduced on September 12, 1989 and referred to the Committee on Agriculture, Nutrition, and Forestry. Morrison, *supra* note 14, at 13. The bill passed the Senate with amendment (voice vote) on November 20, 1989. *Id.*

¹¹⁹C. Holly, *Debate Over CO₂ Reductions Pits Bush Against Congress*, Environmental and Energy Study Conference, Special Report, Nov. 27, 1989 at 21.

¹²⁰*Id.*

¹²¹S. 169, 101st Cong., 1st Sess., 135 Cong. Rec. S171 (1989). S. 169 was introduced by Senator Ernest F. Hollings (D-S.C.) on January 25, 1989. The Senate passed the bill (100 to 0) on February 6, 1990, and the measure is presently waiting to go to the House. Morrison, *supra* note 14, at 13.

¹²²C. Holly, *supra* note 119, at 21.

¹²³H.R. 3332, 101st Cong., 1st Sess., 135 Cong. Rec. 3332 (1989). H.R. 3332 was introduced on September 25, 1989. Morrison, *supra* note 14, at 13. Representative Jones' bill, H.R. 3332, was approved by the Merchant Marine and Fisheries Committee on September 26, 1989, but no action has been taken on the floor. See C. Holly, *supra* note 119, at 21.

¹²⁴H.R. 3332, 101st Cong., 1st Sess., 135 Cong. Rec. 3332 (1989).

¹²⁵*Id.*

¹²⁶H.R. 3332, 101st Cong., 1st Sess., 135 Cong. Rec. 3332 (1989). See *supra* text accompanying note 82.

¹²⁷H.R. 2984, 101st Cong., 1st Sess., 135 Cong. Rec. H4144 (1989). The bill was introduced on July 24, 1989, and was referred to the following: (1) Science, Space, and Technology Committee; (2) Foreign Affairs Committee; and (3) Merchant Marine and Fisheries Com-

mittee. Morrison, *supra* note 14, at 12. The bill cleared the Science, Space, and Technology Committee on November 16, 1990, but no action has been taken on the floor. See C. Holly, *supra* note 119, at 21.

¹²⁸H.R. 2984, 101st Cong., 1st Sess., 135 Cong. Rec. H4144 (1989).

Article Update

Since this article went to print, The Clean Air Act of 1990 (an amended version of S. 1630) was enacted into law on November 15, 1990 as P.L. 101-549; S. 324 was reintroduced in the 102nd Congress on January 31, 1991; H.R. 1078 was not enacted; most of the provisions of S. 1610 became part of Title 24 of the 1990 Farm Bill which was enacted into law on November 28, 1990 as P.L. 101-624; Titles 1 and 4 of H.R. 3332 and Titles 1 & 2 of H.R. 2984 were combined with S. 169 (Title 3, Growth Decision Aid, was added to S. 169), which was enacted into law on November 16, 1990 as P.L. 101-606; and on November 7, 1990, the Second World Climate Conference adopted a ministerial declaration to serve as the basis for negotiations in Washington, D.C., starting February 4, 1991, for an international global warming treaty.

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