GLOBAL WARMING OR NOT: THE GLOBAL CLIMATE IS CHANGING AND THE UNITED STATES SHOULD TOO

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I. INTRODUCTION

We have the evidence, we see the train coming, but most ordinary Americans, in their day-to-day lives, cannot yet hear the whistle blowing. Unless they live in a place where they have experienced a couple of hundred year floods in the past decade, the consequences of global warming are not yet readily apparent to them.¹

The frightening predictions of disaster have been made, but as the Environmental Protection Agency (EPA) administrator observed, most Americans have not yet suffered negative consequences of the phenomenon known as global warming. Despite the fact that most people have not been harmed by global warming, scientists and policy-makers around the world have accepted evidence indicating that global warming may threaten our health, safety, and economy in the near future. Uncertainties still exist regarding the extent of mankind’s interference with the climate and the impact of such interference. However, evidence suggests that the costs of ignoring the risks would be significant.

In December of 1997, representatives from over 160 nations gathered in Kyoto, Japan, to finalize the negotiations of an international agreement to combat global warming. This international agreement, referred to as the Kyoto Protocol, is significant in that it is the first multilateral agreement to establish specific emission reduction requirements for the greenhouse gases believed to be causing global warming.² The Kyoto Protocol is also notable because it results from the recognition of a recent development in international

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1 Carol M. Browner, Global Climate Change Threats and Solutions, 13 J. LAND USE ENVTL. L. 273, 275 (1997).
law known as the precautionary principle.\textsuperscript{3} The precautionary principle recognizes that the role of international relationships is becoming more important in the policies of many nations and the lives of many people. Traditionally, international law and policy has been reactionary, but the precautionary principle encourages the nations of the world to work out peaceful solutions to problems before they become urgent situations or crises.

II. BACKGROUND SUMMARY

A. The Science of Global Climate Change

Global warming results from the greenhouse effect, which involves the trapping of the sun's heat within the earth's atmosphere. While the greenhouse effect is necessary to sustain life on earth, human activities have augmented this process by causing increased atmospheric concentrations of certain gases. The primary greenhouse gases are water vapor, carbon dioxide (CO\textsubscript{2}), methane (CH\textsubscript{4}), nitrous oxide (N\textsubscript{2}O), and chlorofluorocarbons (CFCs). According to the EPA, atmospheric concentrations of greenhouse gases have increased significantly since the Industrial Revolution, and they are expected to reach double the pre-industrial levels by about 2060.\textsuperscript{4} Carbon dioxide is the main contributor to the anthropogenic (human induced) increase in greenhouse gases. The combustion of fossil fuels is the primary cause of increased carbon dioxide emissions.\textsuperscript{5} A wide range of industrial and human activities causes increases in the emissions of the other greenhouse gases. In recent decades, scientists have been able to monitor the concentrations of greenhouse gases in the atmosphere. Today, scientists generally agree that the atmospheric concentrations of greenhouse gases are increasing due to human activities, and


\textsuperscript{4} See United States Environmental Protection Agency, Climate Science Slides (visited Apr. 19, 2000) <http://www.epa.gov/globalwarming/presentations/science/index.html>, slide 3. Since the Industrial Revolution, the atmospheric concentration of carbon dioxide has increased by 30 percent; methane by 100 percent; and nitrous oxide by 15 percent. \textit{See id.}

they have warned that the increased concentrations will cause global climate change.\(^6\)

The potential results of increased concentrations of atmospheric greenhouse gases remain controversial. The complex interactions between the atmosphere, oceans, land, and life are not completely understood, and the capacity of the Earth to adapt to climate change is uncertain.\(^7\) One controversy concerns the effects of water vapor on global warming. The rate of water evaporation would increase as the Earth’s surface temperature increases, but the effect of increased water evaporation could result in an increase or decrease in the average atmospheric temperature of the Earth.\(^8\) Further warming would result if the water remained as vapor and acted as an additional greenhouse gas, but if the water vapor condensed to form clouds, sunlight would be reflected and a cooling effect could result.\(^9\) It is also possible that ocean currents may distribute the atmosphere’s heat energy in a manner that could delay global warming.\(^10\) As the atmospheric concentrations of greenhouse gases increase, vegetation might cause positive or negative feedbacks that could possibly increase or decrease the effects of global warming.\(^11\) Because there are many uncertainties regarding how the environment will respond to increased concentrations of greenhouse gases, many industry leaders and policymakers believe that it is too early to take definitive actions.

Although there is disagreement in the scientific community concerning the rate and extent of global climate change, it is clear that the probable effects would result in widespread economic and ecological change.\(^12\) If the average global temperature increases as scientists predict,

[the] consequences will include not only more extreme temperatures, with hotter heat and colder cold, but also more intense rain and snowstorms, extraordinarily destructive hurricanes, and protracted, crop-destroying droughts, particularly in the interior regions of continents. Island nations and

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\(^8\) See id. at 125.

\(^9\) See id.

\(^10\) See id.

\(^11\) See id.

\(^12\) See id. at 119, 130-39.
low-lying coastal regions everywhere might disappear under rising seas. These ecological shifts would trigger outbreaks of infectious diseases, as they have already begun to do.\(^{13}\)

Increased temperatures would be particularly pronounced in mid-latitudes.\(^{14}\) Agriculture, forests, grasslands, and water demand would all be affected by drier soil conditions. The melting of polar ice caps and the thermal expansion of water would cause a rise in sea levels, which would affect coastal resources and human habitation along coasts.\(^{15}\) In addition to these consequences, researchers warn that the feedback effects of global warming may cause a further increase in the rate of warming.\(^{16}\) For example, increased drought conditions could lead to wildfires burning large areas of forest.\(^{17}\) This would cause a further increase in the atmospheric concentration of greenhouse gases because vegetation acts to absorb carbon dioxide, a main greenhouse gas.\(^{18}\)

To address the concern of global climate change, the Intergovernmental Panel on Climate Change (IPCC) was established by the United Nations in 1988. The task of the IPCC is to assess the impacts of climate change and provide “comprehensive, objective, and balanced assessments”\(^{19}\) that nations could use as a starting point for strategies to reduce their CO\(_2\) emissions.\(^{20}\) Composed of the leading 2,500 climate scientists and technical experts from around the world, the IPCC studied the science and impacts of climate change.\(^{21}\) The first IPCC report was issued in 1990 and concluded: “Emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases.... These increases will enhance the greenhouse effect, resulting on average in an additional warming

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\(^{14}\) See Botkin, supra note 7, at 131.

\(^{15}\) See id. Botkin also notes that “[c]hanges in climate could threaten endangered species and raise new concerns about conservation of biological diversity and about national laws and international agreements affecting biological conservation.” Id.

\(^{16}\) See Gellner, supra note 13, at 11.

\(^{17}\) See id.

\(^{18}\) See id.

\(^{19}\) United States Environmental Protection Agency, Global Warming (visited Mar. 3, 2000) <http://www.epa.gov/globalwarming/about_the_site.html> (noting that the IPCC bases its assessment “mainly on published and peer reviewed scientific technical literature”).

\(^{20}\) See Gellner, supra note 13, at 17.

\(^{21}\) See id.
of the Earth’s surface.” In 1995, the IPCC issued a report concluding that the average temperature of the Earth has increased by about one degree Fahrenheit over the last century. The IPCC further estimated that the global surface air temperature would increase by another 2 to 3.5 degrees Fahrenheit over the next century. This would represent a faster rate of climate change than any experienced in the last ten thousand years on this planet.

The eleven warmest years of this century have all occurred since 1980, with 1995 being the warmest year in recorded history. A record heat wave during the summer of 1995 resulted in 465 deaths in Chicago. If warming trends continue as researchers expect, Americans will experience increased health problems and heat-related deaths. Although winter mortality rates may decrease, the decline is not expected to offset the increase in summer mortality. The areas most vulnerable to climate change include arid and semi-arid regions where water quantity and quality is already a problem. In the Middle East and Africa, water scarcity may lead to further tension and political instability. Although some regions may benefit economically from a favorable climate change, many regions would be adversely affected by the deterioration of natural ecosystems and the loss of human habitat due to rising sea levels.

While some have suggested that recent warming trends are only normal climate variations, research indicates that the warming of the Earth over the last thirty years goes far beyond natural variations. In fact, researchers have calculated a one-in-forty chance that the recent trends represent a natural

24 See id. at S10872-73.
25 See id.
26 See id. at S10873.
27 See id. (“[I]ncreased warming will exacerbate existing air quality problems such as smog that aggravate asthma and allergic disorders, especially in children and the elderly. Warmer climates breed diseases such as malaria, dengue and yellow fever, encephalitis, and cholera due to the expansive range of mosquitoes as a consequence of increased warmer climates and other disease-carrying organisms.”).
29 See 143 CONG. REC. S10871, supra note 23, at S10873.
30 See id. at S10872.
Based on these odds, many policymakers and scientists have accepted global warming as a serious and significant threat. \(^{32}\) While a small group of dissenting scientists has been vocal in questioning the climate change theories, the IPCC assessments are "the most widely accepted statements ever on climate change." \(^{33}\) The results of continued greenhouse gas emissions will be compounded, however, as the balancing effects of carbon sinks are removed. Carbon sinks include forests and other natural ecosystems that absorb greenhouse gases from the atmosphere. \(^{34}\) Current data show the concentration of carbon dioxide in the atmosphere is 30 percent above pre-industrial levels. Existing data also show increased concentrations of the other greenhouse gases over recent decades. \(^{35}\) This excess is accumulated in the atmosphere and causes the increased greenhouse effect.

Although the consequences of the increased atmospheric concentrations of greenhouse gases are not certain, it is certain that the effects will continue long after any corrective action is undertaken. Scientists warn that the oceans will continue to rise for several centuries even after temperatures stabilize. \(^{36}\) Based on the acceptance of the IPCC reports and the present state of science, the time to take corrective action is now. In the United States, coastal areas have already faced problems with flooding and the erosion of beaches due to rises in sea level. Although the fossil fuel industry has waged a massive campaign to dispute the prospect of climate change, some oil companies have recently decided to recognize the potential for global climate change. In comparing the oil industry to the tobacco industry, which spent years denying the dangerous effects of cigarettes, a Shell executive explained that his company did not want to become trapped in lies. \(^{37}\) Some industries have actively supported efforts to reduce greenhouse gas emissions. The insurance industry is threatened by climate change, and many believe insurers have already paid significant costs for increased storm damage from climate change. \(^{38}\) Industry figures show that annual weather-related disaster claims rose from a total of five billion dollars during the 1980s to thirty billion dollars during the first half of the 1990s. \(^{39}\)

\(^{31}\) See id.
\(^{32}\) See id.
\(^{33}\) GELBSPAN, supra note 13, at 69 (quoting Jerry Mahlman).
\(^{34}\) See United Nations Environment Programme, supra note 3.
\(^{35}\) See Botkin, supra note 7, at 123.
\(^{36}\) See id. at 134-35.
\(^{37}\) See GELBSPAN, supra note 13, at 86.
\(^{38}\) See id. at 38-39.
\(^{39}\) See id.
B. International Policies and Events Preceding the Kyoto Conference

“When I was young, my father told me the countries of the world would make peace only when they were threatened by invaders from outer space. Today it is climate change that poses a common threat to all of humanity.” Recognizing this common threat to humanity, the first step toward an international legal instrument that would coordinate a global response to climate change was taken in Rio de Janeiro during the United Nations Conference on Environment and Development in June 1992. The parties to this conference adopted the United Nations Framework Convention on Climate Change (FCCC), which entered into force in 1994 upon ratification by fifty countries including the United States. The parties to the convention acknowledged scientific evidence of a serious risk of rapid climate change over the coming decades and centuries. Although the consequences of such risks are uncertain, the parties chose to proceed with the precautionary principle rather than ignore the risks. The convention responded by establishing a framework calling for specific actions to be taken at a future date.

The ultimate objective of the FCCC is to stabilize atmospheric concentrations of greenhouse gases at a level that will prevent dangerous anthropogenic interference with the climate system. In achieving this objective, the FCCC supports a sustainable development concept, the sharing of environmentally sound technology, and efforts to educate the citizens of the world about climate change.

The FCCC does not specify a precise level of greenhouse gas reductions necessary to achieve its objective. Instead, it calls only for a reduction to a non-dangerous level that “should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development in a sustainable manner.” The FCCC did take preliminary steps to encourage

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40 Id. at 32.
41 United Nations Framework Convention on Climate Change, opened for signature June 4, 1992, S. TREATY DOC No. 102-38 (1992), 31 I.L.M. 849 (1992) (entered into force Mar. 21, 1994) [hereinafter FCCC]. As of July 20, 1998, the FCCC had been ratified by 175 nations. Nations that have adopted the FCCC are legally bound by the agreement and are referred to as “parties to the convention.” Id.
42 See United Nations Environment Programme, supra note 3.
43 FCCC, supra note 41, art. 2.
44 See United Nations Environment Programme, supra note 3.
45 Id.
specific action by parties to the convention. For instance, the parties agreed to take climate change into account in matters involving agriculture, energy consumption, and natural resources. The parties were also encouraged to share technology and cooperate in any way possible to reduce anthropogenic greenhouse gas emissions. To aid in the development of international policy, each party to the convention is required to develop a national inventory of greenhouse gas sources and sinks.

In adopting the FCCC, the nations of the world recognized that the threat of global warming was an international problem requiring an international solution. The parties to the convention understood that reducing greenhouse gas emissions would involve significant efforts from their leaders, their industries, and their people. Although the parties to the convention agreed that an international effort was necessary, there continues to be much disagreement over how the responsibility for these efforts should be allocated among the countries of the world.

Global climate change threatens the entire world, not just those people or nations primarily responsible for the increased atmospheric concentrations of greenhouse gases. This “fundamental unfairness to the climate change problem” has intensified already strained relationships between the rich and poor countries of the world. It is argued that the rich countries of the world, while building their industries and raising their standards of living, have caused the rise in greenhouse gases. The developing nations of the world fear that they will not have the opportunity to become great industrial nations if they are held responsible for significantly reducing greenhouse gas emissions. Although developed nations may be able to maintain their present industries and consumption rates through the use of fossil fuel alternatives, many developing countries lack the technology and the capital to invest in new technologies.

In response to the concerns of the world’s developing nations, the FCCC allocates the primary share of responsibility and cost for emissions reductions to the rich nations of the world. Noting that most historical and current emissions originate in developed countries, the FCCC calls on these nations to “take the lead in combating climate change and its adverse impacts.”

46 See id.
47 See id. “These inventories will have to be updated regularly and made public. The information they provide on which activities emit how much of each gas will be essential for monitoring changes in emissions and determining the effects of measures taken to control emissions.” Id.
48 Id.
49 Id.
treaty commits the twenty-four nations of the Organization for Economic Cooperation and Development (OECD)\textsuperscript{50} to provide financial support to developing countries for climate change activities.\textsuperscript{51} The OECD countries and twelve "economies in transition" also agreed to specific commitments on efforts for limiting greenhouse gas emissions and enhancing natural sinks.\textsuperscript{52}

To protect the ability of less developed nations to expand industry and improve economic and social conditions, the FCCC recognizes the right of these nations to develop their economies. In acknowledging this right, the FCCC notes that the greenhouse gas emissions of developing nations would probably increase as a result of economic expansion.\textsuperscript{53} In an attempt to address the concerns of rich and poor nations, the FCCC supports a sustainable development concept. The goal behind this concept is to allow countries to develop economically and seek a higher quality of life for their citizens while at the same time ensuring that the world's natural resources are not depleted faster than they are replaced. Given the high rate of consumption in industrialized nations and the large populations of many developing nations, sustainable development represents a significant international challenge.

The FCCC encourages the development of environmentally sound technologies in order to reduce greenhouse gas emissions and promote sustainable development. The development and adoption of clean energy sources will reduce the consumption of coal and oil. It is hoped that new technology will allow nations to prevent some of the effects of climate change and adapt to those effects that may be unavoidable. For example, "[t]echnology can make industrial processes more efficient, water purification more viable, and agriculture more productive for the same amount of resources invested."\textsuperscript{54} By encouraging education about climate change and the sharing of technology, the FCCC has established an international approach to solving the problem of global climate change.

In following the precautionary principle, the FCCC has established a process for future meetings and agreements while recognizing some uncer-

\textsuperscript{50} Mexico joined the OECD in 1994 and was not a party to these commitments.
\textsuperscript{51} See United Nations Environment Programme, supra note 3. This financial support commitment is in addition to any financial assistance being given before this agreement was made. See id.
\textsuperscript{52} See id. The economies in transition include those of Central and Eastern Europe and the former Soviet Union. These commitments may not have been actually specified; however, "it is generally accepted that the OECD and transition countries should at a minimum seek to return by the year 2000 to the greenhouse gas emission levels they had in 1990." Id.
\textsuperscript{53} See id.
\textsuperscript{54} Id.
tainty and disagreement over climate change. Through the established framework, parties may weaken or strengthen the treaty in response to new scientific developments. The FCCC establishes the Conference of the Parties (COP) as the supreme body of the convention. The objective of the COP is to review the implementation of the FCCC and any related legal documents that the COP may adopt. The COP is to meet periodically to assess the implementation of the FCCC and to facilitate cooperative actions for reducing greenhouse gas emissions.

The COP met twice prior to its December 1997 conference in Kyoto, Japan. The first Conference of the Parties (COP-1) was held in Berlin in April 1995. At COP-1, the parties decided that the existing commitments were inadequate to meet the objectives of the FCCC for three reasons: first, most Annex I parties were not on track to meet the emissions aims of the FCCC for the year 2000; second, the FCCC contained no provision for emissions reductions after 2000; and third, the parties recognized that the stabilization of greenhouse gas emissions at 1990 levels would not be sufficient to stabilize atmospheric greenhouse gas concentrations. In response to these inadequacies, the parties issued the Berlin Mandate. The purpose of the Berlin Mandate was to initiate a process to strengthen the FCCC’s commitments through a legally binding instrument.

The Berlin Mandate set a goal for the parties to negotiate quantified emissions limitation and reduction objectives for the post-2000 time frame. The Ad-Hoc Group on the Berlin Mandate was established to begin negotiation of the new legal instrument. In setting the stage for the negotiation of a binding document, the parties agreed not to introduce new commitments for developing countries. The Berlin Mandate does specify, however, that developing countries should advance the implementation of their existing commitments under the FCCC.

55 See FCCC, supra note 41, art. 7, § 2.
56 See id. art. 7, § 4.
58 See id.
59 See id. These objectives are also referred to as QELROs or emissions targets. See id.
60 The parties hoped to adopt a binding document at the third Conference of the Parties (COP-3) in 1997. The Ad-Hoc group met eight times from 1995 to 1997 to develop the framework and specific provisions of the new instrument. The group produced a draft to serve as the negotiating document at Kyoto (COP-3). See id.
62 See id.
The Conference of the Parties met in Geneva for its second meeting in April 1996. In the Geneva Declaration, the parties "agreed on guidelines for submission of the first national communications by developing countries." The Geneva Declaration endorsed the Second Assessment Report of the IPCC as "‘the most comprehensive and authoritative assessment of the science of climate change.’"

C. The Kyoto Protocol

Some have heralded the [Kyoto] Protocol as one of the most significant advances in environmental regulation, but many do not hold it in such high regard. Some claim the effort to be too little, too late, and others fear the Protocol threatens the U.S. economy and is unfair to developed nations. Whatever the deficiencies, the fact that an agreement could even be reached indicates that most nations are sufficiently convinced of the threat of global warming to want to take action.

The Kyoto Protocol was adopted by over 160 countries at the third Conference of the Parties to the FCCC. It was described in the press as a sweeping environmental treaty because it established the first legally binding limits for the emissions of greenhouse gases by industrialized countries. The protocol was opened for signature on March 16, 1998, and it remained open until March 15, 1999. Countries may accede to the protocol after the expiration of this period. The protocol will enter into force ninety days after the date on which not less than fifty-five parties to the convention have adopted the protocol. In addition to the fifty-five party requirement, the protocol must be accepted by enough Annex I parties to represent at least 55

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64 Id.
65 Id. at 917-18.
68 See id. art. 24, § 1.
percent of the total carbon dioxide emissions for 1990 of all the parties included in Annex I.\footnote{See id. art. 25, § 1.}

The Kyoto Protocol contains substantive commitments addressing the three primary concerns of the parties at COP-1: it sets binding emission reduction targets for industrialized nations,\footnote{See id. art. 3, § 7.} it requires industrialized parties to implement or elaborate appropriate policies to meet these reduction targets,\footnote{See id. art. 2.} and it seeks to advance the existing commitments that pertain to all parties to the FCCC, including developing nations.\footnote{See id. art. 10.}

The Kyoto Protocol encourages parties to promote sustainable development in implementing their reduction commitments.\footnote{See id. art.} In order to promote sustainable development, article two of the protocol calls for the parties to implement policies that will enhance energy efficiency, protect reservoirs and sinks of greenhouse gases, promote sustainable forms of agriculture in light of climate change considerations, promote the research, development, and use of new and renewable forms of energy, and reduce or phase-out market imperfections that run counter to the objectives of the FCCC.\footnote{See id. art. 2.} In addition, "parties must attempt to minimize adverse social, environmental, and economic impacts on the developing countries."\footnote{Booncharoen & Gase, supra note 63, at 924.}

Land use and forestry practices play an important role in the sequestration and removal of atmospheric greenhouse gases. The FCCC encouraged countries to take advantage of sinks in order to mitigate climate change, but there was no specification regarding how countries were to include the removal of greenhouse gases by sinks when calculating their overall emissions.\footnote{See Breidenich et al., supra note 57, at 322 (referring to FCCC art. 4(2)(a) and (b)).} As a result, different parties used various methods to account for and credit removal by sinks, and some parties did not provide any data on greenhouse gas sequestration.\footnote{See id. Some countries combined their removal by sink figures with other categories of emissions to yield a net total, and others reported the information separately. Id.}

Another issue resulting from the FCCC’s vagueness was the method used to calculate emissions sequestration:

[M]ost countries calculate emissions from LUCF [Land Use Change and Forestry] as an annual flow rate of carbon
sequestered or emitted. Since the ability of trees to sequester carbon declines over time, a country with a large proportion of forested area, hence a high rate of carbon sequestration in the base year, will not be able to maintain the same rate of carbon sequestration in the later years as its forestry resources age. The declining rate of carbon sequestration in these countries makes an emissions target more difficult to attain. Conversely, countries that had net emissions from LUCF in their base year, due to deforestation, can ease the difficulty in attaining their target simply by decreasing the rate of deforestation. Thus, the system under the FCCC rewarded countries that historically had been deforesters and penalized countries that historically had been afforesters.78

During the Kyoto negotiations, the issue of sequestration by sinks was debated intensely. The parties disagreed on how the sinks should be accounted for and the provisions of the FCCC did not provide sufficient guidance on that matter. After extensive negotiations, the parties to the Kyoto Protocol included a compromise agreement that creates an accounting system to reward increased forestry sinks and to penalize deforestation.79 Article three of the protocol allows parties to use their emissions sequestrations by sinks as a factor during the commitment period, but if a party’s land use and forestry activities resulted in net greenhouse gas emissions in 1990, these emissions will not be included in calculating its base year emissions.80 Article three also requires Annex I countries to report to the COP the totals of their greenhouse gas emissions and removals by sinks for all anthropogenic activities since 1990.81 There are still some details requiring clarification before countries can determine how to use sinks towards their reduction targets.

Flexibility is one of the defining features of the Kyoto Protocol. Flexibility has been viewed as an essential element of a successful agreement because of the long-term nature of the climate change problem and the uncertainties

78 Id.
79 See id.
80 Kyoto Protocol, supra note 67, art. 3, §§ 3, 7. “Recognizing the difficulty that this new accounting system will create for a few parties, the Protocol requires Annex I countries with net emissions from LUCF in 1990 (i.e., those Annex I countries which were deforesting in 1990) to include those emissions in their base year, which has the effect of correspondingly raising their assigned amount and allowed emissions.” Breidenich et al., supra note 57, at 322.
81 See Kyoto Protocol, supra note 67, art. 3, § 3.
related to climate change. This feature will make the agreement more attractive to many parties. The protocol does not impose quantified limitations on the developing nations, but it does install legally binding emissions targets for Annex I countries within a flexible timetable. These targets are to be met by the commitment period of 2008 to 2012, and the Annex I parties are to show demonstrable progress in achieving the protocol's commitments by 2005. The multi-year commitment period gives parties flexibility in achieving their targets and takes into account "annual fluctuations, for example, from business cycles."

In establishing goals for the reduction of greenhouse gas emissions, the protocol considers emissions and the sequestrations of greenhouse gases by carbon sinks. The protocol calls for reductions of aggregate carbon dioxide-equivalent emissions of greenhouse gases by at least 5 percent below baseline levels. The protocol uses 1990 as the baseline year for determining the permitted emissions levels of carbon dioxide, methane, and nitrous oxide for each industrial country. Each country may choose either its 1990 or 1995 emissions level to calculate the baseline for the other three greenhouse gases.

There is no uniform reduction target for all Annex I parties. The protocol defines a percentage of the base year emissions for each party, and the parties are to reduce their emissions to the set percentage of the base year before the expiration of the commitment period. The percentages range from an 8 percent reduction for several countries (which is 92 percent of the base year)

82 See Daniel Bodansky, The United Nations Framework Convention on Climate Change: A Commentary, 18 YALE J. INT'L L. 451, 555-56 (1993). In evaluating the FCCC, Bodansky noted several criteria in addition to flexibility that were necessary for a successful convention. These criteria were: political acceptability to a wide variety of states, equity (to encourage burden-sharing while treating developing countries fairly), economic efficiency by allowing states to consider cost-effective measures to address climate change, a framework for future action, and established targets and timetables for greenhouse gas limitations. These criteria can also be used to assess the Kyoto Protocol. Id. at 555.

83 See Kyoto Protocol, supra note 67, art. 3, §§ 1-2. Article three, section one reads: "1. The Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of this Article, with a view to reducing their overall emissions of such gases by at least 5 percent below 1990 levels in the commitment period 2008 to 2012." Id. art. 3, § 1.

84 Breidenich et al., supra note 57, at 321.

85 See id. at 319.

86 See Booncharoen & Gase, supra note 63, at 925.
to a 10 percent increase for Iceland. To determine if the commitments are achieved, each country’s total emissions for the commitment period will be averaged.

In addition to a flexible timeframe, the protocol allows for flexibility in the parties’ national implementation programs. Parties may meet their reduction targets through the gain or transfer of emission reduction units (ERUs) and credits from projects complying with the other requirements of the protocol. These mechanisms may be used within a nation or cooperatively among nations. Article four of the Kyoto Protocol allows parties to adopt joint implementation programs. Joint implementation would allow countries to implement their emissions limitations jointly and perhaps more effectively. Greenhouse gases migrate globally and remain in the atmosphere for long periods of time after they are released. To reduce the greenhouse effect, it is necessary to reduce the total global emissions of greenhouse gases, but it makes little difference where emissions are reduced. This feature of greenhouse gas emissions suggests that a comprehensive regional approach may be more effective than a country-by-country regulatory approach. Cost effectiveness is the main rationale for joint implementation programs, but such programs would also encourage the transfer of financial resources and technology.

The FCCC also endorses the concept of joint implementation. At COP-1, the Parties to the Convention established a pilot phase for “Activities Implemented Jointly.” This program allows Annex I countries to invest in greenhouse gas reduction projects in other countries. The pilot program does not allow the investing country to apply the reduction credits against its own

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87 See Breidenich et al., supra note 57, at 320. The protocol contains emissions targets for all of the FCCC Annex I countries except Turkey. Annex B to the protocol contains the emissions reduction targets for Annex I parties. See Appendix B, infra, for the information contained in Annex B.

88 See Booncharoen & Gase, supra note 63, at 925.

89 Kyoto Protocol, supra note 67, art. 4.

90 See Bodansky, supra note 82, at 520. “Because of differing national circumstances, the costs of abatement measures can vary substantially by country. If greenhouse gas emissions can be reduced more cheaply in country A than in country B, then allowing B to take advantage of this cost differential by funding an emissions reduction in A is more efficient than requiring B to achieve the same reduction at home.” Id.

91 See id. at 482, 520.

92 FCCC, supra note 41, art. 4. Article 3, § 3 says, “Efforts to address climate change may be carried out cooperatively by interested parties.” Id. art. 3, § 3. Article 4, § 2(a) says, “These Parties may implement such policies and measures jointly with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention. . . .” Id. art. 4, § 2(a).
There was speculation that if a joint implementation program was adopted beyond the pilot phase, emission credits would be allowed, and the credits would be shared by the investing and recipient countries. This would allow developing countries to retain some credit for these projects and could result in a net carbon savings.\(^9\)

The technicalities of joint implementation were further debated at the Kyoto conference. The United States and some of the other Annex I countries wanted the pilot phase ended. They therefore proposed adopting a joint implementation program that would allow Annex I countries to receive credits for projects with developing nations.\(^9\) The developing countries opposed this proposal, and the European Community, while supporting a joint implementation program with credits among Annex I nations, agreed that a further decision regarding developing nations should be postponed until the completion of the pilot program.\(^9\) Annex I countries also debated the mechanics of emission trading among themselves, and the rules of emissions trading remain to be defined.

After extensive negotiations, the provisions of the protocol defined three mechanisms reflecting the competing proposals on international emissions trading.\(^9\) First, joint implementation is permitted among Annex I countries. The Kyoto Protocol does not provide specific criteria for joint implementation programs, but it does allow Annex I countries and private-sector participants to earn credits for emission reduction projects in other Annex I countries.\(^9\) This allows a country that finances an emissions reduction project in a different country to apply the credit ("Emission Reduction Unit” or “ERU”) to offset its own reduction commitments.\(^9\)

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\(^9\) See Reid & Goldemberg, supra note 61, at 236.
\(^9\) See Breidenich et al., supra note 57, at 323.
\(^9\) See id.
\(^9\) See id. at 324.
\(^9\) See Booncharoen & Gase, supra note 63, at 926. To receive joint implementation credits, article six of the protocol requires a project to meet the following criteria: (1) the project must have the approval of the parties involved; (2) the project must provide "a reduction in emissions by sources, or an enhancement of removals by sinks, that is additional to that which would otherwise occur"; (3) the party must comply with its obligations under articles five and seven; and (4) "the acquisition of emission reduction units shall be supplemental to domestic actions for the purposes of meeting commitments under article three." Kyoto Protocol, supra note 67, art. 6.
\(^9\) See Booncharoen & Gase, supra note 63, at 926. The ERU credit may be applied to offset a country's own reduction commitments as long as the requirements of article six are met and the country is otherwise in compliance with the protocol. See id.
The second mechanism of emissions trading outlines a target-based emissions trading program. The Parties to the Convention could not agree on the specifics of this program, but the protocol states that Annex I parties may purchase emissions permits from other countries that have surplus credits. In meeting the emission reduction requirements of the protocol, Annex I parties may work jointly to achieve their commitments by aggregate emissions reductions.99

The Clean Development Mechanism is the third tool for achieving international emissions reductions. Established in article twelve, the purpose of the Clean Development Mechanism is “to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.”100 Through this program, developed nations may receive credit toward their commitments by investing in emission reduction programs in developing nations. The requirements of this program are more strict than those of the emissions trading program among Annex I countries, and the developing country is only entitled to a portion of the reduction credits earned. To meet the requirements, the participation of each party must be voluntary and must be approved by the COP. In addition, the project must result in “real, measurable, and long-term benefits related to the mitigation of climate change; and reductions in emissions that are additional to any that would occur in the absence of the certified project activity.”101

Beginning in 2000, emissions reductions obtained through the Clean Development Mechanism may be applied towards achieving compliance in the first commitment period. In order to further the goals of the FCCC, the protocol requires the COP to ensure that a share of the proceeds from Clean Development Mechanism activities is used to assist developing country parties that are particularly vulnerable to the effects of climate change.

Developing nations strongly opposed being included in the protocol’s legally binding emissions reduction requirements, and their involvement in international emissions reductions programs is limited to voluntary participation.102 Although developing nations are still bound by the terms of the FCCC, they are under no substantive obligations. The Kyoto Protocol may be

99 See Kyoto Protocol, supra note 67, art. 4.
100 Id. art. 12, § 2.
101 Id. art. 12, § 5(b), (c).
102 See id. arts. 3,4,10, & 11 (placing obligations on developed countries in articles three and four, but merely inviting developing countries to become involved in articles 10 and 11).
amended by a three-fourths vote of the COP to include developing nations. The Kyoto Protocol has been criticized for lacking a compliance mechanism, but this criticism is misdirected. In international law, one of the common techniques for encouraging compliance with a bilateral or multilateral agreement is the termination by the nonbreaching party of related obligations under the same agreement. Incorporating this type of compliance mechanism into the Kyoto Protocol would not be desirable because "if a nonbreaching party stops performing a related obligation as a reciprocal countermeasure, the problem the agreement seeks to remedy—in this case, climate change—may well be exacerbated even further than it was by the initial breach, and other nonbreaching parties would be injured as a result." Rather than using general international customs to encourage compliance with the protocol, the parties agreed to a compliance mechanism incorporated into the document itself.

The Kyoto Protocol expands on compliance mechanisms contained within the FCCC in several ways. These improvements include:

1. Legally Binding Commitments. The commitments under the FCCC were voluntary, and thus easier for parties to avoid or ignore. There were no consequences for failing to achieve the FCCC's commitments, and most parties made little or no progress under the FCCC. The Kyoto Protocol, however, contains mandatory, legally binding emissions targets. Because the targets are clearly defined, there is an objective standard for determining whether the targets have been met, and excess emissions will result in noncompliance with the protocol.

2. Flexible Implementation. This feature of the protocol encourages compliance by allowing parties several options for achieving compliance.

3. Measurement of Emissions. The protocol clarifies the emissions measurement guidelines of the FCCC and requires each party to have a national system for estimating greenhouse gas emissions and removals in place at least one year prior to the first commitment period. Parties are encouraged to adopt the standardized methods of the IPCC for the preparation of national greenhouse gas inventories. Parties have an incentive to use the IPCC

\[103\] \textit{Id.} art. 19, § 3.

\[104\] See Breidenich et al., \textit{supra} note 57, at 326. Breidenich notes that this mechanism of enforcement is probably not available for multinational agreements such as the Kyoto Protocol due to provisions contained in the Vienna Convention on the Law of Treaties. \textit{Id.}

\[105\] \textit{Id.}

\[106\] See \textit{id.} at 326-27.

\[107\] See \textit{id.} at 327.

\[108\] See \textit{id.}
standards to avoid having their estimates adjusted for uncertainty. These standardized measurements will simplify international comparisons and make it easier to verify the attainment of emissions targets.109

4. Reporting. The protocol expands on the FCCC's two reporting requirements of annual inventories of greenhouse gas emissions and periodic national communications regarding implementation. Article seven of the protocol requires additional annual reporting to evaluate progress and ensure compliance with the article three reduction targets.110

5. Review of Implementation. Article eight of the protocol provides for teams of experts to review the emissions information submitted by each party. The review process provides a "thorough and comprehensive technical assessment of all aspects of the implementation by a Party of this Protocol."111 The expert teams report to the COP on the status of implementation and on any potential problems that they have identified. The COP is authorized to address any potential compliance problems and to make appropriate decisions in response to any problems.112

6. Consequences of Noncompliance. Article seventeen of the protocol requires the parties to develop procedures to address noncompliance.113 The language of article seventeen was adopted as a compromise between parties that wanted binding but unspecified consequences for noncompliance and those parties that did not want to commit to unspecified consequences.114 Breidenich notes, "Essentially, the parties agreed to defer consideration of specific, binding consequences to a later date, but also agreed that they would adopt a list of indicative measures that could be implemented sooner, although they would not be legally binding."115

Critics of the protocol's compliance mechanisms are correct in arguing that the protocol lacks the specific details necessary to ensure compliance. However, the protocol does establish a solid framework for discouraging
noncompliance, and the lack of specific consequences for noncompliance should not prevent parties from accepting the protocol.

D. Current Status of the Kyoto Protocol

The Kyoto Protocol was adopted by delegates of more than 150 nations. It has been signed by more than the required fifty-five parties but has not yet met the additional requirement of the Annex I parties. Nearly 35 percent of the world’s 1990 greenhouse gas emissions came from the United States, and another 15 percent were from Russia. To meet the ratification requirements, it is widely held that the Kyoto Protocol must be signed and ratified by at least one of these two Annex I parties.

Many provisions of the protocol were to be detailed at later sessions of the COP. Negotiations on these provisions have continued since the parties met at Kyoto, and these negotiations may lead to a more complete product that is also more acceptable to many parties. For example, many countries are eager to work out the details on emissions trading and joint implementation. Committing to the protocol now does not mean that these details cannot be clarified at a later date, but many countries are hesitant to adopt the protocol before they are certain about the rules of implementation and other key provisions.

III. ANALYSIS

A. United States Policies on Global Warming

In 1994, the United States emitted about 1.65 billion tons of greenhouse gases. This figure represents about 20 percent of total global greenhouse gas emissions. To decrease this figure, the United States adopted several domestic and international programs. The Climate Change Technology Initiative is one of several programs designed to reduce domestic greenhouse gas emissions. Led by the Department of Energy and the EPA, the initiative provides $2.7 billion to these and other agencies for research and development on energy efficiency, renewable energy, and carbon-reduction technologies. To encourage the adoption of more efficient technologies in buildings, industrial

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116 See Booncharoen & Gase, supra note 63, at 929.
117 See id.
118 See Environmental Protection Agency, Emissions Slides, supra note 5, slide 1.
processes, power generation, and vehicles, the initiative also includes $3.6 billion in tax incentives.\textsuperscript{120}

The Global Change Research Program, led by NASA and the National Science Foundation, was established to increase knowledge of climate change and variability, atmospheric chemistry, and ecosystems.\textsuperscript{121} The program will develop better climate change monitoring systems to help assess the possible impacts of climate change on the United States. The results of the program’s scientific assessments will be used for policymaking. Other federal agencies conduct programs indirectly related to climate change. These programs include research efforts to reduce fuel consumption and to improve energy efficiency and vehicular traffic flows.\textsuperscript{122}

The United States also contributes to international efforts to combat climate change. In June 1997, President Clinton announced a one billion dollar, five-year commitment to address climate change in developing nations.\textsuperscript{123} The money from the initiative will be used for programs promoting energy efficiency, forestry, agriculture, and other projects. In October 1997, President Clinton outlined an expanded domestic program designed to reduce greenhouse gas emissions. The program was to take effect regardless of the outcome of negotiations in Kyoto, and it included (1) a plan for activities that encourage good energy and environmental policy and (2) a mandatory domestic emissions trading system to take effect in the 2008-2012 period if an agreement were reached in Kyoto and adopted by the United States government.\textsuperscript{124}

The president’s expanded domestic program includes an electricity restructuring proposal estimated to reduce greenhouse gas emissions in the United States by roughly twenty-five to forty million metric tons per year.\textsuperscript{125} In addition, the administration is working with industry leaders to promote voluntary agreements that would produce further emissions reductions. The Partnership for Advanced Technology in Housing (PATH) is one such

\textsuperscript{120} See id.
\textsuperscript{121} See id.
\textsuperscript{122} See id.
\textsuperscript{123} See id.
\textsuperscript{125} See id. at v ("Competition would provide a direct profit incentive for generators to produce more electricity with less fuel and improve energy efficiency. Several specific provisions in the Administration’s proposal would yield further emissions reductions.").
agreement that established goals for voluntary improvements in home energy use. Announced in May 1998, the PATH program would reduce emissions in 2010 by about twenty-four million metric tons. Finally, the administration is seeking to reduce emissions by the federal government, the nation's largest consumer of energy.

B. United States Opposition to the Kyoto Protocol

The United States was successful in achieving several goals during the negotiations at Kyoto. First, the protocol includes a multi-year commitment period to begin in 2008. This multi-year period is important to the United States objective of flexibility in achieving emissions reductions. The position of negotiators from many nations was that a multi-year target was too weak and that an earlier target was necessary to make the agreement more effective in its goal of reducing global emissions. The United States, however, was able to successfully negotiate from the position that an earlier target would seriously weaken the United States economy and would call for drastic measures that would not permit flexibility in implementation.

Second, the protocol includes emissions trading and joint implementation provisions advocated by the United States. The Clinton Administration supports these mechanisms as a means of reducing the costs to United States citizens of compliance with the Kyoto Protocol. Despite these successes from the United States' perspective, there is much opposition to the protocol between industry leaders and the United States Congress. The basic issues behind this opposition are a perceived lack of meaningful participation by the developing nations and the uncertain costs of the protocol to the United States economy.

Prior to the meeting of the parties at Kyoto, the United States Senate passed a "sense of the Senate" resolution to send a message to the Clinton Administration and the United States delegates to the conference. This message contained a strong sentiment against the United States adoption of any international agreement that placed primary responsibility for the reduction of greenhouse gas emissions on developed nations. The message, known as the Byrd-Hagel resolution, was adopted by the Senate in July 1997, and it

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126 See id.
127 See id.
129 In order for a treaty to legally bind the United States, it must be signed by the president and ratified by two-thirds of the Senate. See U.S. CONST. art. II, § 2, cl. 2.
encouraged the president not to sign any treaty unless the following requirements were met: first, the treaty must legally bind developing nations to meet reduction targets within the same compliance period as the developed nations and second, the treaty must not result in serious harm to the United States economy. 130

This resolution was adopted by the Senate because of concern regarding the negotiations leading to the Kyoto Conference. Many believed that the best interests of the United States were not being reflected in the negotiations, and the Senate wanted to ensure that the Executive Branch and the United States negotiating team did not reach an agreement that was harmful to the United States. 131 The concerns of the Senate were summarized in a newspaper article cited in the Congressional Record along with the proceedings of the resolution. 132 This article identified three possible results of the impending treaty negotiations. First, United States industry would face significantly increased production costs; second, the treaty would send many jobs abroad to countries that are not bound by reduction targets; and third, the United States would be forced to tax energy use and United States citizens would face higher energy bills. 133 These concerns were not effectively refuted by the administration, and the Senate passed the Byrd-Hagel Resolution by a vote of 95-0. 134

There are several arguments that explain the rationale behind the Byrd-Hagel Resolution. First, some argue that it would not be effective for only Annex I countries to be obligated to reduce emissions if developing countries are allowed to continue increasing their emissions of greenhouse gases at a rapid rate. The rate of greenhouse gas emissions in developing countries is expected to exceed that of developed nations in the next fifteen to twenty years. If this happens as predicted, any reductions in greenhouse gas emissions by developed countries would be overshadowed by increases in developing countries. Also, as one senator expressed, it is more logical for developing nations to pursue economic development in an environmentally friendly manner now than to take corrective action later. 135

The results of the conference at Kyoto did not bind the developing nations to reduction targets, and the protocol thus does not meet the requirements of the Byrd-Hagel resolution. Senator Byrd, a sponsor of the resolution that

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131 See id. at S8113-38 (providing transcript of the debate).
133 See Kemp, supra note 132, at A14.
prevents the protocol from being ratified by the United States, believes that the global problem of climate change cannot be solved without a global solution that includes all nations.\textsuperscript{136} He does, however, imply that a solution that required gradually implemented limitations according to each developing nations' national circumstances would be acceptable.

The Clinton Administration believes that the Clean Development Mechanism functions as a down payment by developing nations toward more meaningful participation in the future.\textsuperscript{137} The Senate does not seem to agree, and many believe that without legally binding targets the developing nations will take advantage of the opportunity to grow without the limits of the Kyoto Protocol. The administration is still seeking more significant commitments from developing nations, and it is not likely to have the support of the Senate until developing nations commit to meaningful participation.

Congressional leaders are also concerned that the Kyoto Protocol does not meet the second requirement of the Byrd-Hagel Resolution. The impact of the agreement on the United States economy is unclear, and various assertions have been made regarding the costs of implementing the protocol. The Clinton Administration reported to Congress that the United States would have an actual reduction target of 3 percent below 1990 levels.\textsuperscript{138} This approximation makes compliance with the protocol seem less costly than the 7 percent reductions called for in the protocol; however, the costs of United States compliance with the Kyoto Protocol are dependent on the methods of compliance. If the United States is able to meet its reduction targets primarily through an emissions trading system, compliance will be less costly than if the United States is required to adopt more efficient energy practices or reduce fossil fuel consumption.

The White House has estimated the costs of compliance to be much lower than the estimates of other economists because the administration’s calculations relied heavily on emissions trading. This may not be an option though if other countries are able to successfully limit the ability of a party to achieve its reductions primarily through emissions trading.

\textsuperscript{136} See id. at S195. Senator Byrd expressed the concern that without the responsible action of developing nations, the solution would not be global and would not be successful. See id.

\textsuperscript{137} See Administration Economic Analysis, supra note 124, at iii.

\textsuperscript{138} See 144 CONG. REC. S197. Although the Kyoto Protocol calls for the United States to reduce emissions by 7 percent below 1990 levels for three greenhouse gases, emissions levels from 1995 may be used to calculate the required reductions for the other three gases. According to the Clinton Administration, when the 1995 levels are factored into consideration, along with the treaty's expanded definition of carbon sinks, the target reduction for the United States is approximately 3 percent below 1990 levels. See id.
GLOBAL WARMING

In June 1998, the Parties to the Conference met in Bonn, Germany, to negotiate details of the Kyoto Protocol in preparation for the fourth Conference of the Parties. In Bonn, the European Community sent a message that the United States could not simply buy its way out of commitments but would need to take action at home. The details of the Kyoto Protocol’s emissions trading program remain to be defined, but the costs of compliance will be greater if emissions trading is limited. Unless these details are clarified and it is shown that emissions reductions can be achieved without harming the economy, Senate opposition to the treaty is likely to continue.

The Clinton Administration estimated that the costs for the United States to meet its commitments under the protocol are likely to be modest if those reductions are undertaken in an efficient manner employing the flexibility measures of emissions trading (both domestic and international), joint implementation, and the Clean Development Mechanism. This would be so even without considering the direct benefits of mitigating climate change or the impact that key additional factors—such as the President’s domestic climate change proposals, the ancillary benefits of improved air quality, or the inclusion of sinks—could have on lowering the net costs of mitigation.

Using computer models, the administration’s economists estimated that the costs of attaining the emissions targets might amount to between seven and twelve billion dollars per year in 2008-2012. This estimate represents only 0.1 percent of the projected Gross Domestic Product. The administration emphasizes the point that these costs may be reduced by the benefits of

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140 Administration Economic Analysis, supra note 124, at iii.
141 See id. at iv.
142 See id. “The same model predicts that emission permits in 2010 would cost between $14 and $23 per ton of carbon equivalent—which would translate into an increase of about 4 to 6¢ per gallon of gasoline. The increase in energy prices would raise the average household’s energy bill in 2010 by between $70 and $110 per year—a relatively small amount compared to typical energy price changes. Moreover, this increase would be substantially offset by the decline in electricity prices resulting from the Administration’s electricity restructuring proposal.” Id.
mitigating climate change and the potential for employment of other cost-effective policy measures in addition to emissions trading.\textsuperscript{143}

Currently, it is doubtful the Senate will be convinced that compliance can be achieved without harming the economy. In adopting a resolution that encourages President Clinton not to sign the Kyoto Protocol and states that the Senate will reject any proposed protocol inconsistent with the Byrd-Hagel resolution, the Senate cited economic impact studies by the federal government. These studies found that commitments requiring the United States to reduce greenhouse gas emissions to 1990 levels "would result in the loss of more than 900,000 jobs in the United States, sharply increase energy prices, reduce family incomes and wages and cause severe losses of output in energy intensive industries such as aluminum, steel, rubber, chemicals, and utilities. . . ."\textsuperscript{144} A senior vice-president from the Wharton Econometrics Forecasting Associates testified before a Senate committee that the Clinton Administration's economic analysis of the Kyoto protocol's impact on the United States economy was flawed. She predicted that the costs of meeting the protocol's requirements would be $250 billion, which represents a loss of 3.2 percent of gross domestic product.\textsuperscript{145} She also stated that the protocol would cost the United States 2.5 million jobs and that the annual expense per family would exceed $2,700.\textsuperscript{146} These estimates vary widely from those of the Clinton Administration, but none of the estimates should be relied on until the means of implementation and compliance are certain.

There is further opposition to the Kyoto Protocol from the fossil fuel industry. A coalition of oil companies was recently formed with the goal of waging a multi-million dollar campaign that would publicize the dissenting science and question the repercussions of the agreement on the United States economy. A New York Times article discussed an internal memo of this group that expressed concern over the possibility of a "deep reduction in American consumption of fossil fuels."\textsuperscript{147} The document called for spending five million dollars over two years in order to "maximize the impact of scientific views consistent with ours on Congress, the media, and other key audiences."\textsuperscript{148}

\textsuperscript{143} See id.
\textsuperscript{146} See id.
\textsuperscript{148} Id.
In response to this group, Representative Miller argued that a recent poll revealed that 77 percent of Americans believe that global warming is occurring and that 67 percent believe steps should be taken to combat global warming. In trying to persuade congressional leaders not to succumb to the public relations campaign of the oil companies, Miller said:

So we see the tobacco companies, they set up their spin organizations; the health care corporations, they set up their spin organizations; and now the oil companies are going to set up their spin organizations to tell us that all of this we have heard about climate change, greenhouse gases, global warming is nothing for us to be concerned about. Well, the fact is it is something for us to be very concerned about.

It is not in the best interest of the oil companies for the United States to stop burning fossil fuels, and the companies claim compliance with the protocol would be very costly. Representative Miller disagreed, stating:

The truth is the steps necessary to curb global warming present an enormous economic opportunity for the people of the United States. The scientific evidence about global warming compels strong action, not a head-in-the-sand approach that characterizes the organized opposition to the Kyoto Protocol and U.S. energy efficiency measures.

Many countries and industries have adopted energy efficient practices as a method of cost-efficiency. If the United States wishes to remain an economic and technological leader, Miller argues, it is necessary to recognize the opportunities in global climate change mitigation. The current global market for energy efficient products and services is $80 billion per year and is expected to increase to $125 billion per year by 2015. Miller also claims that several studies estimate the job growth potential “from energy efficiency and technological innovation will exceed 800,000 new jobs over the next 15

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149 See id. at H2324 (citing a national survey conducted at Ohio State University in January 1998).
150 Id.
151 Id.
152 See id.
153 See id.
The opposition of the oil companies is very strong, and they are correct in asserting that the evidence on global warming is incomplete. Members of Congress, however, need to carefully consider the underlying reasons for the opposition of the fossil fuel industry. In evaluating such opposition, the long-term costs and benefits should be weighed before adopting a long-term solution.

C. The Role of Developing Nations

Negotiations to strengthen the FCCC may fail because many of the industrialized countries argue that they should not commit to greenhouse gas reduction targets unless developing countries also agree to reductions. Unfortunately,

[...]his position backtracks on the pivotal compromise reached in the Framework Convention on Climate Change (FCCC), which balanced the timing and strength of actions by industrialized countries (which are largely responsible for the climate change that is now underway) with those of developing countries (which ultimately will be the major source of emissions). 155

This position rests on a faulty assumption that because developing countries are not legally bound by the same commitments agreed to by the developed nations, the developing countries are not and will not take action to mitigate climate change. On the contrary, developing nations are already taking action to reduce their greenhouse gas emissions even without binding reduction commitments. 156

Under the FCCC, developed nations "accepted a greater burden . . . for slowing the growth of greenhouse gas emissions" because of the fact that industrialized nations presently account for more than two-thirds of annual carbon dioxide emissions and an even larger share of other greenhouse gases. 157 There were many other reasons for the FCCC's policy of differentiation of commitments between developed and developing nations, including: (1) equity considerations due to the fact that the bulk of past greenhouse gas emissions...
emissions came from industrialized nations; (2) the cumulative releases of developing countries will not match those of developed nations for a long time; and (3) growth in emissions in developing countries results from meeting the basic needs of growing populations whereas the growth of emissions in developed countries contributes to already high standards of living.\footnote{158} Moreover, "developing countries are already doing a great deal to limit emissions—a fact largely overlooked in the current debate."\footnote{159} Despite the equity concerns that allowed the developing nations to avoid legally binding commitments for now, "by 2020, developing country emissions are projected to exceed those of industrialized countries. To prevent dangerous impacts from climate change, developing countries will eventually need to reduce the rate of growth and, ultimately, the level of their emissions."\footnote{160}

There are several examples of climate change mitigation activities that have already been implemented in developing nations:

1. Price Reform.

Between 1990-1991 and 1995-1996, total fossil fuel subsidies in 14 developing countries, accounting for 25\% of global carbon emissions from industrial sources, declined by 45\%, from $60 billion to about $33 billion (World Bank, 1997). (During this same period, OECD subsidies declined by 21\%, from $12 billion to $9.9 billion). Reduced subsidies lead to higher fuel prices and reduced rates of growth in consumption and carbon emissions.\footnote{161}

2. Promotion of energy efficiency and renewable energy. These activities, which decrease emissions through decreased reliance on fossil fuels, are being promoted in many developing countries. China, Mexico, India, and Brazil have all adopted specific programs to encourage the use of both renewable energy and energy efficient products.\footnote{162} Renewable energy, including hydropower and biomass, now accounts for 25\% of energy use in China, and in some rural areas the reliance on renewable power approaches 50

\footnote{158} See id. at 234-35.
\footnote{159} Id. at 235.
\footnote{160} Id. at 233.
\footnote{161} Id. at 235.
\footnote{162} See id.
percent.\textsuperscript{163} In India, wind generation capability increased from 39 megawatts to 820 megawatts between 1992 and 1996.\textsuperscript{164} The government of India encourages the use of renewable forms of energy through tax incentives.\textsuperscript{165} In Mexico, voluntary programs have been launched between government and industry to encourage energy conservation.\textsuperscript{166} The Brazilian government has been able to reduce its automobile fossil fuel consumption by one-half through an aggressive program to use ethanol from sugar cane to fuel automobiles.\textsuperscript{167} Ethanol is a renewable resource, and this program has reduced Brazil’s total emissions from fossil fuels by 15 percent.\textsuperscript{168}

The greenhouse gas reduction programs implemented by developing countries were not adopted as a result of domestic climate mitigation projects.\textsuperscript{169} Emission reductions have been “a side benefit of policy changes and projects designed to meet national economic, social, and public health needs.”\textsuperscript{170} These projects were initiated in response to energy shortages and public health problems due to air pollution.\textsuperscript{171} Side benefits also are encouraging developed nations to reduce greenhouse gas emissions. Only two Annex I countries, the United Kingdom and Germany, are likely to meet the FCCC’s goal of returning to 1990 emissions levels by the year 2000; this is largely due to factors not related to the mitigation of climate change.\textsuperscript{172} Two-thirds of the emissions reductions expected by 2000 in the United Kingdom will result from the replacement of coal-fired plants with more energy efficient fuel methods. Germany’s reductions will result primarily from the switch from coal to natural gas following unification with the former East Germany.\textsuperscript{173}

Many industrialized parties were disappointed by the protocol’s failure to include new commitments for developing parties. The voluntary commitments, which encourage all parties to promote sustainable development by mitigating climate change, are not strong enough to allay the fears of developed nations like the United States. Opponents of the protocol have

\textsuperscript{164} See id.
\textsuperscript{165} See Reid & Goldemberg, supra note 61, at 235.
\textsuperscript{166} See id.
\textsuperscript{167} See id.
\textsuperscript{168} See id. at 236.
\textsuperscript{169} See id.
\textsuperscript{170} Id. at 236.
\textsuperscript{171} See id.
\textsuperscript{172} See id.
\textsuperscript{173} See id.
expressed several fears. These include the fear that developing nations will have no incentive to comply with the voluntary commitments and the fear that many industries will relocate to developing nations rather than comply with the reduction requirements of the developed nations.\textsuperscript{174} Advocates of the protocol point to the activities mentioned above that demonstrate the developing world’s commitment to climate change mitigation.\textsuperscript{175} To achieve a compromise acceptable to all parties, the parties should accept legally binding commitments that recognize differentiated levels of responsibility.

\textbf{D. Subsequent Negotiations of the Conference of the Parties}

Officials representing 180 governments met in Buenos Aires from November 2-13, 1998, to negotiate the details for reaching the reduction targets of the Kyoto Protocol.\textsuperscript{176} The convention’s Executive Secretary Michael Zammit Cutajar noted that defining the details of the protocol’s three primary mechanisms was important because it would affect the economic costs of emission reductions and the role of both developed and developing nations in meeting future commitments.\textsuperscript{177} Implementation of the mechanisms has been controversial because of the concern that some nations will be able to meet their targets with little effort and will then be able to sell large quantities of emissions credits to industrialized countries.\textsuperscript{178} Some parties believe that placing limits on the amount of credits countries are allowed to buy and sell will ensure that no country is able to buy its way out of the commitments and that each country is forced to make domestic cuts in emissions.\textsuperscript{179}

The negotiations at Buenos Aires did not result in specific rules for implementation of the Kyoto Protocol, but the parties were able to agree on a two-year Plan of Action.\textsuperscript{180} The Plan of Action accelerates the goals of the FCCC and establishes a work schedule for the parties to finalize the remaining details of the protocol. The parties’ goal is for the plan to make the Kyoto Protocol fully operational by 2001.\textsuperscript{181} The parties intensely debated mechanisms of implementation, and the resulting plan addresses several issues that must be considered to ensure that the mechanisms are effective. These issues

\textsuperscript{174} See \textit{generally id.} at 234 (discussing industry and political concerns about the protocol).
\textsuperscript{175} See \textit{id.}
\textsuperscript{176} See \textit{Buenos Aires 1998, supra} note 163.
\textsuperscript{177} See \textit{id.}
\textsuperscript{178} See \textit{id.}
\textsuperscript{179} See \textit{id.}
\textsuperscript{180} See \textit{id.}
\textsuperscript{181} See \textit{id.}
include: "the nature and scope of the mechanisms, criteria for project eligibility, compatibility with sustainable development, auditing and verification criteria, institutional roles, principles and guidelines, and so forth."

The issue of future commitments of developing countries was not formally on the agenda at COP-4, but the host government of Argentina requested that the topic of voluntary commitments be discussed. President Menem of Argentina addressed the participants and expressed his country's intention to voluntarily adopt a limitation target for the 2008 to 2012 period. The country of Kazakhstan also expressed its intention to join the Annex I countries and accept a legally binding target. Voluntary commitments from these developing nations could encourage other developing nations to follow their example. Voluntary commitments may also reassure industrialized nations that they will not bear sole responsibility for mitigating climate change.

The Kyoto Protocol received the signature of the United States during the Buenos Aires conference on November 12, 1998. While the world was watching, the United States became the sixtieth country to sign the protocol. Although the protocol has been signed by more than the required minimum number of nations, it has not been ratified by the required percentage of nations. In addition to the United States, there are many countries that have signed but not ratified the Kyoto Protocol. The United States signing of the Kyoto Protocol is important internationally because the world looks to the United States for leadership, and many countries would not take action without some indication that the United States would also be committed to the Kyoto agreement. However, it will be difficult to obtain ratification in the United States due to the Byrd-Hagel Resolution.

The fifth Conference of the Parties was held in Bonn, Germany, between October 25 and November 5, 1999. The goal of this meeting was to define rules for the three implementation mechanisms and establish consequences for failure to meet the emissions targets of the protocol. The delegates finished their work earlier than expected, and the parties seemed optimistic that they

183 See id.
184 See id.
are on target to fulfill the goals of the Buenos Aires Plan of Action by the conclusion of the sixth Conference of the Parties.186

E. National and International Alternatives to the Kyoto Protocol

The Clinton Administration and United States industries have implemented many programs that will help reduce the emissions of greenhouse gases and mitigate climate change. Many of these programs were not implemented as a response to the threat of global warming but were chosen instead for economic reasons. Research and development programs aimed at increased energy efficiency have led to cost savings for industries and consumers in addition to yielding reduced emissions. Without a binding international agreement, governments and industries may pursue climate mitigating programs for various reasons, but the question is whether these efforts alone will be enough to decrease the risks of climate change. Opponents of the Kyoto Protocol argue that the individual efforts of nations and industries will be the most cost-efficient approach. However, the overwhelming balance of evidence indicates that an organized global response is necessary to seriously address the risks of global climate change. Although the costs of compliance with the Kyoto Protocol may be higher in the short-term, the long-term outlook favors an immediate international response. Following the precautionary principle of international law gives the countries of the world a unique opportunity to come together and take careful action to benefit all mankind. Regardless of the atmospheric changes, the global climate of politics and communications is changing, and an international law that reflects these changes seems the best approach to solving global problems such as climate change.

A realistic alternative to the Kyoto Protocol has not been proposed. The choice is either to ignore the risks or to acknowledge the efforts of years of scientific study and political negotiations. Countries should accept the protocol as a work in progress. It is part of the FCCC, and it will continue to evolve as the COP continues to meet and evaluate the global climate situation. As the parties further negotiate, it is possible that the protocol may be revised into a document that is acceptable to a majority of the conference parties.

186 See United Nations Framework Convention on Climate Change, Press Release: Ministers Pledge to Finalize Climate Agreement by November 2000 (visited Apr. 10, 2000) <http://cop5.unfccc.de/media/cop5pressf.html>. At the time of COP-5, the Kyoto Protocol had been signed by 84 parties including the European Community. The protocol has been ratified by 14 parties, all of which represent developing nations. COP-6 will be held at The Hague, Netherlands, from November 13-24, 2000. See Global Consensus, supra note 185.
IV. CONCLUSION: THE UNITED STATES SHOULD ADOPT THE KYOTO PROTOCOL

There are two dangers which lawmakers must avoid: the first is paying too little attention to the possibility of global warming; the second is treating the concern with global warming as a fad and developing superficial responses in the interest of political expediency rather than from a basis in careful consideration of the impacts.\textsuperscript{187}

To avoid these dangers, Botkin describes two classes of legal options: "those directed at eliminating the causes of global warming, and those aimed at mitigating the effects of global warming."\textsuperscript{188}

The United States and the rest of the international community should take steps to pursue both classes of legal options. The Kyoto Protocol is not a complete solution, but it does take steps to eliminate the causes of global warming and to mitigate the effects of the phenomenon. Although the costs of implementing the protocol cannot be accurately calculated until the methods of compliance are ascertained, the United States should adopt the protocol. The Kyoto Protocol was not intended to be a final resolution to the problem of global climate change, but merely part of a larger, evolving agreement that began with the FCCC. Members of the United States Senate have valid concerns about adopting a treaty that lacks enforcement mechanisms and other important elements. However, the nations of the world will not move forward to improve the agreement if the United States does not show a willingness to compromise and accept responsibility for its contributions to the global climate change problem. In the long run, the costs of the protocol are not likely to be significant compared to the costs of ignoring the risks. Throughout history, people have been able to efficiently adapt to changes in technology and availability of resources. It is reasonable that the United States and the entire world will be able to do so now.

The Kyoto Protocol is not a perfect agreement. Its weaknesses include uncertainty in compliance, monitoring, and enforcement measures. These weaknesses are not incurable, and they should not be significant enough for the United States Senate to refuse to ratify the agreement. Representatives from the United States and the rest of the world have worked long and hard to produce an agreement that involves the efforts of all nations and recognizes a

\textsuperscript{187} Botkin, \textit{supra} note 7, at 139-40.
\textsuperscript{188} \textit{Id.}
differentiated responsibility among nations. The United States needs to recognize its role as a world leader and accept responsibility for the contributions it has made to the increased atmospheric concentration of greenhouse gases.

Understandably, the United States is concerned about the role of developing nations in the mitigation of climate change, but the United States should not refuse to take action until the developing nations have agreed to legally binding commitments. Instead, the United States should provide leadership by example and should continue to actively promote the involvement of developing nations in the mitigation of climate change. The protocol's flexible mechanisms will allow the United States to reduce its greenhouse gas emissions through cooperative international efforts. Compliance with the protocol will result in costs and benefits, but the economic stability of the United States will not be threatened by our compliance with the protocol. Some scientists and environmentalists question whether the protocol is strong enough to mitigate climate change, and they believe that anything less than compliance may not secure our future stability.

The Kyoto Protocol is a good foundation from which to build a strong agreement. There are several steps that should be taken to make the agreement stronger. First, the industrialized nations must secure the commitments of developing nations. Although fairness and equity concerns argue against forcing developing nations to reduce emissions at the cost of economic growth, some compromise should be reached that allows developing nations to promote sustainable growth. This would appease the United States and other developed nations by assuring them that their efforts would not be futile and their industries would not relocate to developing nations. Although it is argued that the lack of developing country participation will not have a significant impact on United States competitiveness, it is still necessary for developing countries to commit to emissions controls because they will become the largest source of greenhouse gas emissions in the near future. See Reid & Goldemberg, supra note 61, at 233. Professor Robert Stavins said that four developing countries need to accept emissions controls: China, Brazil, India, and South Korea. If these countries do not accept emissions controls, energy intensive industries are likely to shift to the developing world and this will increase the costs of future emissions controls in developing countries. See Climate Change: Kyoto Protocol Flawed but Fixable, Harvard University Professor Tells Briefing, 21 INT’L ENV’T REP. (BNA) 202 (Mar. 4, 1998).

Second, the parties to the protocol need to commit to the Plan of Action adopted in Buenos Aires. The details of emissions trading, joint implementation, and the Clean Development Mechanism will be finalized under the plan, and this will allow parties to move forward and develop efficient programs for
reaching their targets. The parties also need to finalize the procedures for handling noncompliance. The procedures should be strong enough to discourage noncompliance yet flexible enough to encourage parties that the protocol is a reasonable agreement.

The Kyoto Protocol is the product of a remarkable international effort. It calls for sacrifices and compromises from all the parties involved. The United States may not be completely satisfied with the agreement at this time, but the costs of mitigating climate change are certain to be less today than they will be in the future, and the United States is not the only nation being called to make important decisions and tough sacrifices. In the words of Representative Hamilton,

Finally, the Kyoto Protocol is historic and important—but it is only a first step. In the United States, the debate over global warming has really just begun. This must be seen as an initial and partial agreement, which will begin many years of international negotiations. With sustained and committed leadership, this treaty can evolve into a significant international agreement that commits the nations of the world to action to safeguard the future of the planet. Reducing emissions will protect against unpleasant environmental surprises. The pressing question is how much should we sacrifice now to buy insurance against unknown future threats. To do nothing would be irresponsible, but to sacrifice our economic vitality would be a high price to pay, and the benefits are uncertain. . . . There is no reason to rush or panic, but gradual steps now to reduce reliance on fossil fuels could prevent disruptive climate change later—change that could severely damage the economies of the world. If we do not get this right, our grandchildren will not—and should not—forgive us.  

APPENDIX A: ANNEX I TO THE FCCC\textsuperscript{191}

The industrialized countries listed in this annex to the convention are trying to return their greenhouse gas emissions to 1990 levels by the year 2000 as per article 4.2(a) and (b). They also have accepted emission targets for the period 2008-12 as per article 3 and annex B of the Kyoto Protocol. They include the following countries: Australia, Austria, Belgium, Bulgaria, Canada, Croatia, the Czech Republic, Denmark, Estonia, the European Community, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, the Netherlands, New Zealand, Norway, Poland, Portugal, Romania, the Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, the Ukraine, the United Kingdom of Great Britain and Northern Ireland, and the United States of America.

APPENDIX B: ANNEX B TO THE KYOTO PROTOCOL\textsuperscript{192}

This annex lists the negotiated emissions targets for the Annex I countries.

<table>
<thead>
<tr>
<th>PARTY</th>
<th>QUANTIFIED EMISSION LIMITATION OR REDUCTION COMMITMENT (percentage of base year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>108</td>
</tr>
<tr>
<td>Austria</td>
<td>92</td>
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<tr>
<td>Belgium</td>
<td>92</td>
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<tr>
<td>Bulgaria</td>
<td>92</td>
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<tr>
<td>Canada</td>
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<td>Croatia</td>
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<td>Czech Republic</td>
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<td>Denmark</td>
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<tr>
<td>Estonia</td>
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<tr>
<td>European Community</td>
<td>92</td>
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<td>Finland</td>
<td>92</td>
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<tr>
<td>Germany</td>
<td>92</td>
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<td>Greece</td>
<td>92</td>
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<tr>
<td>Hungary</td>
<td>94</td>
</tr>
<tr>
<td>Iceland</td>
<td>110</td>
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\textsuperscript{191} FCCC, \textit{supra} note 41, Annex I.
\textsuperscript{192} Kyoto Protocol, \textit{supra} note 67, Annex B.
<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
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<tr>
<td>Italy</td>
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<tr>
<td>Japan</td>
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<td>Russian Federation</td>
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<td>Ukraine</td>
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<tr>
<td>United Kingdom of Great Britain and Northern Ireland</td>
<td>92</td>
</tr>
<tr>
<td>United States of America</td>
<td>93</td>
</tr>
</tbody>
</table>

The economies in transition include Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia, and the Ukraine. Under article three of the Kyoto Protocol, these parties may be able to use a base year other than 1990 or 1995.

**APPENDIX C: ANNEX II TO THE FCCC¹⁹³**

The rich countries listed in this annex to the convention have a special obligation to help developing countries with financial and technological resources. They include the following countries: Australia, Austria, Belgium, Canada, Denmark, the European Economic Community, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, the United Kingdom of Great Britain and Northern Ireland, and the United States of America.

¹⁹³ FCCC, supra note 41, Annex II.
New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom of Great Britain and Northern Ireland, and the United States of America.